Encyclopedia of Cleanrooms

Desiccator / Cleanroom Storage Systems

Modular Cleanrooms & Accessories

Cleanroom Work Stations, Wet Benches

Glove Boxes & Hoods

Gowning Room Products

Note: Some products have been modified or discontinued since publication; contact Terra for current specifications and availability.

TERRA UNIVERSAL.COM
Critical Environment Solutions

For over 40 years, Terra Universal has manufactured innovative solutions for the critical environment industry. During that time, Terra's catalogs have served as a comprehensive resource for the cleanroom market. From product information to industry trends, case studies, test data and technical guidance, Terra's catalog is more than an advertising piece, it's an encyclopedia.

TERRA UNIVERSAL

Designer & Manufacturer of —

Desiccator / Cleanroom Storage Systems

Modular Cleanrooms & Accessories

Cleanroom Work Stations, Wet Benches

Glove Boxes & Hoods

Gowning Room Products

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4. Packing tracking number
5. Quantity, description of the items to be returned
6. Reason for return

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City	State / Province	Zip / Mail Code	Country	E-Mail	
Telephone (Include Country Code)	Fax (Include Country Code)			Local Rep (If Any)	

Ship-To Address				End User	
Ship-To Company / Organization				End User	Title
Address Line 1	Address Line 2			Telephone	Fax
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Telephone (Include Country Code)	Fax (Include Country Code)			Date Required	

FOB Ex Works Shipper's Dock	Ship Via (Carrier Or Method)	Ship Payment ❑ Prepay & Add ❑ Collect	Partial Shipments Ok? ❑ Yes ❑ No	Payment Terms Requested ❑ Credit Card ❑ Advance Pay ❑ Letter Of Credit ❑ Terms
Voltage ❑ 110 - 120 ❑ 220 - 240	Notes			Credit Card Info: Number _____ Name / Exp _____

Items To Be Quoted / Ordered – PRICES Will Be Confirmed Before Order Is Entered

Terra Part #	Page #	Item Description & Size (Describe Custom Features On Line Below Original Item)	Quantity
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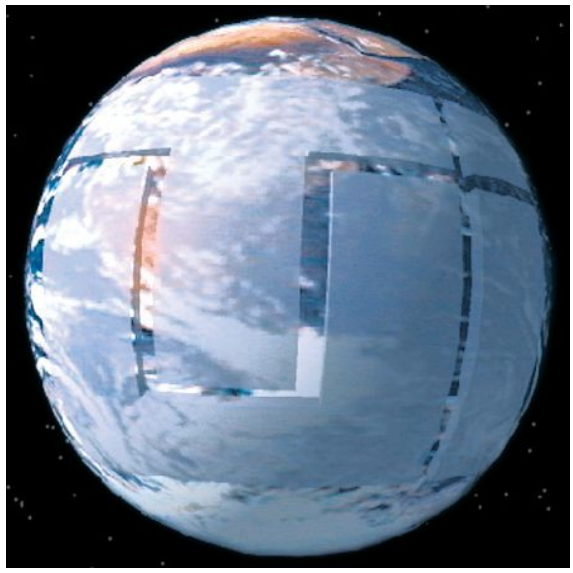

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FreeFlow™ 600 Laminar Flow Storage System

- Certified Class 1 storage environment for reticles, wafers and other parts
- Inventory Management Software tracks detailed information on thousands of parts

Page 37

ASD-600™ Drying System

Safe, controlled parts drying, with automated access controls

Page 36

ASD-600™ Low-Temperature Storage System

Cold storage (to -40°C) retards oxidation and chemical reactions

Page 50

Reticle Storage Shelves

HDPE-lined horizontal storage slots for secure reticle storage inside Terra's Automated Storage Systems

Page 54

FreeFlow™ 600 Laminar Flow Storage System

- Static-dissipative PVC front panels afford full parts visibility
- Small footprint conserves valuable cleanroom floor space

Page 58

Robotic Handling

Cleanroom-certified robotic transport systems, configured to your requirements!

Page 108

Faraccator™ Low-Humidity Storage System

Stainless steel Faraday cage ensures complete static shielding

Page 35

ASD-600™ Automated Low-Humidity Storage System

- Automatically maintains a low-humidity, particle-free environment
- Provides organized, high-volume, space-effective storage
- Extends product shelf lives
- Ideal for wafers, dies, pharmaceutical & biological samples

Page 102 ***Kiticcator™ Low-Humidity System***
Versatile desiccator is optimized for storing kitting trays

Page 80 ***SmartDesiccator™***
Integrated humidity controls cut nitrogen costs by up to 78%

Page 96 ***Portable Desiccators***
Available in many sizes and materials, including static-dissipative PVC

Page 84 ***NitroPlex™ Hand-Held Humidity Controller***
Remote control and datalogging of storage conditions in a Terra NitroPlex™ system

Page 82 ***NitroPlex™ Humidity Control System***
- Multiplexed humidity controller cuts N_2 costs up to 78%
- Automatically maintains separate humidity levels in each desiccator chamber

Page 122 ***Series 400 Stainless Steel Desiccator***
Ultra-clean storage environment, available in pass-through configurations

Page 86 ***Adjust-A-Shelf™ Desiccator***
- Extends shelf lives of stored materials
- Static-Dissipative PVC enhances static and particle control

Page 98 ***Tape-and-Reel™ Desiccator***
- Adjustable racks accommodate many sizes of carrier reels in one cabinet
- Protection against humidity, particles and static

Page 92 ***Wafer Box Desiccator***
Optimal storage for 150mm, 200mm and 300mm wafer lot boxes

Page 116 ***DesiCart™***
Keeps parts clean and dry during transit

Page 159 ***Chemical Storage Cabinet***
Electropolished stainless steel meets cleanroom requirements

Page 162 ***Quartzware Stocker***
Securely supports delicate quartz tubes

Page 164 ***Screen Frame Storage Cabinets***
Adjustable racks accommodate many frame sizes in a single, space-efficient cabinet

Page 176 ***PureFlow™ Laminar-Flow Transport Cart***
Mobile storage system maintains laminar flow of HEPA-filtered air during transit

Page 157 ***Stainless Steel Work-in-Process (WIP) Cabinet***
HEPA/ULPA filter/fan unit creates a Class 1 particle-free environment

Page 154 ***Curing/Drying Cabinet:***
Provides continuous wash of filtered air (HEPA or ULPA) for controlled adhesive curing, PC board drying and parts storage

Page 148 ***Reticle Storage Cabinet, Vertical Storage***
Filtered cabinet keeps reticles and photomasks clean

Page 149 ***Reticle Storage Cabinet, Horizontal Storage***
HDPE retaining slides for reticle positioning

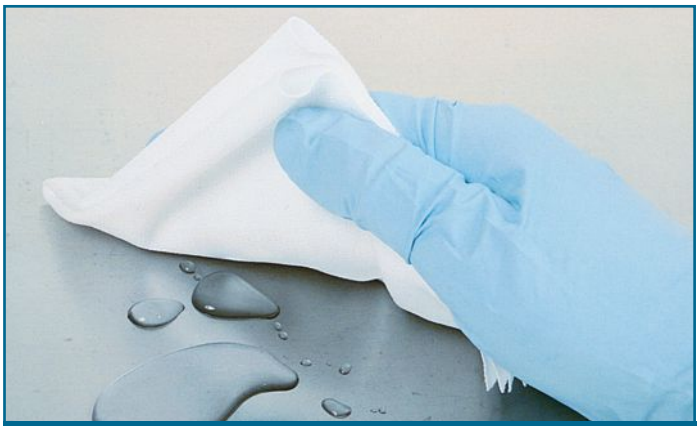
Page 149 ***Wafer Box Security Cabinet***
Secure work-in-process (WIP) storage inside the cleanroom

Page 202 ***Softwall Cleanrooms***
- An economical, versatile solution to clean manufacturing requirements
- Portable, expandable systems in a variety of softwall materials

Page 184 ***Cleanroom Shelving***
- Modular designs priced below the competition
- Super Adjustable shelving system simplifies shelf height adjustment

Page 200 ***Modular Hardwall Cleanrooms***
- Provide the rigidity and durability of a freestanding room
- Select static-dissipative PVC hardwall panels for optimal static and particle control
- Versatile HEPA/FILTER ceiling modules meet any cleanroom requirement
- On-site installation is usually completed in less than a day

Page 227 ***Cleanroom Waste Receptacles***
Safe, clean disposal of cleanroom waste



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Comprehensive lines to meet every application from Class 1 to Class 1,000 standards

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Electropolished adjustable benches and shelves leave floor unobstructed for operator comfort and easy cleaning

Page 215 ***Modular Cleanroom Pass-Throughs***
- Allow easy transfer of materials without contamination
- Available in many sizes to meet your requirements

Page 220 ***Fire-Rated Cleanroom Pass-Throughs***
Certified fire safe

Page 230 ***Electropolished Step Stools and Ladders***
A step up in cleanliness

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Communication without contamination!

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Securely supports monitor and saves floor space

Page 257 ***Cleanroom Garments***
Select between disposable or reusable designs

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Full line includes static-safe gloves and finger cots

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Branson quality at a surprisingly low price

Page 281 ***MicroVac™ Portable Cleanroom Vacuum Cleaner***
A portable ULPA-filtered vacuum for tight corners

Page 272 ***SnowBox™ Dry Ice Cleaning Station***
Safely removes contaminants while providing a dry, clean environment

Page 291 ***Cleanline® Sticky Mats®***
Enter the cleanroom and leave your particles at the door

Page 289 ***Sole Cleaner™ Automated Contamination-Control Mat***
- Automatically replaces sticky surface and removes soiled mat
- Guarantees effective sole cleaning without the need for monitoring or upkeep

Page 290 ***Motorized Shoe Cleaner***
Multi-brush system cleans all shoe surfaces

Page 297 ***PureDry™ Cleanroom Hand/Glove Dryer***
Provides warm, contamination-free air for drying hands and gloves, with industry-best low-noise level

Page 296 ***Hand and Glove Washing/Drying Station***
Incorporates washing and ULPA-filtered drying modules in one cleanroom-compatible station

Page 302 ***Cleanroom Wiper Dispenser***
Designed for single-sheet dispensing of wipers

Page 303 ***Wall-Mount Glove Dispenser***
Available in two designs and materials

Page 304 ***Small Parts Dispenser***
Four partitioned bins allow organized storage of finger cots and other small cleanroom items

Page 310 ***Cleanroom Garment and Supplies Storage Cabinet***
Available with HEPA filter/blower system, in several cabinet configurations

Page 309 ***Garment Storage Racks***
- UltraClean™ racks are available in many configurations
- Compatible electropolished hangers for any style rack

Page 324 ***UltraClean™ Work Stations***
QuietTop™ rods "float" in a non-outgassing elastomer that dampens noise and vibrations

Page 314 ***Class 1 Stainless Steel Gowning Benches***
- UltraClean™ benches are certified Class 1 compatible
- Optional bootie racks provide convenient storage slots

Page 323 ***UltraClean™ Work Stations***
OpenTop™ perforated benches preserve strength and laminar flow of air

Page 329 ***Accessories for Cleanroom Work Stations***
Include keyboard trays, bar code scanner holster, mounting feet, vacuum line fittings and more

Page 335 ***Modular Cleanroom Work Stations***
Combine performance, versatility and economy

Page 348 ***Vibration-Free Platform***
Converts any bench into a vibration-isolated work surface

Page 350 ***ErgoHeight™ Auto-Adjusting Cleanroom Work Stations***
Motorized lifters automatically raise, lower and level the work surface

Page 344 ***TLC Series Vibration-Free Work Stations***
Increases accuracy and throughput of high-resolution inspection
Motorized lifters automatically raise, lower and level the work surface

Page 354 ***Cleanroom Seating***
- Fully adjustable for optimal comfort and safety
- Wide range of materials for low-particle, static-sensitive applications

Page 394 ***Universal Hood***
Converts any work surface into a mini-cleanroom or exhaust purifier

Page 410 ***Horizontal Laminar Flow Station***
Advanced air-flow engineering ensures uniform flow of HEPA-filtered air

Page 418 ***Exhaust Fume Filter System***
Adjustable take-up arm is easy to position where you need it

Page 378 ***Environmental Control Modules*** Can be configured for any of three basic configurations:
• Horizontal or vertical laminar flow hood • Horizontal or vertical ductless fume hood
• Exhaust fume hood

Page 406 ***Vertical Laminar Flow Stations***
Combines state-of-the-art features with surprising economy

Page 432
Photoresist Deposition Glove Box
Provides a clean moisture-free environment for applying photoresist

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Nitrogen Generator
An economical, reliable source of clean, dry nitrogen

Page 461
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Minimize nitrogen loss and contamination inflow while parts are passed into and out of the glove box

Page 444
Pharmaceutical Powder Packaging Chamber
Allows safe handling and packaging of chemotherapy powders and other hazardous materials

Page 440
Carbon Monoxide Sensor Calibration Chamber
Allows potentially lethal CO gas to be fed into a large chamber at precise concentrations for sensor calibration

Page 443 ***Radioactive Material Handling Chamber***
Allows safe handling of radioactive materials used in medical applications

Page 489 ***Aluminum & Stainless Steel Vacuum Chambers***
Ideal for vacuum processing of large components and assemblies

Page 452 ***Series 200 Glove Box***
Designed for negative-pressure applications

Page 458 ***Series 400 Stainless Steel Glove Box***
A versatile, inert-gas processing environment, available with a vacuum antechamber

Page 465 ***High-Performance Pass-Through Vacuum/Nitrogen Oven***
Allows efficient high-temperature and vacuum operation for heavy throughput

Page 494 ***Rotary Vane Vacuum Pumps***
Available in several vacuum capacities for cleanroom use

Page 496 ***Diaphragm Vacuum/ Pressure Pump***
Oil-less design for clean operation

Page 497 ***Panther Air Compressors***
Silent operation and 0.01 micron filter make it ideal for the cleanroom

Page 508 ***Class 100 Cleanroom Ovens***
Clean, safe heating to 250°C

Page 514 ***Precision Vacu-Sealer (Model 635)***
Designed specifically for cleanroom use

Page 503 ***Modular Vacuum/Nitrogen Pass-Through Oven***
Wide temperature and vacuum range at an affordable price

Page 518 ***Nesting Tote Boxes***
Available in conductive and static-dissipative HDPE for clean, static-safe applications

Page 540 ***Flammable Materials Cart***
Safe transport of flammable materials in tanks up to 5 gallons

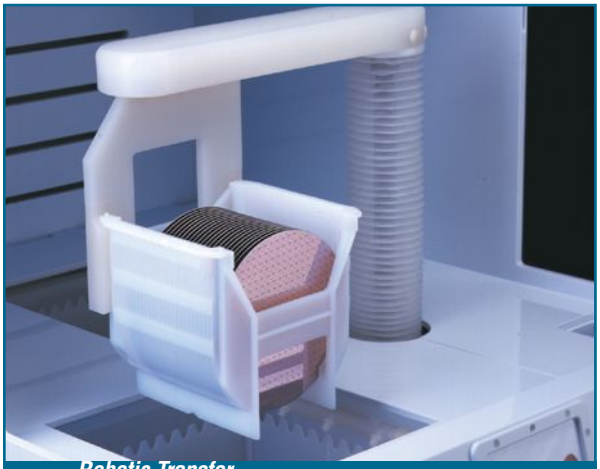
Page 527 ***Cleanroom Utility Carts***
Wide assortment of sizes, shelf materials, and configurations

Page 532 ***IPA Wetting Cart***
For a convenient supply of pre-wetted wipers

Page 526 ***Wafer Box Carts***
Electropolished stainless steel carts feature spring-loaded casters for a cushioned ride

Page 542 ***Chemical Transport Carts***
Safe, convenient transport of acids and other hazardous chemicals

Page 533 ***Wafer Box DesiCart™***
Clean, low-humidity environment for transport of delicate parts



Page 563 ***Robotic Transfer***
Precise, clean, consistent parts transfer, configured to your application

Page 553 ***Versatile Deck Configurations***
Single or double-row tank arrangements to meet space and process requirements

Page 549 ***Wet Cleaning & Processing Cabinets***
Incorporates all processing components into one self-contained, easy-to-clean system

Page 550 ***Modular Wet Cleaning & Processing Station***
• Accepts wide range of processing tanks and baths • Let Terra design a turnkey system to your specifications

Page 559 ***DR Series Dump Rinser***
The right way to rinse—requires less DI water and less DI water disposal

Page 564 ***Remote Control Hot Plates***
Ceramic-coated steel top plate combines chemical resistance and physical strength

Page 565 ***Solvent Spray Booth***
Ideal for corrosive or flammable liquids

Page 567 ***Enclosed Safety Shower***
Provides full-body shower and eye wash while protecting lab against water and chemical splashes

Page 571 ***Polyethylene Acid Storage Cabinets***
One-piece molded polyethylene body provides the maximum protection against chemicals and leaks

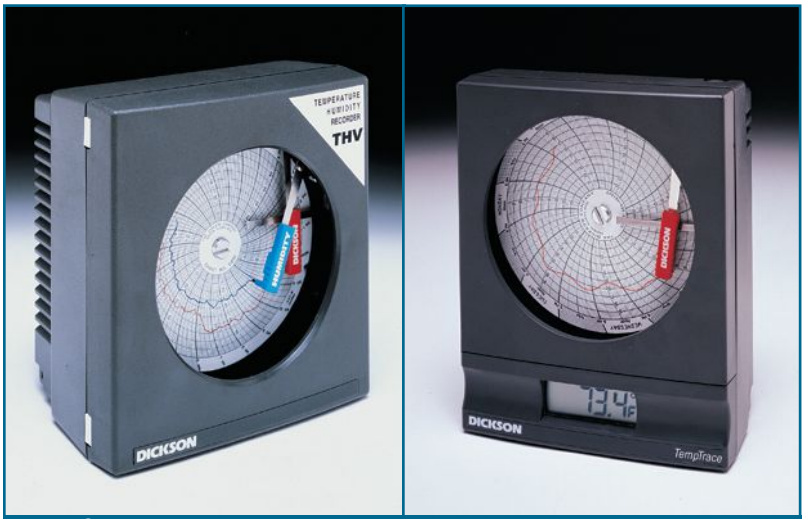
Page 572 ***Toxic Gas Detector System***
Complete, easy-to-use sampling and analysis system

Page 574 ***Oxygen Deficiency Monitors***
Ideal for use around nitrogen-purged desiccators and other process gases that could deplete oxygen levels

Page 578 ***Laser Particle Counters***
Portable and benchtop designs, with sensitivity down to 0.1 micron

Page 592 ***Gun-Style Infrared Thermometer***
Non-contact IR temperature sensing won't disturb delicate samples

Page 582 ***CompuFlow® ThermoAnemometer Kit***
Measures velocity, volume, temperature and humidity without changing probes

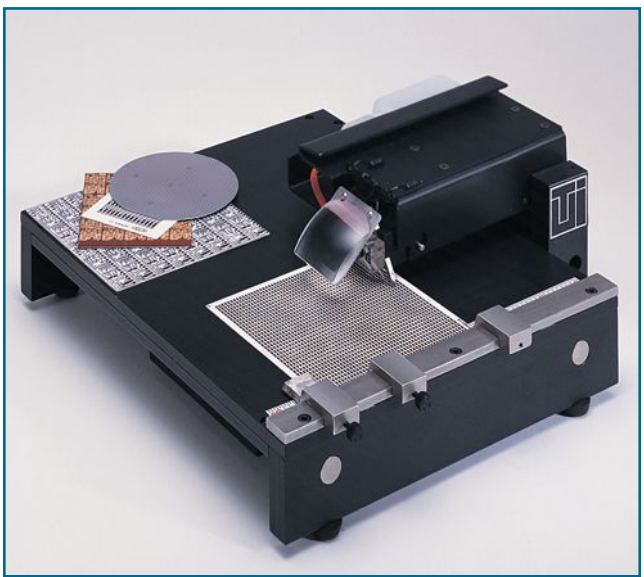


Page 590 ***Chart Recorders***
Self-contained easy-to-use recorders provide a permanent record of temperature and humidity conditions

Page 604 ***Conductive Wrist Straps***
Vital ESD protection

Page 599 ***Ionizing Blowers***
Intrinsically balanced ion emission for safe, reliable static control

Page 630 ***Wire-Bond Strength Tester***
Cost-effective, on-line destructive and nondestructive testing



Page 632 ***Adjustable Diamond Scriber***
Effective on a variety of substrates

Page 602 ***Cleanroom Ionizing Air Gun***
Safely neutralizes surfaces with pinpoint accuracy

Page 612 ***Precision Tweezers***
Ultra-high precision line with specialized processing tools

Page 623 ***Wafer Grip Tweezers***
A full line of tweezers with a wide range of applications

Automated Storage & Retrieval Syst

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Low-Temperature ASD-600™ 66

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Terra Advanced Storage/Retrieval Systems

Terra Universal Automated Storage/Retrieval Systems — *Critical Storage Solutions for Every Requirement*

Environmental Controls

- Class 1 Cleanroom Certified
- Constant Low-Humidity (to 0% RH)
- Static Neutralization
- Low-Temperature, Energy-Efficient Storage (to -40°C)
- Controlled Drying at High-Temperature, Low %RH
- Documentation of Environmental Conditions

Inventory Management

- Automated or Manual WIP Controls
- User-Configurable Inventory Software
- SECS/GEM Compliance
- Intuitive, Easy-Operate GUI Interface
- Datalogging Capabilities
- Industry-Standard Bar Code Readers
- Interface to In-House Inventory Management Network
- Automated Pick List Queuing
- Pick-and-Place Inventory Control
- Optional Robotic Interface
- Centralized Control of Multiple Machines

Safety Features

For the Operator—

- Safety Light Curtain
- Ergonomic Pick Window
- Operation Lock-Outs
- Emergency EMO (Stop) Button

For the Product—

- Full-time Scanning IR Beams
- Product-Specific Shelves & Retaining Fixtures
- Low-Vibration Operation
- Heating/Cooling Cut-Outs

Access Security

- Password Controls
- ID Card Scanner
- Fingerprint, Iris, and other Personal ID Readers
- Documentation of Access History

Control Over:

Humidity

Static

Particles

Temperature

System Benefits

Higher Yields

By maintaining optimal storage conditions, Terra stockers extend shelf lives, reduce defects, and boost your bottom line!

Automated, documented control over particles, humidity and/or temperature conditions minimizes the statistical probability of contamination-related defects.

Expect increases in product yields—and profitability!

Space Efficiency

Increases production capacity without the need for expensive facility expansion or upgrade.

Automated stockers conserve valuable cleanroom floor space. Their small footprint and high-volume storage capacity—equivalent to that of dozens of standard WIP racks—make optimal use of your existing facility. Stockers can extend above false ceilings or behind cleanroom walls to use "dead" space. Pass-through models allow transfer of parts in and out of the cleanroom.

Increased Throughput

Speeds up parts retrieval, increases stocking accuracy, and virtually eliminates costly rework caused by wrong picks.

At the press of a PC-based touchscreen, Terra's Stocker brings the selected part to an access window for manual or robotic retrieval. The IR security scanning grid ensures that parts are returned correctly to their dedicated storage bays. Terra stockers integrate with centralized inventory networks and automated parts transfer systems.

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AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

Applications in Every Industry

Ordering information

FreeFlow 600™ Laminar-Flow System
— see page 34

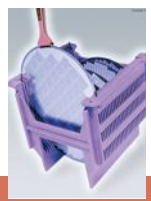
ASD-600™ Low-Humidity System
— see page 35

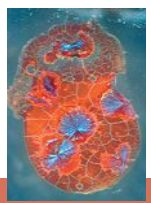
Low-Temperature ASD-600™
— see page 36

The following pages provide several sample applications for Terra's Automated Storage/Retrieval Systems, configured to meet unique requirements for particle counts, humidity, temperature, and other conditions.

These systems are ideal for a host of semiconductor, pharmaceutical, medical and biotech applications:

- Particle-Free Photomask/Reticle Storage
- Flat Panel Display Storage
- Low-Temperature PC Board Storage
- Low-Humidity Sensor or Critical Component Storage
- Particle-Free, Low-Humidity Diced Wafer Storage
- Wafer Box Drying
- Low-Temperature Blood/Plasma Storage
- Drying Chemical or Biological Samples
- DNA Sample Preservation





Ideal For: Reticles | Wafers | Blood & Plasma | Bio Samples | Pharmaceuticals ***And More . . .***

Operator/Product Safety

Each Automated Stocker is engineered for optimal protection of personnel and stored materials.

Specialized fixtures securely retain parts while maximizing storage capacity. The many system safety features, including an access window light curtain and full-time scanning IR beams, safeguard both product and operator. The ergonomically positioned access counter eliminates bending and reaching.

Low Operating Cost

Over 20 years of design and manufacturing innovations, coupled with the latest CAD/CAM/CNC equipment, result in the best MTBF/MTR rates in the industry.

Terra's low-maintenance systems offer reliability unsurpassed in controlled environment applications. Externally accessible plug-in control modules reduce repair times to less than one hour (in most cases) with no disruption of the internal storage environment.

WIP Inventory Control

Versatile, easy-to-use software lowers inventory costs, improves inventory control.

SECS/GEM-compliant software provides comprehensive, centralized inventory control for greater production efficiency. The intuitive graphical interface is easy to learn and operate by gloved operators. Capabilities include "real time" inventory updates for storage and processing locations throughout a manufacturing facility.

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Sample Applications: Laminar Flow Storage

Terra's FreeFlow 600™ Storage Systems employ a laminar-flow design. Installed beneath cleanroom ceiling filters or equipped with optional filter/fan units, they continuously wash stored parts with HEPA- or ULPA-filtered air to protect against particulate contamination.

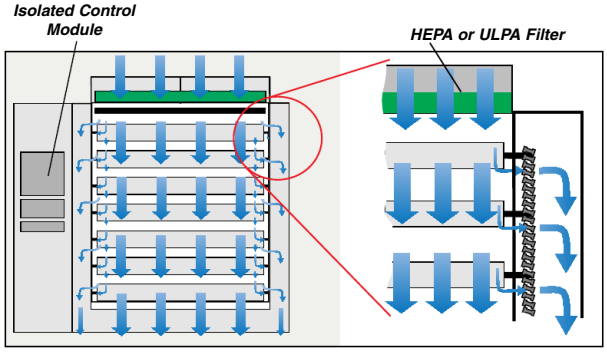
In the sample application below, a standard FreeFlow™ system was modified for horizontal reticle storage. Specialized slide-out reticle trays, featuring smooth, noncontaminating HDPE storage bays, hold reticles securely in position. The slide-out drawers can be fully extended to allow complete viewing of contents, and an ergonomically positioned stainless steel access counter provides a convenient staging area.

User-configurable software allows tracking of available reticle types, storage locations, and access history (input via bar code reader). Built-in laser particle counter monitors particle levels and outputs data to PC.

Model Shown
FreeFlow™ Reticle Stocker

- ***Vertical flow of particle-free air maintains Class 1 conditions.***
- ***Heights from 102" to 300" store & organize thousands of reticles.***
- ***Slide-out drawers for easy parts access.***
- ***Electropolished stainless steel and dissipative PVC for optimal particle control.***

Isolated drive mechanism and advanced airflow engineering ensure effective particle control. Terra FreeFlow™ systems have been independently certified to provide a Class 1 particle environment (per FED STD 209E).



Model shown: No. 2320-00

Ordering information begins on page 60.

Sample Applications: Low Humidity Storage

Terra ASD 600™ Storage Systems incorporate a humidity control system that automatically regulates a flow of clean, dry nitrogen to maintain any user-selected low relative humidity set point. An optional filtration module continuously recirculates the nitrogen through a HEPA filter to maintain low particle counts.

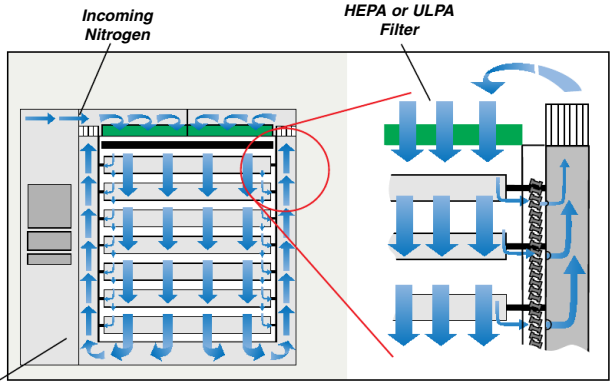
In the sample application below, an ASD™ system provides a clean, low-humidity environment for storage of moisture-sensitive microelectronic devices. Stainless steel and static-dissipative PVC construction contributes to clean operation and static control, and ionization modules provide additional ESD control. Automatic doors are specially configured for large storage tote boxes.

Terra's user-configurable software allows tracking of tote box contents, storage locations, and access history (input via personal ID badge reader). Built-in datalogger provides traceable history of humidity levels, particle counts, and user access.

Model Shown
Critical Components ASD-600™ Stocker

- ***Automatically maintains moisture level down to 5 PPM.***
- ***Extends product shelf life by retarding oxidation and other reactions that degrade parts.***
- ***HEPA/ULPA modules remove particles***
- ***Fail-safe pneumatic doors enhance security & simplify parts retrieval.***
- ***Datalogger provides traceable history of environmental conditions and operator access.***

Humidity control system regulates a nitrogen purge to maintain user-selected humidity level down to 0% RH. Motor and drive chain are isolated in a separate control module, and optional HEPA filter recirculates nitrogen for enhanced particle control.



Model shown: No. 2320-01

Ordering information begins on page 46.

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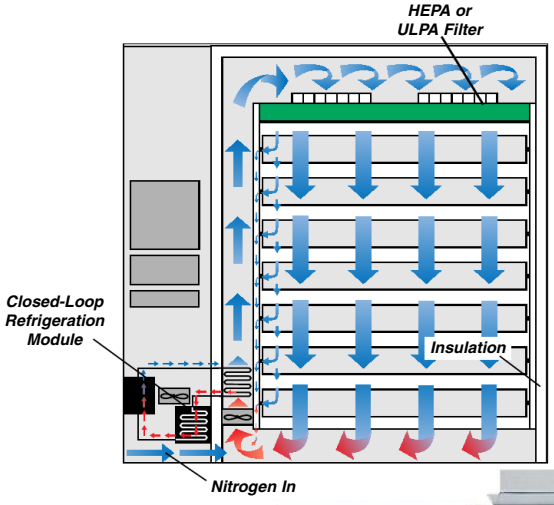
Sample Applications: Dry, Low-Temperature Storage

The closed-loop refrigeration system in Terra's Low-Temperature ASD-600™ provides another way to extend shelf lives and increase yields. It retards oxidation and other chemical reactions, and the nitrogen environment is dry and inherently frost-free.

In the sample application below, a Low-Temperature ASD™ system provides an inert storage environment for PC boards prior to surface mounting. By preventing oxidation, the system optimizes the solderability of the bonding pads, eliminating the need for costly re-prepping and increasing yields. A HEPA filtration module recirculates nitrogen for optimal contamination control, and user-configurable software records temperature and humidity data, as well as inventory and access information.

Model Shown
Low-Temperature Stocker

- *Maintains temperatures as low as -40˚C*
- *Retards oxidation and other chemical reactions*
- *Dry nitrogen provides an inherently frost-free environment for unrestricted visibility.*



Energy-efficient refrigeration module and high R-factor, fully encased polyurethane insulation ensure stable sub-freezing temperature. Motor and drive chain are isolated in a separate control module, and optional HEPA filter recirculates nitrogen for enhanced particle control.

Ordering information begins on page 66

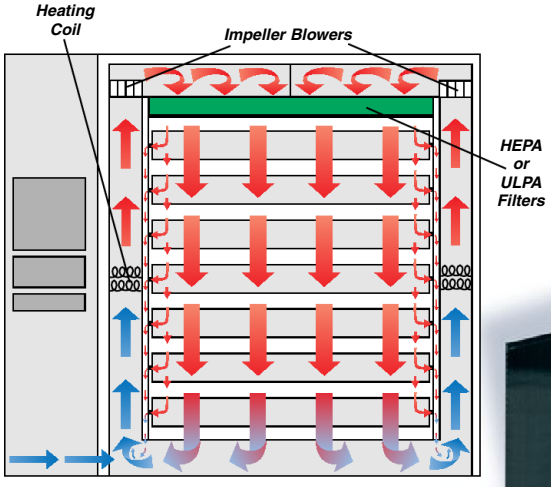
Sample Applications: Drying System

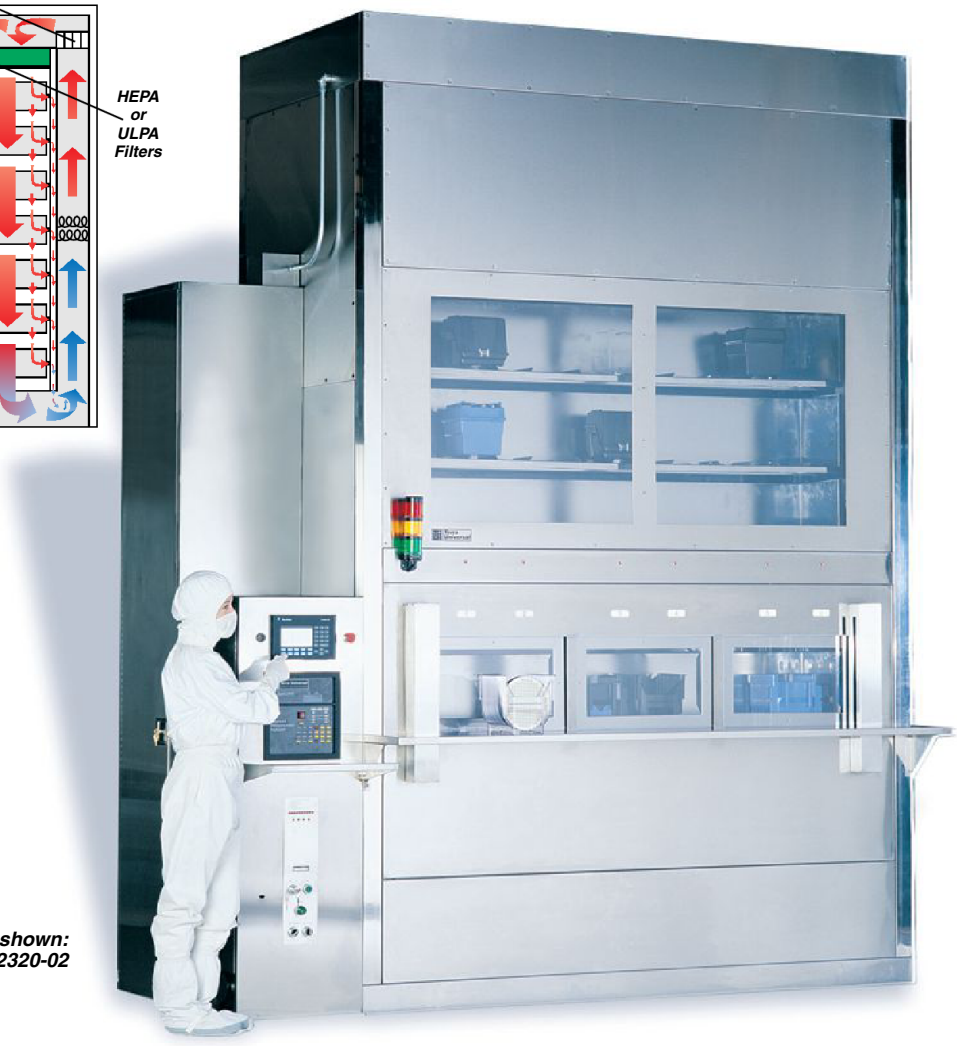
This Automatic Drying Stocker is another innovation of Terra's ASD-600™. It incorporates a recirculating module that forces clean, dry nitrogen through dual heating modules and HEPA filters to ensure temperature uniformity and particle removal.

In the sample application, the PLC controller and user-defined Inventory Management Software work in tandem to ensure safe, controlled batch drying of wafer lot boxes in an ultra-clean environment. When the operator wishes to retrieve a box, the system delivers the closest unit(s) that have completed the specified drying cycle; all others are locked-out until they have been completely dried. Visual indicators alert the operator of which locations contain "ready" product. Redundant over-temperature features ensure that heating ramp cycles do not cause thermal stress or exceed specified temperature of 120°F. The system maintains a relative humidity under 5% RH and Class 10 particle conditions (per FED STD 209E).

Model Shown
Wafer Drying System

- ***Eliminates costly, labor-intensive drying after cleaning operations.***
- ***Ideal for controlled drying of chemical samples.***
- ***Precisely controlled heating cycles ensure safe drying.***
- ***PLC controls deliver only parts that have completed drying cycle.***





Model shown: No. 2320-02

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Sample Applications: Multi-level Pass-Through

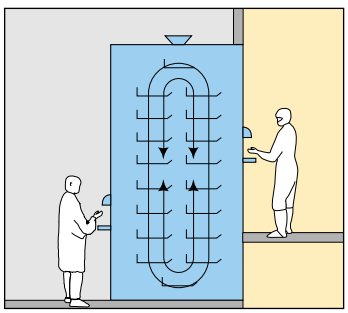
This Pass-Through configuration of Terra's FreeFlow™ 600 features opposing automatic access doors positioned at different heights to accommodate different floor levels inside and outside a cleanroom. Designed for installation in the cleanroom chase area, it allows parts to be passed into the cleanroom without cross contamination.

In the sample application, Terra designed a narrow version of the FreeFlow™ 600 for buffer storage of SMIF pods in a facility with restricted access space. The multi-story pass-through allows SMIF pod access from the elevated cleanroom floor level. Shelves are optimized for pod dimensions, and Terra's Inventory Management System is configured to datalog pod type and location. Electronic interlocks ensure that only one access door at a time can be open, thereby preventing cleanroom contamination. HEPA filter/fan units continuously wash stored parts with HEPA-filtered air to protect pods against particulate contamination, and ionizing bars provide ESD protection.

Model Shown

FreeFlow™ 600 Customized for SMIF Pod Buffer Storage

- ***Pass-through designs allow access from cleanroom or non-cleanroom sides***
- ***Dual-level access accommodates multiple floor levels***
- ***Electronic interlocks prevent cross contamination***
- ***Dimensions customized to suit available facility floorspace***
- ***Multi-story units provide high-volume capacity with small footprint (can protrude above drop ceilings)***
- ***HEPA filter/fan unit eliminates contamination***



Dual-level pass-through design allows access from different floor levels on the cleanroom and non-cleanroom sides. Isolated drive mechanism and HEPA filter/fan units ensure effective particle control.

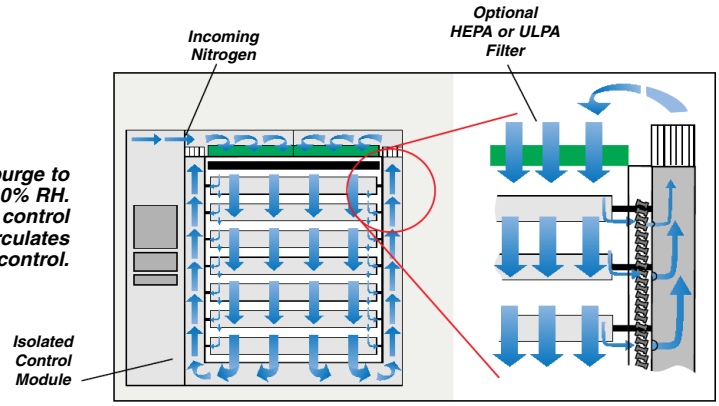
Model shown:
No. 2320-03

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

Auto-Strat™ Desiccators
+ASD-600™ Automated Storage/Retrieval Systems

- Sealed, particle-free, low-humidity environment extends shelf life of stored materials indefinitely
- Provides organized, high-volume storage of waffle packs, wafer boats, reticles, photomasks, IC tubes, solder preforms, and a host of other materials
- Automated conveyor system retrieves desired item at the push of a button for dramatically improved picking accuracy
- Automatic doors with nitrogen shield enhances security and contamination control
- Data recorder and optional particle counter provide documentation to meet stringent MIL-STD-1772A and other requirements
- Automatic nitrogen and humidity controls maintain internal humidity levels down to 0% RH
- Static-Dissipative PVC offers full visibility and eliminates particle attraction, keeps surfaces clean—inside and out
- Bar code option and computer interface deliver fully automated inventory management, improve picking time and accuracy
- Optional SECS/GEM-compliant software provides comprehensive, centralized inventory control for greater production efficiency
- Safety features ensure full access to parts in event of power failure, minimize possibility of injury or damage during all phases of operation
- Available in standard sizes from 7' to over 20' tall, with varying load capacities

Humidity control system regulates a nitrogen purge to maintain user-selected humidity level down to 0% RH. Motor and drive chain are isolated in a separate control module, and optional HEPA filter/fan module recirculates nitrogen for enhanced particle control.



Model Shown: ASD-600 (Cat. No. 2310-00) with optional nitrogen generator and air compressor

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

Tall models can extend through false ceilings

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AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

Mass Storage Doesn't Have to Mean Mass Confusion!

Terra's Auto-Strat™ Desiccator ASD-600™ automates high-volume storage of reticles, wafers, hybrids, waffle packs, PC boards and other sensitive materials without sacrificing any of the versatility and contamination-free security you expect from Terra Universal storage systems. Its human-engineered design ensures operator safety and convenience, and a full line of accessories lets you pick the system that's right for your application.

The ASD-600 features 102"-wide stainless steel storage shelves in three depths that hold up to 600 pounds each. Shelves can be electropolished for additional particulate control. Select solid or perforated designs, which feature perforations to facilitate vertical air flow through the storage area and to minimize particle retention. Models are available from 7' to over 20' tall, with up to 50 shelves, giving you all the storage capacity you need yet taking up minimal floor space. Select among nine shelf clearances between 10½" and 22½" high.

A Vertical Chain Conveyor is the prime mover of the ASD. Its motor and direct gear box deliver enough power to move the mechanized steel shelves while maintaining a safety margin to protect against overloading. At the touch of the selected control panel button, a microprocessor commands the power unit to deliver the selected shelf to the access area within the shortest possible elapsed time.

Clean, Practical Construction

Like our smaller desiccators, the ASD provides a 100% hermetically sealed environment to guarantee clean, dry storage. It meets Class 10 requirements.

All systems feature a completely modular, low-maintenance design. Nonadhesive seals guarantee clean day-to-day operation and allow the system to be accessed and serviced without destroying seal integrity. Such devices as the motor control module and the gas control module are externally mounted; their plug-in, plug-out design lets you maintain uninterrupted operation should servicing ever be required and eliminates the need to call in a skilled technician. And because some parts decay more quickly in an ultra-dry environment, Terra has selected only materials that stand up to the conditions in which they must perform. All drive mechanisms—even the lubricant!—are designed to provide long, trouble-free service and to operate without outgassing or otherwise contaminating the internal environment.

* Indicates system option

Model Shown: ASD-600 (Cat. No 2311-57)

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

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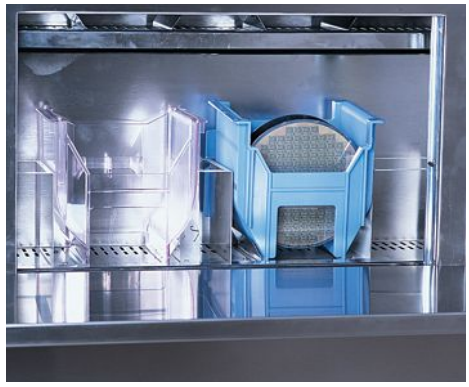
Angled fixtures securely hold standard reticle cassettes



Configurations for secure wafer cassette storage

Slide-out drawers with reticle trays hold cassettes of various sizes

A Controlled Environment for Increased Shelf Lives, Higher Yields

The flow of nitrogen or clean dry air maintains a continuous internal positive pressure that blocks out moisture and contaminants. The optional filter/recirculator module continuously recirculates the purge gas through a HEPA filter to remove any contaminants that might enter the storage area. A high-flow gas shower over the access area is automatically activated when a door is opened, and an additional high-flow internal purge activates when humidity levels climb above a humidity set point (adjustable down to 0% RH). The ASD systems are the only ones available that offer this completely automatic humidity monitoring and control. You simply set the desired relative humidity level, and the ASD regulates gas flow to maintain this level within 2% RH of the RH setting, no matter how ambient levels may vary.

This moisture protection eliminates the need for regular manual monitoring and offers your customers a guarantee of product integrity. The built-in, multi-track chart recorder provides hard documentation of storage conditions for completely traceable storage conditions (recorder can also document particle levels with selection of the optional Laser Particle Counter). Storage data can also be loaded into a computer for electronic storage and processing. What better evidence can you imagine to document optimal storage conditions in case of an audit? And what better accountability can you offer your customers?

Automatic Doors Simplify Access, Guarantee Security

The ASD-600 features automatic doors on a standard basis for enhanced security and more convenient access to stored parts. Door controls are conveniently located on the main panel of the control module. You bring the appropriate shelf to the access area and open the appropriate door with the push of a button.

These doors feature redundant safety features to protect both parts and personnel (see summary of safety features on page 45). Most importantly, they keep on working—they are rated for millions of operations without any need for servicing. Custom door sizes are available; contact Terra with your specifications.

Static-Dissipative PVC for Enhanced Contamination Control

All of Terra Universal's ASD systems come with static-dissipative PVC front panels for optimal visibility and cleanliness.

This revolutionary material offers a new alternative to standard methods of static and contamination control. Like acrylic, it is transparent, yet it also resists a wide range of chemicals and is nonflammable and noncontaminating. It features a surface resistivity of about 10^7 ohms/square, protecting stored parts against ESD-damage.

This dissipative property also aids in contamination control. By eliminating static charges, this material also helps to eliminate the particles they attract. As a result, surfaces remain clean—inside and out. (See page 596 for technical information on this material.)

Improved Picking Accuracy, Reduced Picking Time

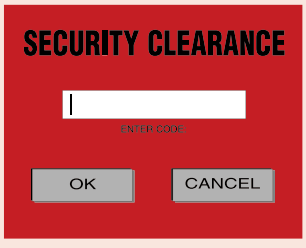
The ASD's superior organization of literally thousands of stored parts saves money in more ways than one.

By coding the system's shelves and removable storage trays to your inventory records, you can call up the exact part you need at the press of a button. The computer interface, which includes inventory management software, completely automates this process: keying in a part number immediately brings the desired component to the access area and simultaneously updates inventory records.

This process can be further simplified through the use of bar code equipment, which makes it easier than ever to keep track of the parts inside the ASD. It also eliminates the chance of the wrong part winding up in the wrong package!

Using a variety of industry-standard bar codes this equipment cuts picking and sorting costs up to 80%. Simply scan a label and the system does the work for you, from part retrieval to product tracking to inventory management.

Picking accuracies with the ASD-600 typically approach 100%, and picking times quickly fall, particularly if the system is computer-automated.



Hardware and Software Lock-Outs Protect Against Product or System Tampering

Terra offers several security options for ASD and FreeFlow Automated Storage/Retrieval Systems.

Using one of the options below, the system provides a traceable record of each inventory access, including the operator performing the action and time and date of access. The product tracking options, such as bar code scanners positioned above each storage bay, allow additional documentation of each part stocked or retrieved.

Security options include —

Password-Controlled Access Codes: Codes can be configured for any system that includes Terra's Inventory Management Software.

ID Badge Clearance: A bar code reader, using industry-standard codes, verifies ID badges or other security cards before allowing system access.

Fingerprint, Iris-Reader or other Personal ID System: Terra will configure ASD to verify unique personal traits, using fingerprint, eye (iris), voice, or other recognition system.

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

ASD-600™

Standard Features

Safety Features include microswitches on all front panels, independent EMO mechanical shut-off, infrared detector shut-off, light curtain, and automatic door shut-off, features that halt conveyor and/or door operation when danger is present, thereby preventing injury to personnel and damage to stored parts or system components.
See summary, page 45.

100% Hermetically Sealed Environment to guarantee economical contamination and moisture control.

Standard Sizes simplify ordering and speed up delivery.

Externally Isolated Control Module for enhanced safety and cleanliness.

Membrane Control Switches bring you the desired shelf to the access counter.

Automated Conveyor System retrieves the selected shelf at the press of a key.

Static-Dissipative PVC Front Panels eliminate static charges and the contamination they attract and ensure clean, transparent surfaces, inside and out.

Automatic Doors enhance security and reduce contamination risk. Three doors are standard; four-door designs are also available.

Nitrogen Shield blocks out contaminants while parts are being accessed.

Stainless Steel Access Counter runs the full length of the access area.

Wrist Strap Connectors are located at both ends of the access counter for easy grounding of wrist straps.

Automatic Nitrogen Control automatically maintains internal positive pressure with minimal nitrogen waste.

Automatic Humidity Control monitors and controls internal relative humidity level automatically by regulating the flow of nitrogen or clean dry air (CDA).

Dual Pressure Alarm activates audible and visible alarms if incoming gas line pressure rises above or falls below preset levels.

Particle Counter Interface allows easy connection of most particle counters without the need for system modification.

Chart Recorder documents humidity levels (and particle counts, if system incorporates the Particle Counter) on a continuous basis to provide completely traceable storage conditions.

Automatic Pressure Relief safely relieves overpressures and functions as a check valve.

Computer Interface is included to allow a single or multiple ASDs to be controlled by a remote PC.

Front and Side Access Panels allow easy access to the drive mechanism/storage area and visual inspection of all critical components.

Security Features include separate lock-outs for system power and for access doors to guard against unauthorized tampering or access.

Manual Conveyor Override Mechanism includes a clutch to allow safe movement of the conveyor mechanism (and full access to stored material) in the event of a power failure.

System Options

Shelving Configurations

Shelves come in solid or perforated stainless steel, or UltraClean™ Finish electropolished stainless steel. Reinforced design supports loads to 600 lbs. ***See page 49***

Stainless Steel Trays fit inside storage shelves for organized storage of components. ***See page 50***

Slide-Out Racks accommodate trays to provide fast, convenient access to every square inch of storage space. ***See page 50***

Stainless Steel Inlays and Dividers form adjustable storage bins inside trays for waffle packs and other small components. ***See page 50***

Tote Boxes are available in many sizes and materials. ***See page 50***

Specialized Parts Fixtures hold a wide range of commonly stored parts, including reticles, IC tubes, component carrier reels, tote boxes, and other materials. Just send Terra a sample.

Filter/Recirculator Module filters nitrogen or clean dry air inside the ASD through a Class 10 HEPA or ULPA filter for enhanced contamination control. ***See page 52***

Particle Counter displays particle counts inside the storage area; can be interfaced to chart recorder for complete environmental documentation. ***See page 52***

Nitrogen Generator provides a steady, economical, reliable supply of clean, dry nitrogen for the ASD and other controlled environments. ***See page 52***

Dryex™ Clean Air Dryer ensures a constant source of clean dry air (CDA) for the ASD and other controlled environments. ***See page 52***

Inventory Management Software (IMS) user-configurable software package that allows complete control over ASD operation, including automated inventory tracking and datalogging. ***See page 53***

Personal Identification Readers, including fingerprint and iris recognition systems, authorize access to optimize parts security. See previous page for more details.

PC uses the software package above to let you retrieve a part simply by punching in its number on a remote keyboard. ***See page 53***

Bar Code Reader speeds up sorting times (reducing the chance of contamination), automates product tracking, and simplifies inventory management. ***See page 53***

Ionizing Bars neutralize static charges and aid in contamination control. ***See page 52***

Spare Parts Kit includes motor control box, IR beam, relays, switches, roller arm assemblies, and other hardware necessary to maintain the ASD-600.

UltraClean™ Stainless Steel Finish is an electrochemical passivation process that removes subsurface contaminants from all stainless steel surfaces, leaving an ultra-clean, noncontaminating surface. Makes the ASD suitable for a Class 1 environment.

Inventory Management Software— Manual or Automated Inventory Tracking

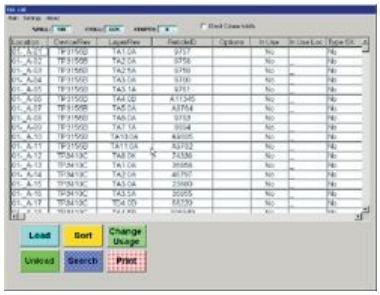
Standard system firmware controls shelf motion and access door operation. Terra's user-configurable Inventory Management Software expands system function by automating inventory management to fit your requirements.

Easy to Operate, User Configurable

The intuitive GUI interface is easy to configure to your application, and Terra's software engineers will customize a system to special requirements. Once configured, a series of system prompts guide the user through the various system functions, allowing inventory tracking, humidity or temperature datalogging, access reporting, and other tasks.

WIP Inventory Tracking

Data on stored parts are entered on a computer keyboard or by bar code reader. System software allows you to record as much information as necessary, including part quantity, location, intended use, process stage, and operator authorization codes. The system updates inventory records each time a part is stocked or retrieved. A SEARCH function allows an operator to locate all stored parts by specified search criteria.



User-configurable software lets you specify product records and stocking criteria to suit your application! See page 53 to order.

On an optional basis, the ASD-600™ can be configured to scan bar codes on parts loaded or unloaded and to verify correct stocking locations. Any time an operator attempts to load an item in a wrong position, the system issues a warning alarm and disables shelf operation. This product tracking capability guarantees that lot boxes are stored in their correct locations and ensures accurate inventory information.

SECS/GEM Compliant (optional)

Terra's software can be configured with all major industry communications protocols, and can be integrated into an existing Central Inventory Management System.

Datalogging

The system stores and analyzes data on humidity, temperature, and particle counts, as well as system access and inventory quantities and locations. Information can be stored, viewed and manipulated via an onboard or remote PC.

Automated Pick-List Queuing

Picking can be performed on a FIFO (first-in, first-out) or SORT (work queue ordered for fastest retrieval) basis. Additional inventory pick parameters can also be established, enabling the system to deliver items based on process stage, operator security clearance level, or other specified criteria.

Stocking (Tracking In)

Operator Action	System Response
Operator access authorization via ID badge, fingerprint, iris reader, or other ID system	*Operator given access to inventory controls*
Operator scans in product at bar code reader	*PLC screen assigns selected product an available storage location ("cell") and indicates position (Carousel No., Shelf No., Bin No., Tier No.). PLC prompts for additional inventory data: product type, use, or other user-defined parameters.*
Operator presses "go to" function key	*System brings selected shelf to the access area and deactivates corresponding security photobeams to allow access*
Operator places product on assigned storage bay and enters "store" function key	*System enters selected product under "Ready" status at selected location. Product is available for future retrieval.*

Typical Stocking Protocol

Optional Inventory Management Software is easy to configure to your needs. IMS complies with Semiconductor Equipment Communications Series (SECS) and General Equipment Model (GEM) protocol. See ordering information on page 53.

Retrieval (Tracking Out)

Operator Action	System Response
Operator access authorization via ID badge, fingerprint, iris reader, or other system	*Operator given access to inventory controls*
Operator scans in product ID no. from pick list or enters via keyboard	*PLC screen indicates storage location ("cell") for the selected product and indicates a status: Ready, InUse, or Reserved. If product has not been entered into inventory, system indicates NotFound.*
Operator presses "retrieve" function key	*System brings selected product to the access area and deactivates corresponding security photobeams to allow access*
- OR -	
Operator presses "reserve" function key	*System marks the selected product as "Reserved"*
Operator retrieves product from assigned storage bay and enters "InUse" function key	*System marks selected product as "InUse" in inventory.*
- OR -	
Operator retrieves product from assigned storage bay and enters "remove" function key	*System removes the selected product from inventory and marks selected storage bay as available for use.*

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

Specifications (see ordering charts beginning on next page)

Work Counter:	Standard stainless steel finish, grounded, with two grounded wrist strap connectors, fixed at standing position; 100"W x 13"D (ASD- 600) with 10" of usable counter depth
Power Requirements:	230VAC/60Hz, single phase and a dedicated 30 amp electrical supply line
Motor:	3 HP
Nitrogen Requirement:	2 incoming lines regulated at 90 psi each
Controls:	Touchscreen or membrane panel to control gas flow and shelf motion; includes keyed lock-out features to control access and shelf movement
Weight Capacity:	600 lbs./shelf; 25,000-lb. system maximum; heavy-duty solid and perforated stainless steel shelves.
Safety Features:	See summary side-bar, page 45
Installation:	System must be installed by a trained technician; requires level floor with adequate foundation

Humidity Indication:	
Display Type:	LED 4 digit
Accuracy (at 20° ambient):	± 2% of scale
Resolution:	± .1% RH
Temp. Dependence:	± .04% RH/°C
Humidity Control Range:	0 to 100% RH.
Humidity Sensor Type:	Capacitive Film, Fast Response

Rotary Strip-Chart Recorder
(Datalogger subsituted with selection of optional software)

Type:	Single analog recording channel
Writing Method:	Disposable fiber-tipped red ink cartridge, 3300 feet of trace minimum

ParticleWatch™ Option

Particle Size Range 1:	.5µm and larger
Selectable Range 2:	5µm and larger
Maximum Concentrations:	1 million particles/cubic foot
Light Source:	50mW laser diode
Flow Rate:	± 10% at 0.1 CFM

Emergency Stop Button

Manual Conveyor-Crank with Safety Clutch

Infrared Safety Beams and Safety Lock-Outs

Safety Features

Terra Universal Automated Storage Systems are engineered to operate safely and reliably under the most extreme conditions. Safety features include:

- **Stop/Reset Button:** Pressing this membrane switch immediately halts the conveyor mechanism.
- **Emergency EPO "Panic" Button:** Positioned prominently on the front control panel, this large red button functions as a "panic button" to let an operator stop shelf motion immediately.
- **Infrared Safety Beams:** Four "full time" infrared beams positioned inside the storage area continuously monitor the top and bottom of the access area and the top and bottom of the conveyor loop. If a part protrudes from a shelf, a beam is broken and shelf motion is stopped.
- **Photoelectric Light Curtain:** Once an access door is opened, this integrated array of infrared beams keeps it open for as long as a hand or other object penetrates the storage area.
- **Automatic Door Override:** A safety override prevents shelf motion as long as one of the automatic doors is open.
- **Breaker Switch:** A 30-amp breaker switch automatically trips to protect the motor if any of the shelves should become jammed.
- **Thermal Overload Switch:** The thermally protected motor automatically stops if excessive current draw threatens to burn it out.
- **Safety Fuses:** Two fuses provide additional electrical protection.
- **Dual Pressure Alarm:** Activates audible and visible alarms if incoming gas line pressure should fall below or exceed pre-set levels.
- **Emergency Gas Back-Up:** Provisions are made to ensure that pneumatic doors remain closed in the event of a gas supply cut-off. Includes brackets for mounting user-supplied nitrogen cylinder, along with all necessary tubing, fittings and controls. (**Note:** An oil-less air compressor may be substituted for nitrogen cylinder; contact Terra.)
- **Manual Conveyor Override Mechanism:** A safety clutch connected to a hand crank allows an operator to move system shelves in the event of a power failure—without risking injury.
- **Manual Conveyor Safety Shut-Off:** Operating the shelves manually (by means of the manual conveyor mechanism) automatically cuts off power to the automated conveyor system.

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

ASD-600™ Low-Humidity Storage/Retrieval System

Ordering Information

1. Select the shelf pitch (shelf clearance) and depth for your application. See ordering charts below and on pages 48 - 49 for the three available shelf depths and nine available shelf pitches (distance from the top of one shelf to the top of the adjacent shelf). For shelf clearance, subtract 1½" from the shelf pitch.

2. Select size and number of shelves. Keep in mind that tall systems can be installed in facilities with false ceilings to make use of every cubic foot of available space. Note: Standard systems use a 3 HP motor. A larger motor is required for systems with a net load of 1800 pounds or more.

3. Select shell material. Standard units are stainless steel. To specify electropolishing, add EP to the part number. See page 320 for more information on Terra's electropolishing procedures. Note: Standard ASD configuration features three access doors. Other configurations are available.

ASD-600™ for 24.5" deep shelves (order shelves separately on page 49)

10.5" Pitch*			12.0" Pitch*			13.5" Pitch*			15.0" Pitch*			16.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	108"	8	**2310-66**
—	—	—	—	—	—	108"	10	**2310-37**	114"	10	**2310-53**	126"	10	**2310-67**
102"	12	**2310-00**	108"	12	**2310-20**	120"	12	**2310-38**	132"	12	**2310-54**	138"	12	**2310-68**
108"	14	**2310-01**	120"	14	**2310-21**	132"	14	**2310-39**	144"	14	**2310-55**	156"	14	**2310-69**
120"	16	**2310-02**	132"	16	**2310-22**	144"	16	**2310-40**	162"	16	**2310-56**	174"	16	**2310-70**
132"	18	**2310-03**	144"	18	**2310-23**	162"	18	**2310-41**	174"	18	**2310-57**	192"	18	**2310-71**
144"	20	**2310-04**	156"	20	**2310-24**	174"	20	**2310-42**	192"	20	**2310-58**	204"	20	**2310-72**
150"	22	**2310-05**	168"	22	**2310-25**	186"	22	**2310-43**	204"	22	**2310-59**	222"	22	**2310-73**
162"	24	**2310-06**	180"	24	**2310-26**	198"	24	**2310-44**	222"	24	**2310-60**	240"	24	**2310-74**
174"	26	**2310-07**	192"	26	**2310-27**	216"	26	**2310-45**	234"	26	**2310-61**	258"	26	**2310-75**
186"	28	**2310-08**	204"	28	**2310-28**	228"	28	**2310-46**	252"	28	**2310-62**	270"	28	**2310-76**
192"	30	**2310-09**	216"	30	**2310-29**	234"	30	**2310-47**	264"	30	**2310-63**	288"	30	**2310-77**
204"	32	**2310-10**	228"	32	**2310-30**	252"	32	**2310-48**	282"	32	**2310-64**	—	—	—
216"	34	**2310-11**	240"	34	**2310-31**	270"	34	**2310-49**	294"	34	**2310-65**	—	—	—
228"	36	**2310-12**	252"	36	**2310-32**	282"	36	**2310-50**	—	—	—	—	—	—
234"	38	**2310-13**	264"	38	**2310-33**	294"	38	**2310-51**	—	—	—	—	—	—
246"	40	**2310-14**	276"	40	**2310-34**	—	—	—	—	—	—	—	—	—
258"	42	**2310-15**	288"	42	**2310-35**	—	—	—	—	—	—	—	—	—
270"	44	**2310-16**	306"	44	**2310-36**	—	—	—	—	—	—	—	—	—
276"	46	**2310-17**	—	—	—	—	—	—	—	—	—	—	—	—
288"	48	**2310-18**	—	—	—	—	—	—	—	—	—	—	—	—
300"	50	**2310-19**	—	—	—	—	—	—	—	—	—	—	—	—

ASD-600™ for 18.5" deep shelves (order shelves separately on page 49)

10.5" Pitch*			12.0" Pitch*			13.5" Pitch*			15.0" Pitch*			16.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	108"	8	**2311-86**
—	—	—	—	—	—	108"	10	**2311-57**	114"	10	**2311-73**	126"	10	**2311-87**
102"	12	**2311-20**	108"	12	**2311-40**	120"	12	**2311-58**	132"	12	**2311-74**	138"	12	**2311-88**
108"	14	**2311-21**	120"	14	**2311-41**	132"	14	**2311-59**	144"	14	**2311-75**	156"	14	**2311-89**
120"	16	**2311-22**	132"	16	**2311-42**	144"	16	**2311-60**	162"	16	**2311-76**	174"	16	**2311-90**
132"	18	**2311-23**	144"	18	**2311-43**	162"	18	**2311-61**	174"	18	**2311-77**	192"	18	**2311-91**
144"	20	**2311-24**	156"	20	**2311-44**	174"	20	**2311-62**	192"	20	**2311-78**	204"	20	**2311-92**
150"	22	**2311-25**	168"	22	**2311-45**	186"	22	**2311-63**	204"	22	**2311-79**	222"	22	**2311-93**
162"	24	**2311-26**	180"	24	**2311-46**	198"	24	**2311-64**	222"	24	**2311-80**	240"	24	**2311-94**
174"	26	**2311-27**	192"	26	**2311-47**	216"	26	**2311-65**	234"	26	**2311-81**	258"	26	**2311-95**
186"	28	**2311-28**	204"	28	**2311-48**	228"	28	**2311-66**	252"	28	**2311-82**	270"	28	**2311-96**
192"	30	**2311-29**	216"	30	**2311-49**	234"	30	**2311-67**	264"	30	**2311-83**	288"	30	**2311-97**
204"	32	**2311-30**	228"	32	**2311-50**	252"	32	**2311-68**	282"	32	**2311-84**	—	—	—
216"	34	**2311-31**	240"	34	**2311-51**	270"	34	**2311-69**	294"	34	**2311-85**	—	—	—
228"	36	**2311-32**	252"	36	**2311-52**	282"	36	**2311-70**	—	—	—	—	—	—
234"	38	**2311-33**	264"	38	**2311-53**	294"	38	**2311-71**	—	—	—	—	—	—
246"	40	**2311-34**	276"	40	**2311-54**	—	—	—	—	—	—	—	—	—
258"	42	**2311-35**	288"	42	**2311-55**	—	—	—	—	—	—	—	—	—
270"	44	**2311-36**	306"	44	**2311-56**	—	—	—	—	—	—	—	—	—
276"	46	**2311-37**	—	—	—	—	—	—	—	—	—	—	—	—
288"	48	**2311-38**	—	—	—	—	—	—	—	—	—	—	—	—
300"	50	**2311-39**	—	—	—	—	—	—	—	—	—	—	—	—

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

4. Select shelves on page 49. Solid and perforated designs are available in each pitch. See page 50 for information on sliding racks and other parts fixtures.

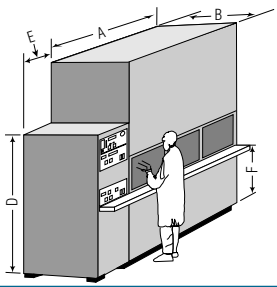
5. Select other system options on page 52, including a HEPA filtration module, Inventory Management Software, laser particle counter, nitrogen generator, ionizing equipment, and more!

FreeFlow™ 600 Laminar Flow Storage System. Ordering information begins on page 62.

Low-Temperature ASD-600™. Ordering information begins on page 69.

ASD-600™ for 24.5" deep shelves, cont'd. (order shelves separately on page 49)

18.0" Pitch*			19.5" Pitch*			21.0" Pitch*			22.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	108"	6	**2310-99**	114"	6	**2311-09**
114"	8	**2310-78**	120"	8	**2310-89**	132"	8	**2311-00**	138"	8	**2311-10**
132"	10	**2310-79**	144"	10	**2310-90**	150"	10	**2311-01**	162"	10	**2311-11**
150"	12	**2310-80**	162"	12	**2310-91**	174"	12	**2311-02**	180"	12	**2311-12**
168"	14	**2310-81**	180"	14	**2310-92**	192"	14	**2311-03**	204"	14	**2311-13**
186"	16	**2310-82**	198"	16	**2310-93**	216"	16	**2311-04**	228"	16	**2311-14**
204"	18	**2310-83**	222"	18	**2310-94**	234"	18	**2311-05**	252"	18	**2311-15**
222"	20	**2310-84**	240"	20	**2310-95**	258"	20	**2311-06**	270"	20	**2311-16**
240"	22	**2310-85**	258"	22	**2310-96**	276"	22	**2311-07**	294"	22	**2311-17**
258"	24	**2310-86**	276"	24	**2310-97**	300"	24	**2311-08**	—	—	—
276"	26	**2310-87**	300"	26	**2310-98**	—	—	—	—	—	—
294"	28	**2310-88**	—	—	—	—	—	—	—	—	—



**** Pitch is the distance from the top of the shelf to the top of an adjacent shelf. For shelf clearance, subtract 1.5" from the pitch indicated.***

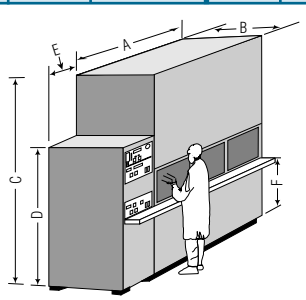
Nominal Dimensions (inch) for systems with 24.5" deep shelves

A	B	C	D	E	F
121	72	108-300	102	15	41

Custom sizes and configurations available!
Terra modifies Automated Storage/Retrieval Systems to your specs, including modifications to meet special access or footprint requirements (see page 39).

ASD-600™ for 18.5" deep shelves, cont'd. (order shelves separately on page 49)

18.0" Pitch*			19.5" Pitch*			21.0" Pitch*			22.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	108"	6	**2312-19**	114"	6	**2312-29**
114"	8	**2311-98**	120"	8	**2312-09**	132"	8	**2312-20**	138"	8	**2312-30**
132"	10	**2311-99**	144"	10	**2312-10**	150"	10	**2312-21**	162"	10	**2312-31**
150"	12	**2312-00**	162"	12	**2312-11**	174"	12	**2312-22**	180"	12	**2312-32**
168"	14	**2312-01**	180"	14	**2312-12**	192"	14	**2312-23**	204"	14	**2312-33**
186"	16	**2312-02**	198"	16	**2312-13**	216"	16	**2312-24**	228"	16	**2312-34**
204"	18	**2312-03**	222"	18	**2312-14**	234"	18	**2312-25**	252"	18	**2312-35**
222"	20	**2312-04**	240"	20	**2312-15**	258"	20	**2312-26**	270"	20	**2312-36**
240"	22	**2312-05**	258"	22	**2312-16**	276"	22	**2312-27**	294"	22	**2312-37**
258"	24	**2312-06**	276"	24	**2312-17**	300"	24	**2312-28**	—	—	—
276"	26	**2312-07**	300"	26	**2312-18**	—	—	—	—	—	—
294"	28	**2312-08**	—	—	—	—	—	—	—	—	—



**** Pitch is the distance from the top of the shelf to the top of an adjacent shelf. For shelf clearance, subtract 1.5" from the pitch indicated.***

Nominal Dimensions (inch) for systems with 18.5" deep shelves

A	B	C	D	E	F
121	60	108-294	102	15	41

Custom sizes and configurations available!
Terra modifies Automated Storage/Retrieval Systems to your specs, including modifications to meet special access or footprint requirements (see page 39).

ASD-600™ Low-Humidity Storage/Retrieval System
Ordering Information, cont'd.

1. Select the shelf pitch (shelf clearance) and depth for your application. See ordering charts below and on pages 48 - 49 for the three available shelf depths and nine available shelf pitches (distance from the top of one shelf to the top of the adjacent shelf). For shelf clearance, subtract 1½" from the shelf pitch.

2. Select size and number of shelves. Keep in mind that tall systems can be installed in facilities with false ceilings to make use of every cubic foot of available space. Note: Standard systems use a 3 HP motor. A larger motor is required for systems with a net load of 1800 pounds or more.

3. Select shell material. Standard units are stainless steel. To specify electropolishing, add EP to the part number. See page 320 for more information on Terra's electropolishing procedures. Note: Standard ASD configuration features three access doors. Other configurations are available.

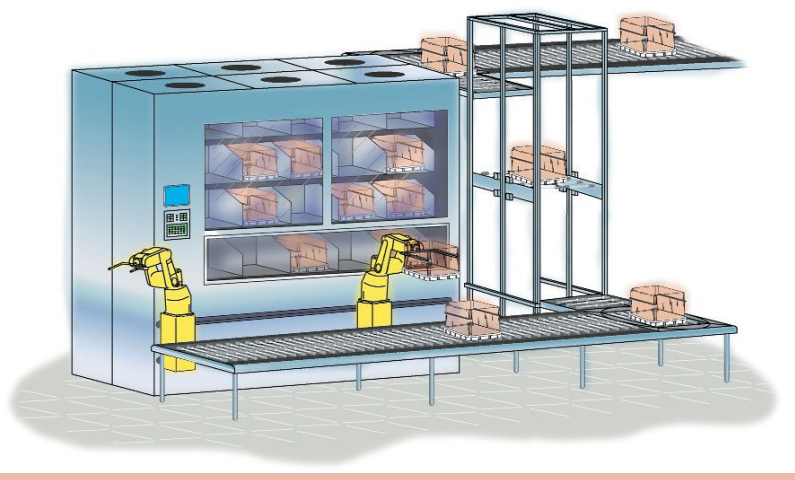
ASD-600™ for 15.5" deep shelves (order shelves separately on page 49)

10.5" Pitch*			12.0" Pitch*			13.5" Pitch*			15.0" Pitch*			16.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	108"	8	**2313-06**
—	—	—	—	—	—	108"	10	**2312-77**	114"	10	**2312-93**	126"	10	**2313-07**
102"	12	**2312-40**	108"	12	**2312-60**	120"	12	**2312-78**	132"	12	**2312-94**	138"	12	**2313-08**
108"	14	**2312-41**	120"	14	**2312-61**	132"	14	**2312-79**	144"	14	**2312-95**	156"	14	**2313-09**
120"	16	**2312-42**	132"	16	**2312-62**	144"	16	**2312-80**	162"	16	**2312-96**	174"	16	**2313-10**
132"	18	**2312-43**	144"	18	**2312-63**	162"	18	**2312-81**	174"	18	**2312-97**	192"	18	**2313-11**
144"	20	**2312-44**	156"	20	**2312-64**	174"	20	**2312-82**	192"	20	**2312-98**	204"	20	**2313-12**
150"	22	**2312-45**	168"	22	**2312-65**	186"	22	**2312-83**	204"	22	**2312-99**	222"	22	**2313-13**
162"	24	**2312-46**	180"	24	**2312-66**	198"	24	**2312-84**	222"	24	**2313-00**	240"	24	**2313-14**
174"	26	**2312-47**	192"	26	**2312-67**	216"	26	**2312-85**	234"	26	**2313-01**	258"	26	**2313-15**
186"	28	**2312-48**	204"	28	**2312-68**	228"	28	**2312-86**	252"	28	**2313-02**	270"	28	**2313-16**
192"	30	**2312-49**	216"	30	**2312-69**	234"	30	**2312-87**	264"	30	**2313-03**	288"	30	**2313-17**
204"	32	**2312-50**	228"	32	**2312-70**	252"	32	**2312-88**	282"	32	**2313-04**	—	—	—
216"	34	**2312-51**	240"	34	**2312-71**	270"	34	**2312-89**	294"	34	**2313-05**	—	—	—
228"	36	**2312-52**	252"	36	**2312-72**	282"	36	**2312-90**	—	—	—	—	—	—
234"	38	**2312-53**	264"	38	**2312-73**	294"	38	**2312-91**	—	—	—	—	—	—
246"	40	**2312-54**	276"	40	**2312-74**	—	—	—	—	—	—	—	—	—
258"	42	**2312-55**	288"	42	**2312-75**	—	—	—	—	—	—	—	—	—
270"	44	**2312-56**	306"	44	**2312-76**	—	—	—	—	—	—	—	—	—
276"	46	**2312-57**	—	—	—	—	—	—	—	—	—	—	—	—
288"	48	**2312-58**	—	—	—	—	—	—	—	—	—	—	—	—
300"	50	**2312-59**	—	—	—	—	—	—	—	—	—	—	—	—

Automated Solutions: Increased Cleanliness and Throughput!

Terra designs ASD-600™ and FreeFlow 600™ systems for use in a fully automated processing environment.

Standard Inventory Management Software allows several of these machines to be controlled remotely by a single PC, which logs data on all inventory in the processing/storage network.



In partnership with other industry-leading automation experts, Terra also provides integrated cleanroom-certified storage and transport systems configured to your requirements. Using either a pick-and-place or carousel-based storage system, these systems deliver selected parts to an automated elevated conveyor that transfers them to remote processing locations.

Call to discuss your processing application!

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

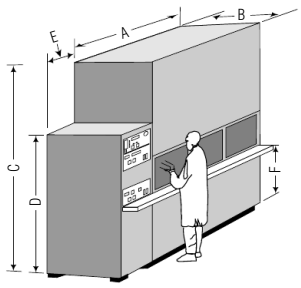
4. Select shelves on page 49. Solid and perforated designs are available in each pitch. See page 50 for information on sliding racks and other parts fixtures.

5. Select other system options on page 52, including a HEPA filtration module, Inventory Management Software, laser particle counter, nitrogen generator, ionizing equipment, and more!

Nominal Dimensions (inch) **for systems with 15.5" deep shelves**

A	B	C	D	E	F
121	60	108-294	102	15	41

Pitch is the distance from the top of the shelf to the top of an adjacent shelf. For shelf clearance, subtract 1.5" from the pitch indicated.



ASD-600™ for 15.5" deep shelves, cont'd. (order shelves below)

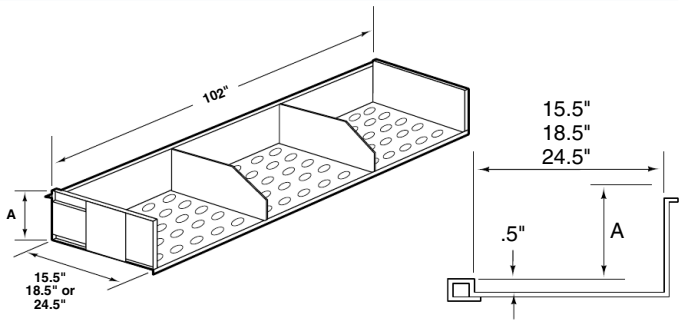
18.0" Pitch*			19.5" Pitch*			21.0" Pitch*			22.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	108"	6	**2313-39**	114"	6	**2313-49**
114"	8	**2313-18**	120"	8	**2313-29**	132"	8	**2313-40**	138"	8	**2313-50**
132"	10	**2313-19**	144"	10	**2313-30**	150"	10	**2313-41**	162"	10	**2313-51**
150"	12	**2313-20**	162"	12	**2313-31**	174"	12	**2313-42**	180"	12	**2313-52**
168"	14	**2313-21**	180"	14	**2313-32**	192"	14	**2313-43**	204"	14	**2313-53**
186"	16	**2313-22**	198"	16	**2313-33**	216"	16	**2313-44**	228"	16	**2313-54**
204"	18	**2313-23**	222"	18	**2313-34**	234"	18	**2313-45**	252"	18	**2313-55**
222"	20	**2313-24**	240"	20	**2313-35**	258"	20	**2313-46**	270"	20	**2313-56**
240"	22	**2313-25**	258"	22	**2313-36**	276"	22	**2313-47**	294"	22	**2313-57**
258"	24	**2313-26**	276"	24	**2313-37**	300"	24	**2313-48**	—	—	—
276"	26	**2313-27**	300"	26	**2313-38**	—	—	—	—	—	—
294"	28	**2313-28**	—	—	—	—	—	—	—	—	—

Shelves for ASD-600™

- **Heavy-duty construction supports up to 600 pounds**
- **Available in solid or perforated designs, with electropolished stainless steel finish for the most critical contamination requirements**
- **Select depth and pitch for optimal use of storage space**
- **See page 50 for shelf racks and other parts fixtures**

These shelves are designed to support up to 600 pounds each, making them ideal for supporting heavy reticles, photomasks, optics, and other sensitive parts.

Select solid or perforated models. Perforated shelves feature holes which create approximately 40% open space to accommodate the flow of clean gas inside the ASD-600™. Other hole patterns and designs are available; call Terra to discuss your application!



Nominal Dimensions (see chart above)

Pitch*	12.0"	13.5"	15.0"	16.5"	18.0"	19.5"	21.0"	22.5"
A	10.5"	12.0"	13.5"	15.0"	16.5"	18.0"	19.5"	21.0"

Pitch is the distance from the top of the shelf to the top of an adjacent shelf. For shelf clearance, subtract 1.5" from the pitch indicated.

ASD-600™ System Shelves (order appropriate depth and quantity for selected system)

Pitch*	24.5" Shelf Depth				18.5" Shelf Depth				15.5" Shelf Depth			
	Stainless Steel		Electropolished Stainless Steel		Stainless Steel		Electropolished Stainless Steel		Stainless Steel		Electropolished Stainless Steel	
	Solid Cat. #	Perforated Cat. #	Solid Cat. #	Perforated Cat. #	Solid Cat. #	Perforated Cat. #	Solid Cat. #	Perforated Cat. #	Solid Cat. #	Perforated Cat. #	Solid Cat. #	Perforated Cat. #
10.5"	**2318-00**	**2318-09**	**2318-00EP**	**2318-09EP**	**2318-18**	**2318-27**	**2318-18EP**	**2318-27EP**	**2318-36**	**2318-45**	**2318-36EP**	**2318-45EP**
12.0"	**2318-01**	**2318-10**	**2318-01EP**	**2318-10EP**	**2318-19**	**2318-28**	**2318-19EP**	**2318-28EP**	**2318-37**	**2318-46**	**2318-37EP**	**2318-46EP**
13.5"	**2318-02**	**2318-11**	**2318-02EP**	**2318-11EP**	**2318-20**	**2318-29**	**2318-20EP**	**2318-29EP**	**2318-38**	**2318-47**	**2318-38EP**	**2318-47EP**
15.0"	**2318-03**	**2318-12**	**2318-03EP**	**2318-12EP**	**2318-21**	**2318-30**	**2318-21EP**	**2318-30EP**	**2318-39**	**2318-48**	**2318-39EP**	**2318-48EP**
16.5"	**2318-04**	**2318-13**	**2318-04EP**	**2318-13EP**	**2318-22**	**2318-31**	**2318-22EP**	**2318-31EP**	**2318-40**	**2318-49**	**2318-40EP**	**2318-49EP**
18.0"	**2318-05**	**2318-14**	**2318-05EP**	**2318-14EP**	**2318-23**	**2318-32**	**2318-23EP**	**2318-32EP**	**2318-41**	**2318-50**	**2318-41EP**	**2318-50EP**
19.5"	**2318-06**	**2318-15**	**2318-06EP**	**2318-15EP**	**2318-24**	**2318-33**	**2318-24EP**	**2318-33EP**	**2318-42**	**2318-51**	**2318-42EP**	**2318-51EP**
21.0"	**2318-07**	**2318-16**	**2318-07EP**	**2318-16EP**	**2318-25**	**2318-34**	**2318-25EP**	**2318-34EP**	**2318-43**	**2318-52**	**2318-43EP**	**2318-52EP**
22.5"	**2318-08**	**2318-17**	**2318-08EP**	**2318-17EP**	**2318-26**	**2318-35**	**2318-26EP**	**2318-35EP**	**2318-44**	**2318-53**	**2318-44EP**	**2318-53EP**

Pitch is the distance from the top of the shelf to the top of an adjacent shelf. For shelf clearance, subtract 1.5" from the pitch indicated.

Versatile Shelf Configurations

Terra offers several standard shelf configurations that can be modified to meet specific requirements for size, quantity, access, and other considerations.

Terra engineers are also happy to work with you to design custom shelving or parts fixtures for your unique application.

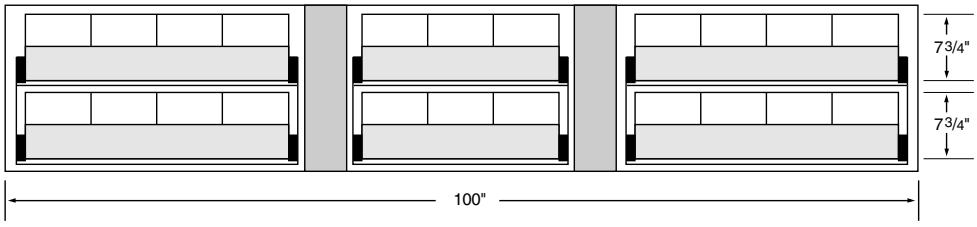
Standard Fixtures for—

Reticle Cassettes (Vertical storage)

Vertical Reticle & Photomask Storage

Terra's sliding reticle racks and trays provide optimal storage densities for all standard reticle sizes.

Racks feature an easy-glide suspension system and low-friction runners that safely support trays loaded with heavy reticles or photomasks. A dual-latch locking mechanism ensures that trays remain securely in position during shelf motion, and dividers feature tension clips to securely hold reticles in position. Perforations allow clean air or nitrogen to circulate freely through the storage area. Sliding rack assemblies, trays and dividers can be specified in stainless steel or electropolished UltraClean™ stainless steel.



Configuration for 7" reticle cassettes

Each assembly holds several trays on two levels, with 7¾" vertical clearance for stored parts.
Capacity for 24½"-deep shelf: 22 reticle trays, each holding approximately 21 reticles = 462 reticles/shelf.

Reticle Cassettes (Horizontal storage)

Horizontal Reticle & Photomask Storage

These sliding fixtures, made of stainless stee, feature an innovative side-mounting system to increase capacity and guarantee secure positioning.

Reticle mounts are made of clean, smooth HDPE for optimal protection. The 10° slot angles ensure that reticles seat securely. Reticle shelves fully extend on noncontaminating, low-friction runners, providing full parts access. Electropolishing is available for all stainless steel components to meet ultra-clean material requirements. Capacity for 24½"-deep shelf: six drawers with 36 reticles per drawer (@ 7" x ⅝"D each) = 216 reticles.

Tote Box

Tote Boxes

Standard ASD-600™ and FreeFlow™ 600 systems feature three access doors, each with 28" of side-to-side clearance. Nine vertical clearances are available, corresponding to the nine standard system pitches, to accommodate many sizes of tote boxes and other storage containers. Specify other desired door configurations.

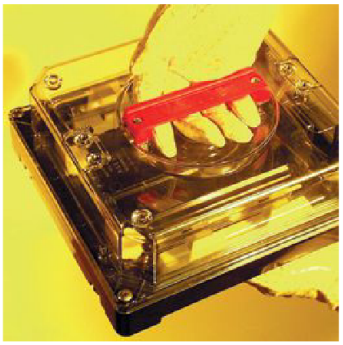
Waffle/Die Packs

Die Pack Storage System

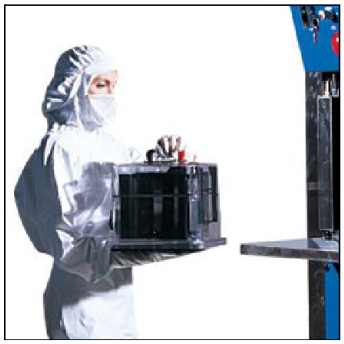
These racks feature an easy-glide suspension system and low-friction runners that ensure full access to every square inch of storage space. They support removable stainless steel trays with adjustable inlays that organize common die ("waffle") pack sizes. Latches keep trays firmly positioned while retracted.

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

Standard Fixtures for—



Reticle SMIF Pods



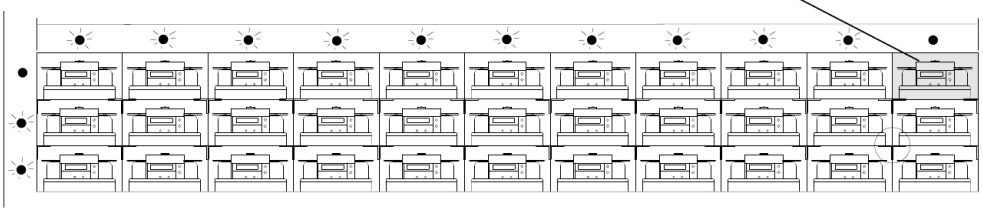
Wafer SMIF Pods

SMIF Pods

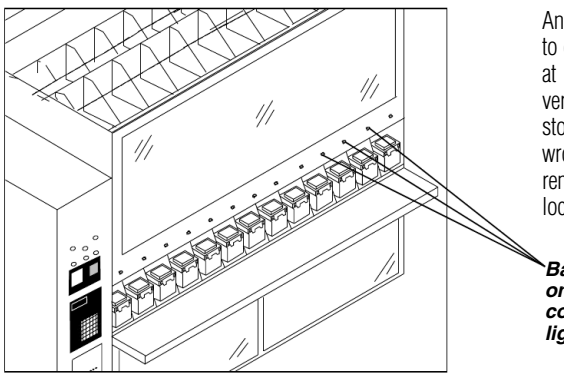
Shelves hold reticle and wafer SMIF pods in either single-tier or multiple-tier configurations, depending on shelf pitch and capacity requirements.

Terra also configures ASD-600™ and FreeFlow™ 600 systems for automated inventory updating of SMIF pods, wafer boxes, and similar storage containers. In the application illustrated below, a system incorporates an infrared array that monitors the access area to prevent "wrong picks." When a part number is selected in system software, the unit deactivates the vertical and horizontal beams that correspond to that unique storage location. Only the SMIF pod at that specified location is available for stocking or retrieval. Any attempt to access any other reticle location produces a "Wrong Pick" alarm and locks out the conveyor.

Active beams prevent parts access
Inactive beams allow access to reticle stored in this position only.



Optional Security Photobeam Grid (for Reticle SMIF Pod Application)



Optional Bar Code Tracking System (for Wafer Carrier Application)

An alternative security system uses bar code scanners to ensure proper product stocking. In the application at left, bar code labels affixed to wafer boxes are verified against inventory records each time a part is stocked or picked. Any attempt to place a part in the wrong bin, or to retrieve a part not authorized for removal, results in a "Wrong Pick" alarm and system lockout.

Bar code readers scan ID labels on each product. Software verifies correct placement, and status lights confirm "Correct Pick."

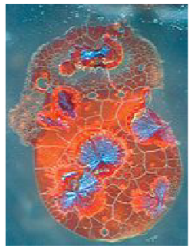
Wafer Cassettes

Wafer Cassette Storage

Retaining fixtures securely position wafer cassettes of any standard size (including 300mm). Sensors mounted beneath each location scan cassettes to ensure correct locations and update inventory records.

Pharmaceuticals

Blood and Plasma



Bio Samples

Call for Other Storage Requirements!

Terra has designed and manufactured innovative storage solutions for dozens of other sample types, sizes and quantities. Call to discuss your application!

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Atuomated Storage/Retrieval Systems
Optional Accessories

Nitrogen Generator
See page 480

Dryex 80
See page 479

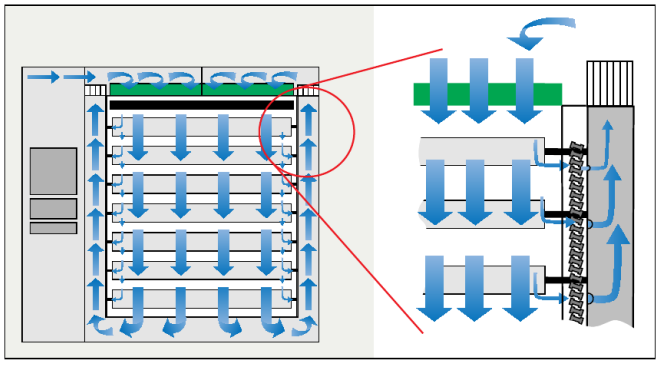
Process Gas Generators
Terra offers several sources of clean, dry process gas for the ASD-600™. These systems free you from dependence on gas cylinders or central supply pods. They use low-maintenance membrane separation technology that requires no moving parts. The only facility requirement is a supply of compressed air.

Nitrogen Generator
This system provides a reliable, economical source of particle-free nitrogen purge gas up to 99% pure at 200 SCFH (see page 480 for full specifications). Its compact design allows quick set-up wherever there's a compressed air supply.

Cat. #
2700-09

Dryex™ 80 Gas Dryer
This system is designed to provide reliable gas drying without the hassle and expense associated with desiccant drying systems. Its dry gas membrane removes moisture from a compressed air stream, and a 0.025-micron coalescing filter removes chemical vapors and particles. Outlet flow: 500 SCFH @ -10°F dew point (see page 479 for complete specifications).

Cat. #
9082-00



Impellers recirculate process gas through HEPA or ULPA filters to scrub the storage environment free of particles.

Filter Recirculation Module
This system enhances cleanliness inside the ASD-600™ by recirculating the purge gas through a HEPA or ULPA filter/blower module.

Dual impeller blowers, one installed on each side of the storage area, create a negative pressure that draws the process gas into stainless steel ducts and feeds it through 99.99% efficient HEPA or 99.999% efficient ULPA filters. The laminar flow of particle-free gas then flows downward through the storage area.

This continuous recirculation of filtered gas removes particles that might enter the system during parts access, producing a Class 10 storage environment.

Protects ESD-sensitive materials!

Full-Coverage Ionizing Blower
This unit projects a balanced stream of positive ions to neutralize static charges throughout the storage area. Its steady-state DC ion emission enables fast discharge with low airflow. Patented IsoStat technology guarantees intrinsically balanced ionization. Each unit is 36" long; several are typically required inside an ASD-600™ for complete static protection. For full specifications, see page 600.

Cat. #
2005-11

Sensitivities to 0.1 microns

Laser Particle Counter
This sophisticated particle counter samples particles 0.5 microns in diameter inside the storage area. Data are displayed directly on an LED readout; they can also be recorded on the system chart recorder or downloaded to PC. Other particle sensitivities are available as small as 0.1 micron. Includes installation.

Cat. #
1685-79

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

Inventory Management Software

(See page 44 for and more information)

- **Performs real-time inventory updates every time a product is accessed for lower inventory costs and better control**
- **Eliminates costly rework caused by "wrong picks" when used in conjunction with bar code scanning system**
- **Standard and optional security features lock out the entire system or selected storage areas from unauthorized personnel**
- **Datalogging capabilities allow documentation and analysis of environmental conditions (humidity, particles, temperature) as well as access history**
- **User-configurable features allow detailed Work-In-Process tracking by part type, quantity, location, intended use, process stage and other data**
- **SECS/GEM-compliant, ready for integration into Central Inventory Management Systems (optional)**

Terra's Inventory Management Software allows completely automated inventory control.

It compiles a detailed parts database with as much information as you require and updates these records each time a part is accessed. Use IMS for part searches, for custom pick lists, for security lock-outs, and a variety of other management functions.

In addition to the function and command keys included in the standard IMS package, Terra provides custom software configurations for unique inventory requirements. Call to discuss you application.

	Cat. #
Inventory Management Software	**2621-00**

Increased throughput and security.

Bar Code Readers

Terra configures bar code readers, scanners and printers to meet any inventory application. Using industry-standard bar codes, these systems greatly speed up stocking procedures and minimize expensive rework caused by "wrong picks." See page 51 for information on bar code security systems that enhance system security and stocking accuracy.

Easily operated by gloved hands.

Flat Panel Touch Screen

Terra's Flat Panel Display allows touch-screen control of all ASD-600™ and FreeFlow™ 600 System functions, including standard features of the optional Inventory Management Software.

Once you enter the appropriate passcode, you make selections on a series of touchscreen windows to update inventory, initiate shelf motion, open/close automatic access doors, and other operations. The screen's low-profile design allows it to be mounted conveniently on the Control Module.

	Cat. #
Plat Panel Touch Screen	**2318-51**

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

FreeFlow™ 600 Automated Storage/Retrieval Systems

- Open-entry design allows laminar flow of HEPA-filtered air through the storage area for particle-free mass storage
- Compatible with Class 10 (and cleaner!) facilities
- Ideal for high-volume storage of reticles, photomasks, wafers, rigid disks, and other contamination-sensitive materials
- Available in a wide range of standard heights—pick the unit that fits best beneath your in-house ceiling filters
- Optional HEPA filter/blower provides particle-free air flow for facilities without integral laminar flow source
- Automated conveyor system delivers selected part to access area in a matter of seconds
- Static-dissipative PVC offers full visibility and eliminates particle attraction, keeps surfaces clean—inside and out
- Optional automatic doors provide access security
- Bar code equipment and computer interface deliver fully automated inventory management, improve picking time and accuracy
- Optional SECS/GEM-compliant software provides comprehensive, centralized inventory control for greater production efficiency
- Safety features ensure full access to parts in event of power failure
- Stainless steel counter runs the full length of the access area
- Select shelf design and clearance to suit your requirements

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

Clean, Organized, Automated Storage—at an Affordable Price

Terra Universal's FreeFlow™ Storage/Retrieval Systems automate high-volume storage of reticles, wafers, rigid disks, and other contamination-sensitive parts.

Like our ASD-600™ these systems incorporate a microprocessor-controlled Vertical Chain Conveyor that delivers the part you select at the push of a button, thereby minimizing locating times and allowing convenient interface with automated processing operations.

The FreeFlow™ can be installed beneath your in-house HEPA/ULPA filter, or you can select optional filtration modules to provide a particle-free vertical laminar flow of air though the storage area. This continuous positive pressure blocks out particles that might enter through the access area. Air exits the system through exhaust panels located at the bottom of the unit. An optional perforated base allows the air purging the FreeFlow to be exhausted through raised floors.

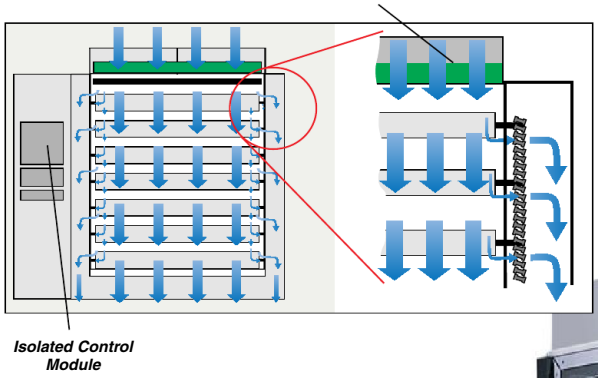
The unique design of the FreeFlow™ ensures that this air stream remains clean throughout the storage area. Optional automatic access doors let you secure the system. The system's modular design and isolated control equipment let you maintain uninterrupted operation should servicing ever be required and in most cases eliminate the need to call in a skilled technician. An optional laser particle counter provides a continuous record of storage conditions—giving you black-and-white assurance of clean, safe storage.

Static-Dissipative PVC for Enhanced Contamination Control

All of Terra Universal's FreeFlow™ systems come with Static-Dissipative PVC front panels for optimal visibility and cleanliness.

This revolutionary material offers a new alternative to standard methods of static and contamination control. Like plexiglass, it is transparent, yet it also resists a wide range of chemicals and is completely nonflammable and noncontaminating. It features a surface resistivity of about 10^7 ohms/square, protecting stored parts against ESD damage.

This dissipative property also aids in contamination control. By eliminating static charges, this material helps to eliminate the particles they attract. As a result, surfaces remain clean—inside and out. (See page 596 for technical information on this material.)



Isolated drive mechanism and advanced airflow engineering ensure effective particle control. Terra FreeFlow™ systems have been independently certified to provide a Class 1 particle environment (per FED STD 209E).

See page 60 for ordering information

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

A Shelf Configuration For Every Application

The FreeFlow™ 600 features shelves 24.5" x 102" that hold up to 600 pounds. Models are available from 7' to over 20' tall, with up to 50 shelves, giving you all the storage capacity you need while taking up minimal floor space. Other sizes and capacities can be ordered on a custom basis. Shelves are available out of stainless steel and electropolished UltraClean™ stainless steel. Perforations allow air to circulate through the unit.

Each of the system's shelves accommodates removable stainless steel trays to hold a wide range of components and devices. Terra inlays and dividers form adjustable bins for optimal organization of stored materials. See pages 50-51 for more information on shelf configurations. Optional ionizing equipment safely neutralizes static charges that are introduced into the storage area.

Improved Picking Accuracy, Reduced Picking Time

The FreeFlow's superior organization of thousands of stored parts saves money in more ways than one.

By coding the system's shelves and removable storage trays to your inventory records, you can call up the exact part you need at the press of a button. Optional computer software and bar code equipment improve efficiency even further. Seconds after you enter a part number on a computer keyboard or scan a bar code label, the system brings the desired part to the access area, updates inventory files, documents storage conditions, and performs a host of other user-definable tasks. Several FreeFlow systems can even be linked together in a storage network under control of a single host computer.

Picking accuracies with the FreeFlow™ 600 typically approach 100%, and picking times quickly fall, particularly if the system is computer-automated. See page 44 for an overview of software capabilities.

Emergency Stop Button

Manual Conveyor-Crank with Safety Clutch

Infrared Safety Beams and Safety Lock-Outs

Safety Features

Terra Universal Automated Storage Systems are engineered to operate safely and reliably under the most extreme conditions. Safety features include:

- **Stop/Reset Button:** Pressing this membrane switch immediately halts the conveyor mechanism.
- **Emergency EPO "Panic" Button:** Positioned prominently on the front control panel, this large red button functions as a "panic button" to let an operator stop shelf motion immediately.
- **Infrared Safety Beams:** Four "full time" infrared beams positioned inside the storage area continuously monitor the top and bottom of the access area and the top and bottom of the conveyor loop. If a part protrudes from a shelf, a beam is broken and shelf motion is stopped.
- **Photoelectric Light Curtain:** Once an access door is opened, this integrated array of infrared beams keeps it open for as long as a hand or other object penetrates the storage area.
- **Automatic Door Override:** A safety override prevents shelf motion as long as one of the optional automatic doors is open.
- **Breaker Switch:** A 30-amp breaker switch automatically trips to protect the motor if any of the shelves should become jammed.
- **Thermal Overload Switch:** The thermally protected motor automatically stops if excessive current draw threatens to burn it out.
- **Safety Fuses:** Two fuses provide additional electrical protection.
- **Dual Pressure Alarm:** Activates audible and visible alarms if incoming gas line pressure should fall below or exceed pre-set levels.
- **Manual Conveyor Override Mechanism:** A safety clutch connected to a hand crank allows an operator to move system shelves in the event of a power failure—without risking injury.
- **Manual Conveyor Safety Shut-Off:** Operating the shelves manually (by means of the manual conveyor mechanism) automatically cuts off power to the automated conveyor system.

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

FreeFlow™ 600

Standard Features

Safety Features include microswitches on all front panels, independent EMO mechanical shut-off, infrared detector shut-off, light curtain, and automatic door shut-off, features that halt conveyor and/or door operation when danger is present, thereby preventing injury to personnel and damage to stored parts or system components. ***See summary, page 56.***

Standard Sizes simplify ordering and speed up delivery.

Externally Isolated Control Module for enhanced safety and cleanliness.

Membrane Control Switches bring you the desired shelf to the access counter.

Automated Conveyor System retrieves the selected shelf at the press of a key.

Static-Dissipative PVC Front Panels eliminate static charges and the contamination they attract and ensure clean, transparent surfaces, inside and out.

Stainless Steel Access Counter runs the full length of the access area.

Wrist Strap Connectors are located at both ends of the access counter for easy grounding of wrist straps.

Particle Counter Interface allows easy connection of most particle counters without the need for system modification.

Computer Interface is included to allow a single or multiple Freeflows to be controlled by a remote PC.

Front and Side Access Panels allow easy access to the drive mechanism/storage area and visual inspection of all critical components.

Security Features include lock-outs for system power to guard against unauthorized tampering or access.

Manual Conveyor Override Mechanism includes a clutch to allow safe movement of the conveyor mechanism (and full access to stored material) in the event of a power failure.

Exhaust Panels at the rear of the unit allow filtered air to be exhausted or recirculated.

System Options

Shelving Configurations

Shelves come in solid or perforated stainless steel, or UltraClean™ Finish electropolished stainless steel. Reinforced design supports loads to 600 lbs. ***See page 99***

Stainless Steel Trays fit inside storage shelves for organized storage of small components (like waffle packs). ***See page 50***

Slide-Out Racks accommodate trays to provide fast, convenient access to every square inch of storage space. ***See page 50***

Stainless Steel Inlays and Dividers form adjustable storage bins inside trays for waffle packs and other small components. ***See page 50***

Tote Boxes are available in many sizes and materials. ***See page 50***

Specialized Parts Fixtures hold a wide range of commonly stored parts, including reticles, IC tubes, component carrier reels, tote boxes, and other materials. Just send Terra a sample.

HEPA Filter/Blower Module filters contaminants from air stream passing through the FreeFlow™. Ideal for facilities without ceiling filter/blower units. ***See page 65***

Flip-Up Security Access Counter swings up and locks in place to prevent unauthorized access in systems without doors. ***See page 65***

Perforated Exhaust Base allows the air purging the FreeFlow™ to be exhausted through raised floors. ***See page 65***

Automatic Doors enhance security and reduce contamination risk. Three doors are standard; four-door designs are also available.

Particle Counter displays particle counts inside the storage area; can be interfaced to chart recorder for complete environmental documentation. ***See page 52***

Inventory Management Software (IMS) is user-configurable software package that allows complete control over ASD operation, including automated inventory tracking and datalogging. ***See page 53***

Personal Identification Readers, including fingerprint and iris recognition systems, authorize access to optimize parts security. See previous page for more details.

Flat Panel Touchscreen uses the software package above to let you retrieve a part simply by pressing the screen. ***See page 53***

Bar Code Reader speeds up sorting times (reducing the chance of contamination), automates product tracking, and simplifies inventory management. ***See page 53***

Ionizing Bars neutralize static charges and aid in contamination control. ***See page 65***

Spare Parts Kit includes motor control box, IR beam, relays, switches, roller arm assemblies, and other hardware necessary to maintain the FreeFlow™-600.

UltraClean™ Stainless Steel Finish is an electrochemical passivation process that removes subsurface contaminants from all stainless steel surfaces, leaving an ultra-clean, noncontaminating surface. Makes the FreeFlow™ suitable for a Class 1 environment.

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Specifications

Cleanliness Rating:	Terra's FreeFlow™ systems have been certified compatible with Class I clean-room environments (test results upon request).
Work Counter:	Standard stainless steel finish, grounded, with two grounded wrist strap connectors, fixed at standing position; 100"W x 13"D (FreeFlow™ 600) with 10" of usable counter depth
Power Requirements:	230VAC/60Hz, single phase and a dedicated 30 amp electrical supply line
Motor:	3 HP
Gas Requirement: (for Optional Automatic Doors)	Incoming line (nitrogen or CDA) regulated at 90 psi
Controls:	Touchscreen or membrane panel to control gas flow and shelf motion; includes keyed lock-out features to control access and shelf movement
Weight Capacity:	600 lbs./shelf; 25,000-lb. system maximum; heavy-duty solid and perforated stainless steel shelves.
Safety Features:	See summary side bar, page 56
Installation:	System must be installed by a trained technician; requires level floor with adequate foundation

ParticleWatch™ Option

(Models available with sensitivity to 0.1 micron)

Particle Size Range 1:	.5µm and larger
Selectable Range 2:	5µm and larger
Maximum Concentrations:	1 million particles/cubic foot
Light Source:	50mW laser diode
Flow Rate:	± 10% at 0.1 CFM

+Inventory Management Software

- **Performs real-time inventory updates every time a product is accessed for lower inventory costs and better control**
- **Eliminates costly rework caused by "wrong picks" when used in conjunction with bar code scanning system**
- **Standard and optional security features lock out the entire system or selected storage areas from unauthorized personnel**
- **Datalogging capabilities allow documentation and analysis of environmental conditions (humidity, particles, temperature) as well as access history**
- **User-configurable features allow detailed Work-In-Process tracking by part type, quantity, location, intended use, process stage and other data**
- **SECS/GEM-compliant, ready for integration into Central Inventory Management Systems**

Standard system firmware controls shelf motion and access door operation. Terra's user-configurable Inventory Management Software expands system function by automating inventory management to fit your requirements.

It compiles a detailed parts database with as much information as you require and updates these records each time a part is accessed. Use IMS for part searches, for custom pick lists, for security lock-outs, and a variety of other management functions.

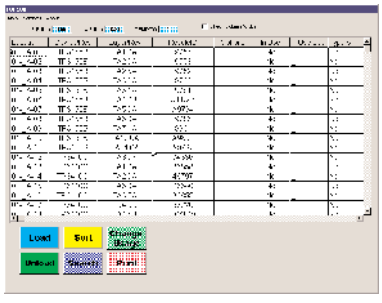
Easy to Operate, User Configurable

The intuitive GUI interface is easy to configure to your application, and Terra's software engineers will customize a system to special requirements. Once configured, a series of system prompts guide the user through the various system functions, allowing inventory tracking, humidity or temperature datalogging, access reporting, and other tasks.

WIP Inventory Tracking

Data on each stored part entered on a computer keyboard or by bar code reader. System software allows you to record as much information as necessary, including part quantity, location, intended use, process stage, and operator authorization codes. The system updates inventory records each time a part is stocked or retrieved. A SEARCH function allows an operator to locate all stored parts by specified search criteria.

On an optional basis, the FreeFlow 600™ can be configured to scan bar codes on parts loaded or unloaded and to verify correct stocking locations. Any time an operator attempts to load an item in a wrong position, the system issues a warning alarm and disables shelf operation. This product tracking capability guarantees that lot boxes are stored in their correct locations and ensures accurate inventory information.



User-configurable software lets you specify product records and stocking criteria to suit your application!

Optional SECS/GEM Compliance

Terra's software can be configured to work with all major industry communications protocols, and can be integrated into an existing Central Inventory Management System.

Datalogging

The system stores and analyzes data on humidity, temperature, and particle counts, as well as system access and inventory quantities and locations. Information can be stored, viewed and manipulated via an onboard or remote PC.

Automated Pick-List Queuing

Picking can be performed on a FIFO (first-in, first-out) or SORT (work queue ordered for fastest retrieval) basis. Additional inventory pick parameters can also be established, enabling the system to deliver items based on process stage, operator security clearance level, or other specified criteria.

In addition to the function and command keys included in the standard IMS package, Terra provides custom software configurations for unique inventory requirements. Call to discuss you application.

	Cat. #
Inventory Management Software	**2621-00**

Typical Stocking Protocol

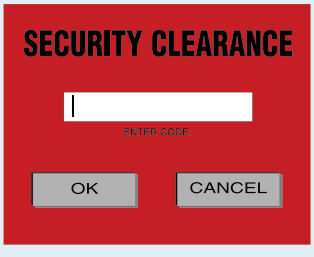
Optional Inventory Management Software is easy to configure to your needs. IMS complies with Semiconductor Equipment Communications Standards (SECS) and General Equipment Model (GEM) protocols.
See ordering information on page 53.

Stocking (Tracking In)

Operator Action	System Response
Operator access authorization via ID badge, fingerprint, iris reader, or other ID system	*Operator given access to inventory controls*
Operator scans in product at bar code reader	*PLC screen assigns selected product an available storage location ("cell") and indicates position (Carousel No., Shelf No., Bin No., Tier No.). PLC prompts for additional inventory data: product type, use, or other user-defined parameters.*
Operator presses "go to" function key	*System brings selected shelf to the access area and deactivates corresponding security photobeams to allow access*
Operator places product on assigned storage bay and enters "store" function key	*System enters selected product under "Ready" status at selected location. Product is available for future retrieval.*

Retrieval (Tracking Out)

Operator Action	System Response
Operator access authorization via ID badge, fingerprint, iris reader, or other system	*Operator given access to inventory controls*
Operator scans in product ID no. from pick list or enters via keyboard	*PLC screen indicates storage location ("cell") for the selected product and indicates a status: Ready, InUse, or Reserved. If product has not been entered into inventory, system indicates NotFound.*
Operator presses "retrieve" function key	*System brings selected product to the access area and deactivates corresponding security photobeams to allow access*
- OR -	
Operator presses "reserve" function key	*System marks the selected product as "Reserved"*
Operator retrieves product from assigned storage bay and enters "InUse" function key	*System marks selected product as "InUse" in inventory.*
- OR -	
Operator retrieves product from assigned storage bay and enters "remove" function key	*System removes the selected product from inventory and marks selected storage bay as available for use.*



Hardware and Software Lock-Outs Protect Against Product or System Tampering

Terra offers several security options for ASD and FreeFlow Automated Storage/Retrieval Systems.

Using one of the options at right, the system provides a traceable record of each inventory access, including the operator performing the action and time and date of access. The product tracking options, such as bar code scanners positioned above each storage bay, allow additional documentation of each part stocked or retrieved.

Security options include —

Password-Controlled Access Codes: Codes can be configured for any system that includes Terra's Inventory Management Software.

ID Badge Clearance: A bar code reader, using industry-standard codes, verifies ID badges or other security cards before allowing system access.

Fingerprint, Iris-Reader or other Personal ID System: Terra will configure ASD to verify unique personal traits, using fingerprint, eye (iris), voice, or other recognition system.

TERRA UNIVERSAL.COM
Critical Environment Solutions
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FreeFlow™ 600 HEPA/ULPA Filtered System

Ordering Information

1. Select the shelf pitch and depth for your application. See ordering charts below and on pages 62-63 for the three available shelf depths and nine available shelf pitches (distance from the top of one shelf to the top of the adjacent shelf). For shelf clearance, subtract 1½" from the shelf pitch.

2. Select size and number of shelves. Keep in mind that tall systems can be installed in facilities with false ceilings to make use of every cubic foot of available space. Note: Standard systems use a 3 HP motor. A larger motor is required for systems with a net load of 1800 pounds or more.

3. Select shell material. Standard units are stainless steel. To specify electropolishing, add EP to the part number. See page 320 for more information on Terra's electropolishing procedures.

FreeFlow-600™ for 24.5" shelves (order shelves separately on page 63)

10.5" Pitch*			12.0" Pitch*			13.5" Pitch*			15.0" Pitch*			16.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	108"	8	**2314-66**
—	—	—	—	—	—	108"	10	**2314-37**	114"	10	**2314-53**	126"	10	**2314-67**
102"	12	**2314-00**	108"	12	**2314-20**	120"	12	**2314-38**	132"	12	**2314-54**	138"	12	**2314-68**
108"	14	**2314-01**	120"	14	**2314-21**	132"	14	**2314-39**	144"	14	**2314-55**	156"	14	**2314-69**
120"	16	**2314-02**	132"	16	**2314-22**	144"	16	**2314-40**	162"	16	**2314-56**	174"	16	**2314-70**
132"	18	**2314-03**	144"	18	**2314-23**	162"	18	**2314-41**	174"	18	**2314-57**	192"	18	**2314-71**
144"	20	**2314-04**	156"	20	**2314-24**	174"	20	**2314-42**	192"	20	**2314-58**	204"	20	**2314-72**
150"	22	**2314-05**	168"	22	**2314-25**	186"	22	**2314-43**	204"	22	**2314-59**	222"	22	**2314-73**
162"	24	**2314-06**	180"	24	**2314-26**	198"	24	**2314-44**	222"	24	**2314-60**	240"	24	**2314-74**
174"	26	**2314-07**	192"	26	**2314-27**	216"	26	**2314-45**	234"	26	**2314-61**	258"	26	**2314-75**
186"	28	**2314-08**	204"	28	**2314-28**	228"	28	**2314-46**	252"	28	**2314-62**	270"	28	**2314-76**
192"	30	**2314-09**	216"	30	**2314-29**	234"	30	**2314-47**	264"	30	**2314-63**	288"	30	**2314-77**
204"	32	**2314-10**	228"	32	**2314-30**	252"	32	**2314-48**	282"	32	**2314-64**	—	—	—
216"	34	**2314-11**	240"	34	**2314-31**	270"	34	**2314-49**	294"	34	**2314-65**	—	—	—
228"	36	**2314-12**	252"	36	**2314-32**	282"	36	**2314-50**	—	—	—	—	—	—
234"	38	**2314-13**	264"	38	**2314-33**	294"	38	**2314-51**	—	—	—	—	—	—
246"	40	**2314-14**	276"	40	**2314-34**	—	—		—	—	—	—	—	—
258"	42	**2314-15**	288"	42	**2314-35**	—	—	—	—	—	—	—	—	—
270"	44	**2314-16**	306"	44	**2314-36**	—	—	—	—	—	—	—	—	—
276"	46	**2314-17**	—	—	—	—	—	—	—	—	—	—	—	—
288"	48	**2314-18**	—	—	—	—	—	—	—	—	—	—	—	—
300"	50	**2314-19**	—	—	—	—	—	—	—	—	—	—	—	—

FreeFlow-600™for 18.5" shelves (order shelves separately on page 63)

10.5" Pitch*			12.0" Pitch*			13.5" Pitch*			15.0" Pitch*			16.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	108"	8	**2315-86**
—	—	—	—	—	—	108"	10	**2315-57**	114"	10	**2315-73**	126"	10	**2315-87**
102"	12	**2315-20**	108"	12	**2315-40**	120"	12	**2315-58**	132"	12	**2315-74**	138"	12	**2315-88**
108"	14	**2315-21**	120"	14	**2315-41**	132"	14	**2315-59**	144"	14	**2315-75**	156"	14	**2315-89**
120"	16	**2315-22**	132"	16	**2315-42**	144"	16	**2315-60**	162"	16	**2315-76**	174"	16	**2315-90**
132"	18	**2315-23**	144"	18	**2315-43**	162"	18	**2315-61**	174"	18	**2315-77**	192"	18	**2315-91**
144"	20	**2315-24**	156"	20	**2315-44**	174"	20	**2315-62**	192"	20	**2315-78**	204"	20	**2315-92**
150"	22	**2315-25**	168"	22	**2315-45**	186"	22	**2315-63**	204"	22	**2315-79**	222"	22	**2315-93**
162"	24	**2315-26**	180"	24	**2315-46**	198"	24	**2315-64**	222"	24	**2315-80**	240"	24	**2315-94**
174"	26	**2315-27**	192"	26	**2315-47**	216"	26	**2315-65**	234"	26	**2315-81**	258"	26	**2315-95**
186"	28	**2315-28**	204"	28	**2315-48**	228"	28	**2315-66**	252"	28	**2315-82**	270"	28	**2315-96**
192"	30	**2315-29**	216"	30	**2315-49**	234"	30	**2315-67**	264"	30	**2315-83**	288"	30	**2315-97**
204"	32	**2315-30**	228"	32	**2315-50**	252"	32	**2315-68**	282"	32	**2315-84**	—	—	—
216"	34	**2315-31**	240"	34	**2315-51**	270"	34	**2315-69**	294"	34	**2315-85**	—	—	—
228"	36	**2315-32**	252"	36	**2315-52**	282"	36	**2315-70**	—	—	—	—	—	—
234"	38	**2315-33**	264"	38	**2315-53**	294"	38	**2315-71**	—	—	—	—	—	—
246"	40	**2315-34**	276"	40	**2315-54**	—	—	—	—	—	—	—	—	—
258"	42	**2315-35**	288"	42	**2315-55**	—	—	—	—	—	—	—	—	—
270"	44	**2315-36**	306"	44	**2315-56**	—	—	—	—	—	—	—	—	—
276"	46	**2315-37**	—	—	—	—	—	—	—	—	—	—	—	—
288"	48	**2315-38**	—	—	—	—	—	—	—	—	—	—	—	—
300"	50	**2315-39**	—	—	—	—	—	—	—	—	—	—	—	—

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

4. Select shelves on page 63. Solid and perforated designs are available in each pitch. See page 50 for information on sliding racks and other parts fixtures.

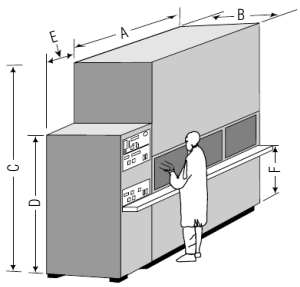
5. Select other system options on page 65, including a HEPA filtration module, Inventory Management Software, laser particle counter, ionizing equipment, and more!

ASD-600™ Low-Humidity Storage System. Ordering information begins on page 39.

Low-Temperature ASD-600™. Ordering information begins on page 69.

FreeFlow-600™ for 24.5" shelves, cont'd. (order shelves separately on page 63)

18.0" Pitch*			19.5" Pitch*			21.0" Pitch*			22.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	108"	6	**2314-99**	114"	6	**2315-09**
114"	8	**2314-78**	120"	8	**2314-89**	132"	8	**2315-00**	138"	8	**2315-10**
132"	10	**2314-79**	144"	10	**2314-90**	150"	10	**2315-01**	162"	10	**2315-11**
150"	12	**2314-80**	162"	12	**2314-91**	174"	12	**2315-02**	180"	12	**2315-12**
168"	14	**2314-81**	180"	14	**2314-92**	192"	14	**2315-03**	204"	14	**2315-13**
186"	16	**2314-82**	198"	16	**2314-93**	216"	16	**2315-04**	228"	16	**2315-14**
204"	18	**2314-83**	222"	18	**2314-94**	234"	18	**2315-05**	252"	18	**2315-15**
222"	20	**2314-84**	240"	20	**2314-95**	258"	20	**2315-06**	270"	20	**2315-16**
240"	22	**2314-85**	258"	22	**2314-96**	276"	22	**2315-07**	294"	22	**2315-17**
258"	24	**2314-86**	276"	24	**2314-97**	300"	24	**2315-08**	—	—	—
276"	26	**2314-87**	300"	26	**2314-98**	—	—	—	—	—	—
294"	28	**2314-88**	—	—	—	—	—	—	—	—	—



**** Pitch is the distance from the top of the shelf to the top of an adjacent shelf. For shelf clearance, subtract 1.5" from the pitch indicated.***

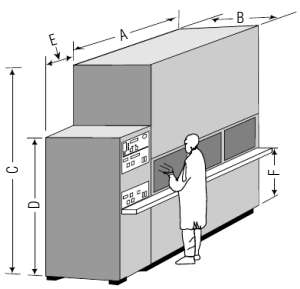
Nominal Dimensions (inch) for systems with 24.5" deep shelves

A	B	C	D	E	F
121	72	108-300	102	15	41

Custom sizes and configurations available!
Terra modifies Automated Storage/Retrieval Systems to your specs, including modifications to meet special access or footprint requirements.

FreeFlow-600™ for 18.5" shelves, cont'd. (order shelves separately on page 63)

18.0" Pitch*			19.5" Pitch*			21.0" Pitch*			22.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	108"	6	**2316-19**	114"	6	**2316-29**
114"	8	**2315-98**	120"	8	**2316-09**	132"	8	**2316-20**	138"	8	**2316-30**
132"	10	**2315-99**	144"	10	**2316-10**	150"	10	**2316-21**	162"	10	**2316-31**
150"	12	**2316-00**	162"	12	**2316-11**	174"	12	**2316-22**	180"	12	**2316-32**
168"	14	**2316-01**	180"	14	**2316-12**	192"	14	**2316-23**	204"	14	**2316-33**
186"	16	**2316-02**	198"	16	**2316-13**	216"	16	**2316-24**	228"	16	**2316-34**
204"	18	**2316-03**	222"	18	**2316-14**	234"	18	**2316-25**	252"	18	**2316-35**
222"	20	**2316-04**	240"	20	**2316-15**	258"	20	**2316-26**	270"	20	**2316-36**
240"	22	**2316-05**	258"	22	**2316-16**	276"	22	**2316-27**	294"	22	**2316-37**
258"	24	**2316-06**	276"	24	**2316-17**	300"	24	**2316-28**	—	—	—
276"	26	**2316-07**	300"	26	**2316-18**	—	—	—	—	—	—
294"	28	**2316-08**	—	—	—	—	—	—	—	—	—



**** Pitch is the distance from the top of the shelf to the top of an adjacent shelf. For shelf clearance, subtract 1.5" from the pitch indicated.***

Nominal Dimensions (inch) for systems with 18.5" deep shelves

A	B	C	D	E	F
121	60	108-294	102	15	41

Custom sizes and configurations available!
Terra modifies Automated Storage/Retrieval Systems to your specs, including modifications to meet special access or footprint requirements.

FreeFlow™ 600 HEPA/ULPA Filtered System

Ordering Information, cont'd.

1. Select the shelf pitch and depth for your application. See ordering charts below and on pages 60-61 for the three available shelf depths and nine available shelf pitches (distance from the top of one shelf to the top of the adjacent shelf). For shelf clearance, subtract 1½" from the shelf pitch.

2. Select size and number of shelves. Keep in mind that tall systems can be installed in facilities with false ceilings to make use of every cubic foot of available space. Note: Standard systems use a 3 HP motor. A larger motor is required for systems with a net load of 1800 poinds or more.

3. Select shell material. Standard units are stainless steel. To specify electropolishing, add EP to the part number. See page 320 for more information on Terra's electropolishing procedures.

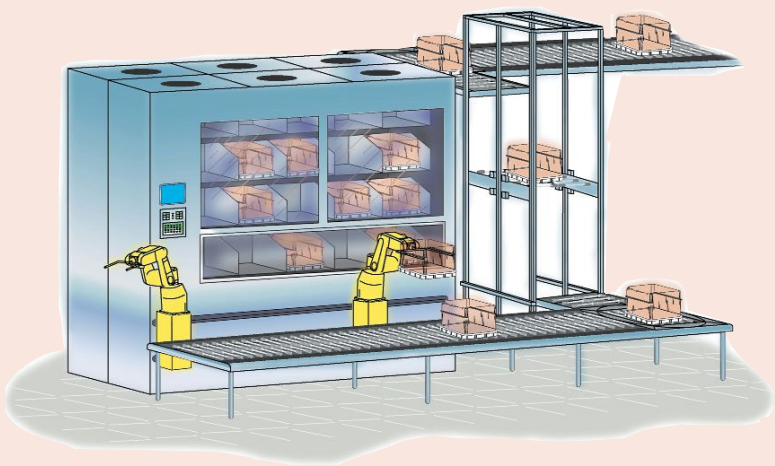
FreeFlow-600™ for 15.5" shelves (order shelves separately on page 63)

10.5" Pitch*			12.0" Pitch*			13.5" Pitch*			15.0" Pitch*			16.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	108"	8	**2317-06**
—	—	—	—	—	—	108"	10	**2316-77**	114"	10	**2316-93**	126"	10	**2317-07**
102"	12	**2316-40**	108"	12	**2316-60**	120"	12	**2316-78**	132"	12	**2316-94**	138"	12	**2317-08**
108"	14	**2316-41**	120"	14	**2316-61**	132"	14	**2316-79**	144"	14	**2316-95**	156"	14	**2317-09**
120"	16	**2316-42**	132"	16	**2316-62**	144"	16	**2316-80**	162"	16	**2316-96**	174"	16	**2317-10**
132"	18	**2316-43**	144"	18	**2316-63**	162"	18	**2316-81**	174"	18	**2316-97**	192"	18	**2317-11**
144"	20	**2316-44**	156"	20	**2316-64**	174"	20	**2316-82**	192"	20	**2316-98**	204"	20	**2317-12**
150"	22	**2316-45**	168"	22	**2316-65**	186"	22	**2316-83**	204"	22	**2316-99**	222"	22	**2317-13**
162"	24	**2316-46**	180"	24	**2316-66**	198"	24	**2316-84**	222"	24	**2317-00**	240"	24	**2317-14**
174"	26	**2316-47**	192"	26	**2316-67**	216"	26	**2316-85**	234"	26	**2317-01**	258"	26	**2317-15**
186"	28	**2316-48**	204"	28	**2316-68**	228"	28	**2316-86**	252"	28	**2317-02**	270"	28	**2317-16**
192"	30	**2316-49**	216"	30	**2316-69**	234"	30	**2316-87**	264"	30	**2317-03**	288"	30	**2317-17**
204"	32	**2316-50**	228"	32	**2316-70**	252"	32	**2316-88**	282"	32	**2317-04**	—	—	—
216"	34	**2316-51**	240"	34	**2316-71**	270"	34	**2316-89**	294"	34	**2317-05**	—	—	—
228"	36	**2316-52**	252"	36	**2316-72**	282"	36	**2316-90**	—	—	—	—	—	—
234"	38	**2316-53**	264"	38	**2316-73**	294"	38	**2316-91**	—	—	—	—	—	—
246"	40	**2316-54**	276"	40	**2316-74**	—	—		—	—	—	—	—	—
258"	42	**2316-55**	288"	42	**2316-75**	—	—	—	—	—	—	—	—	—
270"	44	**2316-56**	306"	44	**2316-76**	—	—	—	—	—	—	—	—	—
276"	46	**2316-57**	—	—	—	—	—	—	—	—	—	—	—	—
288"	48	**2316-58**	—	—	—	—	—	—	—	—	—	—	—	—
300"	50	**2316-59**	—	—	—	—	—	—	—	—	—	—	—	—

Automated Solutions: Increased Cleanliness and Throughput!

Terra designs ASD-600™ and FreeFlow 600™ systems for use in a fully automated processing environment.

Standard Inventory Management Software allows several of these machines to be controlled remotely by a single PC, which logs data on all inventory in the processing/storage network.



In partnership with other industry-leading automation experts, Terra also provides integrated cleanroom-certified storage and transport systems configured to your requirements. Using either a pick-and-place or carousel-based storage system, these systems deliver selected parts to an automated elevated conveyor that transfers them to remote processing locations.

Call to discuss your processing application!

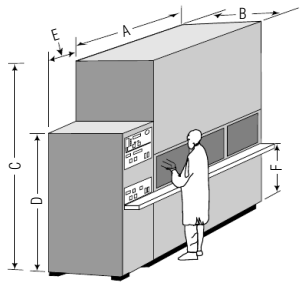
AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

4. Select shelves on page 63. Solid and perforated designs are available in each pitch. See page 50 for information on sliding racks and other parts fixtures.

5. Select other system options on page 65, including a HEPA filtration module, Inventory Management Software, laser particle counter, nitrogen generator, ionizing equipment, and more!

Nominal Dimensions (inch) for systems with 15.5" deep shelves					
A	B	C	D	E	F
121	60	108-294	102	15	41

** Pitch is the distance from the top of the shelf to the top of an adjacent shelf. For shelf clearance, subtract 1.5" from the pitch indicated.*



FreeFlow-600™ for 15.5" shelves, cont'd. (order shelves separately below)

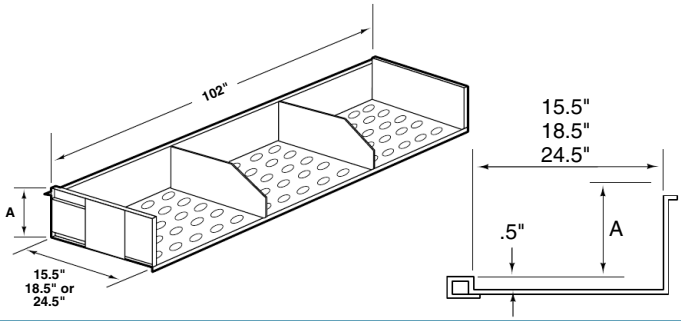
18.0" Pitch*			19.5" Pitch*			21.0" Pitch*			22.5" Pitch*		
Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #	Height	Number of Shelves	Stainless Steel Cat. #
—	—	—	—	—	—	108"	6	**2317-39**	114"	6	**2317-49**
114"	8	**2317-18**	120"	8	**2317-29**	132"	8	**2317-40**	138"	8	**2317-50**
132"	10	**2317-19**	144"	10	**2317-30**	150"	10	**2317-41**	162"	10	**2317-51**
150"	12	**2317-20**	162"	12	**2317-31**	174"	12	**2317-42**	180"	12	**2317-52**
168"	14	**2317-21**	180"	14	**2317-32**	192"	14	**2317-43**	204"	14	**2317-53**
186"	16	**2317-22**	198"	16	**2317-33**	216"	16	**2317-44**	228"	16	**2317-54**
204"	18	**2317-23**	222"	18	**2317-34**	234"	18	**2317-45**	252"	18	**2317-55**
222"	20	**2317-24**	240"	20	**2317-35**	258"	20	**2317-46**	270"	20	**2317-56**
240"	22	**2317-25**	258"	22	**2317-36**	276"	22	**2317-47**	294"	22	**2317-57**
258"	24	**2317-26**	276"	24	**2317-37**	300"	24	**2317-48**	—	—	—
276"	26	**2317-27**	300"	26	**2317-38**	—	—	—	—	—	—
294"	28	**2317-28**	—	—	—	—	—	—	—	—	—

Shelves for FreeFlow™ 600

- **Heavy-duty construction supports up to 600 pounds**
- **Available in solid or perforated designs, with electropolished stainless steel finish for the most critical contamination requirements**
- **Select depth and pitch for optimal use of storage space**
- **See page 64 for shelf racks and other parts fixtures**

These shelves are designed to support up to 600 pounds each, making them ideal for supporting heavy reticles, photomasks, optics, and other sensitive parts.

Select solid or perforated models. Perforated shelves feature holes which create approximately 40% open space to accommodate the flow of clean air inside the FreeFlow™ 600. Other hole patterns and designs are available; call Terra to discuss your application!



Nominal Dimensions (see chart above)								
Pitch*	12.0"	13.5"	15.0"	16.5"	18.0"	19.5"	21.0"	22.5"
A	10.5"	12.0"	13.5"	15.0"	16.5"	18.0"	19.5"	21.0"

** Pitch is the distance from the top of the shelf to the top of an adjacent shelf. For shelf clearance, subtract 1.5" from the pitch indicated.*

ASD-600™ System Shelves (order appropriate depth and quantity for selected system)

Pitch*	24.5" Shelf Depth				18.5" Shelf Depth				15.5" Shelf Depth			
	Stainless Steel		Electropolished Stainless Steel		Stainless Steel		Electropolished Stainless Steel		Stainless Steel		Electropolished Stainless Steel	
	Solid Cat. #	Perforated Cat. #	Solid Cat. #	Perforated Cat. #	Solid Cat. #	Perforated Cat. #	Solid Cat. #	Perforated Cat. #	Solid Cat. #	Perforated Cat. #	Solid Cat. #	Perforated Cat. #
10.5"	2318-00	2318-09	2318-00EP	2318-09EP	2318-18	2318-27	2318-18EP	2318-27EP	2318-36	2318-45	2318-36EP	2318-45EP
12.0"	2318-01	2318-10	2318-01EP	2318-10EP	2318-19	2318-28	2318-19EP	2318-28EP	2318-37	2318-46	2318-37EP	2318-46EP
13.5"	2318-02	2318-11	2318-02EP	2318-11EP	2318-20	2318-29	2318-20EP	2318-29EP	2318-38	2318-47	2318-38EP	2318-47EP
15.0"	2318-03	2318-12	2318-03EP	2318-12EP	2318-21	2318-30	2318-21EP	2318-30EP	2318-39	2318-48	2318-39EP	2318-48EP
16.5"	2318-04	2318-13	2318-04EP	2318-13EP	2318-22	2318-31	2318-22EP	2318-31EP	2318-40	2318-49	2318-40EP	2318-49EP
18.0"	2318-05	2318-14	2318-05EP	2318-14EP	2318-23	2318-32	2318-23EP	2318-32EP	2318-41	2318-50	2318-41EP	2318-50EP
19.5"	2318-06	2318-15	2318-06EP	2318-15EP	2318-24	2318-33	2318-24EP	2318-33EP	2318-42	2318-51	2318-42EP	2318-51EP
21.0"	2318-07	2318-16	2318-07EP	2318-16EP	2318-25	2318-34	2318-25EP	2318-34EP	2318-43	2318-52	2318-43EP	2318-52EP
22.5"	2318-08	2318-17	2318-08EP	2318-17EP	2318-26	2318-35	2318-26EP	2318-35EP	2318-44	2318-53	2318-44EP	2318-53EP

** Pitch is the distance from the top of the shelf to the top of an adjacent shelf. For shelf clearance, subtract 1.5" from the pitch indicated.*

Versatile Shelf Configurations

Terra offers several standard shelf configurations that can be modified to meet specific requirements for size, quantity, access, and other considerations. Terra engineers are also happy to work with you to design custom shelving or parts fixtures for

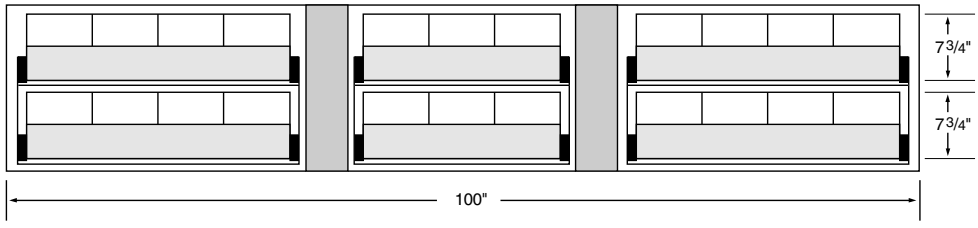
Standard Fixtures for—

Reticle Cassettes (Vertical storage)

Vertical Reticle & Photomask Storage

Terra's sliding reticle racks and trays provide optimal storage densities for all standard reticle sizes.

Racks feature an easy-glide suspension system and low-friction runners that safely support trays loaded with heavy reticles or photomasks. A dual-latch locking mechanism ensures that trays remain securely in position during shelf motion, and dividers feature tension clips to securely hold reticles in position. Perforations allow clean air or nitrogen to circulate freely through the storage area. Sliding rack assemblies, trays and dividers can be specified in stainless steel or electropolished UltraClean™ stainless steel.



Configuration for 7" reticle cassettes

Each assembly holds several trays on two levels, with 7¾" vertical clearance for stored parts. Capacity for 24½"-deep shelf: 22 reticle trays, each holding approximately 21 reticles = 462 reticles/shelf.

Reticle Cassettes (Horizontal storage)

Horizontal Reticle & Photomask Storage

These sliding fixtures, made of stainless steel, feature an innovative side-mounting system to increase capacity and guarantee secure positioning.

Reticle mounts are made of clean, smooth HDPE for optimal protection. The 10° slot angles ensure that reticles seat securely. Reticle shelves fully extend on noncontaminating, low-friction runners, providing full parts access. Electropolishing is available for all stainless steel components to meet ultra-clean material requirements. Capacity for 24½"-deep shelf: six drawers with 36 reticles per drawer (@ 7" x ⅝"D each) = 216 reticles.

Tote Box

Tote Boxes

Standard ASD-600™ and FreeFlow™ 600 systems feature three access doors, each with 28" of side-to-side clearance. Nine vertical clearances are available, corresponding to the nine standard system pitches, to accommodate many sizes of tote boxes and other storage containers. Specify other desired door configurations.

Reticle SMIF Pod

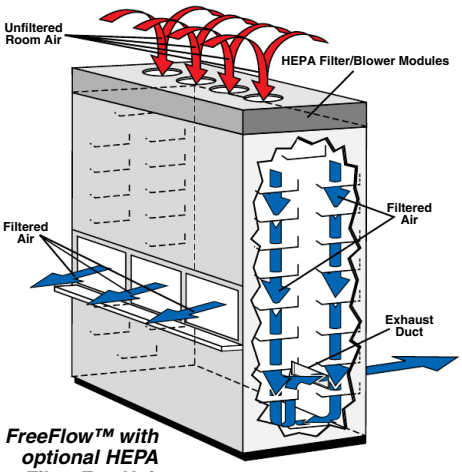
SMIF Pods

Shelves hold reticle and wafer SMIF pods in either single-tier or multiple-tier configurations, depending on shelf pitch and capacity requirements.

Terra also configures ASD-600™ and FreeFlow™ 600 systems for automated inventory updating of SMIF pods, wafer boxes, and similar storage containers. See page 51 for more information.

HEPA/ULPA Filter/Fan Units
For the FreeFlow™ 600

- **Mount on top of a FreeFlow™ 600 system to provide a continuous laminar flow of filtered air**
- **Available with Class 100 HEPA filters (99.99% efficient @ 0.3µm particles) or Class 10 ULPA filters (99.999% efficient @ 0.12µm particles)**
- **Unique plenum chamber design ensures uniform velocity across the entire face of the filter to eliminate turbulence inside the FreeFlow™**
- **Lowest noise and vibration levels of any low-profile fan unit: 50dBA, measured 30" from filter force**
- **Each 2'x4' unit delivers 650 CFM of flow @90 FPM**

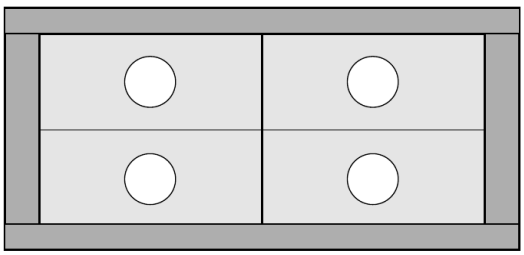


FreeFlow™ with optional HEPA Filter-Fan Unit

HEPA Filter/Fan Units Installed on FreeFlow™ 600

Terra offers these filter/blower modules for use with the FreeFlow™ 600 in facilities without ceiling filters.

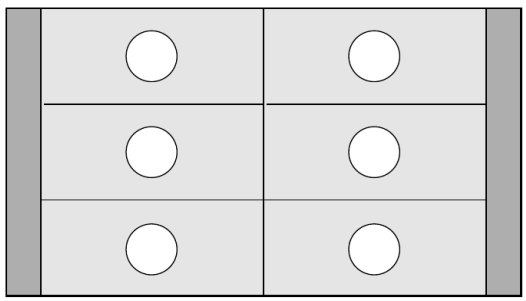
They are installed on top of the FreeFlow™ system to guarantee a continuous vertical laminar flow of filtered air into the storage area. Each module includes an impeller blower mounted in an anodized aluminum housing with a plenum design that ensures a uniform velocity across the face of the filter. Filters are available in two cleanliness ratings: either HEPA filters rated 99.99% efficient with particles down to 0.3µm in diameter; or ULPA filters rated 99.999% efficient with particles down to 0.12µm in diameter. Dimensions: 24" x 48" x 12¼"H (for each module). See page 208 for full specifications.



Top View

Configuration for FreeFlow™ 600, 15½" or 18½" shelf depth
(Price includes installation of four modules as shown)

With HEPA Filter (99.99% @ 0.3µm) Cat. #	With ULPA Filter 99.999% @ 0.12µm) Cat. #
1692-82	**1692-83**



Top View

Configuration for FreeFlow™ 600, 24½" shelf depth
(Price includes installation of six modules as shown)

With HEPA Filter (99.99% @ 0.3µm) Cat. #	With ULPA Filter 99.999% @ 0.12µm) Cat. #
1693-82	**1693-83**

Other FreeFlow™ 600 Options (see also pages 52-53)

Automatic Doors (for FreeFlow™ 600)
These pneumatically controlled doors open and close at the press of a button. Passcode controls allow you to apply security codes for increased product protection. Standard configuration is three doors per system (other configurations also available).

Cat. #/Door **2318-50**

Flip-Up Security Access Counter
Swings up and locks in place over picking windows to prevent unauthorized access.

	Cat. #
Stainless Steel	**1794-34**
Electropolished Stainless Steel	**1794-35**

Perforated Exhaust Base
This exhaust base is ideal for facilities with raised floors. It features 2"-diameter perforations on 5" centers across the base panel (the "floor" of the FreeFlow™ system) to allow unrestricted flow of air from the storage area.

Note: Systems with perforated exhaust bases do not feature perforations on the rear panel.

For FreeFlow™ 600 — Cat. # **1693-85**

Ionizing Bar
Neutralizes static charges in the storage area. Includes 220VAC power supply.

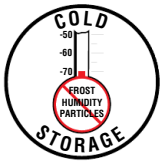
Cat. # **1685-80**

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

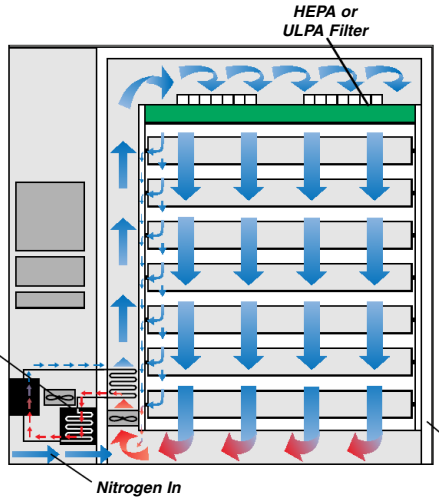
TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Low-Temperature ASD-600™ + Automated Storage/Retrieval System

- First-of-its-kind system adds low-temperature storage capabilities to the standard features of Terra's ASD-600™
- Nitrogen purge gas ensures completely frost-free environment—no matter how cold it gets—for high visibility and low maintenance
- Standard temperature range: ambient to 0°C (lower ranges available)
- Completely isolated closed-loop refrigeration system provides clean, continuous, economical cooling
- Retards chemical processes that can shorten product shelf lives
- Inhibits bacterial growth for sterile storage of medical and pharmaceutical materials
- MAX/MIN feature and data recorder document storage conditions
- Computer interface and optional SECS/GEM compliant software allow automatic part retrieval, inventory updates, and a host of other functions
- Custom sizes and storage fixtures accommodate nearly any application



CE



Energy-efficient refrigeration module and high R-factor, fully encased polyurethane insulation ensure stable sub-freezing temperature. Motor and drive chain are isolated in a separate control module, and optional HEPA filter recirculates nitrogen for enhanced particle control.

*Indicates system option

AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

Extending Shelf Lives, Increasing Yields

Terra Universal's Auto-Strat™ Desiccators (ASDs) bring storage conditions under computer control in a big way. These units organize static-safe, contamination-free, low-humidity storage for literally millions of delicate components, and their fully automated conveyor system keeps track of inventory information as it stocks and retrieves the parts you need.

But what about the temperature-sensitive equipment in your facility? How many materials, whether epoxy preforms or computer components, do you currently store and process at ambient temperatures simply because no method exists to combine refrigeration with precise humidity and contamination control?

Terra Universal's Low-Temperature ASD-600™ now brings a new dimension to the concept of "controlled environment."

Cool, Clear, Clean

The first-ever design of the Low-Temperature ASD-600™ includes a closed-loop cooling system that draws nitrogen through a HEPA filter into a refrigeration unit, where it is brought as low as 0°C. This cold, filtered nitrogen is then returned to the storage area. Because it maintains a constant, uniformly low temperature, this system helps to retard chemical reactions that can diminish the shelf lives of a wide range of materials, from surface mount devices to tissue samples.

And, because the ASD is purged with nitrogen, a dry gas, the storage area remains frost-free regardless of how low the temperature falls. That means that stored components can't be damaged by moisture condensation and that you have clear visibility through all of the access windows—no matter how cold. The use of a dry purge gas also simplifies maintenance procedures.

Wide Range of Applications

This system is ideal for a wide range of applications in industries as diverse as microelectronics and pharmaceuticals. Cold storage prevents oxidation and other chemical reactions that can ruin delicate microcircuits; it is also ideal for storing epoxy preforms that can become distorted at ambient temperatures. In the medical fields, a low temperature is important for storing tissue samples, sterile materials and volatile pharmaceuticals.

The Low-Temperature ASD-600 also gives you the accountability called for in critical applications. The MAX/MIN feature built into these systems displays maximum and minimum temperature values recorded inside the system on an easy-to-read LCD readout, giving you a quick, easy way to ensure that storage specifications are being met. A data recorder provides more detailed documentation of temperature and humidity levels inside the storage area.

Whatever the application, the Low-Temperature ASD-600 combines controlled low temperatures with automated mass storage, making it easy to retrieve the part you need (from among literally thousands) at the press of a button.

Shelves are available out of stainless steel and electropolished UltraClean™ stainless steel. Select solid or perforated shelves to suit stored materials and gas-flow requirements. Shelves accommodate removable stainless steel trays that hold a wide range of components and devices. Terra inlays and dividers form adjustable bins for optimal organization of stored materials.

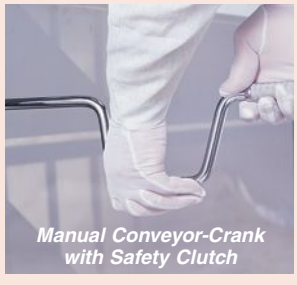
Improved Picking Accuracy, Reduced Picking Time

This system's superior organization of stored parts saves money in more ways than one.

By coding the system's shelves and removable storage trays to your inventory records, you can call up the exact part you need at the press of a button. Optional computer software and bar code equipment improve efficiency even further. Seconds after you enter a part number on a computer keyboard or scan a bar code label, the system brings the desired part to the access area, updates inventory files, documents storage conditions, and performs a host of other user-definable tasks. Several systems can even be linked together in a storage network under control of a single host computer.

See the following page for a complete summary of system options.

Emergency Stop Button


Manual Conveyor-Crank with Safety Clutch

Infrared Safety Beams and safety lock-outs

Low-Temperature ASD-600™ Safety Features

Terra Universal Automated Storage Systems are engineered to operate safely and reliably under the most extreme conditions. Safety features include:

- **Stop/Reset Button:** Pressing this membrane switch immediately halts the conveyor mechanism.
- **Emergency "Panic" Button:** Positioned prominently on the front control panel, this large red button functions as a "panic button" to let an operator stop shelf motion immediately.
- **Infrared Safety Beams:** Four "full time" beams positioned inside the storage area continuously monitor the top and bottom of the access area and the top and bottom of the conveyor loop. If a part protrudes from a shelf, a beam is broken and shelf motion is stopped.
- **Photoelectric Light Curtain:** Once an automatic access door is opened, this integrated array of infrared beams keeps it open for as long as a hand or other object penetrates the storage area.
- **Automatic Door Override:** A safety override prevents shelf motion as long as one of the automatic doors is open.
- **Safety Fuses:** Two fuses provide additional electrical protection.
- **Breaker Switch:** A 30-amp breaker switch automatically trips if any of the shelves should become jammed, thereby protecting the motor.
- **Thermal Overload Switch:** The thermally protected motor automatically stops if excessive current draw threatens to burn it out.
- **Dual Pressure Alarm:** Activates audible and visible alarms if incoming gas line pressure should fall below or exceed pre-set levels.
- **Emergency Gas Back-Up:** Provisions are made to ensure that pneumatic doors remain closed in the event of a gas supply cut-off. Includes brackets for mounting user-supplied nitrogen cylinder, along with all necessary tubing, fittings and controls. (**Note:** An oil-less air compressor may be substituted for the nitrogen cylinder; contact Terra.)
- **Manual Conveyor Override Mechanism:** A safety clutch connected to a hand crank allows an operator to move system shelves in the event of a power failure—without risking injury.
- **Manual Conveyor Safety Shut-Off:** Operating the shelves manually (by means of the manual conveyor mechanism) automatically cuts off power to the automated conveyor system.

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Low-Temperature ASD-600™

Standard Features

Safety Features include microswitches on all front panels, independent mechanical shut-off, infrared detector shut-off, light curtain and automatic door shut-off, features that halt conveyor operation when unsafe conditions exist. See summary on previous page.

100% Hermetically Sealed Environment to guarantee economical contamination and moisture control.

Modular Construction for easy access to all system components, fast servicing and maintenance, and minimal down-time.

Externally Isolated Control Module for enhanced safety and cleanliness.

High-Efficiency Refrigeration System mounted inside the control module includes compressor/condenser and evaporator modules.

Membrane Control Switches bring the desired shelf to the access counter.

Automated Conveyor System retrieves the selected shelf at the press of a key.

Insulated Construction including 3" of polyurethane insulation (5" on -70°C Models) and double-wall, double-pane construction.

Automatic Doors enhance security and reduce contamination risk by restricting access to stored parts. Three doors are standard; other door designs available.

Nitrogen Shield blocks out contaminants while parts are being accessed.

Stainless Steel Access Counter runs the full length of the access area.

Wrist Strap Connectors are located at both ends of the access counter for easy grounding of wrist straps**.**

Automatic Nitrogen Control automatically maintains internal positive pressure with minimal nitrogen waste.

Automatic Humidity Control monitors and controls internal relative humidity level automatically by regulating the flow of nitrogen or clean dry air (CDA).

Dual Pressure Alarm activates audible and visible alarms if incoming gas line pressure rises above or falls below preset levels.

Particle Counter Interface allows easy connection of most particle counters without the need for system modification.

Chart Recorder documents humidity levels and temperatures on a continuous basis to provide completely traceable storage conditions.

Automatic Pressure Relief safely relieves overpressures and functions as a check valve.

Computer Interface is included to allow a single ASD to be controlled by a remote PC.

Front and Side Access Panels allow easy access to the drive mechanism/storage area and visual inspection of all critical components.

Security Features include separate lock-outs for system power and for access doors to guard against unauthorized tampering or access.

Manual Conveyor Override Mechanism includes a clutch to allow safe movement of the conveyor mechanism (and full access to stored material) in the event of a power failure.

Filter/Recirculator Module filters nitrogen or clean dry air inside the ASD through a HEPA filter for enhanced contamination control.

System Options

Shelving Configurations

Shelves come in solid or perforated stainless steel, or UltraClean™ Finish electropolished stainless steel. Reinforced design supports loads to 600 lbs. ***See page 49***

Stainless Steel Trays fit inside storage shelves for organized storage of components. ***See page 50***

Slide-Out Racks accommodate trays to provide fast, convenient access to every square inch of storage space. ***See page 50***

Stainless Steel Inlays and Dividers form adjustable storage bins inside trays for waffle packs and other small components. ***See page 50***

Tote Boxes are available in many sizes and materials. ***See page 50***

Specialized Parts Fixtures hold a wide range of commonly stored parts, including reticles, IC tubes, component carrier reels, tote boxes, and other materials. Just send Terra a sample.

Particle Counter displays particle counts inside the storage area; can be interfaced to chart recorder for complete environmental documentation. ***See page 52***

Nitrogen Generator provides a steady, economical, reliable supply of clean, dry nitrogen for the ASD and other controlled environments. ***See page 52***

Dryex™ Clean Air Dryer ensures a constant source of clean dry air (CDA) for the ASD and other controlled environments. ***See page 52***

Inventory Management Software (IMS) user-configurable software package that allows complete control over ASD operation, including automated inventory tracking and datalogging. ***See page 53***

Personal Identification Readers, including fingerprint and iris recognition systems, authorize access to optimize parts security. See previous page for more details.

Touchscreen Control Panel, simplifies software operation. ***See page 65***

UltraClean™, Electropolished Stainless Steel Finish, is available for system shell and shelves.

Bar Code Reader speeds up sorting times (reducing the chance of contamination), automates product tracking, and simplifies inventory management. ***See page 53***

Ionizing Bars neutralize static charges. ***See page 53***

Spare Parts Kit includes motor control box, IR beam, relays, switches, roller arm assemblies, and other hardware necessary to maintain the Low-Temperature ASD-600.

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AUTOMATED STORAGE/ RETRIEVAL SYSTEMS

Specifications

Construction: Double-wall stainless steel (electropolishing available) with double-glass viewing windows, isolated control module

Controls: Control module contains panels with switches and gauges for nitrogen purge regulation, %RH indication and set-point adjustment, refrigeration control, MAX/MIN display, chart recorder, dual pressure alarm, conveyor UP/DOWN and automatic door controls. Includes keyed lock-out features to control access and shelf movement.

Work Counter: Standard stainless steel finish, grounded, with two grounded wrist strap connectors, fixed at standing position. Dimensions: 100"W x 13"D with 10" of usable counter depth.

Number of Shelves: See chart below.

Power: 220VAC/60Hz, single phase and a dedicated 30 amp electrical supply line.

Motor: 3 HP

Nitrogen: 2 incoming lines regulated at 90 psi each.

Circuit Breaker: 30 amp resettable with integral on/off switch.

Weight Capacity: 600 lbs./shelf; 25,000-lb. system.

Safety Features: See summary side-bar, page 67.

Installation: System must be installed by a trained technician. Requires level floor with adequate foundation.

Humidity Indication:
- Type: LED, 4 digit
- Accuracy (at 20˚ ambient): ± 2% of scale.
- Resolution: ± 0.1% RH
- Temp. Dependence: ± 0.04% RH/ ˚C

Humidity Control Range: 0 to 100% RH

Humidity Sensor Type: Capacitive Film, Fast Response

Chart Recorder

(Datalogger substituted with selection of optional software)

Type: Single analog recording channel

Writing Method: Disposable fiber-tipped red ink cartridge, 3300 feet of trace minimum

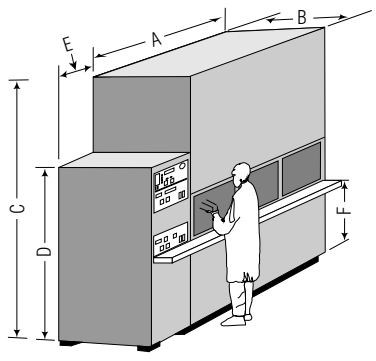
To Order-

1. Select a shelf pitch and depth for your application. Pitch is the distance from the top of a shelf to the top of an adjacent shelf. For shelf clearance, subtract 1.5" from the pitch indicated.

2. Select shelves from ordering chart on page 49. The chart below indicates the number of shelves to specify for each ASD-600™.

3. Select other system options. See pages 50 - 53 for optional accessories, including shelf fixtures, software, and bar code readers.

Note: Custom sizes and configurations are available, including systems with a temperature range down to -70°C. Models below feature all-stainless steel surfaces. To specify electropolishing, add "EP" to the affected part number.



All dimensions are inches

Temp. Range	A	B	C	D	E
to 0°C	127	66	102-120	102	41

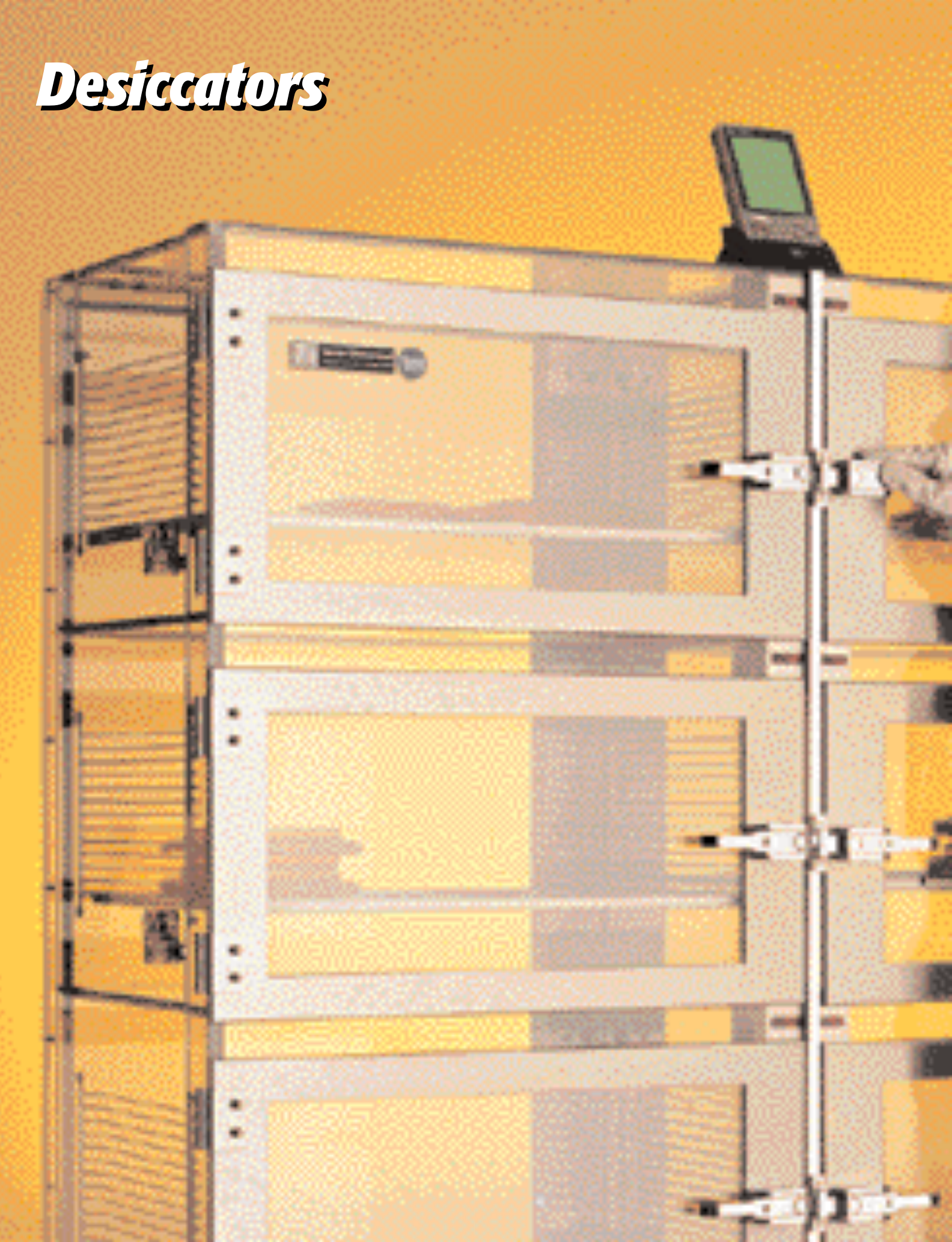
**** Includes 3" of polyurethane insulation encased in double-wall stainless steel panels.***

Low-Temperature ASD-600™ — 0˚ to Ambient (call for other ranges)

For Shelf Depth*	Height	10.5" Pitch No. of Shelves	10.5" Pitch Stainless Steel Cat. #	12.0" Pitch No. of Shelves	12.0" Pitch Stainless Steel Cat. #	13.5" Pitch No. of Shelves	13.5" Pitch Stainless Steel Cat. #	15.0" Pitch No. of Shelves	15.0" Pitch Stainless Steel Cat. #	18.0" Pitch No. of Shelves	18.0" Pitch Stainless Steel Cat. #	22.5" Pitch No. of Shelves	22.5" Pitch Stainless Steel Cat. #
24.5"	102	12	2319-00	—	—	—	—	—	—	—	—	—	—
	108	14	2319-01	12	2319-09	10	2319-15	—	—	—	—	—	—
	114	—	—	—	—	—	—	10	2319-21	8	2319-24	6	2319-27
	120	16	2319-02	14	2319-10	12	2319-16	—	—	—	—	—	—
18.5"	102	12	2319-03	—	—	—	—	—	—	—	—	—	—
	108	14	2319-04	12	2319-11	10	2319-17	—	—	—	—	—	—
	114	—	—	—	—	—	—	10	2319-22	8	2319-25	6	2319-28
	120	16	2319-05	14	2319-12	12	2319-18	—	—	—	—	—	—
15.5"	102	12	2319-06	—	—	—	—	—	—	—			
	108	14	2319-07	12	2319-13	10	2319-19	—	—	—			
	114	—	—	—	—	—	—	10	2319-23	8	2319-26	6	2319-29
	120	16	2319-08	14	2319-14	12	2319-20	—	—	—	—	—	—

**** Order shelves separately; see page 49***

Desiccators



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Why Choose Desiccator Storage?

Desiccator storage has become critical in more and more manufacturing operations. A look at the costly effects of moisture exposure explains why.

As critical components become smaller and more sophisticated, their susceptibility to moisture damage increases.

Once absorbed by sensitive components, water creates a number of potentially disastrous conditions. Even minute traces of oxidation, the most notorious result of moisture exposure, can degrade soldering and other manufacturing processes. Because water dissolves ionic contaminants, it also alters the conductivity of the material, which in turn can degrade electrical function. Water also combines with other materials, causing harmful chemical reactions that degrade pharmaceutical samples and chemical mixtures.

"Popcorn Effect": Moisture Damage in IC Production

One particularly costly example of moisture-related damage is the "popcorn" effect that occurs during reflow soldering of IC packages.

Although the vast majority of integrated circuits are packaged in plastic encapsulants (because they are cheaper than ceramic ones), manufacturers are often unaware of the consequences of using hygroscopic materials in a solder reflow process. Moisture absorbed into the package vaporizes during the rapid heating and generates pressure along the metal-to-plastic contact regions. Differences between the coefficients of thermal expansion of the two materials can cause loss of adhesion, swelling, and cracking. An audible "pop" signals the problem, and testing confirms a deterioration of electrical function.

Because moisture absorption, and with it the likelihood of part failure, is directly related to the duration of exposure, dry storage is an obvious solution to this problem.

Waterlogged Profits — in Many Industries!

Moisture-related damage is also common in package bonding. If the integrated circuit packages have been in inventory for more than six months but inadequately protected against moisture, leads will oxidize, solder joints will fail, and board yields will drop.

Worst of all, the harsh mathematical reality of compounding failure rates in PCB assembly transforms relatively low failure rates among PCB-bound packages into significant failure levels by the time these packages are mounted. As shown on the board yield charts (Figures 1 and 2), assuming a typical complexity of 150 parts, 15% of boards will fail and require costly rework if only one in a thousand packages (1000 PPM) failed during board assembly. With board complexity and competitive yield thresholds on a sharp increase, manufacturers must control moisture exposure at every turn in the processing cycle in order to keep failure levels below this 1000 PPM standard.

Moisture also poses significant risks in other industries as well. High humidity rates facilitate the growth of mold, bacteria, and other microbes, making it an important environmental concern in pharmaceutical, medical, and food processing applications. Biotechnology research that requires controlled moisture removal from DNA samples after protein synthesis also calls for low-humidity storage facilities.

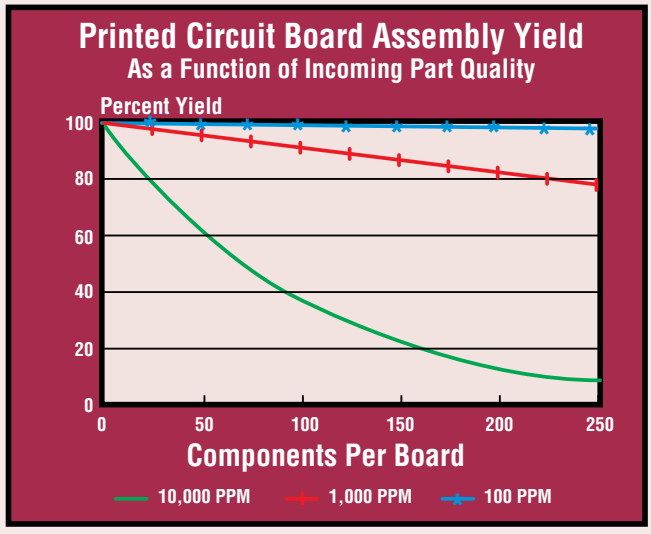


Figure 1

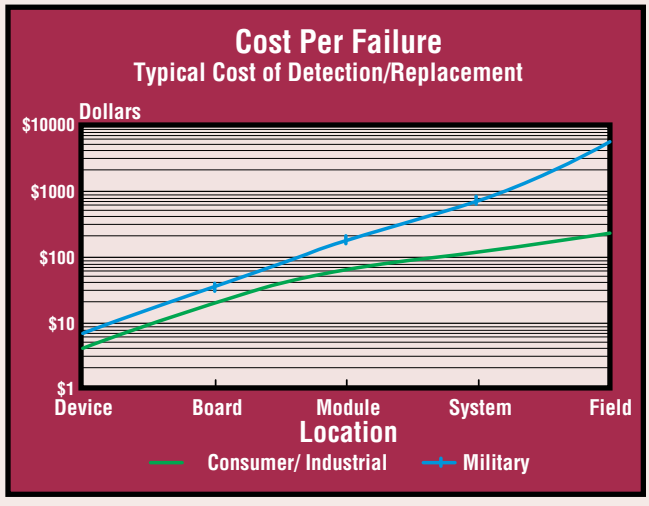


Figure 2

Dwell Effect: Deferred Casualties among the "Walking Wounded"

As bad as these problems are, the damage is worse when it's not immediately detected.

ICs, for example, that have absorbed substantial amounts of water may not show signs of degradation until late in the manufacturing process. These "walking wounded" parts may not fail until they have been shipped to a customer or been installed in increasingly more complex and expensive assemblies.

This deferred "dwell effect" of moisture exposure is perhaps the most economically compelling reason to provide a clean, dry storage environment at every stage of your manufacturing process.

Nitrogen-Purged Desiccators vs. the Alternatives
One common method of dealing with moisture contamination is to remove it prior to each manufacturing step.

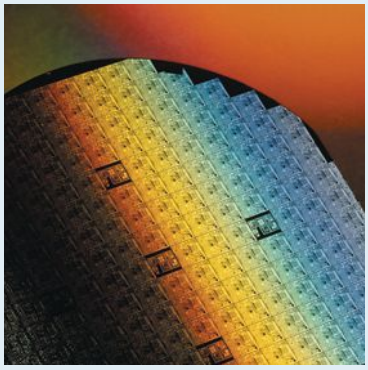
Although vacuum processing and bake-and-bag methods of IC drying accomplish this end, these operations slow down production, particularly if they must be repeated several times in the course of circuit manufacturing. Further, these baking and sealing processes themselves expose parts to thermal extremes that can cause damage.

Desiccant-based dry storage avoids some of these drawbacks, but introduces others. These systems remove moisture from an incoming supply line of air (or other process gas) and often feature dual-tower designs that perform on-line drying and off-line regeneration simultaneously for continuous operation. Such systems can be effective, but they require heating/drying components that may not be reliable. Further, they must be closely monitored to ensure that incoming gas flow remains below a critical humidity threshold. Their complexity and high operating costs makes them prohibitively expensive for long-term storage applications.

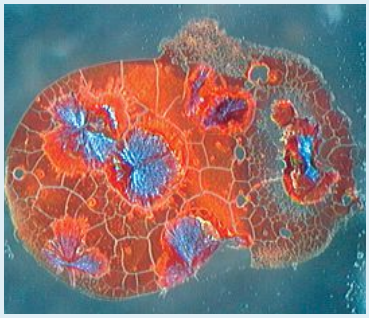
Which Nitrogen Control System is Best?
See page 77 for a system that's right for your application!

As an alternative to desiccant dryers, nitrogen-purged desiccator systems maintain dry conditions relatively cheaply and conveniently.

Moisture Protection in Every Industry—



Semiconductors
Terra manufactures desiccators specially configured for diced ICs, tote boxes, IC carrier reels, and other common microelectronics and electronics parts.



Biological Samples
The dry, inert environment inside a desiccator is ideal for storage of forensic materials, DNA samples, and biological cultures.

Chemical Samples
Desiccators provide an inert gas environment for storing volatile chemicals. They can also be used for slow, controlled drying, and are available with customized heating capabilities.

Pharmaceuticals
Dry storage inhibits growth of organic contaminants and retards other chemical reactions that degrade pharmaceuticals.

Many More!
Clean, dry storage environments for everything from archival records to archeological samples—call to discuss your application!

Terra desiccators also provide complete protection against particles and static charges, making them the ideal environment for your delicate parts.

See the following pages for an overview of Terra's design and fabrication advantages!

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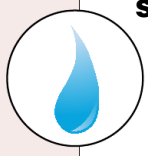
Why Choose a Terra Universal Desiccator?

At first glance, most desiccators look pretty similar. It's not until you put them into service—and fill them with delicate, expensive parts—that differences in quality become apparent.

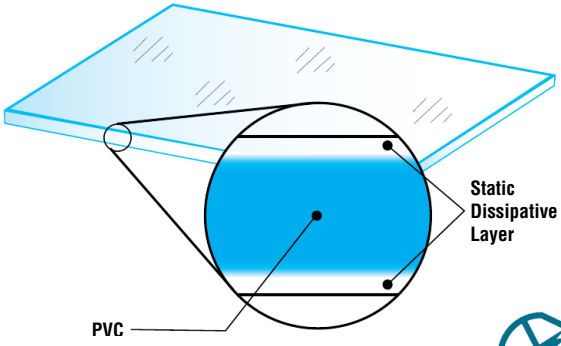
Terra Universal is the world's leading designer and manufacturer of desiccators, with nearly twenty-five years of continuous product innovation. When you invest in a Terra desiccator, you benefit from our experience with literally thousands of systems. Simply put: Terra desiccators function better and function longer—significantly longer.

Compare Terra's Advanced Designs and Fabrication Experience —



Save up to 78% in Nitrogen Costs!

Refer to page 78 to select the right control system for your application.



Accept no substitute!
Unlike inferior products with spray-on coatings, Terra's Static-Dissipative PVC features chemically embedded dissipative layers for durable, reliable performance.

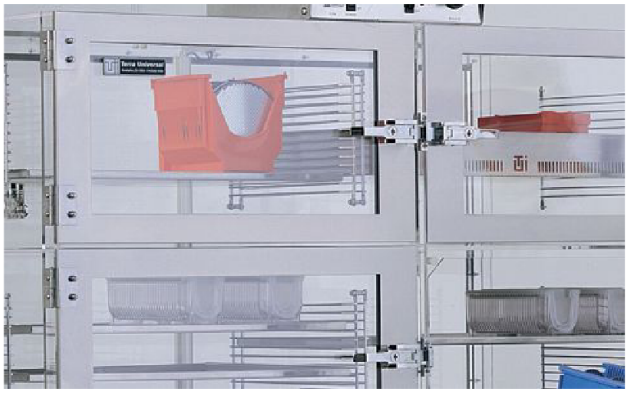
Static-Dissipative PVC — Long-Lasting Protection

Terra uses only Static-Dissipative PVC plate with dissipative layers molecularly bonded during plate manufacturing.

Compare!

Unlike materials with spray-on "Static-Dissipative Coatings" that wear off and have inconsistent thicknesses, Terra's SDPVC features uniformly bonded dissipative layers that resist abrasion, even scratching. Refer to page 596 for extensive test results on the durability of this product. SDPVC desiccators retain their surface resistivity of 10^6 - 10^8 ohms/square indefinitely, protecting your materials against ESD damage.

Further, because this material controls static charges, it also eliminates particle attractions. Surfaces are easier to clean, inside and out!



Doors — The First Failure Point of a Desiccator Cabinet

Terra's full stainless steel door frames offer the strongest door construction in the industry.

Compare!

Terra's stainless steel door frames eliminate the need for internal reinforcements, which create particle surfaces, compromise cleaning, and crack with repeated use. Unlike other doors with glue-on anti-bow pieces, Terra's doors use no adhesives. Their mechanical attachment eliminates particle traps, sources of outgassing—and extends the strength and service life of the desiccator.

Equipped with Terra's heavy-duty hinges, these doors stand up to years of daily use without bowing, cracking, or separating. Further, stainless steel doors are grounded on a standard basis with any stainless steel or static-dissipative desiccator cabinet.

Tamper-proof hinges, available for added security (see page 143)

LiftLatches™ — Outward Action Eliminates Stress on Cabinets and Personnel

Terra's ergonomic lifting latches preserve seals and hinges.

Compare!

Rotary-type "push and twist" latches are hard on both people and cabinets. They violate ergonomic design because they require a twisting motion. They impose lateral torque on door hinges and contribute to premature door failure. As hinges fail, operators naturally apply greater pressure to seal the door, contributing to wear and failure of door seals.

Terra's LiftLatches™ open and seal easily with light pressure applied by a single finger. Their unique external mounting position on stainless steel door frames forms a natural stop that prevents excessive pressure on seals, regardless of how much pressure is applied. Because they have no internal components, they pose no contamination threat to the inside environment.

Each LiftLatch™ also incorporates a lock to enhance product security.

Hollow-formed for better resiliency; mechanically attached to prevent creeping.

One-piece design with fused corners eliminates leaks

Seals — The Barriers between Your Products and Contamination

Terra's unique heat-fused, one-piece gaskets seal far better, far longer.

Compare!

Other cabinets use "weather stripping"-style gaskets attached with double-sided tape. These gaskets creep under long-term use. They lose resiliency and compress quickly. Because they are applied in strips, their joints separate and leak. Adhesives create outgassing problems.

Terra's one-piece "e"-profile gaskets are mechanically attached to stainless steel door frames to prevent creeping, even under heavy use. They are hollow-formed to resist compression and retain their shape. Because corners are heat-fused, they will not separate or leak. This design shields products more effectively against contaminants and also minimizes expensive gas leaks.

Leaks develop as weather stripping creeps.

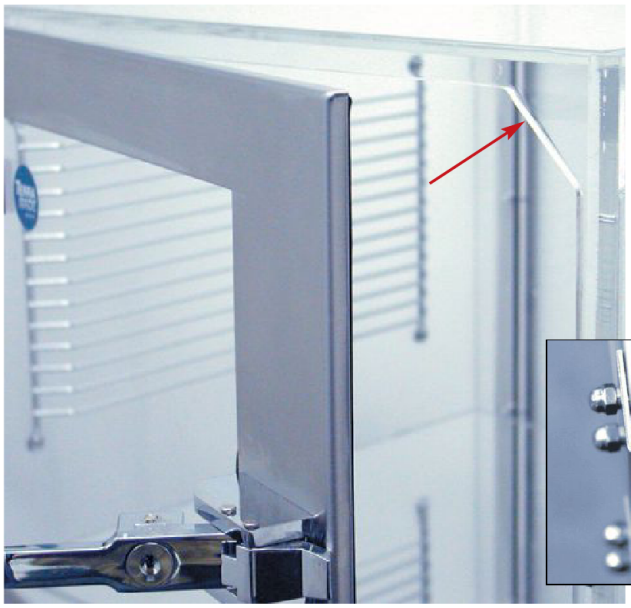
Full Plenum Chambers — Uniform Gas Distribution

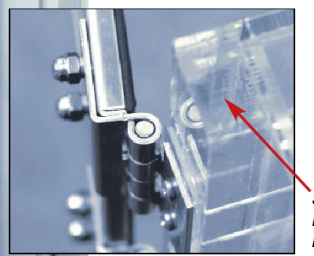
Terra precision-manufactures plenum panels on CNC machines to assure perfect fit and precise hole placement.

Compare!

Terra's standard multi-chamber desiccators include perforated plenum chambers that minimize backfill and ensure uniform gas distribution throughout all storage chambers. Gas pressurizes the plenum chamber before it enters the storage chambers. This design prevents contaminants and moisture from rushing into the rear of a chamber when a door is opened.

Plenum chambers also contribute to the overall strength of Terra desiccators and provide the optimal mounting location for ionizing nozzles.





Stress points—at hinges and latch catches—are externally reinforced by solid bars.

One-Piece Sealing Plate — Increased Strength and Seal Integrity

CNC-machined sealing plates guarantee long-term seals.

Compare!

All Terra desiccators feature one-piece rigid front sealing plates, fabricated by computer numerical control (CNC) routers for absolute precision. This one-piece design ensures that all door gaskets seal uniformly. Unlike cabinets with glued-on sealing panels, this plate is solvent welded to the cabinet, forming a strong, rigid structure. The one-piece design also helps keep the cabinet in alignment, no matter how many chambers it includes.

For additional external strength, Terra cabinets feature 6 x 32 mm solid bar reinforcements at all front corners.

Stainless Steel Shelves and Shelf Supports — Support for Any Load

Terra's adjustable shelves are versatile and strong.

Compare!

To reinforce plastic shelves, Terra offers low-profile stainless steel supports that hold loads up to 130 lbs. without bowing. These supports can also be installed beneath the cabinet ceiling to support heavy process equipment or controls you might position on top of the cabinet.

Terra's stainless steel shelves, adjustable on noncontaminating racks, support loads up to 90 lbs. - more than you're ever likely to place on a single shelf!

Stainless steel shelf (top)
Stainless steel tray (bottom)

Automatic RB® (Relief/Bleed) Valve — Critical Relief

Terra's micro-machined RB® Valve performs two critical functions, and stays out of harm's way.

Compare!

Terra's Automatic RB® Valve provides continuous pressure relief while also functioning as a check valve. By installing one on each desiccator chamber, you ensure that any contaminants that enter through an open door exit out the same chamber and don't migrate to other areas.

Other desiccators use either oil valves, which can contaminate a clean environment, or bulky valves that protrude from cabinets and are subject to impact damage. Terra's latest RB® Valve protrudes less than ½" from the chamber wall. It is designed to fit against the hinge reinforcement bar, so it can't be sheered off.

Care and Cleaning of Terra Desiccator Materials

(See page 636 for chemical compatibility chart.)

Cleaning acrylic and Static-Dissipative PVC Products: These products should be cleaned with clean, lukewarm water and a clean, nonabrasive, noncontaminating cloth. If desired, a mild, nonabrasive detergent may also be used. Use only light pressure when cleaning. If the surface is exceptionally dirty or gritty, "rinse" the surface first by lightly swabbing a saturated cloth over the surface and allowing surfactants to drain away. Avoid rubbing dirt or grit into the surface. Turn the cloth often and replace with a clean cloth frequently. Dry by blotting gently with a clean, dry cloth.

DO NOT USE ketones, aromatics, esters, halogens, window cleaning sprays, kitchen scouring compounds, or solvents (such as acetone, benzene, gasoline, carbon tetrachloride, or thinners). Static-dissipative PVC may be cleaned with alcohol, but avoid touching acrylic surfaces with alcohol because alcohol can cause structural damage to the acrylic.

Characteristics: The acrylic used in Terra desiccators is more rigid than acetates or vinyls, and is much more resistant than glass to thermal shock. The tensile strength of this material is 10,000 PSI at room temperature; however, when continuously loaded, imposed loading should not be allowed to exceed 750 PSI. Although this acrylic can withstand temperatures between -30 and 190 degrees Fahrenheit, it is recommended that temperatures not exceed 160 degrees Fahrenheit for continuous service.

Exposure of acrylic or static-dissipative PVC to direct sunlight may cause the material to warp and distort. Therefore, products should be kept out of direct sunlight.

The self-ignition temperature of acrylic is 830 degrees Fahrenheit (443 degrees Celsius) measured in accordance with ASTM D-1929. The products of combustion, when sufficient air is present, are water and carbon dioxide. However, as with many other common combustible materials, when sufficient air is not present during combustion toxic carbon monoxide will be produced.

For a complete description of the characteristics of Terra Static-Dissipative PVC, see page 596.

Polypropylene is a very light-weight thermoplastic material with considerable strength and outstanding chemical resistance, especially with acids, bases and solvents. It may be used at temperatures up to 130°C (it may be autoclaved).

Rigid PVC is harder and stronger than most other thermoplastics. It is attacked by many organic solvents (ketones, aromatics and some chlorinated hydrocarbons) but it has a very good resistance to oils and a low permeability to gases.

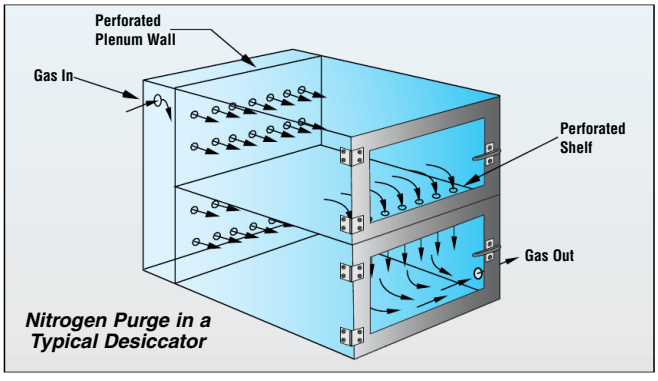
Polycarbonate, commonly known as Lexan®, is virtually unbreakable. It has high tensile strength at temperatures up to 120°C. However, it has poor resistance to solvents, and concentrated acids and alkalis.

Why Use Nitrogen to Purge Moisture from a Desiccator?

Terra offers a comprehensive range of application-specific desiccator cabinets and nitrogen control systems. These performance concepts will help you select the system right for your application.

Nitrogen is the standard medium for contamination-free storage because it is relatively inert—it neither reacts with stored materials nor carries moisture—and because it can be isolated and purified relatively inexpensively.

Desiccator cabinets must be set up so that an appropriate flow of nitrogen forces out all moisture- and contamination-laden air. Because nitrogen has a lower specific gravity than air, it is introduced into the upper section of the desiccator; the heavier air is then purged out of the bottom.

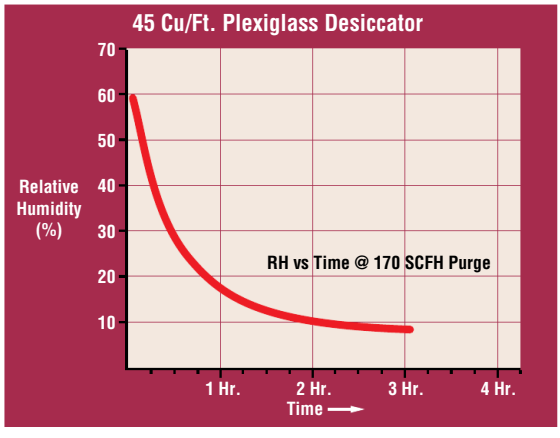


Nitrogen Purge in a Typical Desiccator

Failure to maintain the appropriate nitrogen flow into a desiccator, or to bleed the cabinet effectively, can be devastating. Once inside a desiccator, moisture can penetrate the molecular structure of stored components, requiring baking or vacuum processing.

How Much Nitrogen is Required to Attain a Low-Humidity Set Point?

The amount of nitrogen necessary to attain your set point depends not only on the difference between your set point and the ambient humidity level, but also on the size of your desiccator, how often you open access doors, and how long you leave them open.



Time and N_2 Necessary to Achieve 10% RH

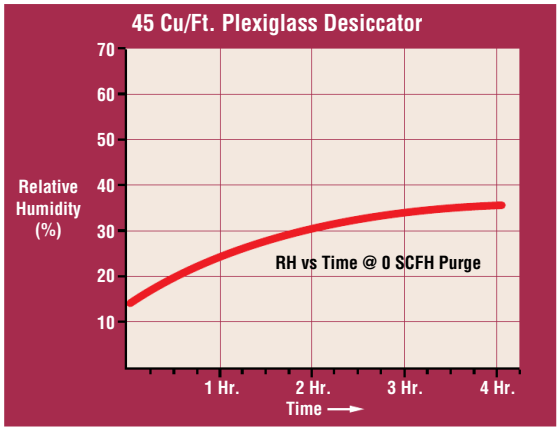
This graph indicates nitrogen consumption in a 45 cubic-foot desiccator. To bring the humidity level down to a set point value of 10% RH from an initial level of 60% (ambient) at 20°C, 340 cubic feet of nitrogen were consumed. The curve is based on a high-flow purge of 170 SCFH delivered by Terra's Dual Purge System. In this test case, the Dual Purge and NitroWatch consumed less than 5 SCFH of nitrogen to maintain the set point of 10% RH once it had been reached, as long as doors remained closed.

Note: These data represent typical desiccator performance but are not intended as guaranteed values. Actual results may vary, depending on other conditions.

How Much Nitrogen is Consumed to Maintain a Low-Humidity Set Point?

Once a set point is attained, the humidity should theoretically remain constant as long as the system is not disturbed. Unfortunately, real-world conditions require humidity monitoring and additional nitrogen purging, for several reasons.

Acrylic, static-dissipative PVC and most other plastics are hygroscopic: they absorb moisture from outside the cabinet and pass it inside. The higher the difference between the external and internal humidity level, and the greater the exposed surface area of the enclosure, the higher the rate at which moisture will enter the chamber—even if it features air-tight seals.
This graph shows the effects of this osmotic pressure on a large (45 cubic-foot) acrylic desiccator. After attaining a set point of 15% RH, the internal humidity level gradually rises to 35% (the ambient humidity level during this test) within four hours—even though all seals are 100% functional. In a more humid ambient environment, this humidity rise would be even more dramatic.



Humidity Equilibration in Permeable Plastic Enclosure

To compensate for this % RH rise, Terra's Dual Purge System provides an economical low-flow purge of about 5 SCFH of nitrogen once the set point is attained.

Recovery Time: Compensating for Parts Access

Another crucial variable affecting humidity stability is the need to access parts inside the desiccator. Each time a door is opened, humidity-laden air, often bearing particles, enters the exposed chamber. Once the door is closed, moisture can migrate from chamber to chamber inside the desiccator, raising the internal RH throughout the cabinet.

In a large, multi-chamber enclosure with a single exit bleed valve, it might take

> ***. . . During periods of frequent parts access, the desiccator may never attain the humidity set point, and parts could be seriously threatened.***

thirty minutes or more to remove this moisture and recover the set point. If another door is opened during this time, this recovery time will be extended. In fact, during periods of frequent parts access, the desiccator may never attain the humidity set point, and parts could be seriously threatened.

These application variables point to the need for an efficient humidity control system. When doors are frequently accessed, a smart purge controller will deliver a high flow to the affected chamber(s), and multiple bleed valves will allow moisture to exit before it can migrate to other chambers. See the following pages for smart humidity control options.

Which Control System is Best for My Application?

Consider these variables when selecting a humidity control system:

- **Humidity Requirement:** Your humidity requirement is the single most important consideration. Extremely low humidity applications (under 10% RH) generally call for one of the smart controllers below.
- **Access:** If you access stored materials frequently, you will need a variable-purge system that can block inrushing air when a door is opened.
- **Nitrogen Expense:** A smart control system conserves nitrogen and reduces costs by up to 78%!
- **Ambient Humidity:** A desiccator in a humid environment requires a more efficient humidity controller than one in an arid environment.
- **Desiccator Size:** Large plastic desiccators typically require more nitrogen, and a more efficient delivery system, than small ones to compensate for the absorption of moisture by the plastic walls.

If for any of these reasons your application requires efficient humidity control, select the SmartDesiccator™ (for small desiccators) or the NitroPlex™ (for large desiccators). See comparison below.

Control System	Relative Humidity Set Point Control (to 0% RH)*	Multiplexed Relative Humidity Monitor/Control (to 0% RH)**	Multiple RH Set Points in a Single Cabinet	Use in Large, Multi-chamber Desiccators	Use in Small Desiccators	Variable N_2 Purge Compensates for Frequent Access	Requires Automatic RB® Valve(s)***
SmartDesiccator™	●				●	●	●
NitroPlex™ System	●	●	●	●		●	Included
Dual Purge™/NitroWatch® Systems	●			●	●	●	●
Dual Purge™ System				●	●	●	●
Flowmeter					●		●

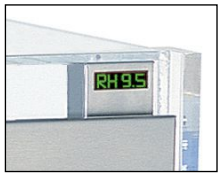
** RH maintained through nitrogen purge; system includes moisture sensor(s).*
*** Nitrogen purge delivered only to chamber that exceeds RH set point.*
**** One recommended per chamber to ensure rapid contaminant purging and fast humidity recovery.*

SmartDesiccator™

Optimal Performance in a Desktop Desiccator—See page 80

Terra's SmartDesiccator™ provides a turnkey dry storage solution for benchtop applications.

Its miniaturized humidity sensor monitors the moisture level and activates a high-flow purge when the relative humidity exceeds the user-selected set point. The use of integrated components makes this compact system easy to set up and maintain. Available in acrylic, static dissipative PVC, or stainless steel.



Miniaturized LED displays current humidity and RH set point

No. 1911-02

Program the desired set point in seconds!

NitroPlex™

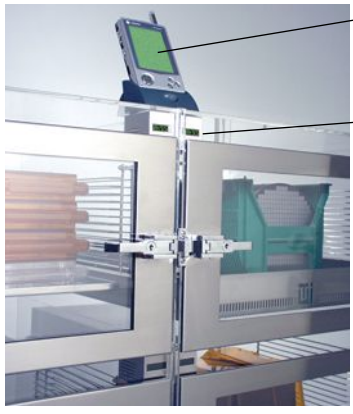
Multiplexed Nitrogen Control—See page 82

The NitroPlex™ is Terra's most efficient humidity control solution.

A NitroPlex desiccator features a miniaturized humidity sensor and display readout in each storage chamber. A gas flow multiplexer delivers a high-flow nitrogen purge only to the chamber that exceeds your set point, and only as long as necessary to remove moisture from that chamber.

This sophisticated system prevents moisture migration, cuts recovery time, and reduces moisture exposure—and risk of part degradation. It also provides the capability of establishing a separate humidity set point in each storage chamber, making it ideal for storing parts with differing moisture sensitivities.

Optional SmartPlex™ hand-held controller simplifies monitor/control operation and allows inventory management.



Optional SmartPlex™ — convenient system control and datalogging

Independent %RH monitor/control in each chamber

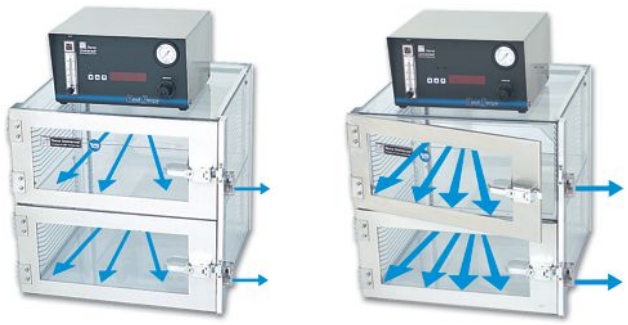
High-Precision Humidity Control!

Dual Purge™ System

Variable Purging—See page 128

The Dual Purge System maintains a low-flow purge when access doors are closed, but automatically activates a high-flow purge when any access door is opened. A time delay maintains the high purge for a user-selectable period after the door is closed.

The Dual Purge is recommended for applications in which humidity monitoring is not required. For additional humidity control, add the NitroWatch, below.



The Variable Purge Advantage:

Low Flow Conserves N_2 when Doors Closed

High Flow Efficiently Purges Moisture when a Door Opens

Dual Purge™ and NitroWatch® Systems

Automated RH Set Point Control—See page 129

The addition of a NitroWatch® control system provides humidity monitoring and control. When the relative humidity level exceeds the set point, the NitroWatch signals the Dual Purge to activate a high-flow nitrogen purge until the set point is attained.

For improved efficiency, select an Automatic RB® Valve for each chamber.

Automated Humidity Control

Low Flow Conserves N_2 when Doors Closed and %RH Under Set Point

High Flow Efficiently Purges Moisture when Doors Opened or %RH Over Set Point

Flowmeter

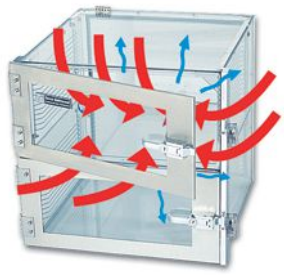
Static Flow Control—Page 132

A simple flowmeter lets you adjust the flow rate of incoming nitrogen, and Terra's Automatic RB® (Relief/Bleed) Valve releases moisture and contaminants.

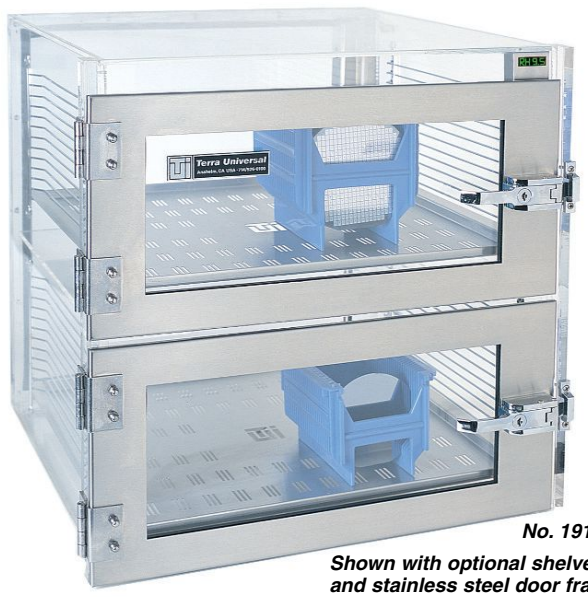
Because the flowmeter delivers only one flow level, it can only deal effectively with one operating condition. A very low flow rate will compensate for the hygroscopic characteristics of a plastic chamber, but will not adequately block inrushing contaminants when a door is opened, nor will it remove these contaminants—including moisture—efficiently. In a large, multi-chamber desiccator, moisture will migrate from chamber to chamber before it exits the cabinet. Each subsequent door opening extends this recovery time.

Expect N_2 waste—and increased N_2 expenses—as a consequence of static flowmeter control.

High Flow Setting:
Blocks Moisture Influx When Doors Open, but Overpressurized Cabinet Wastes N_2 When Doors Closed



Low Flow Setting:
Conserves N_2, but Moisture and Contaminants Not Effectively Purged When Doors Open



No. 1911-17

Shown with optional shelves and stainless steel door frames

No. 1911-02

Program the desired set point in a matter of seconds!

SmartDesiccator™ Benchtop Storage System

- **First-of-its-kind gas control system cuts nitrogen expenses by up to 78%**
- **Automates clean, dry benchtop storage to eliminate moisture-related degradation and optimize yields**
- **Ideal for semiconductor components, biological and pharmaceutical samples, and other sensitive materials**
- **Fully integrated turnkey system takes 30 seconds to install!**

Terra Universal's SmartDesiccator™ maximizes yields of sensitive materials by automatically maintaining a user-determined humidity set point.

Its quick-response feedback system continuously monitors the cabinet's relative humidity level and activates a purge of dry nitrogen only when it is needed. The system thus economizes on gas consumption and minimizes overpressures that can stress cabinet seals. Comparison testing reveals that the SmartDesiccator™ maintains a low relative humidity level using only 22% of the nitrogen required by a flowmeter-based system of the identical size (see sidebar).

The miniaturized LED display and sensor module eliminate the need for external control boxes. This design also simplifies installation—operation requires only one gas and one low voltage power connection.

Stainless steel doors (optional on plastic chambers) restrict the door from flexing or bending, thereby preventing the cracks and fatigue that occur in all-plastic cabinets. The rigidity of the doors also ensures a tight seal between door and frame, minimizing contamination influx and gas leakage. A specially designed lift latch eliminates hinge and door damage caused by the strain of twisting and turning conventional latch systems. The SmartDesiccator™ also incorporates a one-piece, nonadhesive, nonoutgassing gasket specially formulated to retain sealing integrity in extreme low humidity. Because it won't sag or migrate, it extends the service life of the cabinet.

Miniaturized LED monitors humidity and displays set point

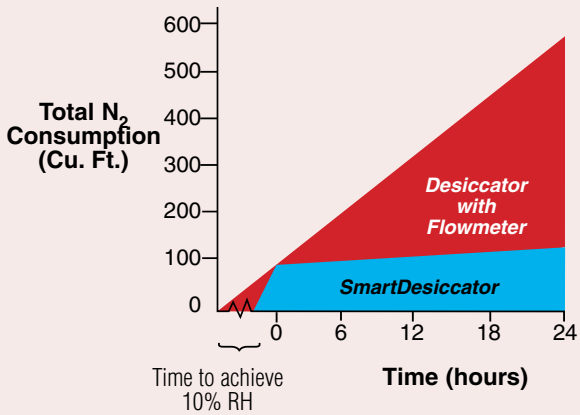
Prices include the humidity control module and sensor. To ensure safe pressure release, order the Automatic RB® Valve. Systems are available in stainless steel, acrylic or transparent static-dissipative PVC, which helps control static charges and the particles they attract.

Smart Performance—and Big Savings!

Testing demonstrates the cost benefit of the SmartDesiccator's automated nitrogen control system.

The test below was conducted on a 24"W x 18"D x 24"H desiccator equipped with a flowmeter and then with a SmartDesiccator™ control system, under the following conditions:

Ambient Humidity: 60% RH Temperature: 70°F RH Setpoint: 10% RH
Test Period: Achieve setpoint and then maintain it for 24 hours
Chamber Access: Door opened once every 30 minutes; remains open for one minute



SmartDesiccator™ (blue line on chart)
To achieve setpoint: 85 cubic feet (required 30 minutes @ 170 CFH on high flow)
Maintain for 24 hrs: 40 cubic feet
Total N_2 Consumed: 125 cubic feet

Desiccator with 0 - 20 SCFH flowmeter (red line on chart)
To achieve setpoint: 85 cubic feet (required over 4 hours @ 20 CFH)
Note: setpoint measured with a hygrometer, since this set up does not monitor humidity level.
Maintain for 24 hrs: 480 cubic feet (24 x 20)
Total N_2 Consumed: 565 cubic feet

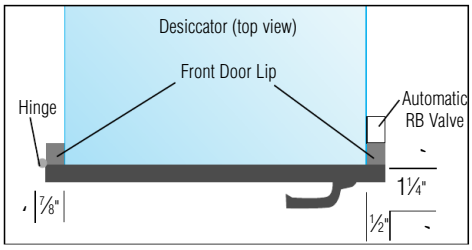
SmartDesiccator™ uses 22% of nitrogen consumed by standard cabinet—a 78% saving!

Plastic SmartDesiccators™

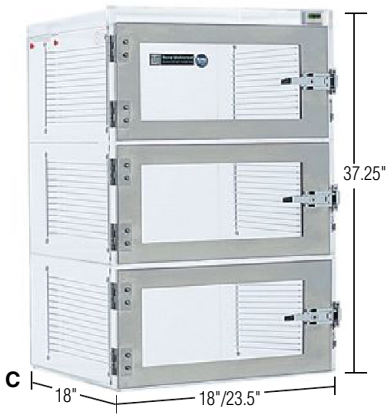
Refer to photos below for nominal dimensions. All models include chrome-plated wire racks that accommodate adjustable shelving (order shelves separately). For safe pressure relief, each cabinet must be equipped with an Automatic RB® (Relief/Bleed) Valve (see ordering information below).

Note: All dimensions are nominal. See "Clearance Dimensions" illustration.

Power Requirements: 110/220VAC, 50/60HZ (universal power supply)
Nitrogen: inlet fitting for ¼"-OD tubing, regulated at 100 psi



Hardware Clearances (add to nominal dimensions)



SmartDesiccator™ and Corresponding Shelves: Select Acrylic or Stainless Steel							Corresponding Options		
Type	Chambers	Overall Dimensions (W x D x H)	Chamber Clearance	Shelf I.D. Clearance	Acrylic Cat. #	Dissipative PVC Cat. #	Acrylic Shelf* Cat. #	Perforated SS Shelf Cat. #	SS Door Frame Cat. #
A	1	12" x 12" x 13.25"	11.25"W x 10.5"H	9.75"W x 9.25"D	1911-15	1911-21	1935-01	1935-02	2200-14
B	2	17.12" x 18" x 25.25"	16.38"W x 10.75"H	14.25"W x 14.5"D	1911-16	1911-22	1976-01	1976-02	2200-61
	2	22.62" x 18" x 25.25"	21.88"W x 10.75"H	19.88"W x 14.5"D	1911-17	1911-23	1977-01	1977-02	2200-60
	2	22.62" x 24" x 25.25"	21.88"W x 10.75"H	19.88"W x 21"D	1911-18	1911-24	1978-01	1978-02	2200-60
C	3	17.12" x 18" x 37.25"	16.38"W x 10.75"H	14.25"W x 14.5"D	1911-19	1911-25	1976-01	1976-02	2200-61
	3	22.62" x 18" x 37.25"	21.88"W x 10.75"H	19.88"W x 14.5"D	1911-20	1911-26	1977-01	1977-02	2200-60

**** Includes stainless steel BowGuard™. For use with acrylic chambers (select stainless steel for dissipative PVC chambers.)***

Stainless Steel SmartDesiccators™

Overall Dimensions 22"W x 20.75"D x 16.625"H

Features front and rear static-dissipative PVC viewing windows, which help control static charges and the particles they collect. Order one Automatic RB® (Relief/Bleed) Valve separately to ensure proper pressure relief. Power: 110/220VAC, 50/60HZ (universal). Nitrogen: inlet fitting for ¼"-OD tubing, regulated at 100 PSI.

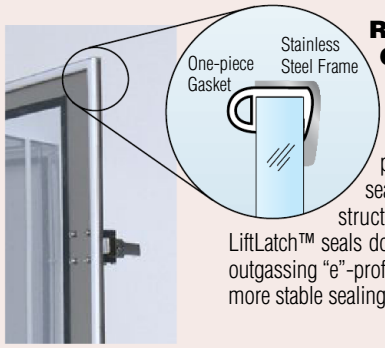
Door Opening: 20.25"W x 14.5"H. Optional Shelf ID: 19.5"W x 19.25"D

	Stainless Steel Cat. #	Electropolished Stainless Steel Cat. #
SmartDesiccator™	**1911-01**	**1911-02**
Perforated Shelf (order racks separately)	**1610-35**	**1611-04-2**
Nonperforated Shelf	**1679-45**	**1611-08-2**
Racks (order two)		**1504-04**

Automatic RB® (Relief/Bleed) Valve

Ensures safe pressure relief and maintains a constant positive pressure inside a nitrogen purged desiccator cabinet. Also serves as a check valve. Price includes installation.

Cat. #
1600-60B



Revolutionary Door and Gasket Design Reduces Wear, Enhances Performance!

Terra's stainless steel door frames reinforce plastic doors to extend service life and improve sealing. Tests show that these frames increase structural rigidity by a factor of five. A built-in LiftLatch™ seals doors without torque that strains hinges. The non-outgassing "e"-profile gasket is attached without adhesive for cleaner, more stable sealing.

NitroPlex™ Humidity Control System

- **Increases desiccator efficiency up to 400% to minimize nitrogen waste and moisture exposure**
- **Senses and displays relative humidity in each desiccator chamber independently for more efficient, cost-effective moisture control**
- **Cuts nitrogen expenses by over 75%**
- **Prevents moisture and contamination migration from one chamber to another**
- **Lets you specify a different humidity set point for each chamber**
- **Automatically delivers a high-flow nitrogen purge only to the chamber where it's needed, and only as long as it's needed to restore RH set point**
- **Ergonomic design allows easy viewing, eliminates chamber lip for easier parts removal**
- **Convenient hand-held computer (optional) monitors humidity conditions in each chamber, facilitates easy set point programming, datalogs chamber RH, and allows stored data to be transferred to a remote PC**
- **Can be integrated into almost any Terra desiccator line** **(See page 85)**

Performance Improvements Spell Big Savings:
NitroPlex™ Cuts N_2 Costs by over 75%, Improves Efficiency by 400%

A desiccator with only one bleed valve may cause more harm than good.

Once an access door is opened, any moisture that enters a cabinet will tend to migrate from one chamber to the next until it exits the cabinet through a bleed valve. In a large, multi-chamber cabinet with only one bleed valve, the moisture may contaminate several chambers.

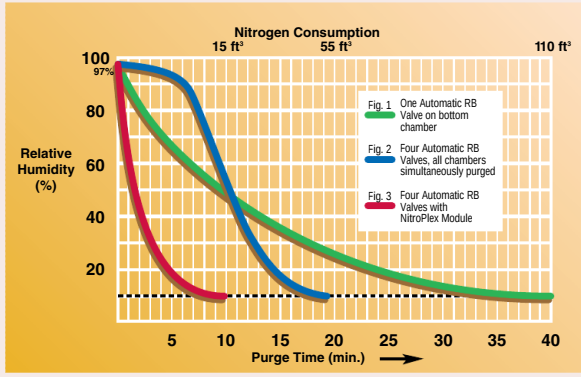
Even a desiccator equipped with Terra Dual Purge™ and NitroWatch® systems may require 40 minutes or more to purge the moisture and recover the desired humidity set point (see test results below). In this test, the top chamber of a four-chamber desiccator was exposed to moisture until the humidity level reached 97%RH. Figure 1 (on graph) represents the desiccator efficiency when it was equipped with a single Automatic RB® Valve located in the bottom chamber. The system required 40 minutes to bring the humidity level down to the 10% set point.

If, during that period, another door is opened, this recovery time will be extended further. Very possibly, the cabinet might fail to reach its programmed RH set point over the course of an entire shift, or even longer.

Simply by installing Terra's Automatic RB® (Relief/Bleed) Valve in each desiccator chamber, you can cut both the system recovery time and the nitrogen consumption in half. This is the test case represented by Figure 2 on the graph. Only 20 minutes—and only half as much nitrogen—were required to bring the humidity level to the set point.

The final test case (Figure 3) included a NitroPlex™ control system. With this set up, the desiccator required only 10 minutes to bring the RH from 97% to the set point level of 10%—only a fourth the time required in the first test. It consumed only 15 cubic feet of nitrogen, only 13% of the amount used in the first test case.

This nitrogen saving alone, nearly 77% in this test, justifies investment in a NitroPlex control system.



RB® Valve Efficiency Enhancement

Nitrogen Consumption	Recovery Time
Fig. 1: 110 ft³	Fig. 1: 40 minutes
Fig. 2: 55 ft³ (100% improvement)	Fig. 2: 20 minutes (100% improvement)
Fig. 3: 15 ft³ (nearly 300% improvement)	Fig. 3: 10 minutes (400% improvement)

Fig. 1: Dual Purge™/NitroWatch® Systems, One Automatic RB® Valve
Moisture migrates through cabinet

Fig. 2: Dual Purge™/NitroWatch® Systems Four Automatic RB® Valves
Moisture migration eliminated

Fig. 3: NitroPlex™ System
Efficient moisture removal, reduced N_2 use

DESICCATORS

CONTROLLED ENVIRONMENT STORAGE

Cuts Nitrogen Costs, Increases Efficiency!

Model shown: No. 3950-36NP, with ten (10) control modules (No. 1911-31) and optional SmartPlex™ computer, stainless steel door frames, and stand.

Miniature LEDs display current humidity and RH set point

Increased Efficiency Lowers Recovery Time, Increases Yields

The NitroPlex™ system provides state-of-the-art automated humidity control to guarantee the integrity of stored components.

Each microprocessor-based multiplexed sensor/display module, one installed in each chamber, enhances desiccator performance and economizes on nitrogen expenses. It contains a miniaturized moisture sensor that reads the internal humidity level within ± 2% of full scale. The LED readout displays this value or the programmable set point for that chamber. The set point is adjustable from ambient to 0% RH (the unit does not increase moisture).

When the humidity climbs above the set point in any chamber, the NitroPlex automatically directs a high-flow purge of clean, dry nitrogen only to the chamber where it is needed, and only for as long as necessary to bring the humidity back below the set point value. An adjustable time delay maintains the high-flow purge for a short period of time—long enough to purge any moisture or contaminants that may have entered—and then shuts off, economizing on nitrogen use.

The Automatic RB® (Relief/Bleed) Valve, installed on each chamber, ensures that moisture and contaminants quickly exit the chamber into which they enter and do not migrate to others. The Automatic RB® Valve thus helps maintain an ideal storage environment while protecting the cabinet against overpressures.

Status alarms are included in each NitroPlex module to warn the user if any door is left open or if the system has been in high purge mode too long, a condition that could indicate an interruption in the gas supply.

All monitor and control functions are duplicated on an optional SmartPlex™ hand-held PC, which docks on top of the desiccator cabinet. This unit includes customizable software that displays chamber readings. Set points can be entered directly via the hand-held PC, and a standard serial interface allows convenient downloading of storage data to a remote PC, providing complete documentation of storage history and environmental conditions. See ordering information below.

This ultra-efficient purging system ensures that your desiccator system maintains the conditions you specify, even during periods of frequent access or very high ambient humidity. Each time a part is accessed and a door closed, the system recovers the desired humidity level in a fraction of the time required by conventional systems (see related sidebar). This reduced recovery time eliminates the risk of moisture-related damage to even the most sensitive parts.

Specifications

Dimensions: (Humidity Module)	1.5"W x 2.75"D x 1.5"H; increases height of affected chamber by 1.25"
Housing Material:	Stainless steel (chamber humidity modules).
Power Requirement:	110VAC, 50/60Hz or 220VAC, 50Hz (universal power supply)
Display:	5-digit LED
Display Resolution:	± 0.1% RH
Sensor Accuracy:	± 2%RH @ 20°C
Measuring Range:	0 - 100% RH
Calibration:	None required for standard accuracy range.

Ordering Information

Desiccators equipped with the NitroPlex™ Humidity Control System are modified to accommodate the display/sensor modules mounted in each chamber. These modules increase the height of each chamber by approximately 1.25", so the height of a 60" five-chamber desiccator, when equipped with the NitroPlex™ system, would increase by 6.25" (1.25" x 5 chambers).

To specify the NitroPlex™ system, simply add the letters "NP" to the part number of the affected desiccator. Then, order one NitroPlex module for each desiccator chamber. See facing page.

Example: Cat. No. 3950-36NP is a NitroPlex™ version of Terra's 10 chamber acrylic Adjust-A-Shelf desiccator #3950-36, located on pg. 90.

NitroPlex™ Module — Cat. # **1911-31**

Includes humidity and door sensor switches, 5-digit LED display, Automatic RB® Valve, and nitrogen control plumbing and electronics. Order one per chamber.

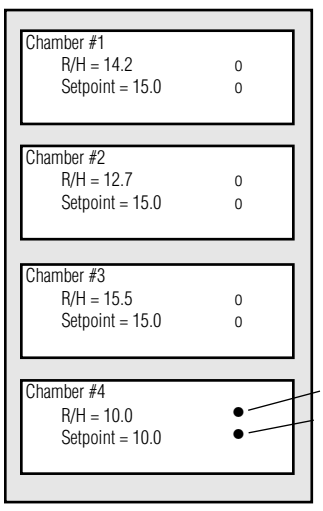
NitroPlex™ Installation — Cat. # **1911-32**

This turnkey charge includes installation of NitroPlex humidity modules and all necessary plumbing and electronics. Order one per cabinet.

SmartPlex™

Hand-Held Monitor/Display Computer

Includes software package customized for the specified desiccator configuration. Provides easy-view monitoring of humidity level, humidity set point, and alarm status in each desiccator chamber. Simplifies programming of separate humidity set point for each desiccator chamber. Includes 12VDC power supply and transformer for operation from 110VAC, 50/60Hz or 220VAC, 50Hz power supply. Serial interface allows downloading of storage data.



SmartPlex™ displays detailed chamber information in one screen

Standard Software Updates Inventory

The SmartPlex™ onboard database software lets you configure the system for your application. You specify number of chambers and contents of each chamber, including detailed information on each product stored (description, part number, quantity and more).

The SmartPlex™ then searches by product name or part number and provides detailed information on quantities on hand, storage history, and environmental conditions. This information can then be downloaded to a remote PC for analysis or print-outs (see facing page).

Cat. # **1911-33**

Portable PC (order separately) allows convenient RH display, programming, database management, and downloading to remote PC

Multi Chamber Activity Report

Date 6/7/01

10 Chamber Desiccator

Chamber Number	R/H Set Point	R/H In Chamber	Door Open/Closed	Time
1.	2%	2%	Open	8:10 a.m.
		14%	Closed	8:15 a.m.
		2%	Closed	8:20 a.m.
2.	10%	10%	Open	12:05 p.m.
		45%	Closed	12:20 p.m.
		25%	Closed	12:21 p.m.
		10%	Closed	12:23 p.m.
3.	1%	1%	Closed	4:00 p.m.
		1%	Open	4:10 p.m.
		50%	Closed	4:15 p.m.
		1%	Closed	4:20 p.m.
4.	2%	1%	Closed	5:10 p.m.
	20%	2%	Closed	5:15 p.m.
		8%	Closed	5:30 p.m.
		15%	Closed	6:10 p.m.
		20%	Closed	7:20 p.m.
		20%	Closed	8:10 p.m.
5.	40%	40%	Closed	10:20 p.m.
	2%	30%	Closed	10:21 p.m.
		20%	Closed	10:22 p.m.
		10%	Closed	10:23 p.m.
		3%	Closed	10:24 p.m.
		2%	Closed	10:25 p.m.
6.	5%	5%	Closed	11:05 p.m.
7.	5%	5%	Closed	11:30 p.m.
		5%	Closed	11:40 p.m.
		5%	Closed	1:05 a.m.
8.	10%	10%	Closed	1:05 a.m.
		10%	Open	1:25 a.m.
		20%	Open	1:26 a.m.
		35%	Open-Alarm	1:27 a.m.
		45%	Open-Alarm	2:30 a.m.
		55%	Open-Alarm	3:30 a.m.
		55%	Open-Alarm	4:30 a.m.
		55%	Closed	5:30 a.m.
9.	15%	15%	Closed	1:20 a.m.
10.	15%	15%	Closed	1:20 a.m.

SmartPlex™ option datalogs access history and environmental conditions for analysis or printing at a remote PC

Specifying NitroPlex™ Capability for Your Application

Convert any of these standard Terra Desiccators to a NitroPlex™ system by adding "NP" to the standard catalog part number.

To complete your order, select one humidity module (Cat. No. 1911-31) per chamber and one installation charge (Cat. No. 1911-32) per chamber. This turnkey charge includes modification of the specified cabinet, including installation of humidity modules (which raise each chamber approx. 1.25"), along with plumbing and electronics.

Adjust-A-Shelf™ Desiccators — page 86

Pass-Through Desiccators — page 93

Tape-and-Reel Desiccators — page 98

Kiticcators™ — page 102

Faraccators™ — page 108

Series 400 Stainless Steel Desiccators — page 122

Custom Performance

Give us your specifications for a customized system with NitroPlex™ control capabilities!

Microccator™ Cat. No. 9010-10

Adjust-A-Shelf™ Desiccator Cabinets (Dry Boxes)

- Durable, efficient nitrogen-purged storage systems from the industry-leading desiccator manufacturer
- Automatically maintains clean, dry, static-safe conditions to reduce part defects and extend product yields
- Optional smart humidity controllers provide unsurpassed efficiency to reduce nitrogen costs and maintain a constant, traceable clean, dry environment—
  - *SmartDesiccators™* incorporate humidity sensor/display module into benchtop cabinets (see page 80)
  - *NitroPlex™* desiccators provide multiplexed nitrogen control for optimal efficiency in larger desiccators (see page 82)
- Unique design and fabrication techniques produce durable, tight-sealing cabinets
- Plenum chamber minimizes backfill, ensures uniform gas distribution
- Optional Automatic RB® (Relief/Bleed) Valve stabilizes internal pressure, protects cabinet doors and seals
- Full line of standardized sizes and components simplifies parts replacement
- Optional stainless steel doors extend cabinet's service life and improve sealing performance
- Chrome-plated racks allow shelf placement at one-inch increments (electropolished stainless steel available—see page 142)
- Locking LiftLatches™ open and close without straining doors, provide lock-out security
- Static-control options protect sensitive materials against ESD
- Grounded rack and door latch and built-in grounding terminals provide additional ESD safety
- Conforms to DOD Handbook 263, MIL-SPEC 1686 and 1772 with selection of proper accessories

No. 3950-45, shown with optional stainless steel doors, shelves, humidity controls, stand.

No. 3950-48, shown with optional stainless steel doors, shelves, humidity controls, stand.

Standard Adjust-A-Shelf™ Desiccator Cabinets

(Model Shown: No. 3950-36 with options)

Transparent Static Dissipative PVC
For full description, see page 596

Humidity Control Systems
SmartDesiccator™—page 80
NitroPlex™—see page 82
Dual Purge & NitroWatch®—page 128

***Dual Purge™ System**
- Maintains positive internal pressure
- Provides low and high purge to save N_2
- Blocks out contamination and moisture
- Activates alarm if door is left open

***NitroWatch®**
- Displays RH level inside desiccator
- Operates with **Dual Purge™ System** to maintain a low humidity level automatically

Grounding terminals ground entire cabinet with a single connection

* Stainless Steel door frame improves sealing, extends service life of cabinet

* Sensor Switches provide reliable control of high- and low-flow purging—rated for over 10 million operations!

Plenum Chamber minimizes backfill, ensures homogeneous positive pressure

***Automatic RB® Valve**
- Reduced size allows mounting in each chamber for improved performance
- Bleeds off excess gas
- Makes cabinet rupture-proof
- Calibrated to maintain the required positive pressure

*One-piece nonadhesive gaskets eliminate flaking, shrinking, slippage; ensure tight seal and prevent sagging

Chrome-Plated Wire Racks support slide-out stainless steel trays and shelves

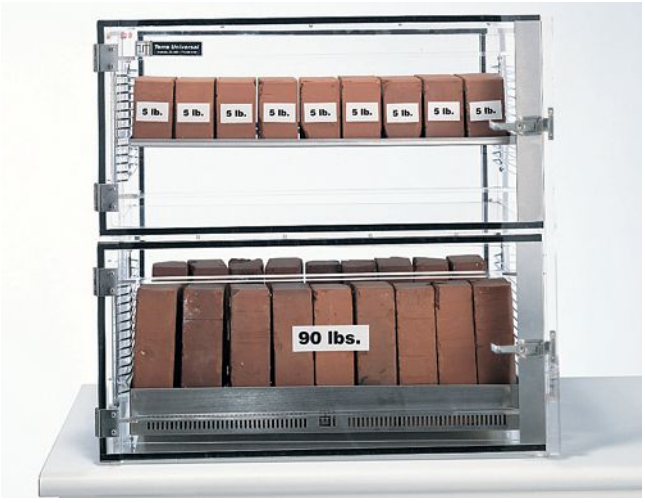
* Stainless steel conductive shelf electrically grounded to protect stored parts and devices against electrostatic discharge

* Grounded door latch discharges the operator before stored components are damaged

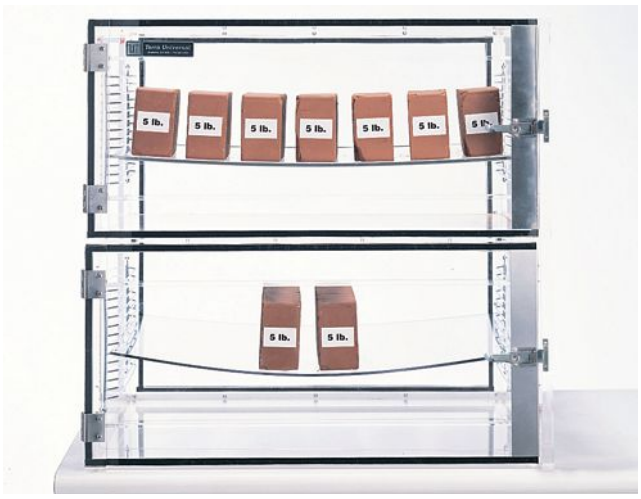
* Stands available in stainless steel, with and without casters

Tamper-proof hinge available

*** Options**—refer to separate catalog listings for full descriptions



Stainless steel shelf (top); stainless steel tray (bottom)



Acrylic shelves shown with and without stainless steel BowGuards

Versatile Shelf Options

All Adjust-A-Shelf desiccators feature chrome-plated wire racks that support a variety of shelves. Shelves can be positioned at ½" increments to accommodate different part sizes; they can also be removed and used as carrying trays. Grounding terminals are included standard on all Static-Dissipative PVC desiccators, allowing you to ground racks and shelves. Grounding is optional on acrylic chambers. Note: Electropolished stainless steel racks are available—see page 142.

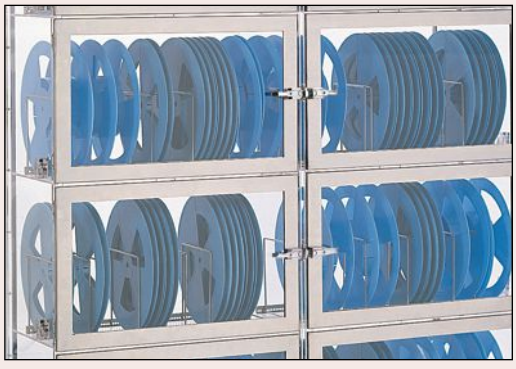
Acrylic shelves feature stainless steel BowGuards™ that support up to 35 lbs.

Stainless steel shelves, which support loads up to 45 lbs., are available with perforations to facilitate gas flow. Their slight depth (½") provides a retaining lip along all edges.

Stainless steel trays are 2⅝" deep and so offer more roomy, secure storage space than shelves. They also provide optimal ESD protection. When grounded stainless steel shelves or trays are placed immediately above each other, they create a Faraday cage that completely blocks out electrostatic charges. Trays are also convenient for carrying parts after they are removed from the desiccator.

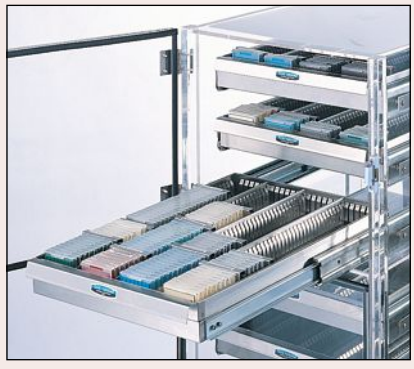
Stainless steel shields are designed to protect plastic chambers from scratching. They are highly recommended for installation on static-dissipative PVC chambers, which can, after repeated scraping and rubbing, lose their dissipative characteristics.

Specialized Shelf Solutions

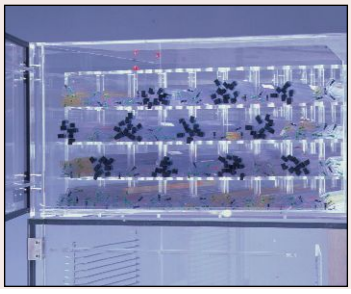


Adjustable Racks for Carrier Reel Storage—see page 98.

Kitting Trays—see page 102.



Slide-Out Drawers—see page 108.



IC Tube Inserts

These versatile storage fixtures adapt a standard Adjust-A-Shelf™ Desiccator chamber for IC tube storage.

Each fixture includes four horizontal shelves (spaced 1¼" apart) with slots that allow vertical insertion of dividing rods. These rods let you form bin sizes to accommodate IC tubes of many dimensions. Select stainless steel shields to prevent scratching (one shield is recommended for each dissipative PVC shelf). Spaces are provided for bin labels.

Fits Desiccator with Shelf ID (in., see pg. 90)	Acrylic	Dissipative PVC	Stainless Steel Shield
	Cat. #	Cat. #	Cat. #
14 ¼ x 14½	**1508-50**	**1508-53**	**1508-56**
19 ⅞ x 14 ½	**1508-51**	**1508-54**	**1508-57**
19 ⅞ x 21	**1508-52**	**1508-55**	**1508-58**

Three Static Control Solutions for Desiccator Storage

Even the slightest static discharge can spell disaster for today's delicate components. Because the dangers of ESD (electrostatic discharge) are amplified in a low humidity environment, Terra strongly urges that you consider these measures as part of your static control program.

1. Static-Dissipative PVC

Acrylic, the most common plastic used in storage enclosures, is a prolific static generator. The act of cleaning an acrylic desiccator with a cleanroom wiper is enough to generate surface charges that can discharge onto semiconductor components. One way to avoid potentially disastrous static damage is to select Static-Dissipative PVC.

This material not only dissipates static charges safely, but it also eliminates the particle attraction that static charges create. Surfaces stay clean, inside and out, making this material perfect for use in Class 1 cleanrooms.

By dissipating static charges, **Static-Dissipative PVC** also eliminates particle attraction, providing an important contamination-control benefit!

Because static-dissipative PVC is transparent and highly durable, it can be used in place of acrylic in nearly any application, desiccators included. It features a surface resistivity of approximately 10^7 ohms per square, placing it in the "dissipative range" (see technical specifications on page 596). It is completely noncontaminating—with no measurable outgassing—and it resists a wide range of chemicals.

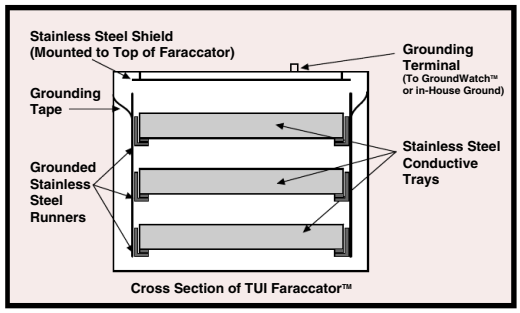
Note: To protect Static-Dissipative PVC surfaces, desiccators made of this material must include stainless steel shields installed at the bottom of each chamber.

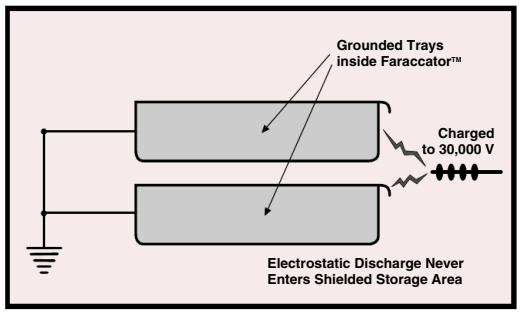
2. Self-Balancing Ionizing Nozzles

By ionizing nitrogen molecules as they pass through the desiccator plenum wall, ionizing nozzles neutralize electrostatic charges on all interior surfaces. They provide practical ESD control for charged nonconductive materials, which cannot dissipate charges to ground. And because they eliminate static attractive forces, they help control contamination: in a statically neutral environment, any airborne particles that enter a desiccator are more likely to remain airborne and to be purged out of the cabinet.

Ionizing nozzles safely neutralize surface charges—see page 140 for complete information.

Terra's self-balancing DC ionizing equipment eliminates problems associated with less sophisticated systems. These nozzles will not charge materials placed too close to them, nor will they generate ozone or RFI. The pulse-width modulating power supply automatically adjusts the stream of positive and negative ions to compensate for charge imbalances detected in the storage area (see page 140 for full specifications).





Faraday cage protects shelf contents against ESD

3. Conductive Shelves, Shields and Trays

For smaller components that can be stored on shelves, Terra's grounded stainless steel shelving provide a 100% ESD-safe enclosure.

As the illustration depicts, grounded conductive plates (such as shelves) create a Faraday cage that prevents penetration of static charges. Because these conductive units are removable, they also protect your sensitive components from ESD as you transport them from one location to another.

Desiccator Grounding

All Terra desiccators made of static-dissipative PVC feature grounding terminals on a standard basis. The surface resistivity of this material (around 10^7 ohms/square) allows controlled dissipation of static charges from any surface in the cabinet, including shelves. Conductive grounding connections safely direct charges to a grounding terminal (standard on SDPVC cabinets; order separately for acrylic cabinets below).

Desiccator Grounding
Includes installation of conductive grounding tape and grounding terminals. Charge is per chamber; quantity should correspond to number of chambers affected. (Included standard on cabinets made of static-dissipative PVC.)

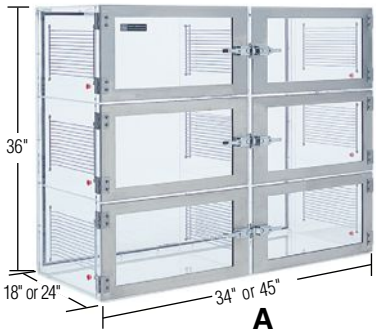
Cat. #
1600-59

Warning: Grounded conductive connectors can create sparking, which can damage sensitive materials. Use of a resistor (not included) is recommended.

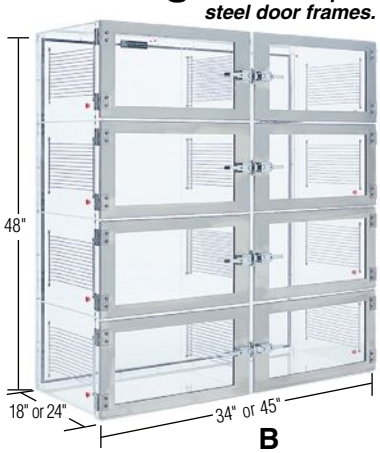
Two Chambers Per Tier
Adjust-A-Shelf™ Desiccators with Interchangeable Shelving

Shelving (including shields and trays) of models listed on these pages can be used interchangeably in any desiccator chamber with the same nominal dimensions.

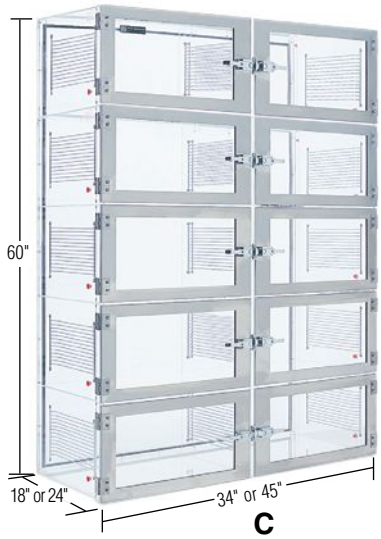
Note: All nominal dimensions exclude front door lip and other hardware. See illustration below. Illustrations below shown with optional stainless steel door frames.



A



B



C

TYPE	Overall Dimensions (W" x D" x H")		No. of Doors	I.D. of Shelves (useable area) (W" x D")	Adjust-A-Shelf™ Desiccators (See page 2 for Terra's crating policy) Static Dissipative* PVC Cat. #	Clear Acrylic Cat. #	Amber Acrylic Cat. #	Corresponding Acrylic Shelves Includes Bow Guard** Cat. #	Stainless Steel Door Frames Select appropriate quantity for your desiccator Cat. #
A	45 x 24 x 36	Two Chambers Per Tier	6	19 7/8 x 21	3950-00	3950-30	3950-60	1978-01	2200-30
A	34 x 18 x 36	Two Chambers Per Tier	6	14 1/4 x 14 1/2	3950-01	3950-31	3950-61	1976-01	2200-31
A	45 x 18 x 36	Two Chambers Per Tier	6	19 7/8 x 14 1/2	3950-02	3950-32	3950-62	1977-01	2200-30
B	45 x 24 x 48	Two Chambers Per Tier	8	19 7/8 x 21	3950-03	3950-33	3950-63	1978-01	2200-30
B	34 x 18 x 48	Two Chambers Per Tier	8	14 1/4 x 14 1/2	3950-04	3950-34	3950-64	1976-01	2200-31
B	45 x 18 x 48	Two Chambers Per Tier	8	19 7/8 x 14 1/2	3950-05	3950-35	3950-65	1977-01	2200-30
C	45 x 24 x 60	Two Chambers Per Tier	10	19 7/8 x 21	3950-06	3950-36	3950-66	1978-01	2200-30
C	34 x 18 x 60	Two Chambers Per Tier	10	14 1/4 x 14 1/2	3950-07	3950-37	3950-67	1976-01	2200-31
C	45 x 18 x 60	Two Chambers Per Tier	10	19 7/8 x 14 1/2	3950-08	3950-38	3950-68	1977-01	2200-30
D	22 5/8 x 24 x 24	One Chamber Per Tier	2	19 7/8 x 21	3950-09	3950-39	3950-69	1978-01	2200-60
D	17 1/8 x 18 x 24	One Chamber Per Tier	2	14 1/4 x 14 1/2	3950-10	3950-40	3950-70	1976-01	2200-61
D	22 5/8 x 18 x 24	One Chamber Per Tier	2	19 7/8 x 14 1/2	3950-11	3950-41	3950-71	1977-01	2200-60
E	22 5/8 x 24 x 36	One Chamber Per Tier	3	19 7/8 x 21	3950-12	3950-42	3950-72	1978-01	2200-60
E	17 1/8 x 18 x 36	One Chamber Per Tier	3	14 1/4 x 14 1/2	3950-13	3950-43	3950-73	1976-01	2200-61
E	22 5/8 x 18 x 36	One Chamber Per Tier	3	19 7/8 x 14 1/2	3950-14	3950-44	3950-74	1977-01	2200-60
F	22 5/8 x 24 x 48	One Chamber Per Tier	4	19 7/8 x 21	3950-15	3950-45	3950-75	1978-01	2200-60
F	17 1/8 x 18 x 48	One Chamber Per Tier	4	14 1/4 x 14 1/2	3950-16	3950-46	3950-76	1976-01	2200-61
F	22 5/8 x 18 x 48	One Chamber Per Tier	4	19 7/8 x 14 1/2	3950-17	3950-47	3950-77	1977-01	2200-60
G	22 5/8 x 24 x 60	One Chamber Per Tier	5	19 7/8 x 21	3950-18	3950-48	3950-78	1978-01	2200-60
G	17 1/8 x 18 x 60	One Chamber Per Tier	5	14 1/4 x 14 1/2	3950-19	3950-49	3950-79	1976-01	2200-61
G	22 5/8 x 18 x 60	One Chamber Per Tier	5	19 7/8 x 14 1/2	3950-20	3950-50	3950-80	1977-01	2200-60
H	12 x 12 x 12	One Chamber Per Tier	1	9 3/4 x 9 1/4	3950-21	3950-51	3950-81	1935-01	2200-14

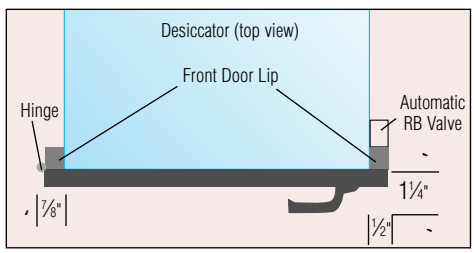
**** Constructed of transparent static-dissipative PVC; removable back wall made of nondissipative material.***
***** For use in acrylic cabinets. Select stainless steel shelves for use with static-dissipative PVC cabinets.***

Better Doors—Long-Lasting Cabinets!

Locking LiftLatches™—Standard on all models, these noncontaminating, durable lifting latches operate without straining hinges.

Stainless Steel Door Frames—Lend strength and rigidity to plastic doors!

One-Piece, Nonadhesive Gaskets—Standard with stainless steel frames, these durable gaskets eliminate adhesives and won't creep. ***We now make them white so that dirt can't hide!***



Hardware Clearances (add to nominal dimensions)

One Chamber Per Tier

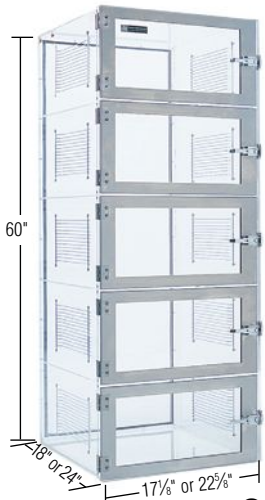
H

D

Illustrations below shown with optional stainless steel door frames.

E

F



G

Corresponding Stainless Steel Shelves**				Corresponding Stands (leveling feet included) (see information on casters at right)		Other Options (See page 126)
Perforated Shelf Cat. #	Non-Perforated Tray Cat. #	Non-Perforated Shelf Cat. #	Non-Perforated Shield Cat. #	Stainless Steel 4" High Cat. #	Stainless Steel 12" High Cat. #	
1978-02	1978-04	1978-05	1978-06	1740-92A	1740-56A	
1976-02	1976-04	1976-05	1976-06	1740-94A	1740-60A	
1977-02	1977-04	1977-05	1977-06	1740-96A	1740-64A	
1978-02	1978-04	1978-05	1978-06	1740-92A	1740-56A	
1976-02	1976-04	1976-05	1976-06	1740-94A	1740-60A	
1977-02	1977-04	1977-05	1977-06	1740-96A	1740-64A	
1978-02	1978-04	1978-05	1978-06	1740-92A	1740-56A	
1976-02	1976-04	1976-05	1976-06	1740-94A	1740-60A	
1977-02	1977-04	1977-05	1977-06	1740-96A	1740-64A	
1978-02	1978-04	1978-05	1978-06	1740-44A	1740-80A	
1976-02	1976-04	1976-05	1976-06	1740-48A	1601-10A	
1977-02	1977-04	1977-05	1977-06	1740-52A	1740-88A	
1978-02	1978-04	1978-05	1978-06	1740-44A	1740-80A	
1976-02	1976-04	1976-05	1976-06	1740-48A	1601-10A	
1977-02	1977-04	1977-05	1977-06	1740-52A	1740-88A	
1978-02	1978-04	1978-05	1978-06	1740-44A	1740-80A	
1976-02	1976-04	1976-05	1976-06	1740-48A	1601-10A	
1977-02	1977-04	1977-05	1977-06	1740-52A	1740-88A	
1978-02	1978-04	1978-05	1978-06	1740-44A	1740-80A	
1976-02	1976-04	1976-05	1976-06	1740-48A	1601-10A	
1977-02	1977-04	1977-05	1977-06	1740-52A	1740-88A	
1935-02	1935-04	1935-05	1935-06	—	1605-09A	

Cat. #
1606-61 **Dual Purge™ System**
1600-49 **Dual Purge™ Sensor Switches** (one/desiccator door required)
1600-60B **Automatic RB® Valve**
9500-00A **NitroWatch®**
9500-02A **NitroWatch® Sensor** (one/desiccator required)
1700-44 **Casters** (Heavy-duty, low-profile, set of 4, including 2 with brakes)

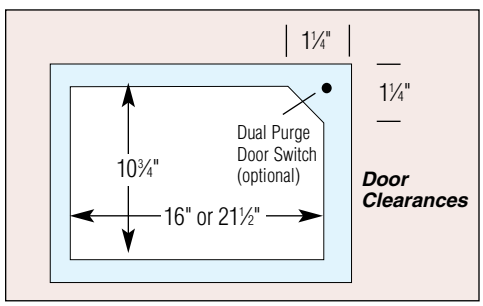
*** Price for a shelf, shield, or tray of a given size is the same. To order electropolished stainless steel shelving, add "EP" to the catalog no. and 30% to the price.*

Smart Humidity Controllers Save Nitrogen and Increase Yields!

SmartDesiccator™—turnkey benchtop system incorporates humidity sensor and gas controls. See page 80.

NitroPlex™—multiplexed humidity monitoring and nitrogen control delivers gas purge only to the chamber that needs it, and only until the humidity setpoint is reached. See page 82.

Smart Desiccator™



Door Clearances

Wafer Box Desiccator

- **Preserves moisture-sensitive wafers in a dry, particle-free environment**
- **Automated nitrogen controls maintain user-selected humidity level (ambient down to 0% RH)**
- **Engineered for optimal storage density of 200mm or 300mm wafers (in most standard cassettes and lot boxes)**
- **Available in strong, rigid acrylic or static-dissipative PVC, which protects against static charges and the particles they attract**
- **Advanced construction features include plenum chamber, stainless steel door frames, locking LiftLatches™, and one-piece front sealing panel**

These Wafer Desiccators are designed specifically for standard lot boxes used for 200mm and 300mm wafers.

Advanced Construction for Unsurpassed Performance

Like Terra's other desiccator lines, they feature the most advanced features available for performance and durability.

All cabinets are designed and fabricated using the latest-generation CAD/CNC equipment, ensuring the perfect form and fit required for optimal sealing. Because all system components are standardized, replacement and optional parts can be ordered at any time. Cabinets feature a plenum chamber for even gas distribution. See pages 78-79 for information on humidity controllers.

No. 9130-21 (for 200mm wafer carriers), shown with optional stainless steel door frames, humidity controllers, and stand.

Custom designs available for any wafer box or other carrier size—Just let us know your requirements!

No. 9130-23 (for 300 mm wafers), shown with optional stainless steel door frames.

For optimal sealing and extended service life, select Terra's optional stainless steel door frames, which reinforce the plastic doors and improve seals. Stainless steel door frames include one-piece nonadhesive gaskets guaranteed not to sag or migrate, even in an ultra-dry environment. See page 144 for more information on these options.

Locking LiftLatches™, standard with each cabinet, allow contents to be securely locked. They also remove wear from doors and hinges by eliminating the rotary stress caused by conventional latches. Latches and tamper-proof hinges are chrome plated for cleanliness and durability.

Other Wafer Storage Systems Available

Refer to these pages for more information on other Terra Universal wafer storage enclosures:

Series 300 Stainless Steel Desiccator
Please see page 121

Wafer Storage Cabinet
Please see page 158

Casters — Cat. # **1700-44**
Set of 4, including 2 with brakes. See page 145.

Wafer Box Desiccator							Corresponding Options	
Wafer Size (See notes below)	**Dimensions (O.D., nominal)** W" x D" x H"	**Chamber Clearance** W" x D" x H"	**No. of Chambers**	**Capacity**	**Acrylic** Cat. #	**Dissipative PVC** Cat. #	**Stainless Steel Door Frame[3]** Cat. #	**Stand[4] (levelers raise 4")** Cat. #
200mm	53.50 x 25.14 x 60.88	25.62 x 22.62 x 10.87	10	40[1]	**9130-20**	**9130-24**	**9130-28**	**9130-30**
200mm	26.88 x 25.14 x 60.88	25.62 x 22.62 x 10.87	5	20[1]	**9130-21**	**9130-25**	**9130-34**	**9130-31**
300mm	38.00 x 26.50 x 63.25	18.00 x 24.00 x 14.50	8	16[2]	**9130-22**	**9130-26**	**9130-29**	**9130-32**
300mm	19.00 x 26.50 x 63.25	18.00 x 24.00 x 14.50	4	8[2]	**9130-23**	**9130-27**	**9130-35**	**9130-33**

[1] Based on box size of 10.75"W x 10.94"D x 9.88"H (Empac No. TR-08A). Capacity based on four boxes per chamber.
[2] Based on box size of 15.06"W x 10.5"D x 12.81"H (Empac No. SX300 01). Capacity based on two boxes per chamber.
[3] Extends service life of cabinet (see page 74). Order one per chamber.
[4] Stainless Steel. Order casters above.

Adjust-A-Shelf™ Pass-Through Desiccators

- **Front and rear access doors allow pass-through operations into a cleanroom or stockroom**
- **Advanced construction techniques optimize seals to maintain a positive pressure and extend shelf-life of stored materials**
- **Select fool-proof stainless steel interlock mechanism to limit access to one door per chamber at any time**
- **Optional stainless steel doors extend the service life of the desiccator**
- **Shelves adjust on chrome-plated racks to accommodate different sizes of stored materials**

Pass-Through desiccators are ideal for dual-side access. See page 122 for stainless steel models.

These storage cabinets provide the same controlled environment as our standard Adjust-A-Shelf Desiccator, but add pass-through versatility.

Humidity Control Systems
SmartDesiccator™—page 80
NitroPlex™—see page 82
DualPurge™ & NitroWatch®—page 128

Easy Access in Many Applications

They are easy to install in a cleanroom or stock room wall, or you can position Pass-Through Desiccators side-by-side in an assembly area to form a room divider that allows dual access to stored materials from both aisles.

Whatever the application, these cabinets help safeguard stored materials from damage associated with particles, moisture and static. Constructed of acrylic or Static-Dissipative PVC, they feature easy-open doors and one-piece wall construction to minimize the problem of peeling or sagging gaskets and to ensure a continuous seal. All seams are solvent-welded to eliminate the problems of outgassing, and all hardware is chrome plated or stainless steel.

Completely Automatic Nitrogen and Humidity Controls

Each cabinet features an inlet to allow the introduction of nitrogen purge gas, and an outlet for easy installation of Terra's Automatic RB® (Relief/Bleed) Valve, which guards against overpressures and functions as a check valve. The optional Dual Purge™ System and NitroWatch® enhance system performance by automatically regulating the gas purge to maintain any subambient moisture level you require, down to 0% RH. A plenum chamber ensures uniform gas distribution.

Standardization

Terra Universal has standardized its desiccator storage systems and accessories to offer you the most flexible, economical solutions available. Shelves are available in acrylic (with stainless steel bow guards) and solid or perforated stainless steel (see information on load capacities on page 88).

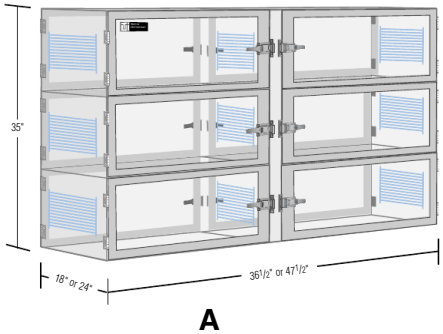
No. 2149-26, shown with optional Dual Purge and Nitro Watch Controllers, shelves, Automatic RB® Valves, and trays

Two Chambers Per Tier
+Adjust-A-Shelf™ Pass-Through Desiccators

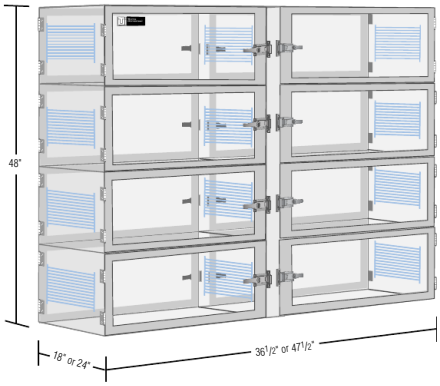
(Plenum chamber in the center accommodates gas control instrumentation.)

Note: Nominal dimensions (indicated on the sketches below) do not include door lip or other clearance requirements. See clearance illustration below for wall cut-out dimensions. To install, simply slide the desiccator into a cut-out of the specified size. Mounting hardware listed below provides ample support in most applications. Door frames shown are optional.

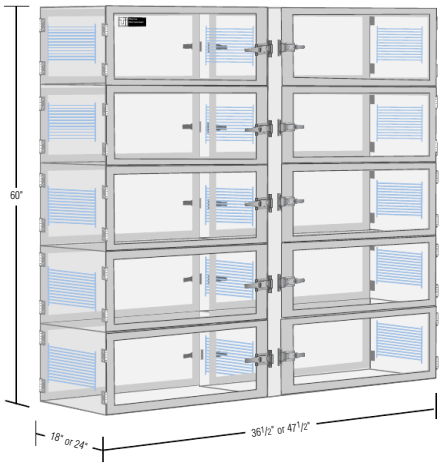
See page 216 for Terra's full line of Cleanroom Pass-Throughs.



A



B



C

Specifications				Adjust-A-Shelf™ Pass-Through Desiccators with Plenum (See page 2 for Terra's crating policy)			Corresponding Plexiglass Shelf	Stainless Steel Doors
TYPE	Nominal Dimensions (W" x D" x H") (See note above)	No. of Doors	I.D. of Shelves (W" x D")	Static Dissipative PVC* Cat. #	Clear Acrylic Cat. #	Amber Acrylic Cat. #	Includes Bow Guard** Cat. #	Select appropriate quantity for your desiccator Cat. #
A	47½ x 24 x 36	12	19⅞ x 21	2149-00	2149-20	2149-40	1978-01	2200-30
A	36½ x 18 x 36	12	14¼ x 14½	2149-01	2149-21	2149-41	1976-01	2200-31
A	47½ x 18 x 36	12	19⅞ x 14½	2149-02	2149-22	2149-42	1977-01	2200-30
B	47½ x 24 x 48	16	19⅞ x 21	2149-03	2149-23	2149-43	1978-01	2200-30
B	36½ x 18 x 48	16	14¼ x 14½	2149-04	2149-24	2149-44	1976-01	2200-31
B	47½ x 18 x 48	16	19⅞ x 14½	2149-05	2149-25	2149-45	1977-01	2200-30
C	47½ x 24 x 60	20	19⅞ x 21	2149-06	2149-26	2149-46	1978-01	2200-30
C	36½ x 18 x 60	20	14¼ x 14½	2149-07	2149-27	2149-47	1976-01	2200-31
C	47½ x 18 x 60	20	19⅞ x 14½	2149-08	2149-28	2149-48	1977-01	2200-30
D	18⅜ x 18 x 24	4	14¼ x 14½	2149-09	2149-29	2149-49	1976-01	2200-61
D	23⅞ x 24 x 24	4	19⅞ x 21	2149-10	2149-30	2149-50	1978-01	2200-60
E	23⅞ x 24 x 36	6	19⅞ x 21	2149-11	2149-31	2149-51	1978-01	2200-60
E	18⅜ x 18 x 36	6	14¼ x 14½	2149-12	2149-32	2149-52	1976-01	2200-61
E	23⅞ x 18 x 36	6	19⅞ x 14½	2149-13	2149-33	2149-53	1977-01	2200-60
F	23⅞ x 24 x 48	8	19⅞ x 21	2149-14	2149-34	2149-54	1978-01	2200-60
F	18⅜ x 18 x 48	8	14¼ x 14½	2149-15	2149-35	2149-55	1976-01	2200-61
F	23⅞ x 18 x 48	8	19⅞ x 14½	2149-16	2149-36	2149-56	1977-01	2200-60
G	23⅞ x 24 x 60	10	19⅞ x 21	2149-17	2149-37	2149-57	1978-01	2200-60
G	18⅜ x 18 x 60	10	14¼ x 14½	2149-18	2149-38	2149-58	1976-01	2200-61
G	23⅞ x 18 x 60	10	19⅞ x 14½	2149-19	2149-39	2149-59	1977-01	2200-60

Two Chambers Per Tier (A, B, C) / One Chamber Per Tier (D, E, F, G)

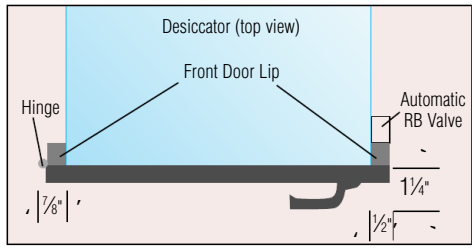
**** Constructed of transparent static-dissipative PVC; removable back wall made of nondissipative material.***
***** For use in acrylic cabinets. Select stainless steel shelves for use with static-dissipative PVC cabinets.***

Better Doors—Long-Lasting Cabinets!

Locking LiftLatches™—Standard on all models, these noncontaminating, durable lifting latches operate without straining hinges.

Stainless Steel Door Frames—Lend strength and rigidity to plastic doors!

One-Piece, Nonadhesive Gaskets—Standard with stainless steel frames, these durable gaskets eliminate adhesives and won't creep. ***We now make them white so that dirt can't hide!***



Hardware Clearances (add to nominal dimensions)

One Chamber Per Tier
Adjust-A-Shelf™ Pass-Through Desiccators

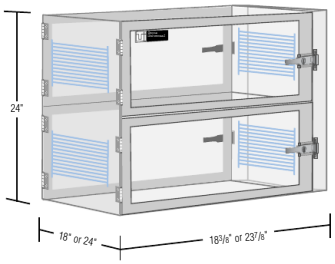
See pages 122 and 216 for additional line of pass-through chambers suitable for other applications.

(Right-side plenum chamber accommodates gas control instrumentation.)

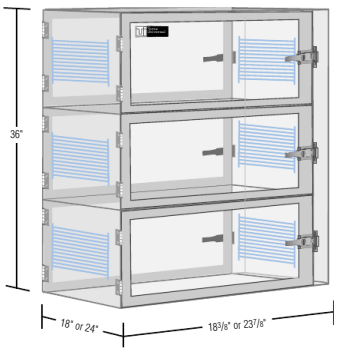
All illustrations shown with optional stainless steel door frames.

Stainless Steel Interlock
Limits access to one side at a time to prevent cross contamination. One unit required for each chamber (price includes installation).

Cat. #
9208-00

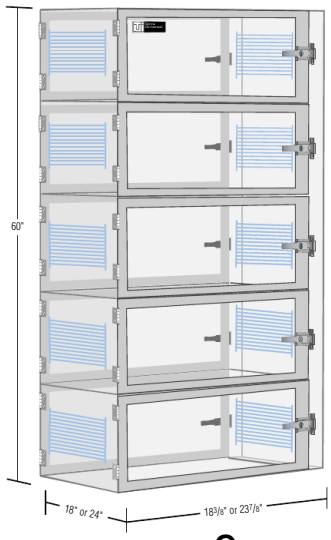


D



E

F

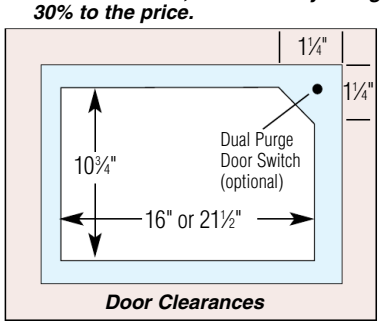


G

Corresponding Stainless Steel Shelves*					Mounting Hardware (Stainless Steel)	Corresponding Stands (Stainless Steel)		Other Options
Perforated Shelf Cat. #	Perforated Shield Cat. #	Non-perforated Tray Cat. #	Non-perforated Shelf Cat. #	Non-perforated Shield Cat. #	Brackets & Supports For wall installation. Allow ½" clearance along perimeter for cut-out Cat. #	Includes leveling feet 4" High Cat. #	Includes leveling feet 12" High Cat. #	
1978-02	1978-03	1978-04	1978-05	1978-06	2149-60	2149-74A	2149-75A	
1976-02	1976-03	1976-04	1976-05	1976-06	2149-61	2149-76A	2149-77A	
1977-02	1977-03	1977-04	1977-05	1977-06	2149-60	2149-78A	2149-79A	
1978-02	1978-03	1978-04	1978-05	1978-06	2149-62	2149-74A	2149-75A	
1976-02	1976-03	1976-04	1976-05	1976-06	2149-63	2149-76A	2149-77A	
1977-02	1977-03	1977-04	1977-05	1977-06	2149-62	2149-78A	2149-79A	
1978-02	1978-03	1978-04	1978-05	1978-06	2149-64	2149-74A	2149-75A	
1976-02	1976-03	1976-04	1976-05	1976-06	2149-65	2149-76A	2149-77A	
1977-02	1977-03	1977-04	1977-05	1977-06	2149-64	2149-78A	2149-79A	
1976-02	1976-03	1976-04	1976-05	1976-06	2149-66	2149-80A	2149-81A	
1978-02	1978-03	1978-04	1978-05	1978-06	2149-67	2149-82A	2149-83A	
1978-02	1978-03	1978-04	1978-05	1978-06	2149-68	2149-82A	2149-83A	
1976-02	1976-03	1976-04	1976-05	1976-06	2149-69	2149-80A	2149-81A	
1977-02	1977-03	1977-04	1977-05	1977-06	2149-68	2149-84A	2149-85A	
1978-02	1978-03	1978-04	1978-05	1978-06	2149-70	2149-82A	2149-83A	
1976-02	1976-03	1976-04	1976-05	1976-06	2149-71	2149-80A	2149-81A	
1977-02	1977-03	1977-04	1977-05	1977-06	2149-70	2149-84A	2149-85A	
1978-02	1978-03	1978-04	1978-05	1978-06	2149-72	2149-82A	2149-83A	
1976-02	1976-03	1976-04	1976-05	1976-06	2149-73	2149-80A	2149-81A	
1977-02	1977-03	1977-04	1977-05	1977-06	2149-72	2149-84A	2149-85A	

Other Options	Cat. #
Dual Purge™ System	**1606-61**
Dual Purge™ Sensor (one/desiccator door required)	**1600-49**
Automatic RB® Valve	**1600-60B**
NitroWatch®	**9500-00A**
NitroWatch® Sensor (one/desiccator required)	**9500-02A**
Casters (heavy-duty, low-profile, set of 4, including 2 with brakes)	**1700-44**

**** Price for a shelf, shield or tray of a given size is the same. For electropolished stainless steel shelving or stand, add "EP" to the cat. no. and 30% to the price.***



Door Clearances

NitroPlex™: Multiplexed Nitrogen Control (See page 82).
Features a miniaturized humidity sensor and display readout in each storage chamber. Delivers a high-flow nitrogen purge only to the chamber that exceeds your set point, and only as long as necessary to remove moisture from that chamber. Cuts recovery time and reduces moisture exposure.

To Order—add "NP" to the part number of the affected cabinet. Cabinets are modified to accommodate NitroPlex control/display modules (chamber heights increase by 1.25"). Select a module for each chamber in the affected desiccator.

	Cat. #
Control/Display Module (Select one/chamber)	**1911-31**
Installation (Applies once/cabinet)	**1911-32**

Portable Desiccators

- **A convenient, contamination-free, economical carrying container for moisture-sensitive devices**
- **Stackable design permits space-saving storage**
- **Optional quick-connect and Automatic RB® (Relief/Bleed) Valve allow nitrogen purge for a particle-free, low-moisture environment**
- **Static-dissipative PVC option ensures ESD-safety, eliminates particle attraction to ensure clean surfaces**
- **Many sizes available**

Terra Universal's Portable Desiccators provide the perfect solution for on-site transportation of delicate microelectronic devices.

Each features air-tight seals and solvent welding that eliminate outgassing. All hardware, including hinges and latches, is chrome-plated, and fold-down steel-reinforced vinyl handles make these desiccators easy to carry. Choose from three materials: clear acrylic, UV-shielding amber acrylic, or static-dissipative PVC, which has a surface resistivity of about 10^7 ohms/square. By safely dissipating static charges, this material also helps eliminate particle attraction, thereby keeping desiccator surfaces clean inside and out! See page 596 for more information on static-dissipative PVC.

A Clean, Dry Storage Environment for as Long as You Need It

For optimal protection against particles and moisture, select a desiccator with a quick-connect fitting and an Automatic RB® (relief/bleed) Valve. The quick-connect fitting allows desiccators to be purged with nitrogen or clean dry air, and the Automatic RB® Valve safely relieves overpressures and functions as a check valve to keep moist, contaminated air out. You can also specify inlet/outlet ports for use with other gas fittings.

These options give you the flexibility both to transport and to store parts without risking contamination. For prolonged storage, simply leave the desiccator connected to a nitrogen line; the Automatic RB® Valve will safely relieve overpressures. When it comes time to move parts, simply disconnect the fitting. The door seal eliminates the penetration of particles, and the Automatic RB® Valve will hold in the clean, dry gas as you move the desiccator from one work station to the next.

E

All models shown with standard access doors. Select stainless steel door frames for extended service.

A *B* *C* *D*

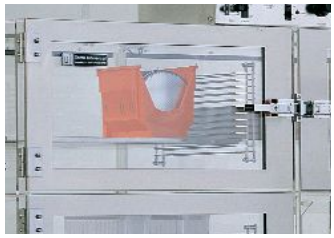
TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

DESICCATORS

CONTROLLED ENVIRONMENT STORAGE

Optional Features:

	Cat. #
Quick Connect Fitting (installed, requires RB valve)	**1601-06**
Automatic RB® Valve (installed, see page 130)	**1600-60B**



Stainless Steel Door Frame (see ordering chart below)

Extends the service life of access doors, typically the only desiccator component that wears out! Includes one-piece, nonadhesive elastomer gaskets that will not outgas, compress, or migrate over time. Superb sealing capability saves nitrogen, eliminates maintenance.

Note: Capped inlet/outlet ports are provided for nitrogen purging. See page 2 for Terra's crating policy.

	Specifications	Portable Desiccators			Accessories
TYPE	Outside Dimensions** (W" x D" x H")	Transparent Acrylic Cat. #	Static Dissipative PVC Cat. #	Amber Acrylic Cat. #	Stainless Steel Door Frames Cat. #
A	12 x 12 x 12	**9302-17**	**9302-20**	**9302-24**	**2200-14**
B	10 x10 1/2 x 8 1/2	**9302-00**	**9302-21**	**9302-25**	**2200-51**
C	12 x 6 x 6	**9302-18**	**9302-22**	**9302-26**	**2200-52**
D	20 x 6 x 6	**9302-19**	**9302-23**	**9302-27**	**2200-53**
E*	9 x 11 x 8 1/2	**4950-06**	**4950-08**	**4950-07**	**2200-54**
F*	10 x 16 x 9 1/2	**4950-09**	**4950-11**	**4950-10**	**2200-55**

CE

**** These microdesiccator models feature no handle. Type E includes one fixed shelf, and Type F includes two fixed shelves.***
***** Dimensions given above are for chamber OD only. Add 1" to door width for hanging and latching.***

SmartDesiccators™

The Latest Development in Humidity Control

- **Eliminates moisture-related degradation and optimizes yields**
- **Quick-response feedback system automatically maintains humidity set point**
- **Fully integrated turnkey system takes 30 seconds to install**
- **Select acrylic, stainless steel, or static-dissipative PVC, which controls static charges and the particles they attract**
- **Quickly pays for itself in N_2 savings!**

See page 80 for complete ordering information

Acrylic or Static Dissipative PVC

First-of-its-kind gas control system cuts nitrogen cost by 78%!

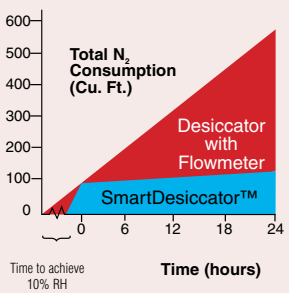
Stainless Steel

Smart Performance—and Big Savings!

Testing demonstrates the cost benefit of the SmartDesiccator's automated nitrogen control system.

The test below was conducted on a 24"W x 18"D x 24"H desiccator equipped with a flowmeter and then with a SmartDesiccator™ control system, under the following conditions:

- Ambient Humidity: 60% RH
- Temperature: 70°F
- RH Setpoint: 10% RH
- Test Period: Achieve and maintain setpoint for 24 hours
- Chamber Access: Door opened once every 30 minutes; remains open for one minute

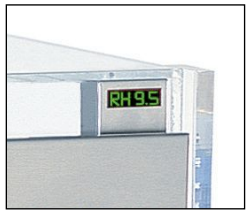


Desiccator with 0 - 20 SCFH flowmeter (red area)

- To achieve setpoint: 85 cubic feet (requires over 4 hours @ 20 CFH) Note: setpoint measured with a hygrometer, since this set up does not monitor humidity.
- Maintain for 24 hrs: 480 cubic feet (24 x 20)
- Total N_2 Consumed: 565 cubic feet

SmartDesiccator™ (blue area)

- To achieve setpoint: 85 cubic feet (required 30 minutes @ 170 CFH flow)
- Maintain for 24 hrs: 40 cubic feet
- **Total N_2 Consumed: 125 cubic feet — *a 78% savings!***



Miniaturized LED monitors humidity and displays set point

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Tape-and-Reel™ Desiccator

- **Mix and match several reel sizes in one easy-access cabinet for optimal organization and space use!**
- **Adjustable stainless steel racks safely support carrier reels of many widths, up to 14" in diameter**
- **Automatic humidity controls increase SMD yield rates by reducing moisture absorption during storage**
- **Dry environment also functions as a degassing chamber to prepare plastic components for solder reflow and other heating processes**
- **Static-Dissipative PVC construction guards against both ESD and static-caused contamination—meets DOD HDBK 263, MIL-SPEC 1686 and 1772 with proper accessories**
- **A full line of options includes automatic ground break indicator, ionizing, grounded door latch and stands**

CE

Mepco/Centralab Surface Mount Components in tape and reel packaging. *Photo courtesy of Mepco/Centralab, Inc.*

More and more semiconductor manufacturers are selecting tape-and-reel packaging for their sensitive chips and other components—and for good reason. Embossed carrier tape securely holds parts in place and allows easy feeding into automatic placement equipment. Reels are lightweight and allow easy transport of large numbers of chips while minimizing the possibility of damage. They also make a good storage container… as long as you keep them clean, dry, and organized.

Tape-and-Reel Desiccator™: Making the Most of a Good Idea

Terra's Tape-and-Reel Desiccators provide the optimal storage environment for tape-and-reel packages.

These desiccators offer all of the features you need to maximize the shelf life of sensitive, expensive stored materials. They include air-tight, noncontaminating seals, a complete line of standardized accessories, and the most advanced humidity control system available anywhere, as well as self-balancing nozzles that safely neutralize static charges on nonconductive surfaces (such as tape reels).

In addition, each compartment is equipped with a stainless steel adjustable rack that securely holds reels up to 14" in diameter. This storage method affords full visibility of all stored reels, and allows you to remove the reel you need without disturbing any others. A variety of desiccator sizes allows you to store reels of various diameters in up to 14 compartments. Labeling slots allow easy identification of reels. Wire dividers can be adjusted in ¼" increments.

Clean, Durable Design Eliminates Leaks, Outgassing

Constructed of acrylic or Static-Dissipative PVC, the Tape-and-Reel Desiccator™ features easy-open doors and one-piece wall construction to minimize the problem of peeling or sagging gaskets and to ensure a continuous seal. A plenum chamber minimizes backfill; the perforated plenum wall ensures a homogeneous positive pressure and prevents contaminants and moisture from rushing into the rear of the Tape-And-Reel™ desiccator when a door is opened. It also allows easy installation of ionizing nozzles, sensor switches, humidity sensors, and other optional electronics.

All seams are solvent welded to eliminate the problem of outgassing, and all hardware is chrome-plated or stainless steel. In addition, all of our desiccators and accessories are standardized. This means that if you should ever need to replace a latch, a door, or a plenum wall, you can order it without costly custom work.

Static-Dissipative PVC: The Solution to Static and Contamination Problems

Terra's Static-Dissipative PVC helps to protect static-sensitive materials by dissipating static charges. It also enhances contamination control by eliminating the problem of particle attraction that results from the accumulation of static charges on the cabinet's surface. This advantage is especially important in cleanroom applications, where a desiccator must remain clean inside and out.

This material is completely transparent and maintains its dissipative characteristics under the roughest treatment. (See page 596 for a complete description.)

Completely Automatic Nitrogen and Humidity Controls

The Tape-and-Reel™ Desiccator comes with an inlet for the introduction of purge gas (generally nitrogen) and an outlet for the optional Automatic RB® (Relief/Bleed) Valve. The Automatic RB® Valve serves three purposes: it guarantees a uniform positive pressure; it makes desiccators rupture-proof; and it functions as a check valve in case of a negative pressure (such as results when a reel is quickly removed from the desiccator).

The optional Dual Purge System™ regulates the gas inflow to maintain a positive pressure at all times—even when access doors are opened. The NitroWatch® operates in tandem with the Dual Purge System™ to maintain any relative humidity level you desire inside the Tape-and-Reel Desiccator. An LED display provides a continuous readout of the humidity level. A datalogging function even allows documentation of humidity conditions.

For more demanding applications—such as a very high ambient humidity level or the need for frequent access—you may need extra help in order to keep the internal humidity level low. The NitroPlex™ Module provides this added efficiency by monitoring the RH level in each desiccator chamber independently and directing a high-level nitrogen purge only to the chamber where it's needed. These options eliminate all of the guesswork from clean, moisture-free storage. Once you set the appropriate humidity set point for your application, you can rest assured that your products will remain clean and dry, no matter what time of the day or night, or how often the desiccator doors are opened, or how much ambient conditions fluctuate.

Model Shown: No. 4022-00

DESICCATORS

CONTROLLED ENVIRONMENT STORAGE

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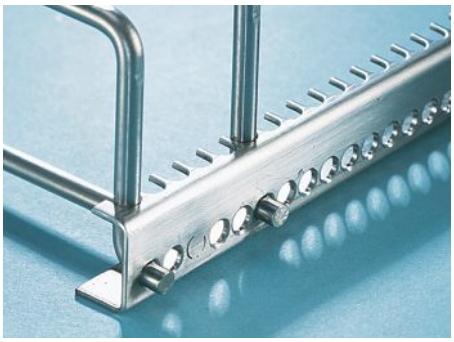
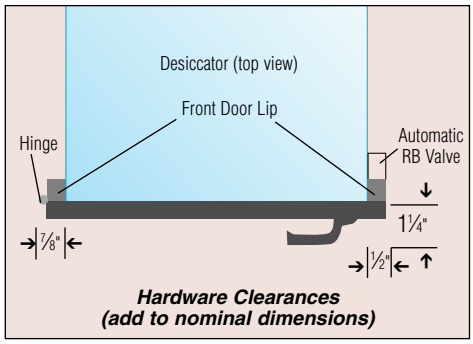
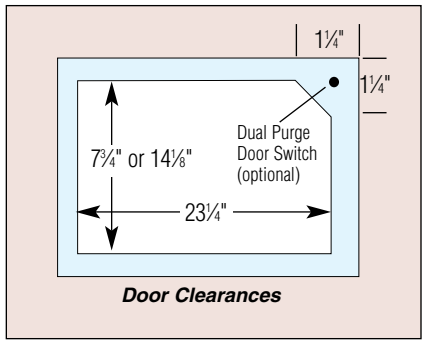


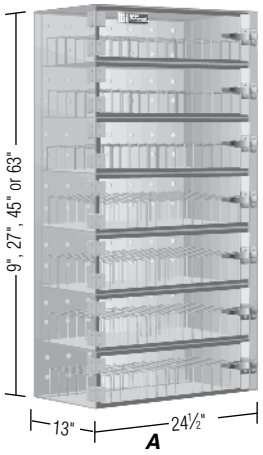
Racks allow adjustment of supports in ¼" increments



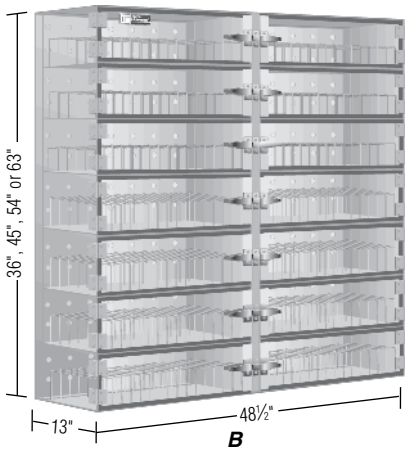
Hardware Clearances (add to nominal dimensions)



Door Clearances



A



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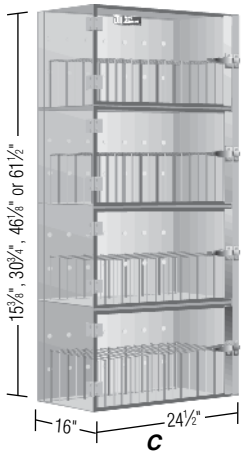
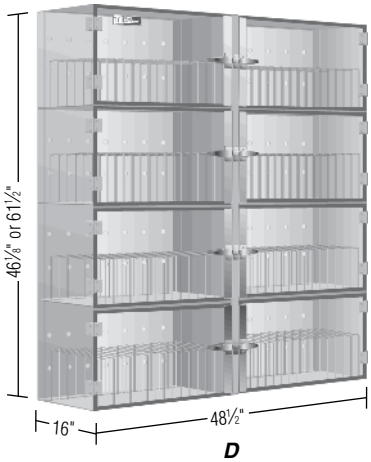


C



D

Note: Dimensions given above are for chamber OD only. For door and hardware clearances see illustrations above.

Ordering Information: Tape-and-Reel Desiccators

To Order Your Desiccator:

1. **Select type:** one or two chambers per tier.
2. **Select height:** the ordering table indicates how many chamber doors each model has
3. **Select material:** acrylic or Static Dissipative PVC.
4. **Select desired options:** including stands and gas controls. Stainless steel doors are recommended for extended service life. Order reel supports separately.

Note: Crating charges are extra (see page 2 for crating policy.)

Corresponding Stands

Note:
Prices of 4" and 12" stands of a given material are the same.

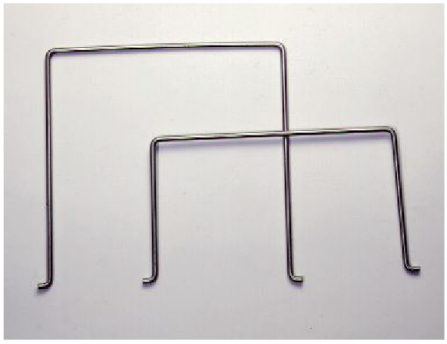
12" stands are recommended for short desiccators; 4" stands for tall ones. Includes leveling feet.

Casters: Set of 4, 2 with brakes. See page 145. Cat. # **1700-44**

TYPE	Reel Size**	No. of Doors	Style	Overall Dimensions W x D x H (inches)	Clear Acrylic Desiccator Cat. #	Static Dissipative* PVC Desiccator Cat. #	Stainless Steel 4" High Cat. #	Stainless Steel 12" High Cat. #
A	Up to 7½" diameters	1	One Chamber Per Tier	24½ x 13 x 9	4001-00	4015-00	4029-01A	4033-01A
		3		24½ x 13 x 27	4002-00	4016-00	4029-01A	4033-01A
		5		24½ x 13 x 45	4003-00	4017-00	4029-01A	4033-01A
		7		24½ x 13 x 63	4004-00	4018-00	4029-01A	4033-01A
B	Up to 7½" diameters	8	Two Chambers Per Tier	48½ x 13 x 36	4005-00	4019-00	4030-01A	4034-01A
		10		48½ x 13 x 45	4006-00	4020-00	4030-01A	4034-01A
		12		48½ x 13 x 54	4007-00	4021-00	4030-01A	4034-01A
		14		48½ x 13 x 63	4008-00	4022-00	4030-01A	4034-01A
C	Up to 14" diameters	1	One Chamber Per Tier	24½ x 16 x 15⅜	4009-00	4023-00	4031-01A	4035-01A
		2		24½ x 16 x 30¾	4010-00	4024-00	4031-01A	4035-01A
		3		24½ x 16 x 46⅛	4011-00	4025-00	4031-01A	4035-01A
		4		24½ x 16 x 61½	4012-00	4026-00	4031-01A	4035-01A
D	Up to 14" diameters	6	Two Chambers Per Tier	48½ x 16 x 46⅛	4013-00	4027-00	4032-01A	4036-01A
		8		48½ x 16 x 61½	4014-00	4028-00	4032-01A	4036-01A

**** Transparent material helps eliminate static charges and the particles they attract. See page 596 for full specifications. Removable back wall is made of nondissipative material. ** Order adjustable supports separately.***

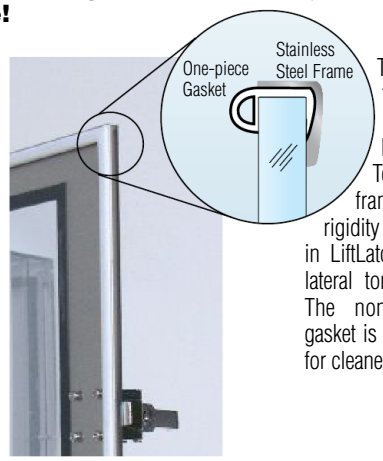
Tape-and-Reel Desiccator Options



Adjustable Reel Supports (patent pending) These 3⁄16"- diameter stainless steel supports can be adjusted in ¼" increments to form holding bins for many reel sizes. Select small racks for reel diameters over 5"; large rack for reel diameters over 8". All supports are 7½" wide at the top (8¼" including bottom mounting ends).

4½" Height	7½" Height
Cat. #	Cat. #
3607-01	**3607-02**

Unique Door and Gasket Design Reduces Wear, Enhances Performance!



Terra's stainless steel door frames reinforce plastic doors to extend service life and improve sealing. Tests show that these frames increase structural rigidity by a factor of five. A built-in LiftLatch™ seals doors without lateral torque that strains hinges. The non-outgassing "e"-profile gasket is attached without adhesive for cleaner, more stable sealing.

Stainless Steel Door Frames for Tape-and-Reel Desiccators

	Cat. #
Type A	**2200-32**
Type B	**2700-63**
Type C	**2200-33**
Type D	**2200-64**

Page 128

Dual Purge™ System
Provides a variable nitrogen purge to maintain a positive pressure whether desiccator doors are open or closed. Ensures effective, economical nitrogen use.

	Cat. #
Dual Purge™ System	**1606-61**
Dual Purge™ System Sensor (installed). One/door required	**1600-49**

Page 129

NitroWatch®
Used with the Dual Purge System, the NitroWatch automatically maintains low humidity levels, down to 0% RH, while providing a continuous % RH readout.

	Cat. #
NitroWatch® Controller	**9500-00A**
NitroWatch® Sensor (installed), one/cabinet required	**9500-02A**

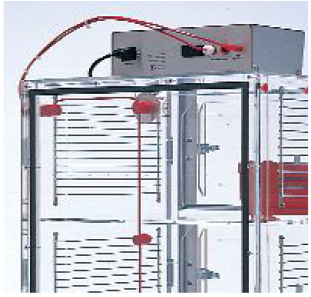
Automatic RB® (Relief/Bleed) Valve

Cat. #
1600-60B

Safeguards glove box against overpressures. Required for operation with Dual Purge System.
— See page 130

NitroPlex™ Gas Control System
Incorporates the functions of the Dual Purge System, NitroWatch and Automatic RB® Valve in a state-of-the-art multiplex controller that monitors and controls moisture levels in each desiccator chamber individually. See page 82 for full information.

	Cat. #
Chamber Module One/chamber required; includes sensor and RB valve	**1911-31**



Ionizing Equipment™
Nozzles installed inside each desiccator chamber emit positive and negative ions to neutralize static charges, protecting stored materials against ESD damage. Automatic self-balancing power supply ensures safe operation.
— See page 140

GroundWatch™
This ground continuity indicator provides audible and visible alarms if the ground connections should ever be broken, thereby protecting contents of your desiccator or Faraccator against electrostatic discharge. It connects to the grounding terminals at the rear of the desiccator/Faraccator chamber. See page 141.

Cat. #
4400-00

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Kiticcators™

Kitting Tray Desiccators

- **Provides organized, space-efficient storage of kitting trays (tote boxes) in a clean, dry, static-safe environment**
- **Tote boxes slide in and out on chrome-plated racks, allowing full view of contents without disturbing adjacent boxes**
- **Three configurations:**
  Series 100 Kiticcators™ accommodate standard 7.5"W x 15.25"D totes in three depths
  Series 200 Kiticcators™ accommodate totes up to 18.5"W x 24.9"D
  Series 300 Kiticcators™ accommodate IC tube trays 27.5"W x 21.5"D
- **Completely automatic humidity control options extend yields while economizing on nitrogen consumption**
- **Optional static-dissipative tote boxes meet MIL-B-81705B specifications**
- **Advanced door and seal engineering enhances performance, extends service life**
- **Static-dissipative PVC construction on select models guards against both ESD and static-caused contamination—meets DOD HDBK 263 and MIL-SPEC 1686 and 1772 with proper accessories**

Terra's Kiticcator is the first desiccator engineered specifically for kitting operations involving tote boxes and other kitting trays.

The Perfect Marriage of Performance and Practicality

It offers all the advantages of Terra's industry-leading desiccator systems: airtight, noncontaminating seals, a complete line of standardized accessories, and the most advanced humidity control systems available. These features minimize nitrogen consumption and, more importantly, extend the shelf lives and yields of stored components.

To these benefits, Kiticcators add dual chrome-plated racks in each compartment that provide space-saving storage. By selecting a Kiticcator sized exactly to your tote boxes, you save time and money—

A more productive workflow—operators have a storage system where kitted totes can be organized and labeled by job, function, date, or other criteria.

Convenient access—any tote box in the Kiticcator can be moved independently of all others. Chrome-plated racks allow boxes to slide in and out for complete viewing of contents. Multiple access doors restrict parts exposure.

Space-efficient storage—Kiticcators use every inch of available space! You take full advantage of your investment in clean, dry, static-safe storage.

Enhanced product protection—By placing a Kiticcator near your kitting operations, you eliminate the need to leave kitting boxes in unprotected environments. Kiticcators also reduce parts handling by eliminating the need to transfer parts in and out of kitting boxes at shift changes. The Kiticcator stores kitted parts indefinitely in a safe, controlled environment.

Clean, Durable Design Eliminates Outgassing

Constructed of acrylic or static-dissipative PVC, the Kiticcator features easy-open doors and one-piece wall construction to minimize the problems of peeling or sagging gaskets. A plenum chamber minimizes backfill. The perforated plenum wall ensures a homogeneous positive pressure and prevents contaminants and moisture from rushing into the rear of the Kiticcator when a door is opened. It also allows easy installation of ionizing nozzles and other optional accessories.

Automated Humidity Controls Minimize Defects, Extend Yields

Terra's advanced gas flow engineering produces a controlled humidity system that optimizes performance and minimizes nitrogen waste.

The Kiticcator comes with an inlet for the introduction of a purge gas, generally nitrogen, and an outlet for installation of the Automatic RB® Valve, which protects the chamber against overpressures and serves as a check valve.

The optional Dual Purge System regulates the gas inflow to maintain a positive pressure at all times—even when access doors are opened. The NitroWatch® operates in tandem with the Dual Purge System to maintain a selected low relative humidity level inside the cabinet. An LED provides a readout of the measured RH level. This smart control system reduces nitrogen waste by as much as 78% compared to a flowmeter-based system. More importantly, your sensitive materials are stored under traceable humidity conditions that help ensure their integrity.

Static-Dissipative PVC: Optimal ESD and Particle Protection

This material is completely transparent and maintains its dissipative characteristics under the roughest treatment. It not only dissipates static charges safely, but it also eliminates the particle attraction that static charges create. Surfaces stay clean, inside and out.

Series 200 Kiticcator™
For totes up to 18.5"W x 24.9"D x 6.8"H
See page 106

Series 300 Kiticcator™
For IC tube trays 27.5"W x 21.5"D x 1.5"H
See page 107

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DESICCATORS

CONTROLLED ENVIRONMENT STORAGE

***NitroWatch®**
- Displays RH level inside desiccator
- Operates with Dual Purge System to maintain low humidity level automatically

***Dual Purge™ System**
- Maintains positive internal pressure
- Provides low and high purge
- Blocks out contamination and moisture

*Grounding terminal grounds entire cabinet with one connection (standard on dissipative cabinets)

Plenum Chamber minimizes backfill, ensures homogeneous positive pressure

One-piece gasket eliminates flaking, shrinking, slippage.

*Tamper-proof stainless steel hinge provides a tight, secure seal

*Grounded door latch discharges the operator before stored components are accessed

Chrome-Plated Wire Racks support optional slide-out tote boxes

*Rugged tote boxes of many sizes can be placed on Kiticcator racks for easy access to small parts

*** Automatic RB® Valve**
- Bleeds off excess gas
- Makes cabinet rupture-proof
- One included in each chamber as part of NitroPlex™ gas control system

*** Stainless Steel Reinforced Doors**
- More rigid design and better sealing than standard plastic doors
- Extend service life of cabinets up to 300%

*Stands available in stainless steel, with and without casters

**** Options—refer to separate catalog listings for full descriptions***

Series 100 Kiticcator™
Kitting Tray Desiccator

- **Removable Tote Boxes allow optimal organization of materials for kitting procedures—without wasting desiccator space**
- **Completely automatic nitrogen and humidity control options extend shelf life of expensive stored components indefinitely**
- **Chrome-plated racks allow easy, noncontaminating insertion and removal of tote boxes of varying sizes**
- **Optional static-dissipative tote boxes meet MIL-B-81705B specifications**
- **Advanced door and gasket engineering ensures reliable seals**
- **Static-Dissipative PVC construction guards against both ESD and particles—meets DOD HDBK 263, and MIL-SPEC 1686 and 1772 with proper accessories**
- **A full line of options includes automatic ground-break indicator, self-balancing ionizing nozzles, and stands**

If you're involved in kitting operations, you've probably had to make do with less-than-ideal storage systems for your materials. If you find adequate tote boxes for your application, chances are they must be stacked inside your existing desiccators, where they waste space and are difficult to remove.

The Kiticcator™: A Perfect Marriage of Performance and Practicality

The Kiticcator™ is designed specifically to remedy these problems. It offers all of the advantages that set Terra Universal desiccators apart from any others available today: noncontaminating cabinets, a complete line of standardized accessories, and the most advanced humidity control system available anywhere. These features minimize nitrogen consumption and, more importantly, extend the shelf life of stored components—you can count on the integrity of expensive materials as long as you keep them inside the Kiticcator™, whether for months, years, or decades!

To these features the Kiticcator™ adds dual chrome-plated racks in each compartment that accommodate slide-out tote boxes. This design makes optimal use of every square inch of desiccator storage space and lets you remove the tote box you need without disturbing any others.

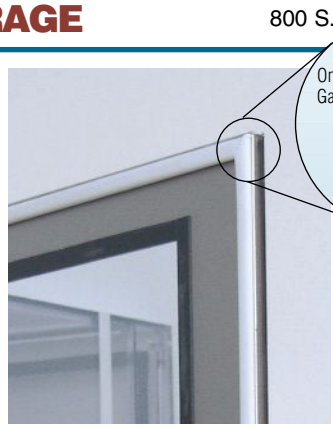
Clean, Durable Design Eliminates Leaks, Outgassing

Constructed of acrylic or Static-Dissipative PVC, the Kiticcator™ cabinet features easy-open doors and one-piece wall construction to minimize the problem of peeling or sagging gasketing and to ensure a continuous seal. A plenum chamber minimizes backfill; the perforated plenum wall ensures a homogeneous positive pressure and prevents contaminants and moisture from rushing into the rear of the Kiticcator when a door is opened. It also allows easy installation of ionizing nozzles, sensor switches, humidity sensors, and other optional electronics.

Completely Automatic Nitrogen and Humidity Controls Extend Shelf Lives Indefinitely

Not all desiccators are created equal—gas-flow engineering has a lot to do with how long stored materials will remain up to spec. Like all Terra desiccators, the Kiticcator™ employs a unique nitrogen and humidity control system that guarantees the precise conditions you require—and extends the shelf life of your materials indefinitely. (See technical information beginning on page 72.)

The Kiticcator™ comes with a pipe-tapped inlet for the introduction of purge gas (generally nitrogen) and an outlet for the Automatic RB® (relief/bleed) valve. The Automatic RB® Valve serves three purposes: it guarantees a uniform positive pressure; it makes a desiccator rupture-proof; and it functions as a check valve in case of a negative pressure (which results when a door is quickly opened).

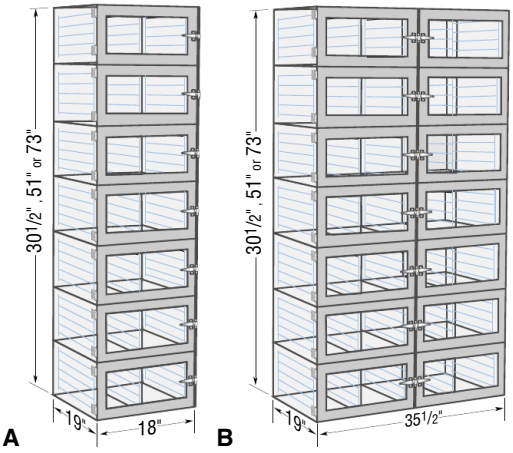


Revolutionary Access Doors Reduce Wear, Enhance Performance!

Terra's stainless steel door frames reinforce plastic doors to extend service life and improve sealing. Tests show that these frames increase structural rigidity by a factor of five. A built-in locking LiftLatch™ seals doors without lateral torque that strains hinges. The non-outgassing "e"-profile gasket is attached without adhesive for cleaner, more stable sealing.

Series 100 Kiticcator™
Shown with optional tote boxes and stand
**** Options—refer to separate catalog listings for full descriptions***

Series 100 Kiticcator™



Tote Boxes (for Series 100 Kiticcators™)

Made of a durable, static-dissipative high-density polyethylene thermoplastic. Meets the minimum static decay specifications of MIL-B-81705B (see page 518 for full specifications). Features excellent chemical resistance and high impact strength. Removable lids protect stored materials as they are transported to a laminar flow or assembly station (order below). Outside dimensions: 7.5"W x 15.25"D. Bottom Inside Dimensions: 6.5"W x 14.12"D (see below for height).

Height	Weight	Cat. #
1.5"	.40 lbs.	**6000-00**
2"	.53 lbs.	**6000-01**
4.75"	.66 lbs.	**6000-02**

Shown with snaps for labeling pouch (specify if desired).

Tote Box Lids

Note: Must be removed before totes box can be placed onto Kiticcator racks.

Cat. #
6000-03

Labeling Pouch

Made of clear plastic. Snaps onto tote boxes above. 2.25" x 6.5"

Cat. #
6000-04

Ordering Information: Series 100 Kiticcators (crating charges extra—see pg. 2)

To Order Your Kiticcator:
(See following pages for other Kiticcator models)
1. Select type: one or two chambers per tier.
2. Select height: the ordering table indicates how many chamber doors each model has and tote box capacity. Order boxes separately.
3. Select material: acrylic or Static-Dissipative PVC
4. Select desired options: including stands and gas controls. Stainless steel doors are recommended for extended service life.

Corresponding Kiticcator Stands (include leveling feet)

Note:
Prices of 4" and 12" stands of a given material are the same.
12" stands are recommended for short Kiticcators; 4" stands for tall ones.

Type	Overall W x D x H (inches)	No. of Doors	Capacity: Number of Tote Boxes* 1½" Deep	2" Deep	4⅜" Deep	Clear Acrylic Kiticcators Cat. #	Static Dissipative** PVC Kiticcators Cat. #	Stainless Steel 4" High Cat. #	Stainless Steel 12" High Cat. #
A: One	18 x 19 x 30½	3	18	18	12	**6001-00**	**8001-00**		
Chamber	18 x 19 x 51	5	30	30	20	**6002-00**	**8002-00**	**8001-02A**	**8001-01A**
Per Tier	18 x 19 x 73	7	42	42	28	**6003-00**	**8003-00**		
B: Two	35½ x 19 x 30½	6	36	36	24	**6004-00**	**8004-00**		
Chambers	35½ x 19 x 51	10	60	60	40	**6005-00**	**8005-00**	**8001-04A**	**8001-03A**
Per Tier	35½ x 19 x 73	14	84	84	56	**6006-00**	**8006-00**		

**** Tote boxes must be ordered separately. Kiticcator racks accommodate all 3 tote boxes, so you can mix boxes of several sizes in a single compartment. ** Transparent material helps eliminate static charges and the particles they attract. See page 596 for full specifications.***

Stainless Steel Door Frames

Extends the cabinet's service life. Select quantity for your cabinet (doors listed fit Kiticcator models above only). Price includes installation.

Cat. #
For Type A **2200-34**
For Type B **2200-62**

Dual Purge™ System

Ensures positive internal pressure of purge gas. Flushes out moisture and contaminants when access door is opened. Requires use of Automatic RB® Valve. See page 128 for full information.

	Cat. #
Control Unit	**1606-61**
Sensor Switch (one required/door)	**1600-49**

Automatic RB® Valve

Automatically relieves pressure build-ups to ensure safe operating conditions with Terra's gas control systems. See page 130 for full information.

Cat. #
1600-60B

Heavy-Duty Casters

Set of 4 hard rubber, non-contaminating casters, 2 with brakes. See page 145 for full specifications.

Cat. #
1700-44

NitroWatch®

Operates in tandem with the Dual Purge™ System to maintain user-determined humidity level (down to 0% RH). See page 129 for full information.

	Cat. #
Control Unit	**9500-00A**
Humidity Sensor (One/desiccator required)	**9500-02A**

NitroPlex™ Gas Control System

Incorporates the functions of the Dual Purge System, NitroWatch and Automatic RB® Valve in a state-of-the-art multiplex controller that monitors and controls moisture levels in each desiccator chamber individually.

To Order—add "NP" to the part number of the affected cabinet. Cabinets are modified to accommodate NitroPlex control/display modules (chamber heights increase by 1.25"). Select a module for each chamber in the affected chamber. See page 82 for more information.

	Cat. #
Control/Display Module	**1911-31**
Installation Charge	**1911-32**

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Series 200 Kiticcator™

Kitting Tray Desiccators

- **For totes up to 18.5"W x 24.9"D x 6.8"H**
- **Each door provides access to two separate chambers**
- **Includes the construction features of Terra's Series 100 Kiticcators (see page 104)**

Each chamber of these Kiticcators accommodates either of the tote boxes listed below, which provide plenty of storage space for semiconductor and pharmaceutical materials.

Like Terra's other Kiticcators, these units are designed for a nitrogen purge, which maintains the low humidity storage environment. Select Terra's advanced gas controls for automatic control of relative humidity (ambient to 0% RH). Controllers require installation of Automatic RB® Valves (order separately).

Note: These chambers do not include shelf racks. Tote boxes sit directly on the chamber floor.

Specifications

Overall dimensions: 26"L x 26½"W x 56¼"H
No. of access doors: 4
No. of chambers: 8
Chamber dimensions: 26"W x 24"D x 13¾"H

Series 200 Kiticcator (Order Tote Boxes separately)					
Overall Dimensions (W x D x H)	Chamber Dimensions (W x D x H)	No. of Doors	No. of Chambers	Acrylic Cat. #	Dissipative PVC Cat. #
26.5" x 26" x 56.25"	26" x 24" x 13.75"	4	8	**6001-71**	**6001-72**

Tote Boxes

These static-dissipative boxes meet static-decay requirements (see page 518). Weight: 1.1 lbs. (No. 6002-97); 4.69 lbs. (No. 6002-98).

Overall Dimensions (W x D x H)	Inside Dimensions (W x D)	Kiticcator Capacity		Cat. #
		Totes per Chamber	Totes per Cabinet	
8.1" x 23.5" x 6"	6" x 21"	3	24	**6002-97**
18.5" x 24.9" x 6.8"	14.8" x 20.8"	1	8	**6002-98**

Stainless Steel Door Frames

Optional stainless steel door frames extend the service life of these cabinets—thereby protecting your investment in clean, dry storage! Select quantity for your cabinet (door listed fits Series 200 Kiticcator models only). Price includes installation.

Cat. #
2200-35

Kiticcator™ Stands

(for Series 200 Kiticcators only)
Raises Kiticcator 4" (7" with selection of casters). Includes leveling feet.

	Cat. #
Stainless Steel Stand	**6001-75A**
Heavy-Duty Casters (Set of 4 hard rubber, 2 with brakes)	**1700-44**

Dual Purge™ System

Ensures positive internal pressure of purge gas. Initiates high-flow purge to flush out moisture and contaminants when access door is opened. Requires use of Automatic RB® Valve for safe pressure release. See page 128.

	Cat. #
Control Unit	**1606-61**
Sensor Switch	**1600-49**

NitroWatch®

Operates in tandem with the Dual Purge™ System to maintain user-determined humidity level down to 0% RH. See page 129.

	Cat. #
Control Unit	**9500-00A**
Humidity Sensor	**9500-02A**

Automatic RB® (Relief/Bleed) Valve

Automatically relieves pressure build-ups to ensure safe operating conditions with Terra's gas controllers. See page 130.

Cat. #
1600-60B

Series 300 Kiticcator™
Ideal for Clean, Dry IC Tube Storage

- **Holds up to forty-four 27.5"W x 21.5"D x 1.5"H trays for storage of IC tubes and other small parts**
- **Chrome-plated racks allow easy tray positioning**
- **Large storage chambers (22"W x 28"D x 29"H) accommodate bulky items**
- **Includes the construction features of Terra's Series 100 Kiticcators (see page 104)**

This variation of Terra's Kiticcator™ provides a controlled storage environment for large and small parts alike.

Its 44 pairs of chrome-plated racks accommodate the storage trays listed below, which are ideal for safely organizing IC tubes as well as many other sensitive devices. Trays, which feature slots for placement of dividers, can be positioned at any interval you desire to suit your stored materials. The ample storage chambers also accommodate large objects that won't fit inside other Terra desiccator and Kiticcator storage systems.

Optional gas controls provide automatic control of relative humidity (ambient to 0% RH). Gas controls require installation of Automatic RB® Valves (order separately).

Specifications
Overall dimensions: 22¾"W x 30½"D x 60"H
Chamber dimensions: 22¼"W x 28½"D x 29¾"H

Series 300 Kiticcator (Order IC Trays separately)

Overall Dimensions (W x D x H)	Chamber Dimensions (W x D x H)	No. of Doors	No. of Chambers	Acrylic Cat. #	Dissipative PVC Cat. #
22.75" x 30.5" x 60"	22.25" x 28.5" x 29.75"	2	2	**6001-82**	**6001-83**

Kiticcator Trays
Made of white 3⁄16" ABS plastic, these trays are slotted at 1" increments to allow insertion of front-to-back or side-to-side dividers (but not both).

Overall Dimensions (W x D x H)	Inside Dimensions (W x D)	Kiticcator Capacity: Totes per Chamber	Kiticcator Capacity: Totes per Cabinet	Cat. #
27.5" x 21.5" x 1.5"	20" x 26"	22	44	**6001-84**

	Cat. #
Front-to-Back Dividers	**6001-85**
Side-to-Side Dividers	**6001-86**

Large doors (equipped with removable card holders) accommodate bulky objects as well as storage trays.

Series 300 Kiticcator™ No. 6001-80 (shown with optional IC trays No. 6001-84 and castered stand)

Stainless Steel Door Frames
Optional stainless steel door frames extend the service life of these cabinets—thereby protecting your investment in clean, dry storage! Select quantity for your cabinet (door listed fits Series 300 Kiticcator models only). Price includes installation.

Cat. #
2200-36

Kiticcator™ Stands
(for Series 300 Kiticcators only)
Raises Kiticcator 4" (7" with selection of casters). Includes leveling feet.

	Cat. #
Stainless Steel Stand	**6001-89A**
Heavy-Duty Casters	**1700-44**
(Set of 4 hard rubber, 2 with brakes)	

Dual Purge™ System
Ensures positive internal pressure of purge gas. Initiates high-flow purge to flush out moisture and contaminants when access door is opened. Requires use of Automatic RB® Valve for safe pressure release. See page 128.

	Cat. #
Control Unit	**1606-61**
Sensor Switch	**1600-49**

NitroWatch®
Operates in tandem with the Dual Purge™ System to maintain user-determined humidity level down to 0% RH. See page 129.

	Cat. #
Control Unit	**9500-00A**
Humidity Sensor	**9500-02A**

Automatic RB® (Relief/Bleed) Valve
Automatically relieves pressure build-ups to ensure safe operating conditions with Terra's gas controllers. See page 130.

Cat. #
1600-60B

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Faraccator™ Storage System
For Static-Sensitive Materials

- **Faraday-design provides 100% static safety; conforms to DOD HDBK 263 and MIL-SPEC 1686**
- **Hermetically sealed, nitrogen-purged environment ensures complete control over particles and moisture**
- **Automatic humidity controls help extend shelf lives indefinitely**
- **Static-Dissipative PVC protects against static and contamination build-ups**
- **Removable trays make kitting a breeze**
- **Inlay packages allow adjustable bin sizes for organized storage**
- **Available with UltraClean™ electropolished stainless steel trays**
- **Security Faraccators™ offer tamper-proof security** **(see page 114)**

Terra's Faraccator Storage Systems incorporate state-of-the-art engineering to control static, moisture and contamination and thereby extend the shelf lives of stored materials. In addition, their space-efficient, modular design maximizes convenience, saves storage space, and cuts locating time.

Their Faraday-cage design completely shields stored materials against induced electrostatic charges. In fact, tests show that the static protection offered by these Faraccators far exceeds that of stainless steel desiccator cabinets with glass sides or doors. They conform to DOD HDBK 263 and meet the static decay requirements of MIL-SPEC 1686.

Shell Design

Fabricated of clear acrylic or Static-Dissipative PVC, Faraccator Storage Systems provide full 360-degree viewing of stored components. Solvent-welding and

contamination-free materials guarantee a clean environment free of outgassing. Faraccator cabinets house from one to four air-tight compartments of two different widths (see dimensional guide). And because Faraccator components are standardized, you can easily replace a damaged door—either with another door from your own stock or simply by phoning in an order.

Slide-Out Drawers and Runners

The system's conductive trays are made of 304 stainless steel. They can be easily removed and used as handling trays throughout manufacturing or testing operations; this flexibility eliminates the need directly to touch—and possibly to contaminate—sensitive microelectronic components. It also allows you to perform kitting and inventory procedures at a laminar flow station—and to minimize the time that access doors must remain open.

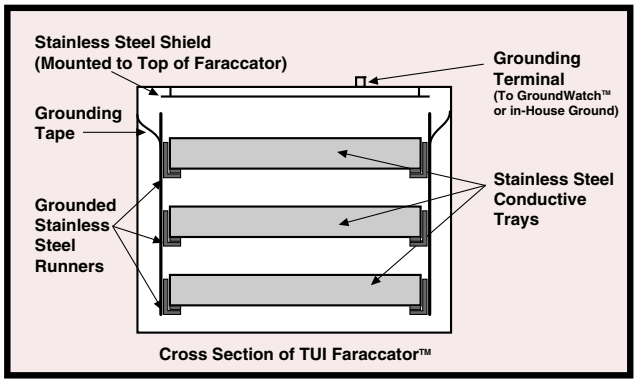
The trays mount easily into the system's runners to become slide-out drawers. Runners feature an easy-glide suspension system that supports up to 40 lbs. when fully extended and allows full access to every inch of drawer space. Two-drawer compartments provide 5¼" of clearance for stored materials (such as 4" waffle packs); three-drawer compartments provide 3$\frac{1}{16}$" of clearance and are ideal for 2" waffle packs.

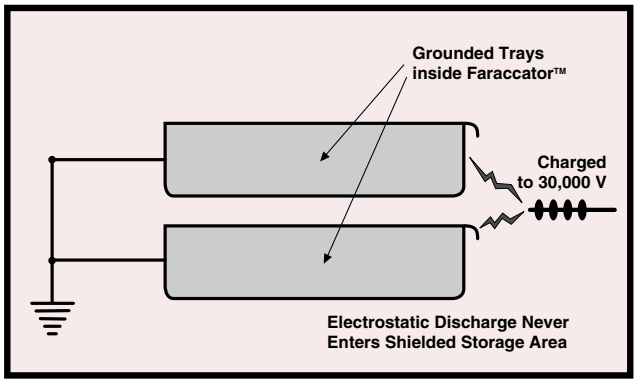
Terra now offers 2", 3" and 5" high drawers to enhance ESD shielding and storage flexibility. Higher drawer heights eliminate exposure of larger stored materials to induced static charge and provide greater protection against contaminants when drawers are used as carrying trays. Smaller trays provide gaps for the circulation of free ions in applications involving ionizing nozzles.

Stainless Steel Doors

Standard Faraccator doors feature a locking LiftLatch™ mounted to a stainless steel reinforcement bar. LiftLatches seal the door without applying lateral torque that could damage door hinges.

For extended service life and improved sealing performance, Terra recommends optional stainless steel door frames, which include a unique, one-piece gasket that will not shrink or migrate over extended exposure to a pressurized cabinet. See ordering options for more complete information.





Faraday cage protects shelf contents against ESD

Slide-out trays are easy to remove from noncontaminating slides

Complete Humidity and Particle Control

All Terra Faraccators feature a gas inlet for the introduction of nitrogen and an outlet for an Automatic RB® (relief/bleed) Valve, which guarantees a uniform positive pressure and guards against warping—or even rupturing—caused by excessive internal pressure. This continuous positive pressure effectively blocks out moisture and contaminants.

System options include the Dual Purge System, which provides a variable flow of nitrogen into the Faraccator, and the NitroWatch, which automatically controls the moisture level. These two systems operate in tandem to ensure a dry, particle-free environment and to extend the shelf life of your valuable materials.

For enhanced contamination control, select Faraccators made of transparent Static-Dissipative PVC. This revolutionary material features static-dissipative surfaces that will not attract charged particles—inside or out. It thus helps keep the exterior of the Faraccator as clean as the interior—an important consideration in the cleanroom environment.

Select Ionizing Nozzles for applications that involve nonconductive materials. These nozzles emit free ions that neutralize any charged surfaces inside the Faraccator. They also help control contamination by making sure that no charged particles can cling to an inside surface.

Stainless Steel Inlays and Dividers

The optional inlays furnish each drawer with 304 stainless steel inlay sides, slotted every ⅜" to permit easy insertion of stainless steel dividers (dividers must be ordered separately). Inlays are offered as a package when you order a Faraccator with 2"-deep trays (see ordering table). Inlay packages can also be ordered for other drawer heights, and individual inlays are also available to let you design your own bin sizes.

Note: Inlays allow front-to-back storage of up to 192 2-inch waffle packs (with clips) in small trays, and up to 240 2-inch waffle packs in large trays.

DESICCATORS

CONTROLLED ENVIRONMENT STORAGE

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

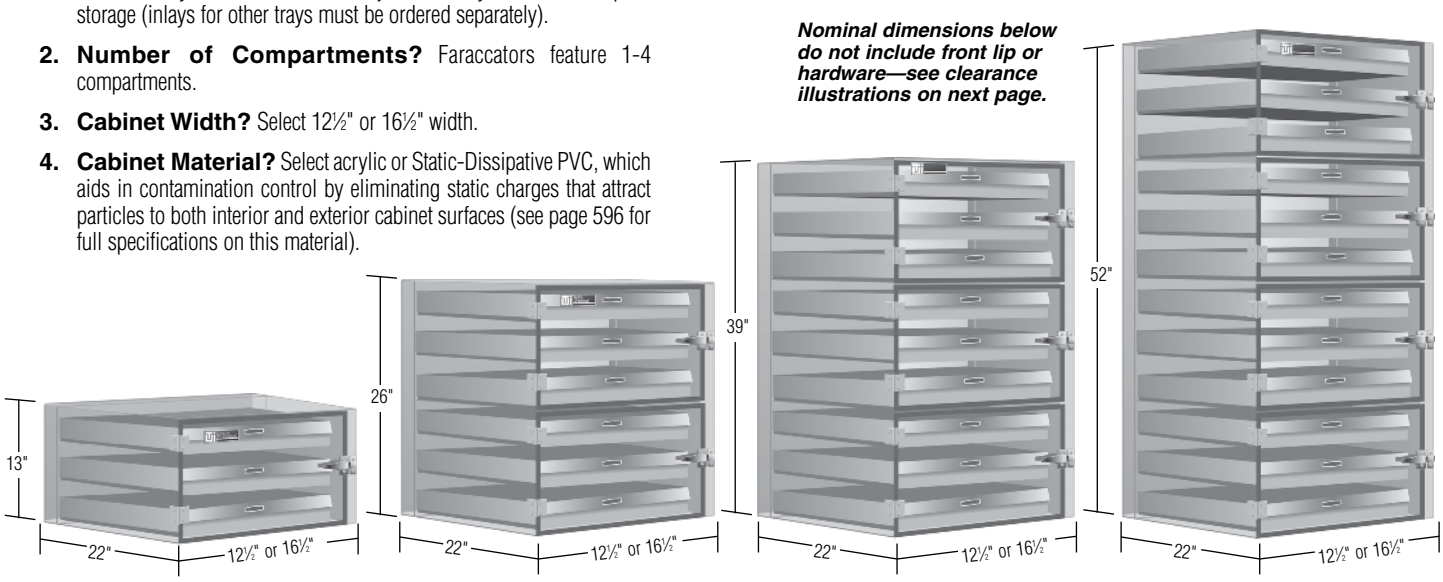
How to Select Your Faraccator™

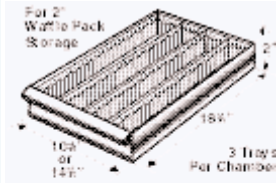
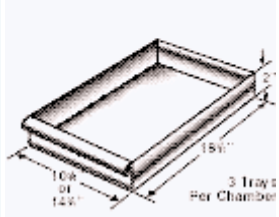
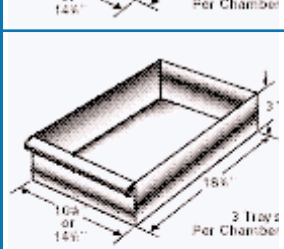
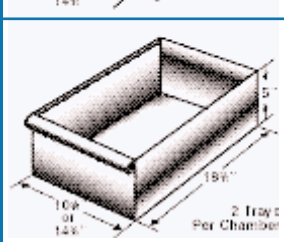
1. **Tray Type?** Each Faraccator™ comes complete with removable stainless steel trays of either 2", 3", or 5" heights. Clearances between tray runners are either 3½" (for 2" and 3" trays) or 5¼" (for 5" trays). Two-inch trays are available with adjustable inlays for 2" waffle pack storage (inlays for other trays must be ordered separately).
2. **Number of Compartments?** Faraccators feature 1-4 compartments.
3. **Cabinet Width?** Select 12½" or 16½" width.
4. **Cabinet Material?** Select acrylic or Static-Dissipative PVC, which aids in contamination control by eliminating static charges that attract particles to both interior and exterior cabinet surfaces (see page 596 for full specifications on this material).

(**Note:** Crating charges are extra. See crating policy on page 2.)

5. **Select System Options:** Stands and casters enhance convenience and cleanliness. Nitrogen control systems allow automatic humidity control.

Nominal dimensions below do not include front lip or hardware—see clearance illustrations on next page.



	Tray Type Load Capacity: 35 lbs./Tray	Number of Chambers (doors)	Number of Sliding Trays	Drawer Inside Dimensions W x D x H (inches)	Cabinet Overall Dimensions W x D x H (inches)	Faraccators: Clear Acrylic Faraccators Cat. #	Faraccators: Static Dissipative* PVC Faraccators Cat. #
With Inlays		1	3	10³/₄ x 18³/₄ x 2	12½ x 22 x 13	**1918-00**	**2534-00**
		2	6	10³/₄ x 18³/₄ x 2	12½ x 22 x 26	**1919-00**	**2535-00**
		3	9	10³/₄ x 18³/₄ x 2	12½ x 22 x 39	**1920-00**	**2536-00**
		4	12	10³/₄ x 18³/₄ x 2	12½ x 22 x 52	**1921-00**	**2537-00**
		1	3	14³/₄ x 18³/₄ x 2	16½ x 22 x 13	**1922-00**	**2538-00**
		2	6	14³/₄ x 18³/₄ x 2	16½ x 22 x 26	**1923-00**	**2539-00**
		3	9	14³/₄ x 18³/₄ x 2	16½ x 22 x 39	**1924-00**	**2541-00**
		4	12	14³/₄ x 18³/₄ x 2	16½ x 22 x 52	**1925-00**	**2542-00**
Without Inlays		1	3	10³/₄ x 18³/₄ x 2	12½ x 22 x 13	**1902-00**	**2543-00**
		2	6	10³/₄ x 18³/₄ x 2	12½ x 22 x 26	**1903-00**	**2544-00**
		3	9	10³/₄ x 18³/₄ x 2	12½ x 22 x 39	**1904-00**	**2545-00**
		4	12	10³/₄ x 18³/₄ x 2	12½ x 22 x 52	**1905-00**	**2546-00**
		1	3	14³/₄ x 18³/₄ x 2	16½ x 22 x 13	**1906-00**	**2547-00**
		2	6	14³/₄ x 18³/₄ x 2	16½ x 22 x 26	**1907-00**	**2549-00**
		3	9	14³/₄ x 18³/₄ x 2	16½ x 22 x 39	**1908-00**	**2550-00**
		4	12	14³/₄ x 18³/₄ x 2	16½ x 22 x 52	**1909-00**	**2551-00**
		1	3	10³/₄ x 18³/₄ x 3	12½ x 22 x 13	**2502-00**	**2552-00**
		2	6	10³/₄ x 18³/₄ x 3	12½ x 22 x 26	**2503-00**	**2553-00**
		3	9	10³/₄ x 18³/₄ x 3	12½ x 22 x 39	**2504-00**	**2554-00**
		4	12	10³/₄ x 18³/₄ x 3	12½ x 22 x 52	**2505-00**	**2555-00**
		1	3	14³/₄ x 18³/₄ x 3	16½ x 22 x 13	**2506-00**	**2556-00**
		2	6	14³/₄ x 18³/₄ x 3	16½ x 22 x 26	**2507-00**	**2557-00**
		3	9	14³/₄ x 18³/₄ x 3	16½ x 22 x 39	**2508-00**	**2558-00**
		4	12	14³/₄ x 18³/₄ x 3	16½ x 22 x 52	**2509-00**	**2559-00**
		1	2	10³/₄ x 18³/₄ x 5	12½ x 22 x 13	**2510-00**	**2560-00**
		2	4	10³/₄ x 18³/₄ x 5	12½ x 22 x 26	**2511-00**	**2561-00**
		3	6	10³/₄ x 18³/₄ x 5	12½ x 22 x 39	**2512-00**	**2562-00**
		4	8	10³/₄ x 18³/₄ x 5	12½ x 22 x 52	**2513-00**	**2563-00**
		1	2	14³/₄ x 18³/₄ x 5	16½ x 22 x 13	**2514-00**	**2564-00**
		2	4	14³/₄ x 18³/₄ x 5	16½ x 22 x 26	**2515-00**	**2565-00**
		3	6	14³/₄ x 18³/₄ x 5	16½ x 22 x 39	**2516-00**	**2566-00**
		4	8	14³/₄ x 18³/₄ x 5	16½ x 22 x 52	**2517-00**	**2567-00**

**** For enhanced contamination control, select Faraccators made of Static-Dissipative PVC. For full specifications refer to page 596.***

DESICCATORS

CONTROLLED ENVIRONMENT STORAGE

Dual Purge™ System
Provides a variable nitrogen purge to maintain a positive pressure whether desiccator doors are open or closed. Ensures effective, economical nitrogen use. See page 128.

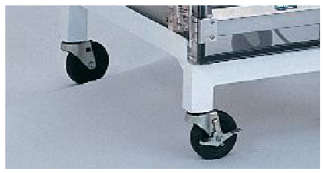
	Cat. #
Dual Purge™ System	**1606-61**
Dual Purge™ Door Sensor (installed). One/door required	**1600-49**

GroundWatch™
This ground continuity indicator provides audible and visible alarms if the ground connections should ever be broken, thereby protecting contents of your desiccator or Faraccator against electrostatic discharge. It connects to the grounding terminals at the rear of the desiccator/Faraccator chamber. See page 141.

Cat. # **4400-00**

NitroWatch®
Used with the Dual Purge System, the NitroWatch automatically maintains low humidity levels, down to 0% RH, while providing a continuous % RH readout. See page 129.

	Cat. #
NitroWatch® Controller	**9500-00A**
NitroWatch® Sensor (installed). One/cabinet required	**9500-02A**

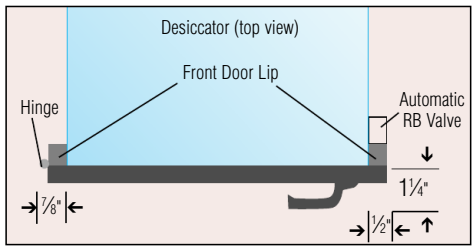


Heavy-Duty, Low-Profile Casters
Set of 4 hard rubber, noncontaminating casters, 2 with brakes. Raise stands 3½".

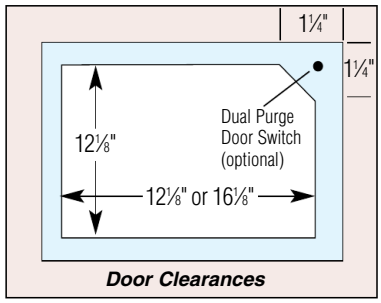
Cat. # **1700-44**

Automatic RB® (Relief/Bleed) Valve
Safeguards desiccator against overpressures. Required for operation with Dual Purge System. See page 130.

Cat. # **1600-60B**



Hardware Clearances (add to nominal dimensions)



Door Clearances

Corresponding Stands (includes leveling feet)

(Prices of 4" and 12" stands of a given material are the same.)

Stainless Steel	
4" High Cat. #	12" High Cat #
1766-20A	1766-21A
1766-20A	1766-21A
1766-20A	1766-21A
1766-20A	1766-21A
1775-12A	1775-13A
1775-12A	1775-13A
1775-12A	1775-13A
1775-12A	1775-13A
1766-20A	1766-21A
1766-20A	1766-21A
1766-20A	1766-21A
1766-20A	1766-21A
1775-12A	1775-13A
1775-12A	1775-13A
1775-12A	1775-13A
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1766-20A	1766-21A
1766-20A	1766-21A
1775-12A	1775-13A
1775-12A	1775-13A
1775-12A	1775-13A
1775-12A	1775-13A
1766-20A	1766-21A
1766-20A	1766-21A
1766-20A	1766-21A
1766-20A	1766-21A
1775-12A	1775-13A
1775-12A	1775-13A
1775-12A	1775-13A
1775-12A	1775-13A

Stainless Steel Door Frames

Revolutionary Access Doors Reduce Wear, Enhance Performance!
To protect your investment in clean, dry, static-safe storage, select optional Stainless Steel Door Frames.

Stainless steel frames reinforce standard plastic doors to extend service life and improve sealing performance. In fact, tests show that these doors increase structural rigidity of the door by a factor of five. A built-in locking LiftLatch™ securely seals the door without applying lateral torque that could damage hinges.

Includes One-Piece, "e"-Profile Gasket

- Non-outgassing material is attached without adhesive
- Won't shrink, sag or migrate, even after extended use
- Eliminates maintenance, extends service life of cabinet

Stainless steel door frames are sealed using Terra's unique one-piece, nonadhesive gasket. Unlike other gaskets applied in strips, this gasket will not sag or migrate because it is mechanically attached to the door frame.

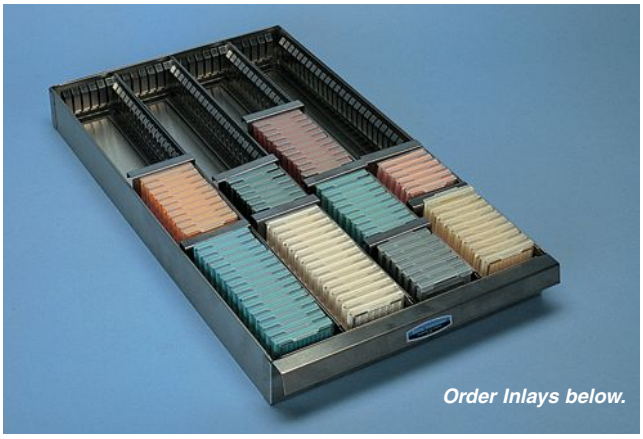
Not only does it require no adhesive, but its one-piece design leaves no gaps or cracks that can allow gas leaks to develop. This leads to both a superb seal and a reduction in nitrogen waste.

Stainless Steel Doors	Cat. #
For 12½"W Faraccators	**2357-01**
For 16½"W Faraccators	**2357-02**

Order one/chamber
(see chart at left for appropriate quantity)

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

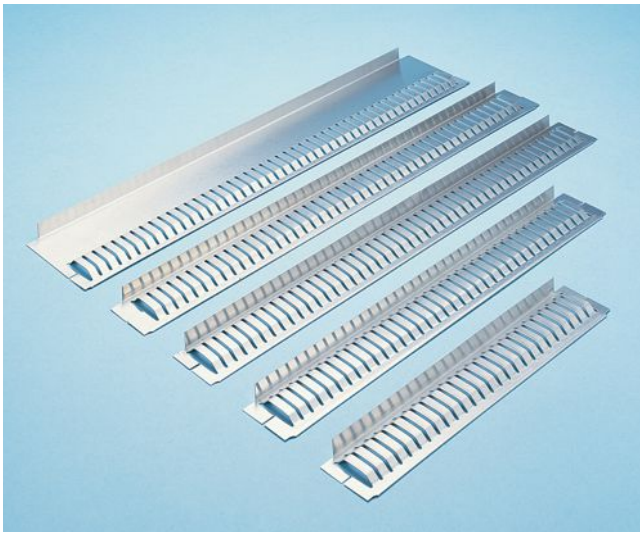
Replacement Conductive Trays



These stainless steel trays comprise the drawers used in Terra Faraccators™. They can also be removed from the sliding glides of the Faraccator™ and used as static-free carrying trays, allowing safe and convenient transfer of components. This flexibility minimizes the need to handle delicate parts and lets you take a tray to a laminar flow station for sorting and picking operations. **Note:** You must select the correct size tray for your Faraccator™ width. Trays are included when you order from the table on the preceding pages.

Tray Depth	Small-Width Tray (10½" x 18") Cat. #	Large-Width Tray (14½" x 18") Cat. #
2" Depth	**1902-01**	**1910-06**
3" Depth	**2502-01**	**2510-06**
5" Depth	**2502-02**	**2510-07**

Universal Conductive Inlays



Terra's Universal Conductive Inlays are made of 304 stainless steel and feature slots every ⅜" to permit easy insertion of stainless steel dividers. By adjusting inlays back and forth in the slotted end pieces, you can create the bin sizes you need to store wafers, waffle packs, hybrids, and other microelectronic components.

The all stainless steel construction provides a static-safe, noncontaminating environment for organized storage and easy transfer of stored parts from one manufacturing operation to another. These inlays are designed to fit precisely inside either the small or large stainless steel conductive trays.

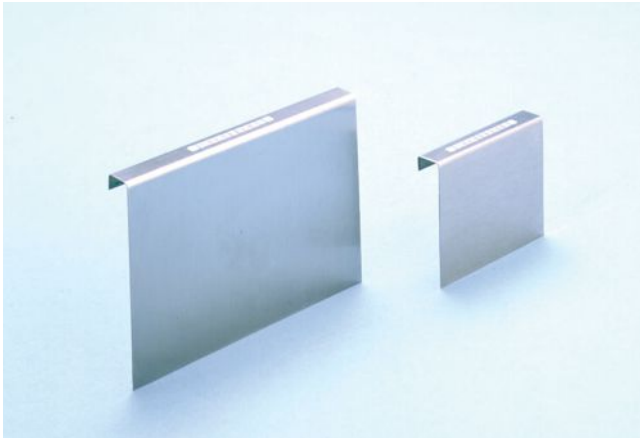
Note: Each inlay features slots on one side only. Two inlays of the same size fit back-to-back to form a separate column.

	Cat. #
For 2" High Inlays	
10½" Inlay side	**1918-03**
14½" side	**1922-03**
18" Inlay side	**1918-04**
For 3" High Inlays	
10½" Inlay side	**2518-03**
14½" side	**2522-03**
18" Inlay side	**2518-06**
For 5" High Inlays	
10½" Inlay side	**2518-05**
14½" side	**2522-04**
18" Inlay side	**2518-09**

For 10¾"-Wide Trays
8 Inlays 18" long (Cat. No. 1918-04)
2 Inlays 10½" long (Cat. No. 1918-03)
Capacity per tray: 192 waffle packs with clips

For 14¾"-Wide Trays
2 Inlays 14½" long (Cat. No. 1922-03)
10 Inlays 18" long (Cat. No. 1918-04)
Capacity per tray: 240 waffle packs with clips

Stainless Steel Dividers



Made of stainless steel, these dividers securely hold 2" and 4" waffle packs in place. A labeling space facilitates optimal organization of stored parts.

	Cat. #
2½" wide Dividers	**1902-03**
4½" wide Dividers	**1902-04**

Double Agent Desiccator™

- **Performs a double function: stores sensitive components in a dry, contamination-free environment; guards against theft or tampering in on- or off-site locations**
- **Features Sargent & Greenleaf Combination Locks and Spy-Proof Dials**
- **Fire rated for 350°C-2 hours; J.I.S. tested and approved**
- **Incorporates 3-wheel changeable combination lock and separate key lock for dual or day lock control**
- **Enhances security with automatic relocking device triggered by forced entry attempt**
- **Houses 8-door desiccator cabinet No. 3950-34 (acrylic) or No. 3950-04 (static-dissipative PVC) — see page 90**
- **Maintains positive pressure throughout operation**
- **Conforms to DOD Handbook 263 and MIL-SPEC 1686 with proper accessories**

Terra's complete line of desiccator cabinets provide the protection your sensitive microelectronic products need from airborne contaminants, electrostatic discharge, and excessive temperature and humidity. But what about security—from fire, explosion . . . or unauthorized access?

Terra Takes Another Step to Meet Critical Safe-Storage Requirements

The Double Agent Desiccator™ performs the two vital functions called for by more and more manufacturers today: clean, dry, ESD-free storage and maximum security from tampering, theft, and fire.

Because microelectronic devices demand specially stringent protection against heat, humidity, ESD, and particle contamination, standard safes designed to protect paper records are inadequate. Internal temperatures in these units can reach as high as 350°F, and they offer little guarantee of stable humidity, positive pressure, or contamination control. Resulting conditions may leave paper products intact, but they destroy or degrade your microelectronic materials and devices.

That's why we've incorporated all of the advanced features of our desiccator cabinets into this security system. The eight-door design of the inner shell minimizes exposure to inrushing contaminants, and a continuous purge of gas maintains a positive pressure. Outside, the Double Agent Desiccator™ looks—and functions—like the toughest, most tamper-proof safes available. Tests indicate that these systems maintain safe levels of heat and humidity inside under extreme conditions outside—even with external temperatures as high as 1700°F! And the many locking features of the Double Agent Desiccator™ are designed to guard against unauthorized access—and to rout the most determined spy.

The Double Agent Desiccator™ features two external doors equipped with 3-wheel changeable Sargent & Greenleaf locks and Spy-Proof dials; both doors lock on the top, bottom and side. The one-piece front door seat provides an even surface for flush closing of all eight doors, thus guaranteeing a reliable seal. The eight-door design ensures convenient access to any storage area while minimizing the possibility of particle contamination. The desiccator features an Automatic RB® Valve (see page 130).

Sargent & Greenleaf heavy-duty combination lock ensures security

For enhanced static control, Terra offers the Double Agent Desiccator with transparent Static-Dissipative PVC, which protects against static charges and the particles they attract.

Built-in shelf racks allow additional shelves to be installed. Two locking drawers positioned below the desiccator come with their own keys.

Specifications

Inside dimensions:	56¼"H x 37"W x 20½"D
Outside dimensions:	67¾"H x 45¼"W x 29½"D
Door opening:	56¼"H x 37"W
Weight:	932 lbs.
Capacity:	24,100 cu. in. (14.0 cu. ft.)

Ordering Note: Part numbers listed below include 8-door desiccator (Type "B" on page 90). Refer to ordering chart on pages 90-91 for shelves, nitrogen controls, and other system options.

	Cat. #
Double Agent Desiccator™	
With Acrylic Desiccator (No. 3950-54; see page 90)	**2000-00**
With Static-Dissipative PVC Desiccator (No. 3950-04; see page 90)	**3001-00**

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Security Faraccator™ Storage Systems

- Faraccator storage system looks deceptively like a standard filing cabinet
- Tamper-proof outer shell eliminates unauthorized access, helps maintain security standards
- Nitrogen-purged inner enclosure establishes a clean, dry storage environment to minimize defects, increase yields
- Faraday-design provides 100% static safety, conforms to DOD HDBK 263 and MIL-SPEC 1686 requirements
- Slide-out removable stainless steel trays afford convenient access to stored contents
- 2", 3" and 5" drawer heights accommodate various sizes of components and samples
- Available in static-dissipative PVC for ESD protection and enhanced contamination control
- See page 108 for more information on Faraccator storage systems

Specifications			Series 100 Security Faraccators™		Corresponding 4" Stands (including leveling glides)	
Drawer Overall Clearance*	Tray Heights	Number of Removable Trays	Acrylic Cat. #	Static-Dissipative PVC** Cat. #	Stainless Steel Cat. #	Casters*** Cat. #
3 1/16"	2"	12	2030-00	2030-15	2030-05	1700-44
	3"	12	2032-00	2030-16		
5 1/4"	5"	8	2033-00	2030-17		

** Drawer overhead clearance is the distance between the bottom of each drawer and the nearest obstacle above it.*

*** Transparent material helps eliminate static charges and the particles they attract; see page 596 for specifications.*

**** Set of 4 heavy-duty, low-profile casters includes 2 with brakes. Casters raise stand an additional 3.5".*

Overall Dimensions: 18½"W x 28"D x 55"H

Overall Faraccator Dimensions: 12½"W x 22"D x 52"H

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DesiCart™
Low Humidity Transport Carts

- **Low-humidity, contamination-free environment protects sensitive materials during process transfer**
- **Optional Quick-Connect fitting and Automatic RB® Valve facilitate dry gas purging**
- **Cushioned casters ensure smooth rolling over uneven surfaces**
- **Select acrylic or static-dissipative PVC enclosure**
- **Dozens of standard configurations for wafer boxes, flat panel displays, chemicals, pharmaceuticals, and other sensitive materials**

These mobile storage carts transport components from one location to another while maintaining critical low-humidity and low-particle conditions.

A Controlled Environment Wherever It Goes!
The DesiCart™ is available in two versions (see facing page for additional application-specific configurations). Each houses a hermetically sealed desiccator storage chamber, which maintains clean, dry storage conditions during parts transport. Desiccators feature opposing access doors for pass-through convenience, and every door is equipped with a locking latch and key (see ordering chart for door configurations).

Quick connect/disconnect fittings (optional) enable you to purge the system with nitrogen while it is stationary. Reinforced door construction and gasketing provide air-tight seals that maintain a clean, dry storage environment while the DesiCart is in motion.

Stainless Steel Frame (shown with optional shelves)

Polyethylene Frame

High-Density Polyethylene DesiCarts™ provide excellent chemical resistance and include an integral one-piece handle. Wrap-up rails make for safe transport of materials carried on top of the cart, and corners are rounded for easy cleaning. Each of these carts features four chambers and includes chrome-plated racks.

Stainless Steel DesiCarts™ feature a solid stainless steel top and a two-chamber desiccator. Chrome-plated wire racks mounted inside the desiccator allow easy adjustment of optional stainless steel shelving.

All models feature 5"-diameter polyurethane swivel casters for smooth quiet operation and Class 100 cleanroom-compatibility. Other stem casters are available; see page 145 for ordering information.

Static-Dissipative PVC: ESD and Particle Control
The DesiCart is available in either acrylic or Terra Universal's transparent Static-Dissipative PVC, which features surface resistance of between 10^6 and 10^8 ohms/square. This durable material safely dissipates static charges that can damage sensitive parts and also eliminates static attraction of contaminants. It also resists a wide range of chemicals (see page 596 for a full description of this material).

	Cat. #
Quick Connect/Disconnect Fitting (installed; requires RB Valve)	**1601-06**
Automatic RB® (Relief/Bleed) Valve (Required for safe gas purging)	**1600-60B**

Note: Models below feature chrome-plated racks and opposing doors for pass-through access.

Polyethylene Frame: Dimensions			Ordering Information		Corresponding Shelves	
Overall H x W x L (inches)	Shelving W x D (inches)	Doors (8) H x W (inches)	with Acrylic Desiccator Cat. #	with Static-Dissipative PVC Desiccator Cat. # ⊗	Acrylic Cat. #	Stainless Steel
						Shield Cat. # **4002-53**
						Tray Cat. # **4002-54**
33 1/4 x 27 x 39 1/2	15 x 22	9 x 15	**4002-50**	**4002-51**	**4002-52**	Shelf Cat. # **4002-55**

Stainless Steel Frame: Dimensions			Ordering Information		Corresponding Shelves	
Overall H x W x L (inches)	Shelving W x D (inches)	Doors (8) H x W (inches)	with Acrylic Desiccator Cat. #	with Static-Dissipative PVC Desiccator Cat. # ⊗	Acrylic Cat. #	Stainless Steel
						Shield Cat. # **4001-96**
						Tray Cat. # **4001-97**
38 x 24 x 36	13 3/4 x 20	20 1/2 x 15 3/4	**4001-90**	**4001-91**	**4001-92**	Shelf Cat. # **4001-95**

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DESICCATORS

CONTROLLED ENVIRONMENT STORAGE

Shown with optional hygrometer and acrylic shelves.

Cushioned ride for optimal product protection

DesiCart™ Mobile Work Station

Ideal for kitting small parts!

- **Controlled low-humidity, low-particle system protects sensitive parts during transit**
- **Stainless steel work surface and external shelf racks provide a convenient kitting area (order desired shelves separately)**
- **Optional hygrometer allows continuous monitoring of humidity level (0 - 100%RH)**

This versatile DesiCart™ provides dual storage chambers, each 16.5"W x 24"D x 37.75"H (clearance: 16"W x 24"D x 36.25"H). Chrome-plated racks allow placement of adjustable acrylic shelves. In addition, a 10"W x 24"D x 37.75"H kitting area, located between the storage chambers, allows convenient placement of kitting trays on adjustable acrylic shelves. Five-inch casters allow smooth rolling over a variety of floor surfaces.

Overall dimensions (including hardware): 48"W x 25.5"D x 49.25"H.

	Cat. #
Acrylic	**1001-35**
Static-Dissipative PVC	**1001-36**
Acrylic Shelf (for storage chamber)	**1001-38**
Acrylic Shelf (for kitting area)	**1001-39**
Hygrometer (see page 585)	**1600-22**

Order Quick Connect Fitting and Automatic RB® Valve on page 116.

Wafer Box DesiCart™

- **Perforated electropolished stainless steel shelves hold wafer boxes securely in position during transit**
- **Spring-loaded casters provide a cushioned ride, eliminate wafer chatter**
- **Each cart holds up to twelve 200-mm wafer boxes***

This DesiCart™ ensures clean, dry, secure transport of delicate wafers. Its 6"-diameter spring-loaded casters provide a cushioned ride, and ultra-clean materials of construction, including electropolished stainless steel shelves, ensure surfaces that won't slough or outgas.

Perforated shelves ensure uniform gas distribution. Their angled design keeps boxes securely in position during transit. Stainless steel door frames ensure tight seals and a long service life. Overall dimensions: 50.88"W x 26.25"D x 38"H (including hardware). Select Quick Connect Fitting and Automatic RB® Valve for nitrogen purging (see previous page). Shelf clearance: 11.25"H.

Perforations facilitate uniform gas distribution

Wafer Box DesiCart™	Enclosure Material	Cat. #
	Acrylic	**4002-48**
	Static-Dissipative PVC	**4002-49**

* Based on Empak model TR-08A. Custom sizing is available for other carrier sizes.

Custom Configurations

Specify any custom modifications you require for your transport requirements!

A. Large-Capacity DesiCart™

Ideal for large assemblies. Double doors afford unrestricted access to the complete storage area. Dimensions: 60"W x 36"D x 54"H.

Cat. # **1001-41**

B. Electropolished Stainless Steel Domed Cart

This ultraclean cart features sliding acrylic access door and a "dead man" braking system that prevents rolling when unattended. The curved top assists in cleaning and also prevents personnel from setting objects on top.

Cat. # **1001-42**

DESICCATORS

CONTROLLED ENVIRONMENT STORAGE

The Terra Security Faraccator™ Storage System combines the static-free, contamination-proof environment of a Faraccator cabinet with the maximum security so often required in a manufacturing environment. Its state-of-the-art design incorporates an inner and outer shell that shield contents against electrostatic charges without the need for ionizing nozzles—while at the same time rendering the system tamper-proof.

The many human-engineered features of this modular system provide maximum user comfort, increase productivity, save storage space, and ensure efficient use of personnel. Its removable trays also help to reduce part rejects. Operators no longer have to leave access doors open during time-consuming sorting and inventory procedures—and increase the possibility of contamination inflow that can damage components. Instead, trays can simply be removed and transported to a laminar flow station, where kitting can be performed safely.

Outer Shell—Inconspicuous Security

The outer shell looks no different from a standard filing cabinet. A lockbar mechanism, which accepts any standard lock, ensures total security, and the full-length door provides immediate access to any of the four secondary doors of the inner shell. The outer shell is fabricated of C.R. steel and finished with semigloss, chip-resistant enamel; standard color is beige.

Inner Shell—Clean, Low-Humidity Environment

The inner shell is constructed of contamination-free clear acrylic or static-dissipative PVC to ensure cleanliness and to allow easy frontal viewing. It maintains a constant positive pressure that blocks the inflow of atmospheric contaminants and moisture while all doors are closed. The four 12" x 12" secondary access doors allow limited access to stored materials and thereby prevent the exposure of materials to inrushing moisture and contaminants that result from larger access doors.

Static-dissipative PVC not only dissipates static charges safely, but also eliminates particle attractions; surfaces stay clean—both inside and out. See page 596 for full specifications on this material.

Slide-Out Drawers and Runners

The system's conductive drawers are made of 304 stainless steel. They can be easily removed and used as handling trays throughout manufacturing or testing operations; this flexibility eliminates the need directly to touch—and possibly to contaminate—sensitive microelectronic components. It also allows you to perform kitting and inventory procedures at a laminar flow station—and to minimize the time that access doors must remain open. Optional stainless steel inlays and dividers let you create the bin sizes you need for optimal organization of stored material. Standard system provides 3⁄16" or 5¼" of overhead drawer clearance—plenty of space for waffle packs, wafers, photomasks, and any other microelectronic products.

The trays mount easily into the system's runners to become slide-out drawers. Runners are made of chrome-plated steel and feature an easy-glide suspension system that supports up to 60 lbs. when fully extended and allows full access to every inch of drawer space. Two-drawer compartments provide 5¼" of clearance for stored materials (such as 4" waffle packs); three-drawer compartments provide 3⁄16" of clearance.

Terra offers 2", 3", and 5" high drawers to enhance ESD shielding and storage flexibility. Higher drawer heights eliminate exposure of larger stored materials to induced static charge and provide greater protection against contaminants when drawers are used as carrying trays. Two-inch high trays are ideal for 2" waffle packs, while 3" and 5" high trays safely store larger waffle packs, wafer boats, reticles, transistors, and many other microelectronic devices. Select 2" or 3" trays for 3-drawer compartments (with 3⁄16" of clearance); 5" trays for 2-drawer compartments (with 5¼" of clearance).

Stainless Steel Inlay Package

The optional inlay package furnishes each drawer with 304 stainless steel inlay slides, slotted every ⅜" to permit easy insertion of stainless steel dividers (dividers must be ordered separately). By adjusting the slotted sides from left to right, and the dividers front to back, you can create the bin sizes you need for your particular products. The all-stainless steel construction provides a contamination-free environment for organized storage of parts and for their convenient transport through different manufacturing processes. Complete packages are available for 2" waffle pack storage. Inlays may be ordered separately for other applications. See page 112 for ordering information.

Grounding System

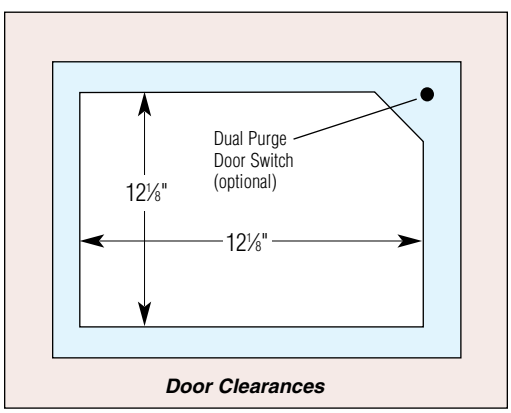
The Security Faraccator comes completely ready for operator hook-up! Its design makes the penetration of electrostatic charges into the cabinet shell virtually impossible. In fact, tests show that the electrostatic protection provided by the Security Faraccator far exceeds that of stainless steel desiccator cabinets with glass sides or doors; it conforms to both DOD HDBK 263 and the static decay requirements of MIL-SPEC 1686.

Humidity Controllers Automate Dry Storage

Terra's Dual Purge™ and NitroWatch® Humidity Control Systems take the guesswork out of low-humidity storage. They also allow convenient monitoring of the enclosure while the security system is closed.

The NitroWatch® monitors the current relative humidity level and also displays the user-selected humidity set point. When the humidity level inside the cabinet climbs above this level, the Dual Purge™ activates a high flow of nitrogen to reduce the RH level below the set point and then re-establishes an economical low-level purge. This advanced humidity control not only ensures the dry conditions your sensitive materials require, but also economizes on nitrogen use.

The Automatic RB® Valve continuously bleeds off excess internal gas to maintain a constant pressure of about 0.05"WC and automatically releases any sudden purge that might result from a malfunction in the gas supply. Please refer to page 130 for a full description.



Door Clearances

	Cat. #
Dual Purge System (see page 128)	**1606-61**
Dual Purge Sensor Switch One required per door	**1600-49**
NitroWatch® (see page 129)	
Controller	**9500-00A**
Sensor	**9500-02A**
Automatic RB® Valve (see page 130)	**1600-60B**

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Heated Dehydration Chamber

- **Excellent thermal stability makes this system perfect for drying sensitive materials under tightly controlled temperature and humidity conditions**
- **Designed for long exposure times at modestly elevated temperatures, which reduce thermal shock and ensure more uniform subsurface drying**
- **Multiplexed design provides independent heating and dry nitrogen purging to each chamber for optimal efficiency and versatility**
- **Maintains temperature up to 180°F, at a controlled humidity as low as 0%RH**
- **Double-wall construction includes 1.5" of fiberglass insulation**
- **Slide-out removable drawers provide easy access to every square inch of storage space**
- **Polycarbonate construction withstands thermal stress**
- **Can be customized to meet your dimensional requirements!**

Perforated slide-out drawers allow air circulation and provide full access to contents

Special Requirements?
No Problem!
Terra will customize any desiccator to your specs.

This heated chamber dries optics, electronics and microelectronics assemblies, chemicals and other materials at safely controlled humidity and temperature levels. This precise control in turn allows extended drying cycles, which produce less thermal shock and more uniform subsurface drying than high-temperature oven baking.

Smart Control Systems Reduce Operating Expenses

Both the heating and the dehumidification systems provide multiplexed, chamber-by-chamber control for lower operating costs and increased efficiency.

Humidity is controlled by a NitroPlex™ system, which regulates the flow of dry process gas, generally nitrogen, into each chamber. Chamber control modules include a humidity sensor, an LED display, and a safety relief/bleed valve. This system allows you to define a subambient humidity set point for each chamber independently. The NitroPlex™ system directs a dry gas purge only to the chamber(s) that need it, and only for as long as necessary to maintain each chamber's humidity set point.

By directing gas only where it is needed, this system cuts down on waste and saves on nitrogen expenses—by as much as 78%. See page 82 for test data and additional information on Terra's NitroPlex™ system.

Similarly, each chamber incorporates its own heating module. Each module includes a fan that continuously recirculates chamber gas through a 100W, 341 BTU heater. Overtemperature protection ensures that the chamber temperature will not damage stored material or the plastic cabinet itself. The double-wall design, which includes 1.5" of fiberglass insulation, helps minimize heat loss and maintain thermal stability. Controls for each chamber's heating module are incorporated into a stainless steel control housing.

The standard system includes three chambers, each with two perforated slide-out stainless steel trays. Trays are easily removed from the runners. Doors include stainless steel door frames, which increase the strength and durability of the cabinet. Terra's unique "e"-profile one-piece gaskets provide a tight seal without the use of adhesives or other materials that can outgas. Locking LiftLatches™ seat the doors firmly against gaskets without straining doors or hinges.

Specifications

Dimensions (OD):	38.0"W x 36"D x 60"H. Optional castered stand raises cabinet an additional 7.63"
No. of Chambers:	3, each with two sliding trays
Chamber ID:	32"W x 30"D x 22"H
Trays:	Perforated 16-gauge 304 stainless steel. 32.61"W x 32.00"L x 2.00"D
Materials:	Polycarbonate with stainless steel door frames
Heater:	100W, 341 BTU with integral muffin fan, mounted at rear of each chamber
NitroPlex Module:	Includes 5-digit LED and sensor rated ± 2%RH accurate (at 20°C). Stainless steel housing: 1.5"W x 2.75"D x 1.5"H. Includes installation of Automatic RB® (Relief/Bleed) Valve, solenoid and other electronics and gas plumbing. See page 82 for more information.

CE

	Cat. # 110VAC, 50/60Hz	Cat. # 220VAC, 50/60Hz
Heated Dehydration Chamber Polycarbonate	**2148-02**	**2148-02-220**
Stand Stainless steel; includes leveling feet. Raises cabinet approx. 7.5"		**2148-03**
Heavy-Duty Casters Set of 4 hard rubber, 2 with locking brakes.		**1700-44**

Series 100 Stainless Steel Desiccators

- **Durable stainless steel enclosure maintains low humidity conditions to prevent oxidation and other moisture-related product defects**
- **One-piece, nonadhesive seals prevent outgassing, maintain a positive internal pressure to block out moisture and contaminants**
- **Inlet and outlet ports allow precise regulation of nitrogen flow**
- **Electropolished stainless steel racks allow height adjustment of shelves**
- **Select front and rear windows of safety glass or Static-Dissipative PVC, which eliminates charges and the particles they attract**
- **Optional Dual Purge™ and NitroWatch® systems automatically maintain specified humidity set point for optimal performance**

Typical configuration featuring three Series 100 Desiccators and optional stand

Cleanliness, Convenience, Economy

These desiccators are constructed of satin-finished 304 stainless steel that forms a Faraday cage to guard stored contents against electrostatic discharge (ESD) when properly grounded.

They feature transparent front and back windows for great visibility of stored materials; select either safety glass or Static-Dissipative PVC to suit your application. The front door features a full-height hinge.

Each desiccator is also equipped with inlet and outlet ports that allow gas to be purged through the storage area; select Terra's Dual Purge™ System and Automatic RB® Valve to ensure an economical nitrogen flow that maintains a continuous positive internal pressure and locks out moisture and particles. Note: for automated gas purging and humidity control in multiple chambers, select the Series 200 Desiccator (page 120).

No. 1911-02

No. 1610-32

Racks included, shelf optional

SmartDesiccator, with integrated humidity controls, saves up to 78% of nitrogen costs—see page 80

Stainless Steel Stands

Each supports up to three 22"-wide Series 100 Stainless Steel Desiccators. Overall dimensions: 28"W x 67"H x 21"D. Height from floor: 12". Non-caster models include leveling feet. Each hard-rubber caster is rated for a 210-lb. load; casters raise the stand an additional 3½" off the floor.

	With Casters Cat. #	Without Casters Cat. #
Stands		
Stainless Steel	**1610-38**	**1610-39**
Electropolished Stainless Steel	**1611-09-2**	**1611-10-2**
Finished Steel	**1679-10**	**1679-11**
Grounding Terminal Includes installation		**1686-12**
Flowmeter 0.6-5 CFH		**1600-03**
Automatic RB® Valve Includes installation		**1600-60B**

(See page 126 for other system options.)

Note: Subtract 2" from outside dimensions to get inside clearance.

Outside Dimensions (W" x D" x H")	Stainless Steel: Tempered Glass Windows Cat. #	Stainless Steel: Dissipative PVC Windows Cat. #	Stainless Steel: Corresponding Shelves Perforated Cat. #	Stainless Steel: Corresponding Shelves Non-Perforated Cat. #	Electropolished Stainless Steel: Tempered Glass Windows Cat. #	Electropolished Stainless Steel: Dissipative PVC Windows Cat. #	Electropolished Stainless Steel: Corresponding Shelves Perforated Cat. #	Electropolished Stainless Steel: Corresponding Shelves Non-Perforated Cat. #
12 x 10 3/4 x 12	**1678-00**	**1610-34**	**1610-40**	**1678-05**	**1610-90-2**	**1610-94-2**	**1610-98-2**	**1611-05-2**
12 1/4 x 16 x 12 1/4	**1690-00**	**1610-91**	**1610-92**	**1610-93**	**1610-91-2**	**1610-95-2**	**1610-99-2**	**1611-06-2**
16 x 13 x 16	**1678-10**	**1610-33**	**1610-41**	**1679-01**	**1610-92-2**	**1610-96-2**	**1611-03-2**	**1611-07-2**
22 x 21 5/8 x 16	**1679-06**	**1610-32**	**1610-42**	**1679-45**	**1610-93-2**	**1610-97-2**	**1611-04-2**	**1611-08-2**

Series 200 Stainless Steel Desiccator

- **Double-wall stainless steel, smooth-profile design ensures a static-safe environment that won't shed or accumulate particles**
- **Available with electropolished stainless steel surfaces to meet Class 1 contamination requirements**
- **Built-in gas plumbing and Automatic RB® (Relief/Bleed) Valve in each chamber allow easy, safe connection to nitrogen or CDA (clean dry air) gas line**
- **Automatically maintains a preset low moisture level (with selection of humidity controllers) to prevent oxidation and other defects, extending product yields**
- **Locking LiftLatches™ open and close without straining door seals and hinges, enhancing performance and extending service life**
- **Optional electropolished racks accommodate adjustable-height shelving**

These turnkey systems provide a contamination-free, low-humidity, static-safe environment for your most sensitive materials.

Clean, Rugged Construction

Series 200 Stainless Steel Desiccators are fabricated completely of noncontaminating, cleanroom-compatible materials and offer a full range of advanced design features for optimal performance.

Their double-wall construction provides smooth surfaces for easy cleaning and minimal particle retention. Viewing windows are made of static-dissipative PVC, which guards against static charges and the contaminants they attract (see page 596 for complete specifications on this material). Chrome-plated locking LiftLatches™ are provided for added security. A grounding terminal, positioned at the top of each desiccator, allows easy connection to your in-house ground. Optional electropolished stainless steel racks accommodate adjustable stainless steel shelves, and optional stands raise the cabinet for easy mobility and floor cleaning.

Smooth chamber interiors are easy to clean, won't harbor contaminants (shown with optional racks and shelves)

Automatic Humidity Control

All models feature built-in gas fittings and piping to allow easy connection to purge gas, and all include an Automatic RB® Valve in each chamber to ensure safe internal pressures at all time.

For optimal moisture and contamination control, select the Dual Purge™ and NitroWatch® option. This configuration provides automated humidity monitoring and control to cut nitrogen costs and boost desiccator efficiency (see page 128-129).

Optional **Dual Purge™** and **NitroWatch®** Systems

- Monitor & display humidity level
- Activate high-flow purge to compensate for open doors or climbing % RH level
- Automatically maintain user-selected set point to increase product yields

Shown with optional stand, shelves/racks, Dual Purge and NitroWatch Humidity Controllers

Dual Purge™ System

Variable purge system boosts desiccator efficiency and cuts nitrogen costs. See page 128.

	Cat. #
Control Unit	**1606-61**

NitroWatch®

Maintains user-selected low humidity level. See page 129

	Cat. #
Control Unit	**9500-00A**
Humidity Sensor	**9500-02A**

Note: For smaller or less critical storage requirements, select Terra's Series 100 Stainless Steel Desiccator. See page 119.

Heavy-Duty Cleanroom Casters

Selected for cleanroom compatibility and strength, these casters feature 4"-diameter wheels with a stainless steel finish. Rated for a 300-lb. load each. See page 145 for complete information.

	Cat. #
Set of 4, 2 with locking brakes	**1700-43**

Note: *To order electropolishing of stainless steel shelves or stand, add "-2" to the Cat. no. and 30% to the price of the stainless steel component.*

Series 200 Stainless Steel Adjust-A-Shelf™ Desiccators*					Corresponding Shelf		Stainless Steel Stand	
							With Levelers. Order Casters Above.	
No. of Chambers	Inside Dimensions (W" x D" x H")	Overall Dimensions (W" x D" x H")	Stainless Steel Cat. #	UltraClean™ Stainless Steel Cat. #	Perforated** Cat. #	Solid** Cat. #	4" High Cat. #	12" High Cat. #
1	20 x 20 x 14	23 1/2 x 22 1/2 x 16 1/2	**9606-20**	**9606-00**	**1610-35**	**1679-45**	**9606-29A**	**9606-32A**
2	20 x 20 x 14	23 1/2 x 22 1/2 x 33 1/2	**9606-21**	**9606-01**	**1610-35**	**1679-45**	**9606-29A**	**9606-32A**
3	20 x 20 x 14	23 1/2 x 22 1/2 x 50	**9606-22**	**9606-02**	**1610-35**	**1679-45**	**9606-29A**	**9606-32A**

**** See page 2 for Terra's crating policy. ** Requires installation of electropolished stainless steel racks (order two): Cat. # 1504-04.***

Series 300 Stainless Steel Desiccator

- **Hermetically sealed, nitrogen-purged cabinet maintains low-humidity storage conditions to minimize moisture-related defects, increase yields**
- **Adjustable stainless steel shelves accommodate most sample and container sizes, including SMIF pods, 300mm wafer boxes, and kitting trays**
- **Large double doors, with heavy-duty locking LiftLatches™ and door hinges, provide years of trouble-free storage under heavy use**
- **Stainless steel construction, available with electropolished finish, meets the highest standard of cleanliness, wipes down clean**
- **Static-dissipative PVC viewing windows control static charges and the particles they attract**
- **See also Terra's Wafer Box Cabinets beginning on page 158**

These stainless steel desiccators provide all the humidity control features of our smaller models, along with double doors that afford unrestricted access to the entire storage area.

Made of satin-finished 304 stainless steel, these cabinets are designed for optimal strength and cleanliness. The electropolished stainless steel model meets the most critical particle requirements. Static-dissipative PVC viewing windows ensure full visibility of stored parts and minimize the danger of electrostatic discharge that could damage sensitive components. Two sets of chrome-plated locking LiftLatches™, with one-piece, nonoutgassing elastomeric gaskets, seal each door snugly.

Select as many optional shelves as you require. Each shelf is perforated along the rear edge to permit unrestricted gas circulation, and can be positioned at any height you desire by means of clip supports. Optional 4" stands are recommended to allow easy cleaning beneath the cabinet.

For optimal humidity and particle control, select the optional Dual Purge™ System and NitroWatch® Humidity Controller (refer to page 128). The standard cabinets below come equipped with an Automatic RB® (Relief/Bleed) Valve to ensure safe pressure relief.

Shown with optional stand, shelves, Dual Purge™ and NitroWatch® Controllers

Series 300 Stainless Steel Desiccators	Shelf*	Stand**
	Cat. #	Cat. #	Cat. #
Stainless Steel	1991-56	1991-51	1991-54
Electropolished SS	1991-57	1991-53	1991-55

** Includes perforations along one edge to permit gas circulation. Comes with mounting clips.*
*** Includes leveling feet; raises cabinet 4"off floor.*

	Cat. #
Dual Purge™ Controller Provides variable gas purge; see page 128.	**1606-61**
Dual Purge™ Sensor Switch	**1600-49**
Nitro/Watch® Controller Automatically maintains subambient humidity. See page 129.	**9500-00A**
Nitro/Watch® Sensor	**9500-02A**

- **The ideal enclosure for your most moisture-sensitive applications**
- **NitroPlex™-ready chamber design features all-stainless steel construction with static-dissipative PVC viewing windows**
- **Optional NitroPlex™ humidity control system enhances desiccator efficiency and saves up to 78% of nitrogen costs**
- **Available in pass-through designs for convenient dual-side access**
- **UltraClean™ electropolished surfaces meet the most stringent particle requirements**

Model shown: No. 1609-11 (Pass-through configuration), with optional NitroWatch® humidity control system and stainless steel casters.

The Series 400 Stainless Steel Desiccator provides the optimal clean, low-humidity environment for sensitive parts.

Available in many chamber configurations, it includes front and rear static-dissipative PVC viewing windows for full visibility of stored contents. Static-dissipative PVC helps control static charges and the particles they attract (see page 596 for specifications). Select pass-through models for convenient dual-side access.

All models feature a plenum chamber that ensures uniform distribution of nitrogen purge gas. Stainless steel reinforced door frames extend the service life of doors and include Terra's "e"-profile, one-piece gaskets. These gaskets are applied without adhesives and will not outgas or migrate over time. Locking LiftLatches™ further extend cabinet service life by operating without lateral torque that strains door hinges.

NitroPlex™ Control System for Optimal Parts Protection

Terra fabricates these desiccators for use with the NitroPlex™ humidity control system, the most advanced nitrogen purge controller available. Equipped with the NitroPlex™, these systems automatically regulate a nitrogen purge in order to maintain any relative humidity set point you require—down to 0% RH.

You can even establish a separate humidity set point in each desiccator chamber. The NitroPlex™ monitors the humidity level in each chamber independently and delivers nitrogen only where it's needed, and only for as long as needed. This high-efficiency control generally results in nitrogen savings of up to 78% compared to conventional flowmeter systems. More importantly, it ensures reliable, documented, operator-independent low moisture levels. Refer to page 82 for complete information.

For applications that don't require this multiplexed nitrogen control, select Terra's Dual Purge and NitroWatch® systems, which include a single humidity sensor per cabinet. See page 128.

DESICCATORS

CONTROLLED ENVIRONMENT STORAGE

NitroPlex™ Humidity Control System

See page 82 for complete descriptions. Desiccators equipped with the NitroPlex™ feature a display/sensor module and relief/bleed valve in each chamber. To order, apply "NP" to the part number of the affected cabinet. Then, order one NitroPlex™ module for each chamber and one turnkey installation charge.

	Cat. #
NitroPlex™ Module	**1911-31**
NitroPlex™ Installation	**1911-32**

Other Humidity Control Options

Dual Purge™ System (See page 128)	**1606-61**
Dual Purge™ Door Sensor Switch (Order one/chamber)	**1600-49**
NitroWatch® Controller (See page 129)	**9500-00A**
NitroWatch® Humidity Sensor	**9500-02A**
Automatic RB® (Relief/Bleed Valve) (Order one/chamber; see page 130)	**1600-60B**

Heavy-Duty Casters

These 4"-diameter cleanroom compatible casters feature a stainless steel finish. See page 145 for full specifications. Includes set of 4, two with locking brakes.

Cat. #
1700-43

Model shown: No. 1609-08 with optional NitroWatch® humidity control system and stainless steel casters.

Series 400 Stainless Steel Desiccators

Type (See below)	No. of Chamber	Nominal Dimensions* (W" x D" x H")	Single-Side Access: Stainless Steel Cat. #	Single-Side Access: Electropolished Stainless Steel Cat. #	Pass-Through: Stainless Steel Cat. #	Pass-Through: Electropolished Stainless Steel Cat. #
A	2	25 x 20.75 x 33.75	1609-01	1609-01EP	1609-07	1609-07EP
	3	25 x 20.75 x 50.62	1609-02	1609-02EP	1609-08	1609-08EP
	4	25 x 20.75 x 67.50	1609-03	1609-03EP	1609-09	1609-09EP
B	4	47 x 20.75 x 33.75	1609-04	1609-04EP	1609-10	1609-10EP
	6	47 x 20.75 x 50.62	1609-05	1609-05EP	1609-11	1609-11EP
	8	47 x 20.75 x 67.50	1609-06	1609-06EP	1609-12	1609-12EP

**** Excludes hardware. Stands raise cabinets an additional 4" (with leveling feet) or 7" (with casters).***
***** Required with selection of shelves. Order two per chamber.***

Type A

Type B

System Options

Accessory	Stainless Steel Cat. #	Electropolished Stainless Steel Cat. #
Shelf Rack**	**1609-13**	**1609-13EP**
Perforated Shelf	**1609-14**	**1609-14EP**
Solid Shelf	**1609-15**	**1609-15EP**
Stands (with levelers)		
4"H	**1609-16**	**1609-16EP**
12"H	**1609-17**	**1609-17EP**

Both models shown with optional NitroPlex™ System and casters.

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Stainless Steel Desiccator Pass-Throughs

- **Perfect for contamination-free transfer of materials in and out of the cleanroom**
- **Hermetically sealed chamber design allows nitrogen purging for a low-humidity storage enclosure**
- **Eliminates unnecessary personnel entry, minimizes cleanroom contaminants**
- **Optional interlock prevents cross-contamination, operates reliably and maintenance-free**
- **Rugged doors include one-piece, nonadhesive gaskets for a better seal**
- **Available with an electropolished stainless steel finish to meet the most stringent particle requirements**
- **Easy to install directly in the cleanroom wall (select optional mounting brackets)**

Complete Line of Standard Cleanroom Pass-Throughs

See page 216

Model shown: No. 2636-07

These versatile pass-through chambers protect your sensitive materials from both particles and moisture.

Fabricated of stainless steel, they feature static-dissipative viewing windows on both sides for full visibility of contents. This material helps protect against both static charges and the particles they attract. The rugged stainless steel door frames include Terra's unique one-piece "e"-profile gasket to ensure effective sealing. These gaskets are applied without adhesives; they will not outgas or migrate over an extended time, even in the presence of dry nitrogen.

This airtight construction allows purging with clean, dry nitrogen. A nitrogen purge helps prevent particle and moisture influx each time a pass-through door is opened. By incorporating the optional Dual Purge™ System and NitroWatch® Humidity Controller, you can automatically maintain a sub-ambient humidity set point down to 0% RH. This capability makes these pass-throughs ideal for storing moisture-sensitive parts in a clean, low-humidity environment. **Note:** An Automatic RB® (Relief/Bleed) Valve is required on all purged chambers.

Doors can be outfitted with a mechanical interlock that keeps personnel from passing particles through the chamber. This device allows only one door at a time to open and thus restricts the volume of air that can enter the cleanroom. The no-maintenance design requires no electrical or pneumatic service.

Installation note: Select mounting brackets below for installation in a standard cleanroom wall. Support brackets are recommended for 36"D wall-mount models (see next page).

Pass-Through Chambers (Doors are made of material indicated in parenthesis; other designs available.)

Type (1) Order Installation Brackets Separately	Outside Dimensions (W" x D" x H") Add 1/2" to W x H for cut-out)	Electropolished Stainless Steel (Stainless Steel Doors/ Dissipative PVC Windows) Internal Access = W x H minus 2" Cat. #	Stainless Steel (Stainless Steel Doors/ Dissipative PVC Windows) Internal Access = W x H minus 2" Cat. #	Mounting Brackets (2) Cat. #/Set of 4	Mechanical Interlocks (3) Cannot be retrofitted Cat. #	Stainless Steel Shelf (4) Cat. #	Stainless Steel Racks (4) (one pair) Cat. #/Pair
Wall Mount	12 x 12 x 12	2636-01EP	2636-01	1994-01	1994-27	1992-70	1993-40
	12 x 12 x 24	2636-02EP	2636-02	1994-02	1994-27	1992-70	1993-41
	18 x 18 x 16	2636-03EP	2636-03	1994-03	1994-27	1992-71	1993-42
	18 x 18 x 24	2636-04EP	2636-04	1994-04	1994-27	1992-71	1993-43
	24 x 24 x 16	2636-05EP	2636-05	1994-05	1994-27	1992-72	1993-44
	24 x 24 x 24	2636-06EP	2636-06	1994-06	1994-27	1992-72	1993-45
	24 x 36 x 24	2636-07EP	2636-07	1994-06	1994-27	1992-73	1993-46
	36 x 36 x 24	2636-08EP	2636-08	1994-07	1994-27	1993-27	1993-47
	24 x 24 x 36	2636-09EP	2636-09	1994-08	1994-27	1992-72	1993-48
	36 x 36 x 36	2636-10EP	2636-10	1994-09	1994-27	1993-28	1993-49
	36 x 36 x 48	2636-11EP	2636-11	1994-10	1994-27	1993-29	1993-50
Floor Mount(1) with Ramp	24 x 24 x 36	2636-12EP	2636-12	1994-11	1994-27	1992-72	1993-51
	36 x 36 x 36	2636-13EP	2636-13	1994-12	1994-27	1993-38	1993-52
	36 x 36 x 48	2636-14EP	2636-14	1994-13	1994-27	1993-39	1993-53

(1) Floor Mount models include low-profile access ramps for easy transport of carts (subtract 1" from internal vertical clearance to compensate for ramps).

(2) Mounting brackets are made of stainless steel. All brackets require 1/4" clearance between wall cut-out and pass-through. Standard mounting is 2" from the front of the cleanroom side (specify other desired location). Price is for one set of four brackets. Two sets are typically required for installation of one pass-through. One is welded on the cleanroom side. See page 217 for sketch of typical installation.

(3) Uses a fail-proof mechanical design that requires no maintenance. Made of stainless steel. Must be specified when Pass-Through is ordered (cannot be retrofitted).

(4) Racks allow adjustable shelf placement and are required for use with shelves (their price includes installation). For electropolishing, add "-2" to the part number and 30% to the price (standard racks are electropolished).

See next page for humidity controllers.

DESICCATORS

CONTROLLED ENVIRONMENT STORAGE

Page 128

Dual Purge™ System

Provides a variable nitrogen purge to maintain a positive pressure whether desiccator doors are open or closed. Ensures effective, economical nitrogen use.

	Cat. #
Dual Purge™ System	**1606-61**
Dual Purge™ System Sensor (installed). One/door required	**1600-49**

Removable Shelves

Can be adjusted on electropolished stainless steel wire racks.

See ordering table on previous page.

Page 129

NitroWatch®

Used with the Dual Purge System, the NitroWatch automatically maintains low humidity levels, down to 0% RH, while providing a continuous %RH readout.

	Cat. #
NitroWatch® Controller	**9500-00A**
NitroWatch® Sensor (installed), one/cabinet required	**9500-02A**

Grounding Terminals

Recommended on stainless steel and static-dissipative PVC pass-throughs. Price includes installation on cleanroom side (see illustration on page 217 for location).

Cat. #
1686-12

Automatic RB® (Relief/Bleed) Valve

Cat. #
1600-60B

Safeguards glove box against overpressures. Required for operation with Dual Purge System. See page 130

Grounded Door Latch

Specify affected door latch(es).

Cat. #
1600-59A

Stainless Steel Support Bracket

Pair recommended for chambers 36"D.
Price includes installation.
(See page 217 for illustration.)

Cat. #
1993-60

Custom Storage Solutions

Put Terra's design and fabrication experience to work in your storage application!

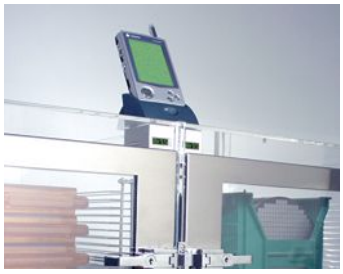
- **Custom Chamber Configurations**
- **Pass-Through Designs**
- **Mobile Desiccators (DesiCarts™)**
- **Dimensional Modifications**
- **Custom Hardware and Materials**
- **High-Temperature and High-Humidity**

Cat. No. 2777-00 Stainless Steel Pass-Through with Customized Chamber Sizes

Cat. No. 2148-02 Heated Dehydration Chamber

Cat. No. 2777-01 Customized DesiCart™

Desiccator Accessory Checklist



NitroPlex™ Module

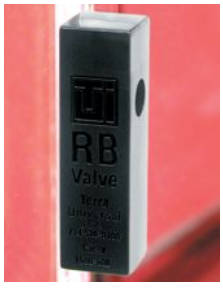
Greatly enhances desiccator performance by controlling nitrogen purge to each desiccator chamber individually. Allows unsurpassed humidity control and nitrogen savings.

Cat. #
Sensor/Display, **1911-31**
See page 82

0.1 and 0.2 Micron Capsule Filters

Provide effective, economical point-of-use filtration of impurities from the gas line. Ideal for use with all Terra desiccators and other nitrogen-purged storage systems.

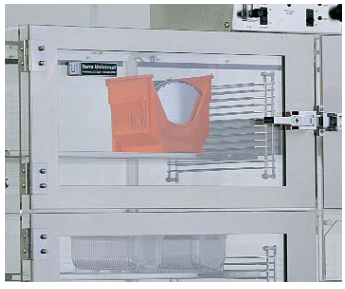
Cat. #
1314-00
See page 136



Automatic RB® Valve

Bleeds off excess gas to make desiccators rupture-proof, and maintains a safe positive internal pressure. Also functions as a check valve.

Cat. #
1600-60B
See page 130



Stainless Steel Door Frames

Extends service life of access doors. Includes one-piece, nonadhesive gasket.

To order, see desiccator ordering charts throughout this section

Desiccator Dual Purge™ System

Maintains a constant positive pressure whether desiccator doors are open or closed. Ensures effective, economical nitrogen use.

Cat. #
Controller **1606-61**
Sensor Switch **1600-49**
See page 128

Chrome-Plated and Electropolished Shelf Racks

Allow flexible height adjustment of plexiglass or stainless steel shelves in Terra desiccators and screen frame storage cabinets and many other storage systems.

See page 142

NitroWatch™

Automatically maintains any sub-ambient relative humidity level you desire in a hermetically sealed enclosure. Provides a continuous reading of %RH.

Cat. #
Controller **9500-00A**
RH Sensor **9500-02A**
See page 129

Stainless Steel Conductive Shields, Shelves, and Trays

Create a Faraday cage in desiccators for complete static protection. (See separate description for sizes and prices.)

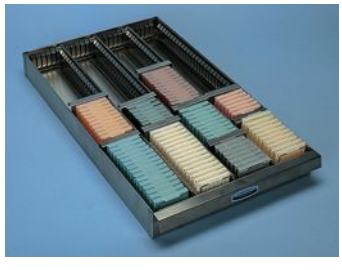
Refer to desiccator ordering tables in this section.

Flowmeter

For precise display and regulation of nitrogen flow.

Cat. #
1600-03
1600-31
1600-32

See page 132



Universal Conductive Inlays and Dividers

Allow you to create adjustable bin sizes in Faraccators™. Ideal for organized storage of waffle packs and other small parts.

Cat. #
1918-03
1902-03

See page 112

Multi-Channel Gas Distributor

Controls flow and pressure of gas to as many as five desiccators, eliminates need for separate flowmeters and excess tubing.

Cat. #
1865-00

See page 133

Ionizing Nozzles and Automatic IonWatch™ Power Units

Neutralize electrostatic surface charges without endangering sensitive stored components.

Cat. #
1520-00
2003-01

See pages 140-141

Desiccator Accessory Checklist (cont'd)

LiftLatch™
Provides security for individual desiccator chambers. Includes tamper-proof hinges.

	Cat. #
Replacement Latch	**1603-80**
Tamper-Proof Hinges	**1603-81**
Master Key	**1603-82**

See page 143.

Kleer-Vue Sorbent Box
(Indicating Silica Gel)
Compact container is perfect for short-term humidity protection in shipping containers and other enclosures. Turns pink as it adsorbs moisture; regenerate in a microwave oven! See page 136.

Cat. #
2010-75

Adjustable Shelf Support
Lends strength to any chamber without taking up valuable space. Retractable design makes installation easy. Typical installation requires two—see page 143.

Cat. #

15" to 26"	**2200-21**
21" to 35"	**2200-20**

Nitrogen Generator
Isolates nitrogen up to 99.9% pure from the air flow. Ensures a continuous, economical nitrogen supply to purge desiccators. See page 135.

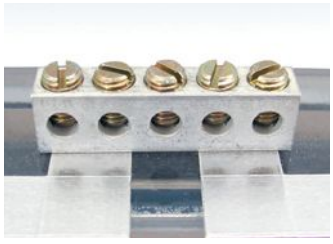
Cat. #
2700-09

GroundWatch™ Ground Continuity Detector
Ensures proper grounding of desiccator doors, latches, racks and shelves; indicates when ground connection is broken. See page 141.

Cat. #
4400-00

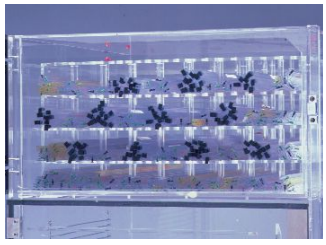
Dryex™ Gas Dryer
Economical source of clean, dry purge gas for a desiccator, glove box or other enclosure. Membrane separation design simplifies maintenance, reduces operating expenses.

Refer to page 134 for flow capacity and ordering information.



Desiccator Grounding
Includes installation of ground terminals and connectors to shelf racks and doors. Standard on dissipative PVC cabinets; specify for acrylic models.

Cat. #
(per chamber)
1600-59A



IC Tube Insert
Adapts a standard Adjust-A-Shelf Desiccator for IC tube storage. Each includes four horizontal shelves with slots for insertion of dividing rods, allowing versatile bin configurations.

Several sizes and materials available; refer to page 88.

Static Dissipative Plating
Transparent material offers all the characteristics of PVC but dissipates static charges. Aids in contamination control by eliminating particle attraction.

See page 596.

Replacement Gaskets
Select closed-cell stripping for desiccators without stainless steel frames, or one-piece, "e"-profile gaskets for doors with stainless steel frames.

See page 144.

Quick Connect Fitting
Allows easy connection of nitrogen line on DesiCarts, Portable Desiccators, and other enclosures. Includes installation on specified enclosure.

Cat. #
1601-06

Desiccator Stands
Provide sturdy support for Terra desiccators and faraccators of all sizes (see separate descriptions for sizes and prices).

Refer to desiccator ordering tables in this section.

Operating Manuals

Terra operating manuals contain substantial technical and application information relating to product use, along with easy-to-follow guidelines for proper set-up, operation and troubleshooting.

We list manuals separately in order to prevent the waste involved in shipping multiple manuals when more than one of the same product is ordered.

To download the operating manual or QuickStart for any Terra Universal product, visit our web site:

www.TerraUniversal.com

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Dual Purge™ System
For Desiccators

- **Cuts nitrogen waste, guards against oxidation**
- **Ensures a constant positive pressure inside desiccators and other enclosures to block contamination and moisture inflow**
- **Automatically activates high-flow purge when doors are opened to ensure fast, effective purge of particles and moisture**
- **Operates in tandem with NitroWatch® to maintain any desired sub-ambient moisture level (down to 0% RH)**
- **Guards against pressure damage to desiccator doors and seals**
- **Door switches are highly reliable—rated for over 10 million operations**

See page 78 for an overview of nitrogen control solutions

Desiccators must be continuously purged with nitrogen or another process gas in order to ensure a controlled environment free of contaminants and moisture.

Unfortunately, however, a steady gas inflow can't guarantee the clean, dry conditions you require. A flow adequate to maintain a safe internal positive pressure when doors are closed is insufficient to overcome the backflow of outside air that occurs when a door is opened. A higher-level purge that might guard against this backflow wastes nitrogen and leads to overpressures that warp doors and damage seals.

Variable-Purge Security

The Desiccator Dual Purge System solves these problems by providing a higher flow level only when it's needed, and only for as long as it's needed.

It relies on a sensor switch installed on each door. During normal operation, with all doors closed, the system maintains an economical low flow of nitrogen into the desiccator to ensure a constant positive pressure of about 0.05" WG (Water Gauge)—just enough to block out moisture and contaminants.

When a door is opened, the sensor switch immediately activates a high-flow purge of nitrogen into the desiccator's plenum chamber that minimizes the influx of moisture and contaminants.

When the door is closed, the high-level gas flow continues to purge the desiccator for a selectable period of time, ensuring that any moisture that does enter the chamber is quickly forced out of the Automatic RB® (Relief/Bleed) Valve, before it can degrade sensitive materials. This time delay is adjustable, so you can retain the high-flow for a longer time when you suspect moisture contamination may have occurred. **Note:** The Automatic RB® Valve must be ordered separately.

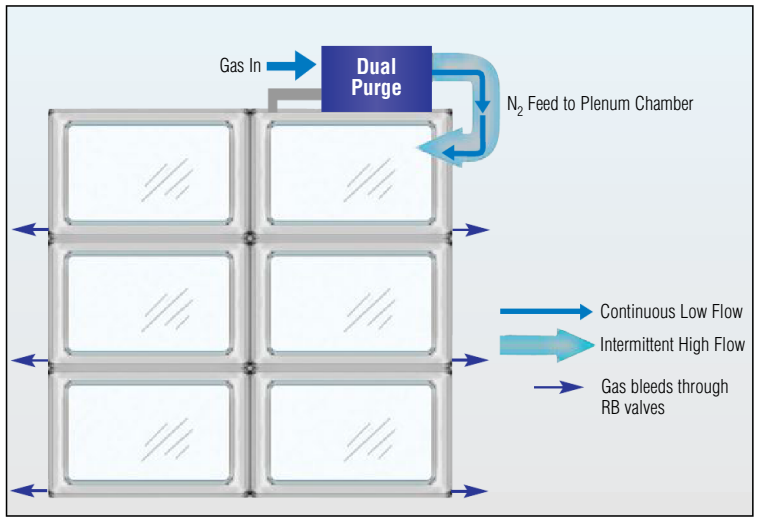
The dual-purge capabilities of these units ensure that contaminants and moisture stay outside the processing chamber and at the same time guard against dangerous overpressures that can lead to warped doors, failed seals—even explosions! And because the Dual Purge System delivers only as much gas as is necessary, it economizes on nitrogen consumption; tests show that in many applications, these units can pay for themselves in a matter of months.

Safety Alarms Ensure Worry-Free Operation

The Dual Purge System incorporates a flowmeter, a line pressure gauge and a variable purge mechanism. A "Low-Pressure" alarm is activated if the incoming line pressure is ever interrupted. This dual audible/visible alarm alerts you to a disconnected supply line, an empty gas storage pod, or other problem that could spell disaster for contents of a desiccator or glove box!

NitroWatch® Controller Expands Capabilities

The Dual Purge System operates in tandem with Terra's NitroWatch® System to fully automate moisture control.



Dual Purge™ System: Variable Level Purge

The NitroWatch® includes a humidity sensor that continuously monitors the internal RH level and activates the Dual Purge to automatically maintain any sub-ambient humidity threshold you require (down to 0% RH). For more critical requirements, select the NitroPlex™, which combines this automatic humidity control with multiplexed purge capability (see page 82). In all of these applications, the Automatic RB® Valve is required to ensure safe relief of overpressures that can build inside a chamber. See page 130.

Specifications

Dimensions:	12"W x 11¼"D x 7"H
Weight:	16 lbs.
Flowmeter:	0-20 SCFH
Line Pressure Gauge:	0-60 psi
Chamber Sensor:	0 - .4" WG (factory set at 0.02" WG)
Inlet/Outlet:	¼" (accepts ¼" OD polyethylene tubing)
Case Material:	Stainless steel; Chrome plated or stainless steel internal fittings
Power Requirement:	110/220VAC, 50/60Hz (requires no manual power setting)
Timer Adjustment:	0-8 minutes (factory set at 1 minute)

CE

	Cat. #
Dual Purge™ System	**1606-61**
Sensor Switch (installed) One per door required	**1600-49**
0.2 Micron Filter Removes contaminants from gas line; see page 136.	**1314-00**

NITRO WATCH® System

For operation with Terra's Dual Purge™ System

Extends shelf lives of stored materials by controlling moisture and moisture-related defects

- **Automatically controls Dual Purge™ System to maintain the desired low relative humidity level (0%RH to ambient) in a desiccator or other enclosure**
- **Reduces nitrogen costs by up to 78%**
- **Continuously monitors and displays relative humidity level**
- **Automatically compensates for shifting environmental variables, eliminating guesswork and reliance on supervisory personnel**
- **New miniaturized sensor eliminates dead space inside glove boxes**
- **Easy-program control functions**

Purging a cabinet with nitrogen is an effective way to maintain a low-humidity storage environment. Using a flowmeter to control the nitrogen purge gas, however, leads to unnecessary expenses!

If you set the gas flow level too high, expensive nitrogen is wasted and cabinet seals are exposed to excessive pressure that could lead to leaks (or even ruptures!). If you set the flow level too low, you may wind up with ineffective contamination and moisture control and expensive component damage. Both problems have cost the semiconductor industry millions of dollars annually.

Terra Universal's NitroWatch® solves these problems by sensing and displaying the relative humidity of an enclosed environment, such as a desiccator, Faraccator, or glove box. More importantly, it operates with the Dual Purge™ System to precisely control the flow of nitrogen into the enclosure and maintain a preset humidity level.

Operation is simple and reliable. Simply program the desired level, and then let the system do its job. The fast-response, capacitive-type sensor detects the relative humidity; the level is indicated on a 4-digit LED display. The NitroWatch® controls Dual Purge System operation to maintain the setpoint level—no matter how often doors are opened, or how large the system is, or what the ambient humidity is, or what time of the day or night. High-flow purges are initiated only when a door is opened or the humidity climbs above the set-point. The moment acceptable conditions are restored, the system returns to low-flow purging.

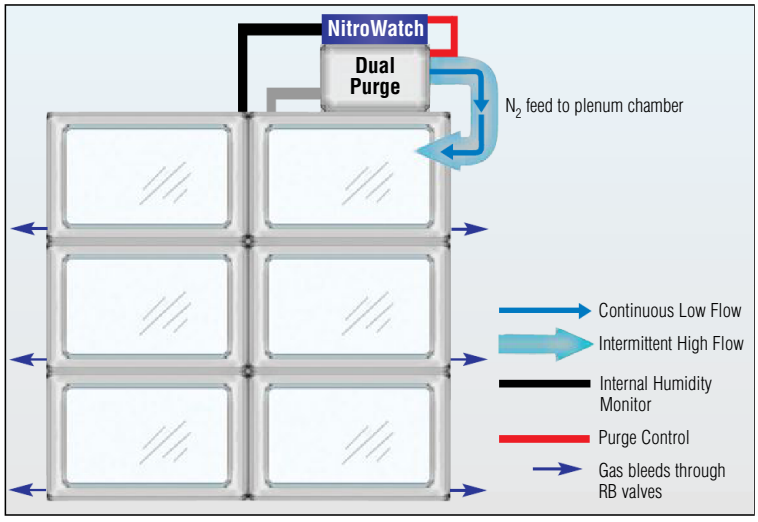
Cuts Nitrogen Waste for Additional Savings!

Higher quality control and reduced part rejects are two convincing reasons to consider the NitroWatch®. But they aren't the only ones.

Your biggest savings will probably come in reduced nitrogen expenses. Typically, the nitrogen flow in a desiccator cabinet is set at a level high enough to compensate for access to stored parts during working hours; this means that a constant high-level purge is required. Yet in most cases, doors remained closed for over 75% of the time!

During off hours, weekends and holidays, unnecessarily high amounts of nitrogen are fed through the system and bled out as waste—even though no flow (or only a very minute flow) may be needed to maintain the appropriate internal humidity and positive pressure. Excess nitrogen bleeding can even endanger worker safety if ambient oxygen levels fall too low.

When you turn out the lights and lock the door, the NitroWatch® will cut out the nitrogen waste. This savings alone in most cases pays for the system within six months. Test data show typical savings of 78% of nitrogen consumption. And you'll be assured that stored components (and your workers) are safe.



NitroWatch®: Humidity Monitor & Control (Dual Purge System, RB valve required)

Space-Saving Sensor

The NitroWatch® sensor is installed in the bottom desiccator chamber without interfering with shelves, doors, process equipment, or stored materials. This sensor features miniaturized components that provide better than 2%RH accuracy over the 10%-90%RH range. Further, it never requires calibration.

The NitroWatch® controller comes complete with all necessary controls for monitoring the relative humidity level. For automatic humidity control, the unit must be connected to Terra's Dual Purge System (see separate description, page 128). Order the NitroWatch® Sensor separately (see below).

Specifications

Controller

Dimensions:	11"W x 6½"D x 3"H
Weight:	4 lbs., 7 ozs.
Power:	12 VDC (provided by Dual Purge™ System)
Case Material:	Stainless Steel
Output:	0-5 V
Measuring Range:	0-100%RH
Display Resolution:	±.1%RH
Temperature Dependence:	±.04%RH/°C

Sensor

Dimensions:	1½" x ¾" x 4"
Weight:	3 ozs.
Measuring Range:	0-100%RH
Accuracy (at 20°C):	± 2%RH
Housing Material:	Stainless steel
Calibration:	None required.

	Cat. #
NitroWatch® Controller	**9500-00A**
NitroWatch® Sensor	**9500-02A**
(One required per desiccator)	

Automatic RB® (Relief/Bleed) Valve

- **Cuts gas consumption and contamination inside a nitrogen-purged desiccator**
- **Continuously bleeds off excess internal gas to maintain a safe positive pressure**
- **Reduced size allows space-efficient mounting on each desiccator chamber, eliminates clearance requirements**
- **Automatically discharges any sudden surge of incoming gas**
- **Protects against accidental negative pressure by functioning as a check valve**
- **Reduces system recovery time and increases system efficiency by up to 400% (see test data on next page)**
- **Extends life of desiccator and glove box gaskets**
- **Operates maintenance-free, with 100% reliability, to eliminate need for inspection of bleed valves**

To ensure a safe, continuous internal positive pressure, Terra Universal recommends the Automatic RB® Valve for use in all hermetically sealed enclosures.

Two Valves in One

The Automatic RB® Valve provides two crucial functions. During normal operation, it allows a continuous low-level release of gas to maintain a positive pressure of about 0.05" WC (water column). It also functions as a check valve to ensure that air and contaminants cannot enter the enclosure in the event of a momentary negative pressure.

Most important, it provides operator peace of mind. Its field-proven reliability guarantees that your cabinets are maintaining a safe positive pressure, even if they experience periodic increases in nitrogen flow. It is thus an ideal complement to Terra's Dual Purge™ System and other nitrogen control equipment. It also helps prevent the warping of doors and extends the life of seals.

Multiple Valve Installation Minimizes System Recovery Time

The Automatic RB® Valve provides all the features of our old one in a much smaller package—only 7/16" x 7/16" x 1½". This compact size makes it feasible to install a separate Automatic RB® Valve on each compartment of a large desiccator. It also allows flush mounting along the front lip of Terra desiccators to eliminate clearance and breakage problems.

Miniaturized design allows flush-mounting on Terra desiccators to eliminate clearance and breakage problems.

Enhanced Protection, Lower Costs!

In a desiccator with one relief valve, contaminants and moisture are passed from one chamber to another on their way to a single outlet at the bottom of the cabinet. Not only do contaminants and moisture take a long time to leave the desiccator, but they also come in contact with more parts.

Installation of an RB valve in each compartment ensures that contaminants are quickly purged out of the same chamber into which they entered (see application sidebar on the next page). This multiple-valve set-up thus maximizes efficiency and minimizes exposure to humidity and contaminants.

For extremely critical moisture and contamination requirements, consider Terra's NitroPlex™ Module, which adds a nitrogen multiplex controller to a multi-chamber desiccator to allow optimal control of the storage environment (see separate description on page 82).

The valve body is fabricated of styrene-acrylonitrile (SAN) resin that resists a wide range of process gases and chemicals. Comes installed on specified cabinets.

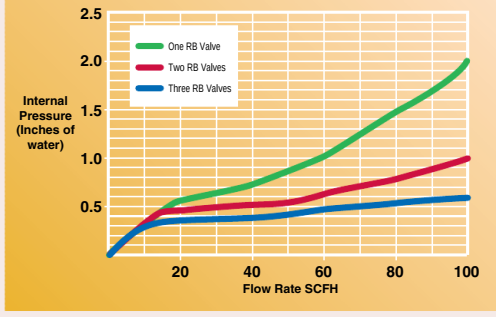
	Cat.#
Automatic RB® Valve	**1600-60B**

Increased Security in Glove Box Applications

Terra's miniaturized Automatic RB® Valve is ideal for use in large, nitrogen-purged enclosures, such as glove boxes.

Its small size allows multiple valves to be installed in a glove box to provide safe pressure release. The graph at right plots the flow rate of incoming gas against the resulting positive internal pressure when a one cubic-foot enclosure incorporates one, two, and three Automatic RB® Valves. This information provides an indication of how to maintain safe pressure levels at varying flow rates.

Refer to page 475 for more information on glove box applications.



Terra's New Automatic RB® Valve: Less is More

The reduced size of Terra's new Automatic RB® Valve greatly enhances its application possibilities.

This valve is designed to begin opening up when the internal positive pressure reaches about 0.05" WC (water column). If the pressure continues to increase, the internal pressure of the chamber could reach a potentially dangerous level. The new design, however, makes it feasible to install several valves in a desiccator or glove box without sacrificing storage or working space. It also allows more efficient nitrogen purging, using Terra's advanced control systems.

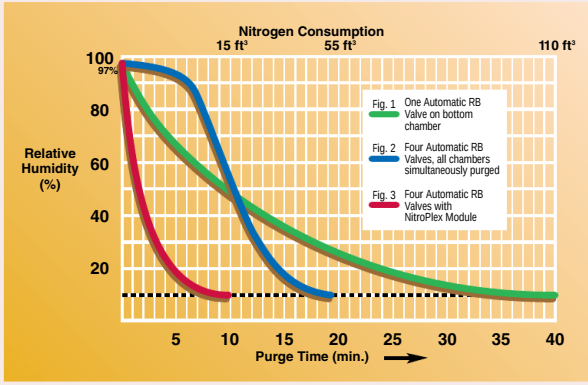
The graph illustrates how desiccator efficiency is improved through the use of multiple valves and Terra's NitroPlex™ Module. See Figures below for system set-ups.

Reduced Nitrogen Costs, Enhanced Product Protection

To maximize the useful life of desiccator doors and door seals, Terra recommends that you install one Automatic RB® Valve per desiccator chamber, regardless of the flow rate. This set-up ensures that any contaminants or moisture that enters a chamber when a door is opened will immediately be purged out of the desiccator—before it has a chance to migrate to other chambers.

In each test case, the top chamber of a four-chamber Terra Faraccator™ was exposed to moisture until the humidity level in that chamber reached 97% RH. Figure 1 (below) represents the desiccator efficiency when it was equipped with a Dual Purge System™, NitroWatch®, and a single Automatic RB® Valve located in the bottom chamber; it required 40 minutes to bring the humidity level down to the 10% RH set point.

In the second test (represented in Figure 2), an Automatic RB® Valve was included in each of the chambers. Only 20 minutes—and only half as much nitrogen—were required to bring the humidity level to the set point.



RB® Valve Efficiency Enhancement

Nitrogen Consumption	Recovery Time
Fig. 1: 110 ft³	Fig. 1: 40 minutes
Fig. 2: 55 ft³ (100% improvement)	Fig. 2: 20 minutes (100% improvement)
Fig. 3: 15 ft³ (nearly 300% improvement)	Fig. 3: 10 minutes (400% improvement)

The final test case (Figure 3) included a NitroPlex™ Module, Terra's new multiplex nitrogen controller that monitors the humidity in each chamber independently and directs a high-flow purge only where it is needed. With this set-up, the desiccator required only 10 minutes to reach the set-point—only ¼ the time required in the first test. It consumed only 15 cubic feet of nitrogen, a small fraction of the amount necessary to attain the set point in the first set-up.

Note: These results are meant to represent typical, not guaranteed, values.

Fig. 1: Dual Purge™/NitroWatch® Systems, One Automatic RB® Valve
Moisture migrates through cabinet

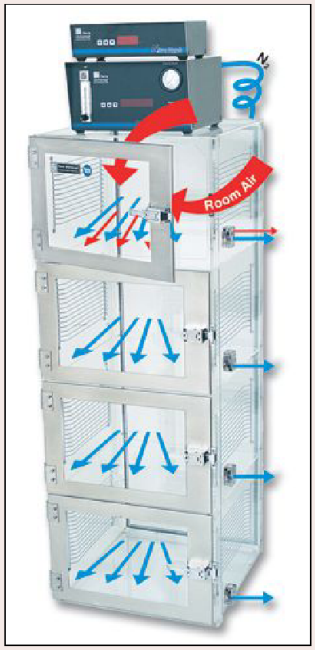


Fig. 2: Dual Purge™/NitroWatch® Systems, Four Automatic RB® Valves
Moisture migration eliminated, but nitrogen is wasted

Fig. 3: NitroPlex™ System
Efficient moisture removal, reduced N_2 use

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Flowmeter

- **Durable acrylic housing includes hot-pressed, easy-read flow scales**
- **Features accuracy within ± 5% of full scale**

Terra Flowmeters are our most popular gas regulators for low-volume flows; they are suitable for total pressures up to 100 psig and temperatures to 150°F. Bodies are cut and precision-machined from solid, clear acrylic blocks for easy visual inspection and maximum durability. Precision-machined bores provide accuracy to within ± 5% of full scale.

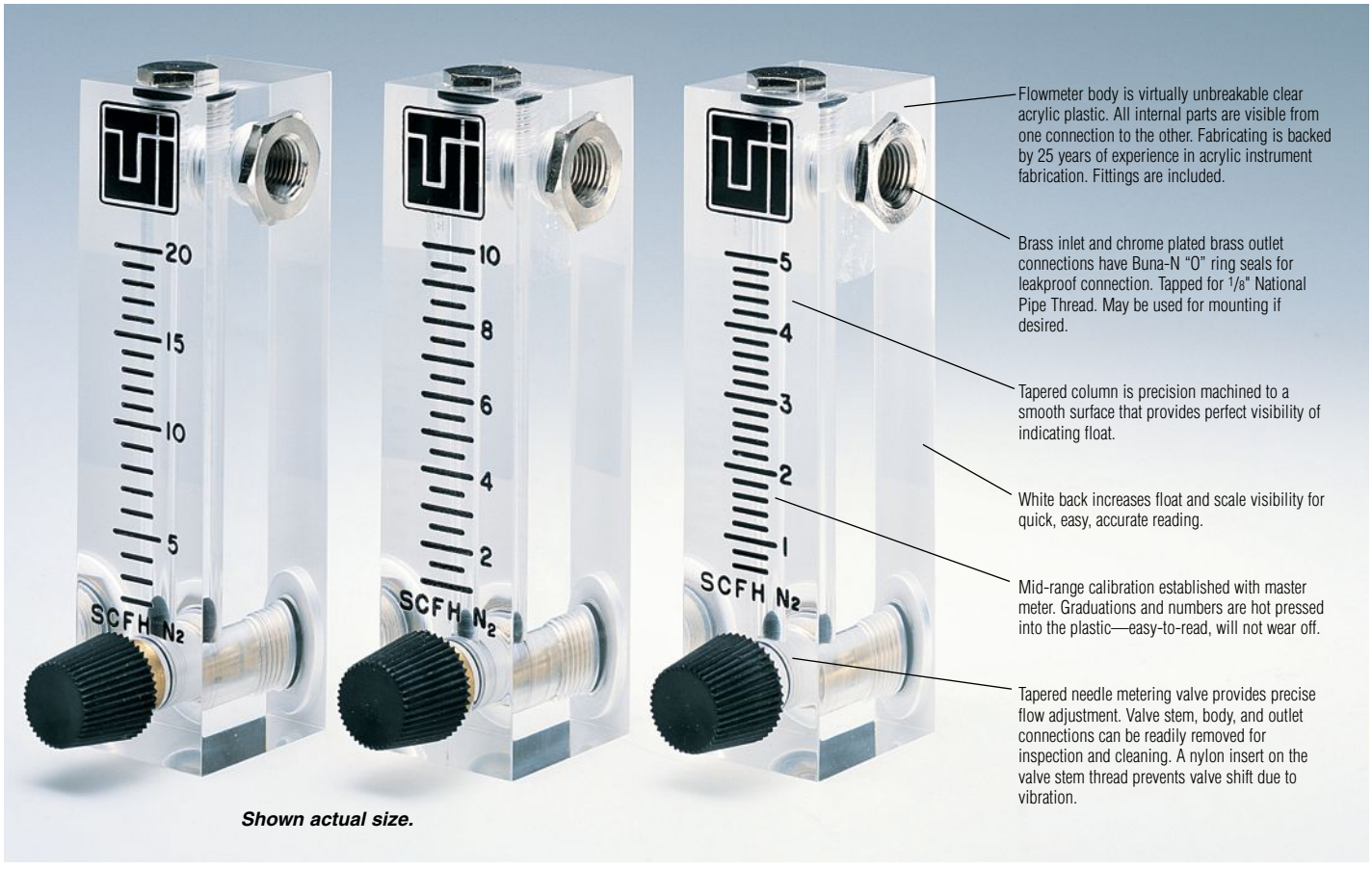
Two-inch reading scales are hot pressed into the plastic; front scale location and white background provide excellent visibility. Select from among three different flow ranges, according to enclosure size (see chart below).

Caution: Terra Flowmeters should not be used with fluids or gases that may attack acrylic plastic body.

Specifications

Meter Body:	Acrylic plastic; metering tube machined into body
Wetted Metal Parts:	Brass inlet, stainless steel outlet
Float:	Black glass
Pipe Connections:	1/8" NPT horizontal
"O" Rings:	Buna-N
Scale:	Hot pressed into acrylic body
Knobs:	ABS Plastic
Pressure Rating:	To 100 P.S.I. maximum
Temperature Rating:	To 150°F maximum
Flowmeter Fittings	Includes brass male connector and hex nipple.

See page 72 for an overview of nitrogen control solutions!



Shown actual size.

Flow Range (SCFH)	Application	Cat. #
.6-5	for one-door desiccators	**1600-03***
1-10	for 2 and 3-door desiccators	**1600-31***
2-20	for desiccators with 4 to 10 doors	**1600-32***

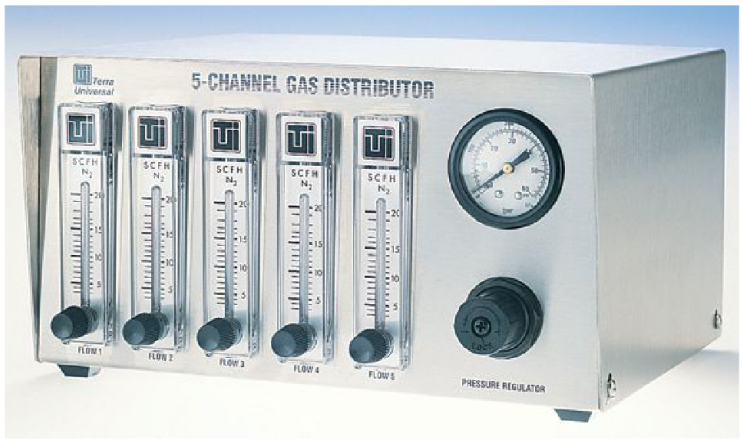
Includes fittings

Multi-Channel Gas Distributor

- **Guards against cabinet damage and explosion that can result from excessive gas inflow**
- **Centralizes flow and pressure control for multiple enclosures**
- **Allows full access to flowmeters when desiccators are arranged side by side**
- **Eliminates needless yards of tubing and piping around the workplace**
- **In conjunction with a flow filter, detects contaminated nitrogen supply**

Although the Automatic RB® Valve effectively relieves temporary pressure build-ups in a sealed enclosure, it is not designed to compensate for a continuous excessive flow of gas into a desiccator. The Terra Flowmeter solves this problem in low-volume storage operations by precisely regulating the flow of incoming gas, but larger-volume set-ups present other difficulties: desiccator cabinets stacked side-by-side or top-to-bottom may not leave an operator adequate access to monitor or adjust a flowmeter, and multiple desiccators lead to a cumbersome proliferation of flowmeters and a jungle of pipes and tubing!

Terra's Multi-Channel Gas Distributors solve these high-volume problems and guarantee the safety of your components, your desiccators, and your personnel. Each of these compact, economical systems regulates gas flow into as many as five channels (flowmeters) and, in custom applications, can control as many as 20 hermetically sealed enclosures (see example configuration). In such applications, the Gas Distributor can save you at least 50% over the cost of flowmeters while guarding against dangerous overpressure!

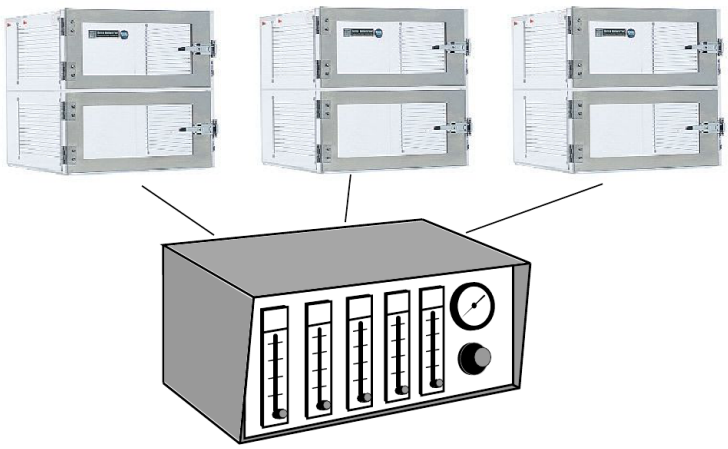


Gas pressure (nitrogen or dry air) is adjusted by means of a regulator and displayed on a 0-60 psi gauge conveniently located on the front panel of the unit. Two ¼" tubing bulkhead fittings are mounted on the back of the unit—one for the incoming, one for the outgoing nylon gas tube. Each channel controls the flow of gas to a desiccator cabinet, glove box, pass-through air lock, or any other enclosure flushed with purge gas.

The Terra Multi-Channel Gas Distributor combines pressure gauges, pressure regulators, and flowmeters all in one compact unit, thus eliminating yards of needless tubing around the workplace and simplifying monitoring procedures.

Note: For safe operation, order one or more Automatic RB® (Relief/Bleed) Valves for your sealed enclosure.

Weight: 18 lbs.



Multi-Channel Gas Distributor		
No. of Channels (Flowmeters)	**Flow Range (SCFH)**	Cat. #
1	0.6-5	**1865-00**
1	2-20	**1866-00**
1	5-50	**1867-00**
2	0.6-5	**1600-20**
2	2-20	**1600-52**
3	0.6-5	**1600-19**
3	2-20	**1600-51**
4	0.6-5	**1600-21**
4	2-20	**1600-53**
5	2-20	**1714-00**

Miniaturized LED monitors humidity and displays set point

Reduces nitrogen cost by 78%!

SmartDesiccator™ Benchtop Storage System

- **Automates dry benchtop storage to eliminate moisture-related degradation and optimize yields**
- **First-of-its-kind gas control system conserves nitrogen!**
- **Fully integrated turnkey system takes seconds to install**
- **Available in stainless steel, acrylic, or static-dissipative PVC**

Detailed data and ordering information starts on page 80.

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800 S. Raymond Ave., Fullerton, CA 92831 CA

Dryex™ Gas Dryer

- **Ideal source for purge gas in moisture-sensitive storage and processing applications**
- **Efficient membrane separation design never needs regenerating (unlike desiccant dryers)**
- **Gives you control over outlet flow and dew point**
- **Low-maintenance, light-weight, compact design includes no moving parts**
- **Requires no electrical service—simply connect to a compressed air feed line and it's ready for operation**
- **Choose between two models to meet your outlet flow requirements**

The Dryex™ Gas Dryer provides a continuous, reliable flow of clean dry air to a desiccator storage cabinet. It is designed to provide reliable gas drying without the hassle and expense associated with desiccant drying systems.

Complete Product Control

It relies on membrane-separation technology to remove moisture from an air stream. This simple but highly reliable design gives you complete control over humidity removal—merely by regulating the flow of air into the Dryex, you can precisely determine the humidity of the air output (see the performance graph). Because this technology requires no moving parts and consumes no energy, it is surprisingly economical to operate and maintain—the main expense is the energy required to provide a stream of compressed feed air.

Each system contains a gas pressure regulator, control valves and instruments, a coalescing filter and carbon filter (which remove oil vapors and particles from the feed line), and the moisture membrane module.

The membrane module consists of bundles of hollow fiber, semipermeable membranes, each of which has a perfectly circular cross-section and uniform core. This uniform wall thickness of each fiber contributes to the physical strength of each membrane. Because the fibers are so small, many can be packed into a limited space, providing an extremely large membrane surface area that can produce a relatively high volume product stream.

Compressed air is introduced into the center of the fibers at one end of the module and contacts the membrane as it flows down the fiber core. Water vapor passes through the outside of the fibers and is discharged as a by-product. The clean, dry air emerges at atmospheric pressure ready to use.

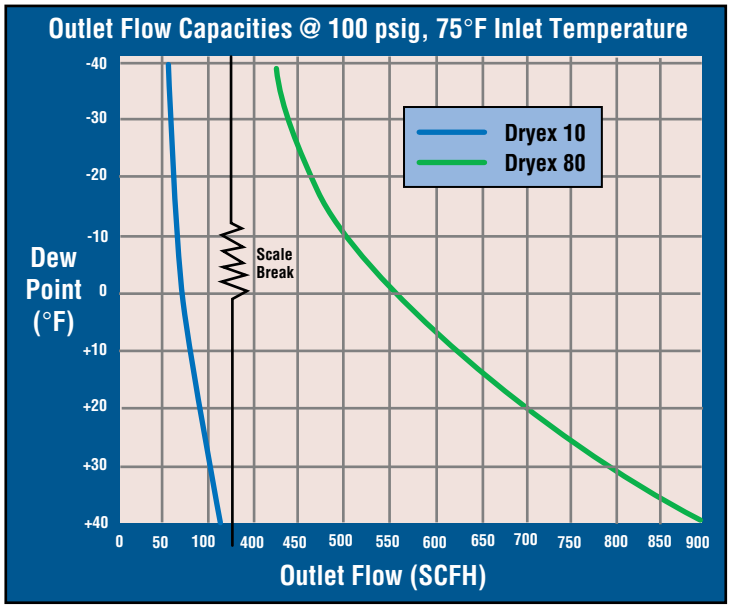
Dryex™ 80 Outlet Flow: 420-900 SCFH. Ideal for supplying multiple enclosures.

Dryex™ 10 Outlet Flow: 54-105 SCFH—perfect for a desiccator or glove box!

Easy to Set Up and Maintain

This compact, light-weight design lets you move the Dryex anywhere you have a compressed air feed line. Because the heart of the system, the membrane module, contains no moving parts, it requires no maintenance. The only attention the Dryex typically requires is an occasional change of the coalescing filter element, an easy operation completed in seconds.

Each Dryex unit includes a stainless steel case housing the membrane filter, a charcoal particle filter, a coalescing filter, regulator, pressure gauge, and stainless steel compression fittings for connection of incoming and outgoing air.



Specifications	Dryex™ 80	Dryex™ 10
	Cat. # **9082-00**	Cat. # **9082-01**
Overall Dimensions:	15"W x 13"D x 42"H	16"W x 7¼"D x 6½"H
Weight:	55 lbs.	11 lbs.
Feed Air Pressure:	60-200 PSIG	60 - 200 PSIG
Outlet Flow @100 psig:	420 - 900 SCFH	54 - 105 SCFH
Feed Air Temperature:	40°F to 150°F (75°F recommended)	
Utilities Requirement:	Electricity required only for user-supplied air compressor/conditioner (see page 482)	

Replacement Filters	Cat. #
1-micron Prefilter	**9082-03**
0.025-micron Coalescing Filter	**9082-02**

CE

Nitrogen Generator

- **State-of-the-art membrane separation technology produces dry nitrogen up to 99.9% pure**
- **Eliminates drawbacks of conventional nitrogen sources—gives you control of rate and purity of nitrogen production**
- **Delivers gas flows up to 600 SCFH or more depending on nitrogen purity requirements (even higher flows possible if only dryness is desired)**
- **Compact, lightweight design allows set-up wherever there's a compressed air supply**
- **Ideal for desiccators, glove boxes, and other enclosures**
- **Simplicity of field-proven design ensures completely reliable, economical operation, virtually eliminates maintenance**

This Nitrogen Generator represents a series of advances by the world leader in hollow-fiber membrane technology used in the first artificial kidney. It gives you complete control of the production of nitrogen for use in a wide range of cleanroom applications—and in most cases quickly pays for itself.

State-of-the-Art and State-of-the-Budget

A nitrogen membrane provides a low-cost, highly efficient means of separating air into its component gases. Because this technology requires no moving parts and consumes relatively little energy, it is surprisingly economical to operate and maintain—the main expense is the energy required to provide a stream of compressed feed air. Each system contains gas pressure control valves and instruments, a coalescing filter and carbon filter (which removes particles and liquid vapors from the feed line), and the nitrogen membrane module.

The membrane module consists of bundles of hollow fiber, semipermeable membranes. Each fiber has a perfectly circular cross-section and a uniform core through its center. The wall thickness of each fiber is thus consistent, which contributes to the physical strength of each membrane. Because the fibers are so small (about the diameter of a human hair), a great many can be packed into a limited space, providing an extremely large membrane surface area that can produce a relatively high volume product stream.

Ideal source of desiccator purge gas!

See page 480 for complete specifications!

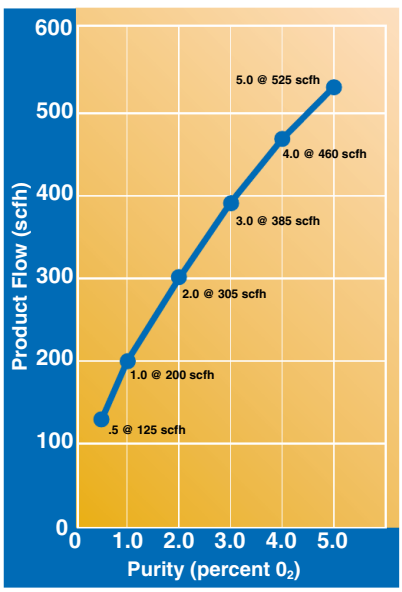
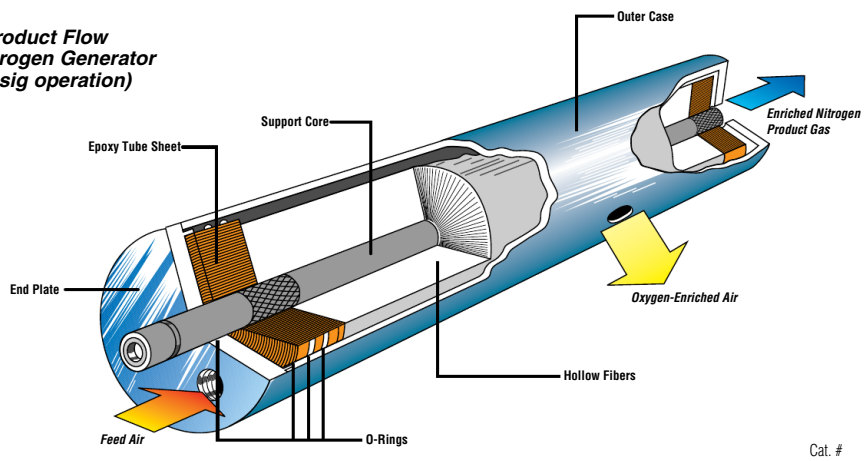


Figure 1
Purity vs. Product Flow Through Nitrogen Generator (25°C, 135 psig operation)



CE

	Cat. #
Nitrogen Generator (200-600 SCFH)	**2700-09**
Replacement Filters	
1-µm Filter	**2701-09**
0.025µm Coalescing Filter	**2701-10**

0.1 and 0.2 Micron Disposable Filters

- **The ideal point-of-use filter for clean nitrogen or dry air applications**
- **PTFE and polypropylene construction guarantees clean operation**
- **Meets HIMA standards for bacterial retention and USPXXII Class VI safety requirements**
- **Filter support delivers strength unmatched by other PTFE filters**
- **Integrity-testable design ensures product performance**
- **Dual upstream vents prevent pressure blow-off and leakage**
- **1/4" MNPT inlet/outlet connectors facilitate quick, easy hook-up**
- **Self-contained housing and element eliminate maintenance, reduce cost**

This inexpensive filter capsule houses a dual-pleated polytetrafluoroethylene (PTFE) filtering element that maximizes the retention of particle contaminants. Polypropylene supports guarantee the strength and durability of the unit. The filter also features 1/4" ID inlet/outlet fittings for easy attachment to gas lines and all Terra desiccator cabinets and accessories.

All materials are cleanroom safe, and the complete fusion welding eliminates adhesives that could contaminate the gas supply. Dual upstream vents guarantee the safety of your storage system by preventing blow-offs and subsequent leakage that might result if the unit were to become clogged. And because each filter is flushed before shipment and packaged in a clean, polyolefin bag, you're assured the cleanliness you ordered.

The filter material is hydrophobic and is therefore able to maintain specified air flow rates despite water condensation. In aqueous liquid filtration applications, the filter cartridge must be pre-wetted with a non-aqueous fluid such as isopropyl alcohol to initiate aqueous fluid flow. It is resistant to most semiconductor process fluids.

Specifications

Materials of construction:

Polypropylene:	End cap, inlet/outlet, vents, housing body, outer support, upstream filter support, downstream filter support, core
Sealing Method:	Thermal bonding
Filter Media:	PTFE
Inlet/Outlet:	1/4", MNPT
Vents:	Two Acro-Lok upstream
Pore Size:	0.1 and 0.2µm
Diameter:	2.6 in. (6.8 cm)

Operating Characteristics

Maximum Continuous Pressure:	60 psi (4.2 kg/cm²) @ ambient temperature
Maximum Temperature:	140°F (60°C) @ 30 psi (2.1 kg/cm²)
Maximum Momentary Pressure at Ambient Temperature:	100 psi (7.2 kg/cm²)

Note: The above measurements were made with DI water as filtrate. Operating characteristics may vary depending upon chemical being filtered.

Bubble Point:	15 psi (1.05 kg/cm²)—Isopropyl alcohol
Cleanliness:	≤ 200 particles/liter of 1µm or larger

Approx. filter size: 4½"L x 2¾" dia.

Filter Size	Pore Size	
Effective Filtration Area	**0.1µm** Cat. #	**0.2µm** Cat. #
124 in² (800 cm²)	**1314-42**	**1314-41**
263 in² (1700 cm²)	**1314-40**	**1314-00**

Cat. #

Female Elbow Fitting **1601-75**
(for use with any 0.1 and 0.2 Micron Disposable Filters and Poly-Flo® tubing; one required for each end)

Kleer-Vue Sorbent Boxes

- **Compact size—only 2.125" x 2.125" x .8"—fits in nearly any enclosure without wasting precious storage space**
- **Indicating silica gel, packaged in a transparent plastic container, adsorbs moisture to retard oxidation and other defects caused by exposure to water vapor**
- **Perfect for packaging, transporting, and other short-term humidity protection**
- **Saturated boxes can be microwave-dried and reused up to 1,000 times!**

The Kleer-Vue Sorbent Box is a small, perforated canister packed with indicating silica gel that will protect sensitive materials from deterioration, rust, corrosion, mold, mildew and other damage caused by moisture exposure.

Safe, Simple to Use and Regenerate

Just place a Sorbent Box in any sealed, moisture-resistant container to create a dry storage or shipping package. A single unit dries a minimum of three cubic feet of air.

The silica gel inside attracts, condenses and holds water vapor physically through surface adsorption and capillary action. As it adsorbs moisture, the blue silica gel turns pink, indicating loss of adsorption potential. To regenerate the package, simply heat it in a microwave oven. After several heating cycles of less than 45 seconds each, the silica gel releases adsorbed water vapor and turns blue again, indicating that it's ready for use. (**Note:** be sure to let the unit cool between cycles.) With proper regeneration, sorbent boxes can be reused 1,000 times!

Kleer-Vue Sorbent Boxes are made of chemically inert plastic and will not react with materials they come in contact with.

Blue indicates dry.
Pink indicates wet.

Cat. #

Kleer-Vue Sorbent Boxes **2010-75**
Twin pack contains two boxes.

Static Control in Desiccator Cabinets

- **What is electrostatic discharge?**
- **How is it generated?**
- **How does it damage microelectronic devices?**
- **How can it be controlled?**
- **What are the advantages and disadvantages of static control methods available today?**

Why all the Static?

Static electricity is an excess or deficiency of electrons on a surface. The total number of deficient or excess electrons determines the charge on that surface. A surface exhibiting an excess of electrons is charged negatively, and an electron-deficient surface is charged positively.

Although static electricity has plagued the semiconductor manufacturing industry ever since the advent of integrated circuitry, its effects pose especially serious problems to today's miniaturized, sophisticated, and expensive components. These devices can be seriously damaged or destroyed by charges much smaller than a person can typically detect.

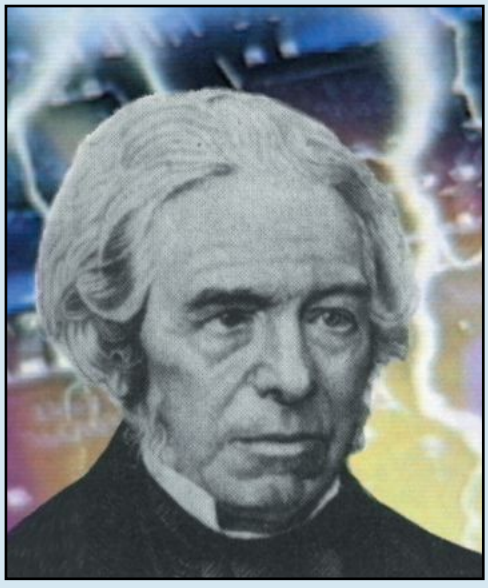
How are Electrostatic Charges Generated?

Electrostatic charges are usually generated by friction between and/or separation of two dissimilar materials, at least one of which is a nonconductor or a poor conductor of electricity. The accumulated charge (static) resides on the surface of, rather than within, the charged nonconductive object.

Electrostatic discharge (ESD) occurs when an accumulated charge (which may be present on an operator, the operator's clothing, or on any other non-conductive object) is discharged through a conductor (which may be part of a wafer, a chip, or a packaged device), and it may occur whenever the electrostatic potential corresponding to accumulated charge is great enough.

Solutions to Static Problems:

1. The Faraccator Concept



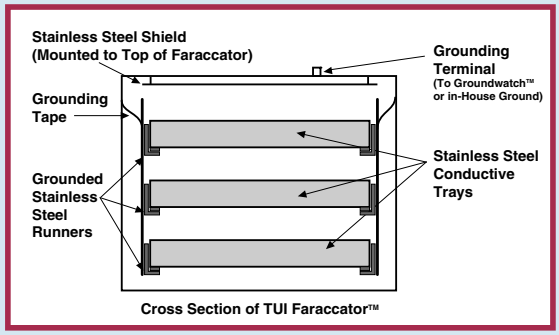
Michael Faraday

The British physicist Michael Faraday long ago observed that a charged body will induce the opposite charge on a metal object placed next to it, thereby establishing an electric field. If the difference in electrical potential between the two objects is high enough to ionize the air between them, a static discharge will occur accompanied by a flow of current through the ionized air that neutralizes this potential. Needless to say, this discharge could damage a sensitive circuit of limited current-carrying capacity.

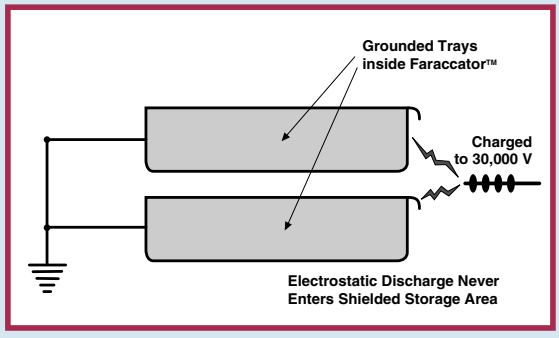
Faraday reasoned that an electric conductor cannot maintain an electric field because any difference in potential would be immediately neutralized by the conductor's free electrons. Hence, any volume enclosed within a conductor (such as a metal box) will be completely shielded from static charges.

Terra's Faraccators work on just this principle. They consist of a metal shield above a metal tray that stores sensitive parts.

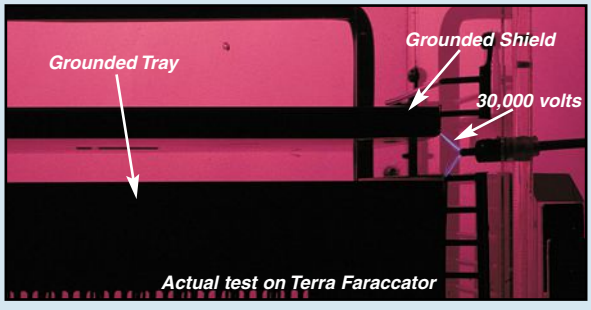
Although this configuration does not form the closed box that Faraday described, both shield and tray are at the same potential and no electric field can exist within the volume they enclose. This effect can be demonstrated simply by directing an electrical discharge at the opening between the shield and the tray. The discharge never enters the cavity, and any stored materials inside remain completely shielded from the effects of the discharge.



Cross Section of TUI Faraccator™

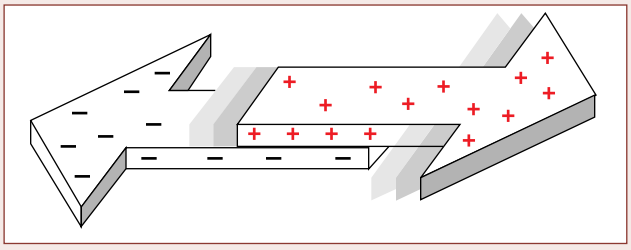


Static Protection with the Faraday Concept



How Do Electrostatic Charges Damage Sensitive Devices?

Microelectronic devices are degraded or destroyed by static in two ways: by excessive voltage and by excessive current. An operator can easily damage the devices he is working with in either of these ways. A voltage-sensitive device may be damaged by exposure to the extremely high field intensity surrounding a highly-charged person (charges may reach as high as 5000V). On the other hand, if he touches the device, an operator may pass a transient discharge directly through it. This electrostatic discharge (ESD) produces such a high current density that it can overheat and even melt current-sensitive circuitry.



Static electricity can also contribute to other kinds of damage. Because electrostatic charges attract charged particles to a surface, they make it especially difficult to maintain a contamination-free environment.

Manufacturers have taken steps to combat these problems throughout the manufacturing process, but until recently, little was done to ensure static-free storage. Desiccator cabinets provide protection against contaminants, but nearly all are made of acrylic, one of the most prolific generators of ESD.

Why Use Acrylic in Desiccator Manufacturing?

In critical contamination-control and static-control applications, you shouldn't.

Acrylic features many attractive characteristics: it allows easy and inexpensive fabrication, permits optimal viewing of stored parts, and stands up to the most rugged manufacturing and stockroom conditions. Yet it also generates static charges. Not only does this static generation threaten sensitive components, but it also makes your desiccator a dust magnet. Particles that cling to charged acrylic surfaces threaten parts, diminish visibility, and are difficult to remove.

Hence, acrylic desiccators can be a dangerous place to store microelectronic parts. For this reason, transparent static-dissipative plastics (such as Terra's static-dissipative PVC) are becoming the industry standard in cleanroom applications.

How Can Electrostatic Discharge be Controlled?

The basic concept behind static protection for microelectronic components is the prevention of static buildup whenever possible and the quick, reliable removal of already existing charges. The means by which these charges are removed depends on whether the charged object is a conductor or a nonconductor (insulator). Both types of materials coexist throughout the semiconductor manufacturing environment.

Once a nonconductive surface has obtained a charge, the only way it can be neutralized is by means of an ion source. Both positive and negative surface charges are eliminated on nonconductive surfaces by ions of the opposite polarity which neutralize surface charges. Static decay times are directly related to the number of air-borne ions; the more negative ions, the faster the decay time for positive charges (and vice versa).

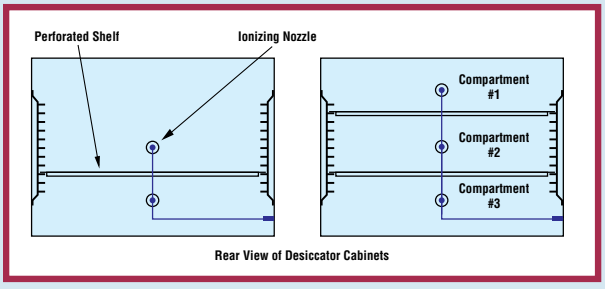
Solutions to Static Problems:

2. Automatic IonWatch™ Ionizing Equipment

This revolutionary ionizing equipment offers one feasible solution to the problem of effective static and contamination control. By installing a single ionizing nozzle in each desiccator compartment, you can effectively neutralize surface charges within that compartment. Ionizing bars deliver this same protection in Laminar Flow Stations, Wet Processing Stations, and under the Terra Universal Hood.

This equipment performs several important functions:

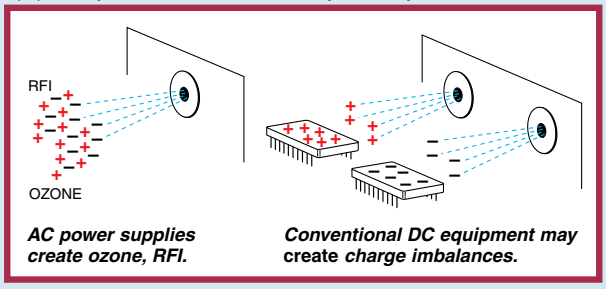
1. It eliminates the build-up of static charges that can damage sensitive materials. Free ions combine with charge imbalances that develop on nonconductive surfaces (such as acrylic), thereby eliminating the possibility of electrostatic discharges. This continuous neutralization is especially important in acrylic desiccators.



Rear View of Desiccator Cabinets

2. It also neutralizes charges already existing on nonconductive materials placed into the desiccator or work station. This second function is especially important since charges on nonconductive surfaces cannot be removed simply through grounding. In most cases, ionizing equipment is the only feasible way to remove these charges.

3. By neutralizing surface charges, ionizing equipment helps to control contamination. Everyone knows how "static cling" makes it difficult to remove lint from clothing; the same force can make it nearly impossible for a laminar flow of air to remove minute particles. Without the proper ionizing equipment, your laminar flow station may be nearly worthless.



AC power supplies create ozone, RFI. ***Conventional DC equipment may create charge imbalances.***

Drawbacks of other Ionizing Equipment

Terra Universal's Automatic IonWatch™ Ionizing Power Supply makes ionization an especially safe and practical solution. This unit does not generate sufficient energy to create radio frequency interference (RFI) or ozone—common problems with AC equipment.

And unlike other DC power supplies, this unit generates both positive and negative ions from a single nozzle—sensing the size of an existing charge imbalance and emitting the appropriate polarity of ions required to neutralize it. This means that you only need one nozzle per chamber, and that objects can be placed next to a nozzle without being exposed to a charge imbalance. And because this unit is completely self-balancing, it requires no routine maintenance.

Note: When ordering ionizing equipment, remember that you need a separate nozzle for each compartment. Free ions will not penetrate through perforations in plastic or stainless steel shelves, so each time you add a shelf you in effect create a new chamber and must add a new nozzle.

For conductive materials, Terra's Faraccator™ concept guarantees 100% ESD protection within a storage area.

Terra has developed a complete line of noncontaminating stainless steel shelves, trays, and drawers that guarantee the absolute conductivity required for a Faraday cage. These durable units come in standard sizes to fit all of our desiccator cabinets and provide organized storage—both inside and outside the desiccator.

Do these Units Provide the Same Static-Proof Protection when Removed?
Absolutely. Shelves and trays interlock to form sturdy, static-free carrying containers. Even though the unit is not grounded outside the desiccator, its own capacitance lets it absorb a great deal of static charge without affecting stored material. Our grounded, chrome-plated racks even let you stack these trays—while maintaining a static-free environment.

Terra also offers a full line of Faraccator™ storage cabinets that incorporate slide-out conductive drawers and stainless steel inlays. Like the trays and shelves, these drawers continue to shield against ESD when removed and used as carrying containers.

Can Terra Desiccators be Retrofitted to Deliver the ESD-Free Protection of a Faraccator™?
Easily. For each of our desiccators we offer chrome-plated racks that accept standard trays and shelves and, connected to a suitable ground, deliver complete electrostatic protection.

Our GroundWatch™ device helps to enhance this protection by continuously monitoring the integrity of the ground connection of an indefinite number of desiccators. The minute a ground line is disrupted, visible and audible alarms alert you to the problem before stored parts can be damaged.

Which Method of ESD Control is Best Today?

The answer depends on the type of material you need to protect.

If stored material is conductive or dissipative
(material placed in conductive bags or boxes, conductive waffle packs, etc.)

1. Take advantage of Terra systems based on the Faraday concept.

Material up to 4" high
- Faraccators
- Security Faraccators

Larger Materials
- Stainless Steel Desiccators
- Double Agent Desiccators
- Desiccators with Stainless Steel Shelving

2. Select Dissipative PVC Desiccators in conjunction with stainless steel shields, shelves, and trays.

If stored material is nonconductive (plastic boxes, nonconductive waffle packs, etc.), or

If stored material is already charged and must be neutralized, we recommend ionizing equipment in addition to the safety measures listed above. For additional protection, use conductive trays in conjunction with ionizing nozzles whenever possible.

Solutions to Static Problems:

3. Static-Dissipative Plastics: The Best of Both Worlds

Terra is proud to offer a wide range of static-dissipative materials that combine the high visibility and light weight of acrylic with the static-dissipative protection you need.

Our **Static-Dissipative PVC** is available on any desiccator we sell. This economical material features permanent static-dissipative coatings on both sides; in tests conducted in accordance with Mil-B-81705B, this material met the 2.0 second static decay requirement to zero as specified; in fact, it had a decay time of 0.01 seconds for each measurement taken. It features a surface resistivity between 10^6 and 10^8 ohms/square, and resists a wide range of corrosive chemicals without suffering any reduction of static-dissipative properties (see separate catalog listing for full specifications).

Dissipative vs. Conductive: Which is Best?

Conductive materials effectively remove static surface charges—in many cases, too effectively!

Consider the case of two identically charged objects, one placed in a conductive and the other in a dissipative enclosure. The higher current flow through the conductive material will facilitate more rapid and potentially disruptive discharge to ground. In fact, the probability of an electrostatic discharge—the very event that a static-safe enclosure is designed to prevent—is higher with a conductive material. The greater resistance offered by a dissipative material facilitates a slower, safer discharge to ground, at a much lower current level.

Because this material will not accumulate surface charges, it won't attract charged particles. It is thus ideal for use in Terra's Vertical Laminar Flow Stations, Universal Hoods, Wet Processing Stations, Auto Strat Desiccators, and any other application that requires the transparency of acrylic without its static cling. It does not outgas, so it is completely safe for use in your cleanroom. It comes in a variety of thicknesses.

Terra also offers a number of other static-dissipative materials to suit special applications (Call Terra for full specifications):

Flexible Static-Dissipative PVC: This material features all of the characteristics of the rigid material described above, but its flexibility makes it ideal for cleanroom curtains, dust covers, microenvironments, and other applications requiring a softer material.

Static-Dissipative Clear Polycarbonate: This rigid material will withstand high temperatures without melting or generating smoke. It is perfect for use in exhaust hoods where visibility and high thermal resistance are required.

Static-Dissipative Acrylic: This high-performance plastic plate has superb methacrylate properties with static-dissipative surfaces.

Static-Dissipative Hard Acrylic: This newly developed material offers the static-dissipative properties described above on rigid plexiglass (methacrylate). It features superb anti-abrasion and anti-friction properties: it maintained its static characteristics after 100 cycles of steel wool and abrasion wheel testing (under a 500 g/cm² load).

For full specifications on Static Dissipative PVC, refer to page 596.

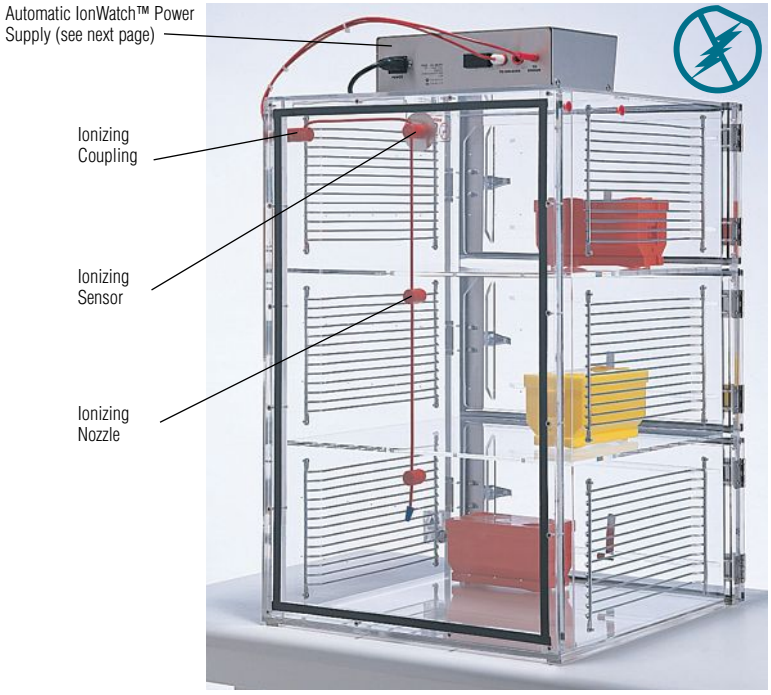
Ionizing Nozzles

- **Prevents build-up of electrostatic charges in acrylic desiccators, protects static-sensitive devices**
- **Neutralizes surface charges on stored materials**
- **Provides ESD-safe storage for devices too large to place in a Terra Faraccator™**

During normal operations, acrylic desiccator cabinets generate electrostatic charges that can damage or degrade static-sensitive devices. Conductive materials that acquire a charge can be discharged through proper grounding, but static charges on nonconductive materials such as plastic boxes and nonconductive encapsulation can only be removed through the neutralizing effect of free ions.

Terra's ionizing nozzles perform this function by breaking up the gas molecules that pass through them into positive and negative ions. These ions then remove static electricity by combining with surface charges of the opposite polarity. The nozzles thus provide dual protection: they eliminate the build-up of static charges generated by acrylic, and they also neutralize charges already existing on materials placed in the desiccator. And because they convert any sized chamber into an electrostatic-safe environment, they offer ideal protection for large assemblies that won't fit into the conductive trays of a Terra Faraccator™. All hardware is made of oxidation- and contamination-proof materials. Nozzles require an Ionizing Power Unit, a Power Cable Extension, and Ionizer Coupling; see separate description below. When equipping a desiccator with ionizing nozzles, you should keep these technical features in mind:

- The free ions emitted by the nozzles will not pass from one chamber to another, so a nozzle should be installed for each desiccator compartment. This means that a new nozzle becomes necessary each time you add a shelf—even a perforated shelf—to a desiccator because each shelf creates a new compartment. A single power unit drives up to 24 nozzles (that is, provides static protection for up to 24 compartments.)



- Because each nozzle requires a steady stream of gas to provide the ion source, nozzles can be installed only on desiccator cabinets which feature a plenum wall.

Nozzles require appropriate Power Supply, Ionizer Coupling and Power Cable Extension.

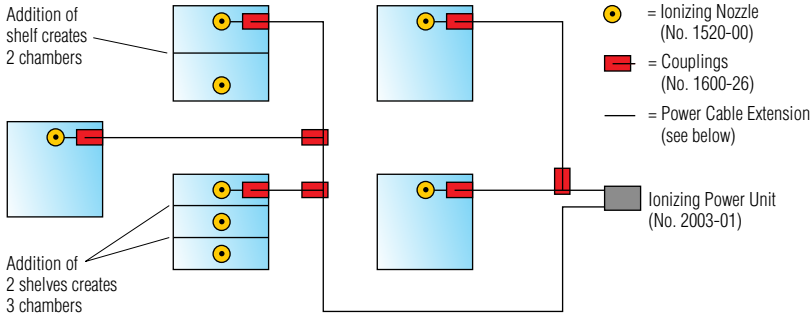
Cat. #
1520-00 ***Ionizing Nozzle for Plenum Chamber***

Ionizing Nozzles, Installed
(use with IonWatch™ Power Supply on page 141)

Ionizer Coupling

Ionizer Couplings facilitate connections of ionizing power cables to desiccator cabinets. This high-voltage (5000V) coupling, fabricated of special noncontaminating, noncombustible material, provides a terminal for plenum chamber ionizing nozzles or can be used as a junction box for branching further power cables. One required per chamber.

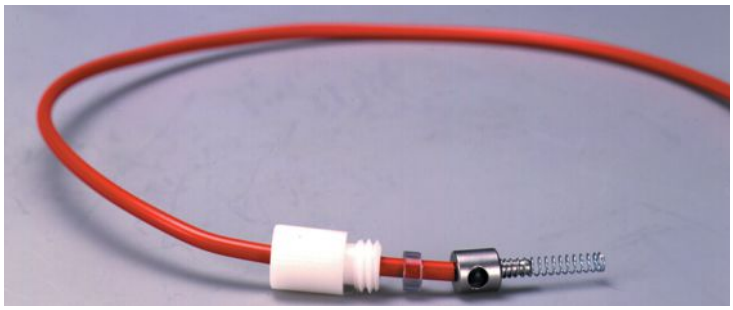
Cat. #
1600-26



Power Cable Extensions

Each extension consists of a high voltage cable (choose desired length) and a spring-loaded cable connector at both ends. Connectors can easily be attached to power unit receptacles or Ionizer Couplings.

Extension Length (feet)	Cat. #
5	**1600-27**
10	**1600-28**
15	**1600-29**
20	**1600-30**



Automatic IonWatch™ Ionizing Power Supply

- **Automatically balances output of positive and negative ions for safe static neutralization in desiccator cabinets**
- **Pulse-width modulation allows safe placement of stored materials next to nozzles**
- **Eliminates problem of RFI and ozone generation**
- **Use with ionizing nozzles (in gas-purged desiccator)—see page 140**
- **See page 421 for ionizing equipment designed for use in laminar flow stations**

Manufacturers of static-sensitive materials typically choose between conventional DC- and AC-powered ionizing systems that can present serious problems. AC units often create RFI and ozone. DC units have to be balanced periodically to prevent a charge imbalance that could damage sensitive devices; and because DC equipment requires a separate nozzle for positive and negative ions, stored parts can be charged if they are placed close to either nozzle.

Automatic IonWatch™: The Best of Both Worlds

To solve these problems, Terra offers the Automatic IonWatch™ Ionizing Power Supply, which combines the advantages of both types of equipment.

This unit will not generate RFI or ozone, and its design requires only one nozzle per desiccator compartment. Because both positive and negative ions are emitted through the same nozzle, even parts placed directly adjacent to the nozzle will not be charged positively or negatively. Furthermore, the unit is completely self-balancing. A remote sensor positioned in the ionization field

continuously monitors the environment and controls the positive and negative outputs of the Automatic IonWatch™. This capacitor feedback ensures that the system maintains a continuously neutral static field, even as the environment changes. As a result, you don't need to worry about a charge imbalance developing that could threaten sensitive materials.

A 5-foot cord is fitted with a 3-prong plug for a grounded, 3-terminal 120 VAC receptacle (220 VAC model requires user-supplier plug). Each power unit accepts two power cable connectors. Dimensions: 11"W x 3"H x 6½"D.

Note: This power supply is designed for use with ionizing nozzles installed inside Terra desiccators (see previous page for ordering information). For ionizing equipment used in laminar flow stations, refer to page 421.

		Cat. #
Automatic IonWatch™ Ionizing Power Supply	120 VAC, 50/60 Hz	**2003-01**
	220 VAC, 50 Hz	**2003-03**

CE

GroundWatch™ Ground Continuity Indicator

- **Ensures that all desiccators are properly grounded**
- **Green LED signals proper ground connection on a continuous basis**
- **Visible and audible alarms signal a break in connection**
- **Controls multiple desiccators in series**

This compact unit ensures that a proper ground connection is maintained in any Terra desiccator cabinet. A green LED signals that ground connections are functioning correctly; should a connection be broken, a visible and an audible alarm are activated to signal personnel of the problem. A switch silences the audible alarm, but the red LED continues to glow until the problem is corrected and the reset button is set. This reset button ensures that intermittent problems don't go unnoticed. Operates on 120/220 VAC. Dimensions: 6"W x 3.5"D x 2"H.

		Cat. #
GroundWatch™ Ground Continuity Indicator	110 VAC, 50/60 Hz	**4400-00**
	220 VAC, 50 Hz	**4400-00-220**

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Storage Chamber Racks

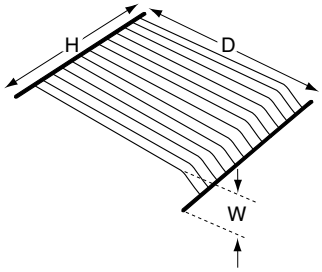
- **Available in a variety of sizes to fit Terra desiccators and other storage chambers**
- **Allow adjustable positioning of standard Terra shelves and trays**
- **Select chrome plated or electropolished stainless steel models**

These noncontaminating racks are available in several sizes to provide conductive support for Terra stainless steel shelves and trays. They are also ideal in many applications to solve organization or handling problems with PC boards, laminating sheets, screen frames and other parts (see Terra's adjustable rack on page 143 for use with larger items).

Racks can be retrofitted into existing storage systems, allowing you to replace damaged racks or replace chrome-plated models with electropolished stainless steel ones. Use the chart at right as a guide for selecting a rack.

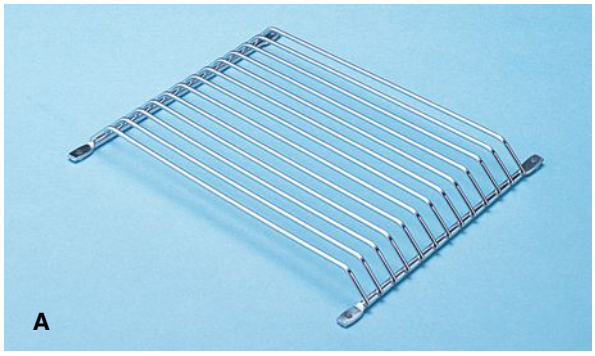
Photo	Overall Dimensions (D" x H" x W")	Number of Bars	Distance Between Bars	Chrome Plated Cat. #	Electropolished Stainless Steel Cat. #
A	$8\frac{15}{32}$ x $7\frac{1}{2}$ x $\frac{11}{16}$	13	$\frac{3}{8}$"	**1600-58**	—
B	12 x $7\frac{7}{16}$ x $\frac{13}{16}$	13	$\frac{3}{8}$"	**1500-01**	**1504-01**
C	$8\frac{3}{4}$ x $9\frac{1}{2}$ x $1\frac{3}{4}$	11	$\frac{3}{4}$"	—	**1504-02**
D	11 x $12\frac{1}{8}$ x $1\frac{1}{2}$	23	$\frac{3}{8}$"	—	**1504-03**
E	$17\frac{1}{4}$ x $12\frac{3}{4}$ x $1\frac{1}{2}$	15	$\frac{7}{8}$"	—	**1504-04**

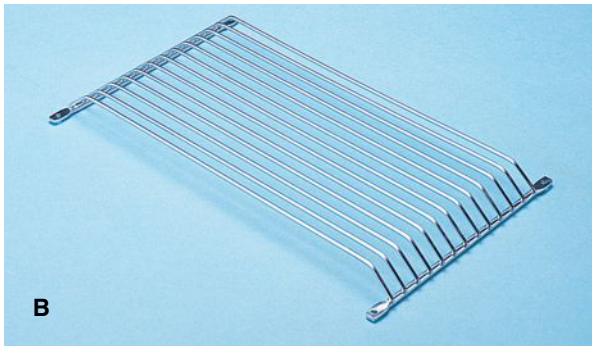
For adjustable racks refer to page 143.



Rack Selection Guide

For Enclosure Type	For Enclosure Size (nominal)	Select Rack Type
Adjust-A-Shelf Desiccators	Up to 16"W x 16"D	A
	Over 16"W x 16"D	B
Stainless Steel Desiccators & Pass-Through Chambers	13"W x 10"D	C
	16"W x 14"D	D
	Over 16"W x 18"D	E





Adjustable Rack

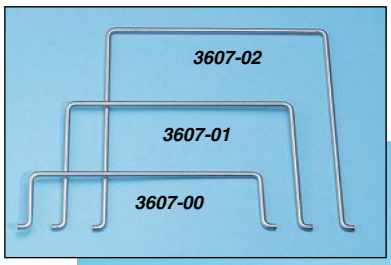
- **Slotted stainless steel rack allows adjustment of wire support bars in ¼-inch increments**
- **Ideal for supporting materials of varying widths within a single storage cabinet**

These adjustable Stainless Steel racks accommodate many different sizes of materials within a single storage cabinet.

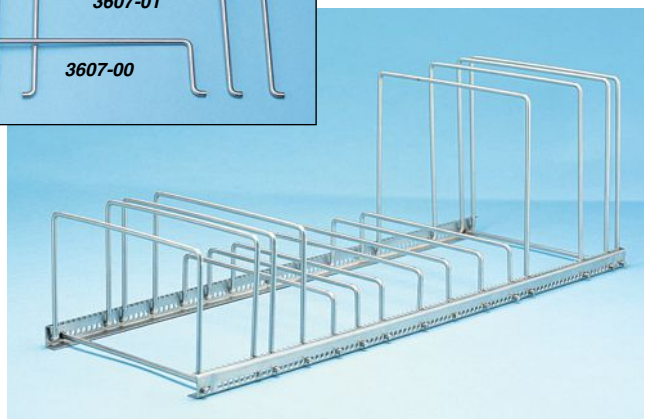
They can be mounted to the bottom and/or top of a chamber. Wire support bars, available in three sizes, can then be moved back and forth in the racks in ¼-inch increments. Bottom-mounted racks with ascending wire supports are well suited to most stored materials. Top-mounted racks with descending wire supports are ideal for tall, thin objects (like screen frames).

Dimensions:
23½"W x 7¾"D

Supports adjustable on ¼-inch centers



Adjustable Wire Supports



	Cat. #
Adjustable Stainless Steel Rack	**3607-03**
Stainless Steel Wire Supports	
2" High	**3607-00**
4½" High	**3607-01**
7½" High	**3607-02**

Tamper-proof hinge

LiftLatch™ Extends Life of Doors and Gaskets

Conventional latches can create torque if too much pressure is applied, placing strain on doors, hinges, and gaskets that in time can cause damage. For this reason, Terra Universal includes the LiftLatch™ on all its desiccators on a standard basis. This improved latch design places no lateral strain on doors, and its cam-style closing mechanism guarantees a snug seal. The LiftLatch™ includes a locking mechanism. For enhanced security, select LiftLatches™ with tamper-proof hinges. **Note:** LiftLatches™ cannot be substituted for older-style rotary latches. All part numbers below are per door.

	Cat. #
Replacement LiftLatch™	**1603-80**
Tamper-Proof Hinges	**1603-81**
Master Key	**1603-82**

Adjustable Shelf Support (for Terra Desiccators)
These low-profile stainless steel supports lend added strength to Terra desiccators—without taking up valuable space. They ensure that cabinets will not warp or crack under heavy loads (up to 150 pounds per fixed chamber shelf). Their retractable design makes installation easy. Only 1/16" high, they are mounted behind a lip beneath the desiccator's fixed chamber shelves in an area that is otherwise unused. Typical installation requires two supports—one 3" from the front and the other 3" from the rear of the chamber; select appropriate size for your desiccator. Price includes installation.

Length (compressed/extended)	Cat. #
15"/26"	**2200-21**
21"/35"	**2200-20**

Gasketing

For Desiccator Doors Without Stainless Steel Frames

- **Allows easy replacement of worn gaskets on desiccator cabinets**
- **Bond strength increases with time and temperature**
- **Rugged material ensures long service life**

Constant exposure to a nitrogen environment eventually dries out door gasketing, causing it to lose its elasticity and hence its sealing capability. But dried-out gaskets don't have to mean an obsolete desiccator.

When you notice that gaskets have begun to crack or stiffen, simply peel them off (you may need to scrape portions off with a razor blade), and then replace them. This closed-cell PVC foam extrusion will stand up to years of nitrogen exposure, and its self-adhesive, noncontaminating backing is specially designed for use with acrylic.

Specifications

Density: lbs./cu. ft. (kg/m^3)	7 (112)	ASTM D-1667
Hardness: Shore 00	45	ASTM D-2240
Tensile Strength: PSI (kPa)	81.5 (562.1)	NTP-7
Elongation: %	167	NTP-7
30% Compression: PSI (kPa)	2.74 (18.9)	ASTM D-1667
30% Deflection: PSI (kPa)	0.87 (6.0)	ASTM D-1667
50% Compression: PSI (kPa)	5.52 (38.1)	ASTM D-1667
50% Deflection: PSI (kPa)	1.72 (11.9)	ASTM D-1667
*Water Absorption: % by Volume	4	NTP-35
*Compression Set Room Temperature: 24 hour recovery %:	2	NTP-37
Recommended Service Temp.:	-15°F to 160°F (-26°C to 71°C)	
Recommended Application Temp.:	40°F to 125°F (4°C to 52°C)	

** Based on 30% compression.*

Desiccator doors without stainless steel frames

	Cat.#
25ft.	**1100-26**
50ft.	**1100-27**

One-Piece "e"-Profile Elastomer Gaskets

All Terra Universal enclosures with stainless steel door frames now feature these innovative nonoutgassing gaskets.

Because they are mechanically attached to the door, they require no adhesives, and they won't slip or migrate over time. They are made of extruded Santoprene®, a thermoplastic rubber which produces no detectable volatile materials over one part per million in high-temperature gas chromatography and mass spectrometry testing.

To order a replacement gasket for any standard Terra desiccator, add "GA" to the catalog number of the affected desiccator. For example, 2269-00GA is a replacement gasket for Desiccator Cat. # 2269-00.

Note: One-piece gaskets are used only on chambers that feature Terra's stainless steel door frame (pictured at left). For doors without these door frames, select the gasket listed above (No. 1100-26 or 1100-27).

One-piece design with fused corners eliminates leaks

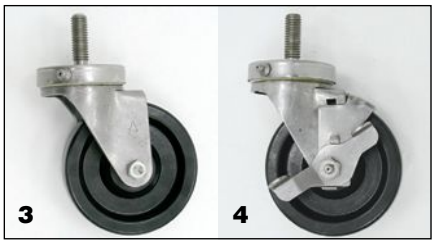
Desiccator doors with stainless steel frames

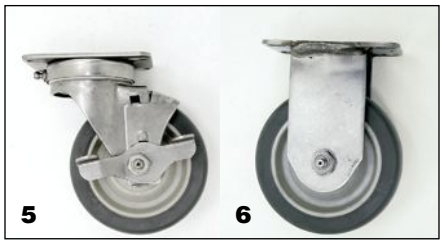
Casters
for Terra Desiccators, Carts, and other Storage Systems

- **Available in materials and gauges to suit various weights, floor surfaces, and cleanliness requirements**
- **Double ball-bearing construction and hardened raceways ensure extra strength and smooth rolling**
- **Available with and without safety brakes**

Application Key

Figure	*Application*
1, 2	Recommended for use on stands used for desiccators, glove boxes, computer cart, reticle and screen frame storage cabinets
3, 4	Stainless steel finish and Bakelite® wheels make these ideal for ultra-clean applications, including Terra's Stainless Steel Desiccators.
5, 6	Standard plate casters used on Terra's acid and chemical carts.
7	Similar to type 5 above, but without brakes.
8	Used on Terra's Softwall Cleanrooms (one required for each support post).
11	Standard caster used on Terra's heavy-duty PureFlow Mobile Storage Systems.





Casters for all Terra Product Carts and Stands (All dimensions are inches)

Figure	Diameter	Tread Width	Wheel Material	Bearing	Axle	Load Capacity	Overall Height	Finish	Stem	Type	Caster Cat.#	Caster Set Cat.#
1	3	1¼	Hard Rubber	Sintered	⅜	210 lbs.	3 15/16	Bright Zinc	½-13 x 1½	Heavy duty Low Profile	**1700-18**	**1700-44** 4 casters (2 with brake)
2	3	1¼	Hard Rubber	Sintered	⅜	210 lbs.	3 15/16	Bright Zinc	½-13 x 1½	Heavy duty Low Profile	**1700-40**[1]	
3	4	1½	Bakelite	Stainless Steel	⅜	300 lbs.	5 1/16	Stainless Steel	½-13 x 1½	Heavy duty	**1700-41**	**1700-43** 4 casters (2 with brake)
4	4	1½	Bakelite	Stainless Steel	⅜	300 lbs.	5 1/16	Stainless Steel	½-13 x 1½	Heavy duty	**1700-42**[1]	
5	4	1⅛	Urethane	Self Lube	⅜	275 lbs.	5 1/16	Stainless Steel	Plate	Medium duty Swivel	**1701-42**[1]	**1700-95** 4 casters (2 with brake)
6	4	1⅛	Urethane	Self Lube	⅜	275 lbs.	5 1/16	Stainless Steel	Plate	Medium duty Fixed	**1701-43**	
7	4	1⅛	Urethane	Self Lube	⅜	275 lbs.	5 1/16	Stainless Steel	Plate	Medium duty Swivel	**1701-41**	
8	6	1¼	Urethane	Stainless Steel	⅜	300 lbs.	7¼	Stainless Steel	Plate	Heavy duty	**6704-08**[2]	
9	4	15/16	Rubber	Self Lube	5/16	115 lbs.	5 5/32	Zinc	½-13 x 1½	Medium duty	**1700-16**	
10	4	15/16	Rubber	Self Lube	5/16	115 lbs.	5 5/32	Zinc	½-13 x 1½	Medium duty	**1700-17**[1]	
11	5	1¼	Urethane	Stainless Steel	1¼	250 lbs.	6¼	Zinc	Expanding	Heavy duty	**1701-37**[1]	

[1] ***With brake***
[2] ***For soft wall clean rooms. One required for each post***
[3] ***Replacement stem for step stools***

Cleanroom Storage

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Reticle/Photomask Storage Cabinets

- **Securely stores and organizes hundreds of reticle or photomask cassettes in a particle-free environment**
- **Select filter/blower system or place beneath cleanroom ceiling filters to provide continuous laminar flow of particle-free air**
- **Available in several configurations for secure vertical or horizontal reticle placement**
- **Ultra-clean materials ensure noncontaminating storage environment**
- **Optimal storage densities conserve valuable cleanroom floor space, enhance inventory organization**

These cabinets are designed specifically to meet the storage requirements of particle-sensitive photomasks and reticles.

A Clean Storage Environment, Inside and Out

Their versatile design lets you incorporate them into an existing cleanroom with ceiling filter/blower modules. Their open-cage construction allows the laminar flow of filtered air to pass downward through the storage area with minimal resistance or turbulence.

For applications without an in-house source of filtered air, Terra offers a stainless steel filter/blower module that mounts on top of the cabinet. It houses a powerful 740 CFM blower and your choice of a 99.99% efficient HEPA filter (rated @ 0.3µm particles) or 99.999% ULPA filter (rated at 0.12 µm particles).

Select between horizontal or vertical storage configurations (see ordering chart for reticle capacities).

Optional casters allow you to transport the photomasks or reticles freely around your facility. Configured as mobile units, these cabinets are especially useful for keeping cassettes clean and organized as you move them from a central storage area (such as Terra's FreeFlow Automated Stocker) to an aligning system or other processing station. Casters raise the cabinet an additional 3" off the floor.

Horizontal Inventory Storage:
Clean, Secure Storage

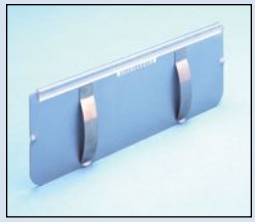
These cabinets, made of stainless steel, feature an innovative side-mounting system to increase capacity and guarantee secure positioning. Reticle mounts are made of clean, smooth HDPE for optimal protection. The 10° slot angle ensures that reticles seat securely, eliminating chatter and vibration when the cabinet is in motion. Reticle shelves fully extend on noncontaminating, low-friction runners, providing full parts access. Electropolishing is available for all stainless steel components to meet ultra-clean material requirements.

Side panels are acrylic or static-dissipative PVC, which controls static charges and the particles they attract.

No. 9130-02, with optional Filter Module and Casters.

Vertical Inventory Storage:
Optimal Storage Density

These systems include open-structure shelves mounted on noncontaminating, low-friction runners that provide full access to stored cassettes. Each shelf contains three removable stainless steel trays that provide secure storage of cassettes while allowing the laminar flow of filtered air to pass through the cabinet. Trays include slots on 3⁄16" centers for inserting optional reticle dividers, which hold cassettes securely in place and minimize the possibility of vibration that could damage delicate masks and reticles. Electropolishing is available for all stainless steel components to meet ultra-clean material requirements.



Reticle/Photomask Dividers (order on next page)

Transparent side panels and hinged front double doors are available to fully enclose the cabinets. Select acrylic or static-dissipative PVC, which controls static charges and the particles they attract.

CLEANROOM STORAGE SYSTEMS

For Vertical-Storage Cabinets

Filter/Blower Module

Includes 740 CFM blower and specified filter. Price includes installation on cabinet. Raises height of cabinet by 13¼". For cabinets shown at right.

Power	with HEPA filter Cat. #	with ULPA filter Cat. #
110VAC, 50/60Hz	**9056-02**	**9056-00**
220VAC, 50 Hz	**9056-02-220**	**9056-00-220**

Heavy-Duty Casters

Set of four, two with brakes. Raise cabinet an additional 3" off the floor.

Cat. #
1700-44

Reticle/Photomask Dividers

Feature tension clips to eliminate any possible vibration while cabinet is in transit. For optimal product safety, select one divider for each photomask/reticle cassette.
See photo on preceding page.

Stainless Steel Cat. #	Electropolished Stainless Steel Cat. #
1688-19	**1688-09**

No. 9130-03, with casters

Call for custom sizes!

No. 9130-03, with optional Filter Module and casters

For Vertical Storage: Photomask/Reticle Cabinets (Order filter/blower module separately)						Panels*	
Nominal Dimensions (inches, includes 10"-high stand)	**No. of Doors** (optional)	**No. of Shelves (Trays)**	**Total Reticle Capacity****	**Stainless Steel** Cat. #	**Electropolished Stainless Steel***** Cat. #	**Acrylic** Cat. #	**Dissipative PVC** Cat. #
28½W x 25D x 38H	1	3 (9)	189	**9130-00**	**9130-02**	**9130-40**	**9130-04**
28½W x 25D x 62H	2	6 (18)	378	**9130-01**	**9130-03**	**9130-41**	**9130-05**

** Includes two side and one rear panels of the material indicated, along with hinged door(s).*
*** Based on 7" x 7" x ⅛"D cassettes. Call for systems customized to other cassette sizes.*
**** Includes electropolishing of all stainless steel components, including internal and external support frame and trays.*

For Horizontal-Storage Cabinets

Filter/Blower Module

Includes 740 CFM blower and specified filter. Price includes installation on cabinet. Raises height of cabinet by 13¼". For cabinets shown at right.

Power	with HEPA filter Cat. #	with ULPA filter Cat. #
110VAC, 50/60Hz	**3505-06**	**3505-13**
220VAC, 50 Hz	**3505-06-220**	**3505-13-220**

Call for custom sizes!

Heavy-Duty Casters

Set of four, two with brakes. Raise cabinet an additional 3" off the floor.

Cat. #
1700-44

No. 3505-09, shown with optional Filter Module and casters

For Horizontal Storage: Photomask/Reticle Cabinets (Order filter/blower module separately)						Panels*	
Nominal Dimensions (inches, includes 10"-high stand)	**No. of Drawers**	**No. of Reticles per Drawer**	**Total Reticle Capacity****	**Stainless Steel** Cat. #	**Electropolished Stainless Steel***** Cat. #	**Acrylic** Cat. #	**Dissipative PVC** Cat. #
27W x 24¾D x 50H	4	36	144	**3505-09**	**3505-10**	**3505-11**	**3505-12**

** Includes two side and one rear panels of the material indicated.*
*** Based on 7" x 7" x 5/8"D cassettes. Call for systems customized to other cassette sizes.*
**** Includes electropolishing of all stainless steel components, including internal and external support frame.*

Look to Terra For All Your Storage Solutions!

Terra offers specialized systems to meet your unique requirement.
Refer to the sections indicated below, or call for a custom storage solution.

- **Desiccator Storage:** Automated control over humidity and particulates to extend product shelf lives and yields! ***Begins on page 70.***
- **Nitrogen-Purged Stockers:** Automated low-humidity storage for thousands of stored items, complete with inventory management and robotic capabilities! ***Begins on page 39.***
- **Heated and Refrigerated Stockers:** Terra's high-volume ASD Stockers are available with low/high-temperature capabilities. ***Begins on page 66.***
- **HEPA-Filtered Stockers:** Integral HEPA-filter modules provide a continuous wash of particle-free air to maintain cleaner-than-Class 10 conditions! ***Begins on page 54.***
- **Cleanroom Carts:** A comprehensive selection of cleanroom-specific carts for transporting wafers, reticles, pharmaceutical samples, and other contamination-sensitive materials. ***Begins on page 524.***

SmartDesiccator™*: Smart nitrogen control system cuts N_2 expenses up to 78%.*
See page 80.

ASD-600™*: High-Volume, Low-Humidity Wafer Storage.*
See page 34.

Cleanroom robotic arm and shuttle mechanism ***for automated parts transfer. See page 32.***

ASD-550™ Drying System: ***Safe, controlled wafer and wafer lot box drying in a clean, nitrogen environment. See page 36.***

NitroPlex™ Module*: Automated multiplexed purge system cuts N_2 expenses and guarantees optimal %RH stability in large, multi-chamber cabinets. See page 82.*

CLEANROOM STORAGE SYSTEMS

CleanStocker™

- **Ideal for storing heavy reticles, photomasks, and other materials that require a contamination-free environment**
- **Rear-mounted HEPA filter/blower module, with filter rated 99.99% efficient @ 0.3µm particles, provides a continuous horizontal laminar flow of particle-free air**
- **Sturdy polypropylene construction supports heavy loads and resists a wide range of chemicals**
- **Keyed locking latch ensures parts security**
- **Available with castered stands to allow easy parts transfer from one processing station to another**

The CleanStocker™ provides the perfect storage environment for such particle-sensitive materials as reticles, photomasks, wafers and optical equipment.

Its rear-mounted HEPA filter/blower module incorporates a 740 CFM variable-speed impeller that directs a continuous flow of particle-free air forward through the storage area. This high-volume flow quickly removes any contaminants that might rest on stored items and keeps other particles from entering the cabinet—even when an access door is opened. Both HEPA filters (rated 99.99% efficient @ 0.3µm particles) and ULPA filters (rated 99.999% efficient @ 0.12µm particles) are available. Vents along the front door allow air to escape.

Three fixed shelves provide plenty of storage space; the top shelf has 5 1/2" vertical clearance, and all others have 6 1/4". Select single-door model (with 4 chambers) or double-door model (with 8 chambers). Filter must be ordered separately.

Ordering Information

Model	Outside Dimensions* (W" x D" x H")	Inside Dimensions** (W" x D" x H")	CleanStocker™ 110VAC, 50/60HZ Cat. #	CleanStocker™ 220VAC, 50Hz Cat. #	Corresponding Stand (4" high with levelers) Cat. #
Single Door	21 x 16 x 34	20 x 14 1/2 x 5 1/2/6 1/4	**9010-20**	**9010-20-220**	**9010-22A**
Double Door	21 x 16 x 68	20 x 14 1/2 x 5 1/2/6 1/4	**9010-21**	**9010-21-220**	**9010-22A**

**** Excluding 14 1/2"W x 11"D x 29"H filter/blower module. ** Usable shelf space. Top shelf has 5 1/2" of vertical shelf clearance; others have 6 1/4.***

Casters

Set of four casters, two with locking brakes. Raise stands an additional 3" off of the floor.

Cat. #
1700-44

HEPA/ULPA Filters

Fit inside the filter/blower module of the CleanStocker™. Select the filter that meets your particle requirements (one for single-door cabinet, two for double-door cabinet).

Cat. #

HEPA Filters **1681-02**
99.99% efficient at 0.3µm particles

ULPA Filters **1681-10**
99.999% efficient at 0.12µm particles

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General Purpose Storage Cabinets

- **Economical storage cabinets are ideal for many laboratory, cleanroom and stockroom applications**
- **HEPA-filter/blower option provides a continuous downstream of particle-free air for contamination control**
- **Select acrylic for full visibility and economy, or polypropylene for strength and chemical resistance**
- **Available in several chamber sizes and configurations**

These storage cabinets provide an economical alternative to Terra's complete line of desiccators.

Clean, Durable, Economical

Like our desiccators, they feature advanced fabrication techniques that reflect over a decade of experience in plastics manufacturing. Their solvent welds, noncontaminating gaskets and chrome-plated hardware ensure complete cleanroom compatibility.

All cabinets feature double full-height access doors that require minimal clearance space. The durable hinges are spring-loaded and, together with gaskets, ensure a tight seal and a clean environment for stored materials.

For critical contamination-control requirements, select a model with an integral filter/blower module. This unit, mounted to the top of the cabinet, features a 740 CFM variable speed impeller that directs a continuous stream of HEPA-filtered air downward through the storage area. The HEPA filter is rated 99.99% effective at removing particles 0.3 microns or larger in diameter (ULPA filters are available with 99.999% efficiency ratings @ 0.12µm particles). The unique plenum design of the filter/blower housing ensures a uniform face velocity across the filter and thus a uniform outflow of clean air.

All models with HEPA filter/blower modules feature shelf perforations to allow air distribution throughout the cabinet. They are available with either acrylic or static-dissipative PVC doors (dissipative PVC offers complete visibility in addition to dissipative characteristics and excellent chemical resistance).

Options include stainless steel stands that raise cabinets 4" off the floor for convenient access and cleaning. Stands are available with and without casters. For optimal strength, acrylic cabinets can be reinforced with adjustable supports that enable shelves to support up to 100 pounds each without bowing.

Type C Polypropylene Cabinet with Filter/Blower

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CLEANROOM STORAGE SYSTEMS

Casters
Set of four, two with locking brakes. Raise stands an additional 3" off the floor.

Cat. #
1700-44

HEPA/ULPA Filters
Fit inside the filter/blower module of either polypropylene or acrylic cabinets. Select the filter that meets your particle requirements.

HEPA Filters
99.99% efficient
at 0.3µm particles
Cat. #
1681-02

ULPA Filters
99.999% efficient
at 0.12µm particles
Cat. #
1681-10

Type A Acrylic Cabinet with Filter/Blower

Type D Acrylic Cabinet with Filter/Blower

Polypropylene Storage Cabinets

TYPE	No. of Tiers	Shipping Weight (pounds)	Overall Dimensions* (W x D x H inches)	Cabinets Without Filter & Blower: Acrylic Doors Cat.#	Cabinets Without Filter & Blower: Static Dissipative PVC Doors Cat.#	Cabinets With Filter & Blower**: Acrylic Doors Cat.#	Cabinets With Filter & Blower**: Static Dissipative PVC Doors Cat.#	Corresponding Stands (Includes levelers) Cat.#
A	1	72	25¾ x 20 x 22½	9010-30	9010-45	9010-60A	9010-75A	9010-90A
B C	2	100	25¾ x 20 x 44½	9010-31	9010-46	9010-61A	9010-76A	9010-90A
C	3	153	25¾ x 20 x 66½	9010-32	9010-47	9010-62A	9010-77A	9010-90A
A	1	72	25¾ x 15 x 18	9010-33	9010-48	9010-63A	9010-78A	9010-91A
B	2	100	25¾ x 15 x 35½	9010-34	9010-49	9010-64A	9010-79A	9010-91A
C	3	153	25¾ x 15 x 53	9010-35	9010-50	9010-65A	9010-80A	9010-91A
A	1	72	25¾ x 15 x 23	9010-36	9010-51	9010-66A	9010-81A	9010-91A
B	2	100	25¾ x 15 x 45½	9010-37	9010-52	9010-67A	9010-82A	9010-91A
C	3	153	25¾ x 15 x 68	9010-38	9010-53	9010-68A	9010-83A	9010-91A
A	1	72	25¾ x 29 x 32	9010-39	9010-54	9010-69A	9010-84A	9010-92A
B	2	100	25¾ x 29 x 63½	9010-40	9010-55	9010-70A	9010-85A	9010-92A
B	2	100	25¾x 13½ x 22½	9010-41	9010-56	9010-71A	9010-86A	9010-93A
D	4	190	25¾x 13½ x 44½	9010-42	9010-57	9010-72A	9010-87A	9010-93A
B	2	100	25¾ x 15 x 27	9010-43	9010-58	9010-73A	9010-88A	9010-91A
D	4	190	25¾ x 15 x 53½	9010-44	9010-59	9010-74A	9010-89A	9010-91A
Acrylic Storage Cabinets								
A	1	190	25¾ x 16¾ x 18	9011-05	—	9011-08	—	9010-94A
C	3	100	25¾ x 14½ x 36½	9011-06	—	9011-09	—	9010-95A
D	4	190	25¾ x 17 x 64½	9011-07	—	9011-10	—	9010-96A

Without Filter/Blower Module. ** Order desired filter separately. Stainless Steel housing increases overall height by 10½".

Adjustable Shelf Supports (for Acrylic Cabinets)

These low-profile stainless steel supports allow shelves to support up to 100 pounds each. Their retractable design makes installation easy, and their low profile (11/16") takes up very little storage space. Typical installation requires two supports (one in the front and one in the rear of each chamber). Price includes installation.

Dimensions (compressed/extended)	Cat. #
15"/26"	**2200-21**
21"/35"	**2200-20**

Curing/Drying Cabinet

To Order, Call—(714) 578-6000 or Fax (714) 578-6020 • For Current Pricing—www.TerraUniversal.com

- **Provides continuous wash of filtered air (HEPA or ULPA) for clean, controlled adhesive curing, PC board drying, and parts storage**
- **Exhaust purification system removes odors and chemical vapors from air-stream for safe indoor release**
- **Stainless steel shelves can be adjusted on racks to accommodate various part sizes**
- **Select static-dissipative PVC storage cabinets for maximum static and particle control**

This versatile cabinet is ideal for drying PC boards after epoxy coating or solvent cleaning, as well as in other applications requiring a high-volume wash of particle-free air to dry and clean sensitive materials.

Dual Filtering Capability Removes Particles and Fumes

These versatile cabinets can be equipped to provide dual filtration. A powerful 740 CFM blower with adjustable speed controls forces incoming air through a HEPA particle filter, rated 99.99% efficient with particles 0.3 µm in diameter, and then horizontally through the storage area (99.999% ULPA filters are also available).

The filtered air exits the cabinet through perforations on the opposing wall of the cabinet. Systems are also available with a filter housing on the exhaust side to facilitate final filtration (either HEPA or ULPA).

A second filter/blower system can be added in place of these exhaust openings to allow duct-free exhaust purification and release. These modules draw exhaust fumes through an activated carbon filter and an optional final particle filter to allow safe indoor venting. Equipped with dual opposing filter/blower modules, this drying cabinet maintains optimal air flow speeds and control over particles and chemical fumes to ensure both safe, effective parts drying and also full compliance with environmental safety regulations.

Clean, Practical Construction

The storage cabinet is available in several sizes and configurations to meet individual requirements. Each chamber includes dual electropolished stainless steel racks that allow height adjustment of stainless steel shelves in ½-inch increments to meet varying clearance requirements (order shelves separately).

Select cabinets of either acrylic or transparent static-dissipative PVC, a durable material that eliminates build-ups of surface charges (which are commonly generated by standard plastics). Static-dissipative PVC, which features a surface resistivity of about 10^7 ohms/square cm, also helps ensure cleanliness by eliminating particle attractions created by charged surfaces. All cabinets made of static-dissipative PVC feature grounded racks and ground terminals to allow easy connection to your in-house ground.

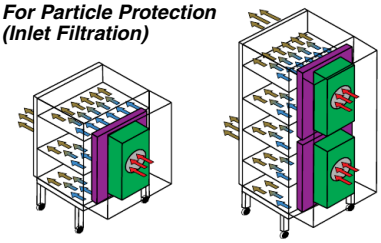
Custom Configurations Available!

These drying cabinets can be ordered in custom sizes, and with special shelving configurations and parts fixtures, to meet your requirements. Simply fax us your specifications—we'll provide a quotation on a system tailor-made to your application!

No. 6082-35
Inlet HEPA filtration, outlet chemical vapor filtration.

CLEANROOM STORAGE SYSTEMS

For Particle Protection (Inlet Filtration)



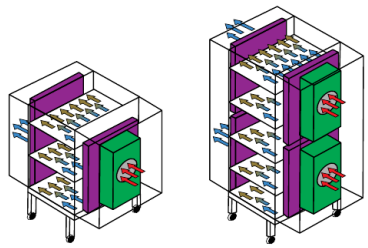
3 or 6 Chambers *5 or 10 Chambers*

Drying/Curing Cabinets: Inlet Filter/Blower[1] (Order desired filter(s) separately, below)

No. of Chambers	Overall Dimensions (W" x D" x H")	Chamber Dimensions (W" x D" x H")	Acrylic 110VAC, 50/60Hz Cat. #	Acrylic 220VAC, 50Hz Cat.#	Static-Dissipative PVC 110VAC, 50/60Hz Cat. #	Static-Dissipative PVC 220VAC, 50Hz Cat.#
3[2]	33⅜ x 24 x 36	22⅝ x 24 x 12	**6082-00**	**6082-04**	**6082-08**	**6082-12**
6[2]	56¼ x 24 x 36	22⅝ x 24 x 12	**6082-01**	**6082-05**	**6082-09**	**6082-13**
5[3]	33⅜ x 24 x 60	22⅝ x 24 x 12	**6082-02**	**6082-06**	**6082-10**	**6082-14**
10[3]	56¼ x 24 x 60	22⅝ x 24 x 12	**6082-03**	**6082-07**	**6082-11**	**6082-15**

[1] Includes perforations on opposing side for exhaust release.
[2] Includes inlet filter housing with one 740 CFM blower (order filter separately)
[3] Includes inlet filter housing with two 740 CFM blowers (order filters separately)

For Particle Protection (Inlet and Outlet Filtration)



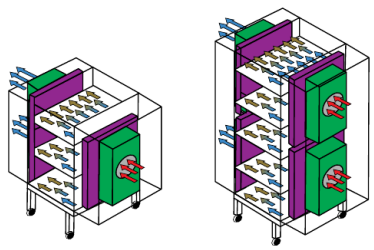
3 or 6 Chambers *5 or 10 Chambers*

Drying/Curing Cabinets: Inlet Filter/Blower and Exhaust Filter (Order desired filter(s) separately, below)

No. of Chambers	Overall Dimensions (W" x D" x H")	Chamber Dimensions (W" x D" x H")	Acrylic 110VAC, 50/60Hz Cat. #	Acrylic 220VAC, 50Hz Cat.#	Static-Dissipative PVC 110VAC, 50/60Hz Cat. #	Static-Dissipative PVC 220VAC, 50Hz Cat.#
3[1]	37⅜ x 24 x 36	22⅝ x 24 x 12	**6082-16**	**6082-20**	**6082-24**	**6082-28**
6[1]	59¾ x 24 x 36	22⅝ x 24 x 12	**6082-17**	**6082-21**	**6082-25**	**6082-29**
5[2]	37⅜ x 24 x 60	22⅝ x 24 x 12	**6082-18**	**6082-22**	**6082-26**	**6082-30**
10[2]	59¾ x 24 x 60	22⅝ x 24 x 12	**6082-19**	**6082-23**	**6082-27**	**6082-31**

[1] Includes inlet filter housing with one 740 CFM blower and outlet (exhaust) housing for one filter (order filters separately)
[2] Includes inlet filter housing with two 740 CFM blowers and outlet (exhaust) housing for two filters (order filters separately)

For Particle and Chemical Vapor Protection (Inlet and Outlet Filtration)



3 or 6 Chambers *5 or 10 Chambers*

Drying/Curing Cabinets: Inlet and Exhaust Filter/Blower (Order desired filter(s) separately, below)

No. of Chambers	Overall Dimensions (W" x D" x H")	Chamber Dimensions (W" x D" x H")	Acrylic 110VAC, 50/60Hz Cat. #	Acrylic 220VAC, 50Hz Cat.#	Static-Dissipative PVC 110VAC, 50/60Hz Cat. #	Static-Dissipative PVC 220VAC, 50Hz Cat.#
3[1]	45⅛ x 24 x 36	22⅝ x 24 x 12	**6082-32**	**6082-36**	**6082-40**	**6082-44**
6[1]	67½ x 24 x 36	22⅝ x 24 x 12	**6082-33**	**6082-37**	**6082-41**	**6082-45**
5[2]	45⅛ x 24 x 60	22⅝ x 24 x 12	**6082-34**	**6082-38**	**6082-42**	**6082-46**
10[2]	67½ x 24 x 60	22⅝ x 24 x 12	**6082-35**	**6082-39**	**6082-43**	**6082-47**

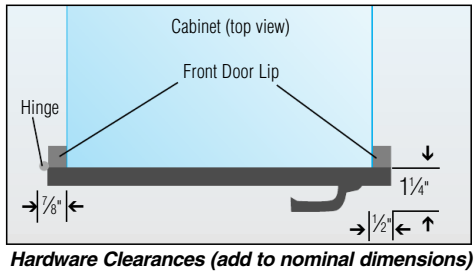
[1] Includes inlet filter housing with one 740 CFM blower and outlet filter housing with one 1200 CFM exhaust blower (order filters separately)
[2] Includes inlet filter housing with two 740 CFM blowers and outlet filter housing with two 1200 CFM exhaust blowers (order filters separately)

Other Options

Stands
Made of stainless steel. Includes leveling feet.

	For 3 and 5 Chamber Cabinets Cat#	For 6 and 10 Chamber Cabinets Cat#
Raises Cabinet 4"	**1740-44A**	**1740-92A**
Raises Cabinet 13"	**1740-80A**	**1740-56A**

3" Heavy-Duty, Low-Profile Casters **1700-44**
Set of four, two with locking brakes



Hardware Clearances (add to nominal dimensions)

Filters (see pages 422-425)
One filter per blower is required (see charts above). HEPA or ULPA filters may be combined with purification filters to provide final particle filtration.

	Cat. #
HEPA Filter Rated 99.99% efficient @ 0.3µm particles	**1681-02**
ULPA Filter Rated 99.999% efficient @ 0.12µm particles	**1681-10**
Purification Filter Removes common organic/solvent fumes	**1716-00**
Purification Pre/Post Filter One required on each side of No. 1716-00 to contain medium.	**1681-04A**
Stainless Steel Shelves (perforated)	**1978-02**
Stainless Steel Shield (prevents scratching)	**1978-06**

Stainless Steel Laminar Flow Storage Safe

- **Prevents unauthorized access while allowing free passage of HEPA-filtered air**
- **Double-wall construction, triple-action boltwork, and sturdy combination lock ensure security of stored parts**
- **Wire shelving provides ample storage space and minimal restriction of vertical air flow through the cabinet**
- **Built-in stand raises unit off the floor for unrestricted laminar flow, easy cleaning, and more convenient access**
- **Electropolished UltraClean™ stainless steel model available**

This open-cage Laminar Flow Storage Safe is designed to provide a high-security, low-particle environment for contamination-sensitive materials.

Its open-cage design lets you position it beneath a vertical laminar flow of HEPA-filtered air emanating from ceiling filter/blower units. The airstream encounters minimal resistance as it passes through the interior shelves and out through the bottom. Five stainless steel wire shelves mounted inside the unit provide secure storage yet have no horizontal surfaces where particles could accumulate.

The double-wall, reinforced outer shell features a Mosler combination lock and triple-action security boltwork to protect against unauthorized access to stored materials. When locked, steel rods secure the top, bottom and opposing sides of the dual, swing-action access doors. The internal hinges are inaccessible when doors are closed, so the locked system is completely tamper-proof.

This cabinet is also available with an electropolished UltraClean finish to meet the most rigorous cleanroom requirements; see page 321 for more information.

Specifications

Outside Dimensions:	48"W x 20"D x 72½"H (including 17" stand)
Shelves:	42"W x 18"D with ⅛" stainless steel rods, welded on ⅜" centers
Number of Shelves:	5 (excluding top and bottom); 4" clearance for top shelf, 10" clearance for all others (specify other desired shelf configuration)
Construction:	All-welded, double-wall 16-gauge 304 stainless steel (electropolishing available)
Combination Lock:	Mosler dial with triple-action boltwork

CE

	Cat. #
Stainless Steel Laminar Flow Storage Safe	**1113-13**
UltraClean™ Electropolished Laminar Flow Storage Safe	**1113-14**

Stainless Steel Storage Cabinet

- **Stainless steel construction and vapor-resistant gaskets make this cabinet ideal for chemical storage**
- **Two full-length shelves provide ample storage space**
- **Mounts conveniently on a wall above counter or benchtop**
- **Includes dual locks**

This clean, durable, stainless steel storage cabinet is ideal for a wide range of storage needs in the laboratory or stockroom.

It is designed for wall-mounting above a counter or workbench. Two full-length shelves provide plenty of storage space, and corrosion-resistant stainless steel provides a perfect environment for corrosive chemicals. Dual swing-open doors feature chemical-resistant gaskets that make the cabinet vapor tight, so any chemical fumes remain confined inside the storage area. Both doors include a keyed locking mechanism. Dimensions: 60"W x 24"D x 36"H (other dimensions and configurations available).

	Cat. #
Stainless Steel Storage Cabinet	**9010-00**

Stainless Steel Work-in-Process (WIP) Cabinet

- **HEPA/ULPA Filter/Fan Unit (FFU) creates a Class 1 particle-free environment for storing sensitive semiconductor devices**
- **Stainless steel shell is durable and easy to clean**
- **Locking double doors include transparent viewing windows of acrylic or static-dissipative PVC**
- **Adjustable perforated shelves facilitate laminar airflow through the storage area for optimal particle control**
- **Lowest noise level of any low-profile fan unit: 50dBA, measured 30" from filter face**
- **Available with casters and onboard self-charging power cell to allow cordless parts transfer**

Shown with HEPA Filter/Fan Unit and optional casters

This stainless steel enclosure provides the perfect particle-free environment for sensitive work-in-process.

Made of 304 stainless steel, it features dual locking doors with transparent windows that afford full visibility of stored contents. Select windows of acrylic or static-dissipative PVC, a durable, chemical-resistant material that protects parts against static charges and the particles they attract (see page 596).

Class 1 Particle-Free Environment

The WIP cabinet's open-cage design facilitates the vertical laminar flow of particle free air through the storage area. Select a filter/fan unit (FFU) for a contamination-free storage environment that meets Class 1 cleanliness standards (per FED-STD-209). Patented baffling technology ensures uniform airflow across the filter face and attenuates sound for the lowest noise level in the industry: approximately 53 dBA. Select HEPA filter, rated 99.99% efficient @ 0.3 micron particles, or ULPA filter, rated 99.9995% efficient @ 0.128 micron particles.

Versatile Shelves Accommodate Variety of Part Sizes

The standard cabinet comes with three reinforced stainless steel shelves, which feature ¾"-diameter perforations to optimize the vertical laminar airflow. The bottom shelf is fixed 17" above the floor; the other two are easy to adjust at 1" increments to suit your part sizes.

System options include 3"-diameter heavy-duty casters and an onboard power cell for cordless DC operation of the FFU (see sidebar on PureFlow™ operation). On an optional basis, cabinet and shelves can be electropolished.

Specifications

Dimensions:	
Overall:	48¼"W x 24⅜"D x 62½"H (FFU adds 11⅜" to height)
Storage Area:	48"W x 24"D x 41"H (from filter face to bottom shelf)
Shelves:	47⅜" x 22⅜"
Construction:	304 stainless steel (electropolishing available); stand made of 1½" square tube members with leveling feet. Reinforced shelves feature ¾"-diameter perforations.
Fan Motor: (See page 208)	Continuous duty; furnished with overload protection and a two-speed switch. Rated ¼ HP @ low speed (⅓ HP at high speed).
Sound Level:	50 dBA, measured no more than 30" from filter face @ 90 FPM
Air Flow:	650 CFM
Prefilter:	16" x 23¼" x ½" polyurethane foam (washable)
Power Requirements:	See chart below.

Casters

Set of four, two with locking brakes. Raise cabinet an addition 3½ off the floor. Spring-loaded casters also available for cushioned ride; call Terra for information.

Cat. #
1700-44

Work-In-Process Cabinets (Order desired FFU below)

Stainless Steel		Electropolished Stainless Steel	
Acrylic Doors Cat. #	Dissipative PVC Doors Cat. #	Acrylic Doors Cat. #	Dissipative PVC Doors Cat. #
1529-02	**1529-03**	**1529-04**	**1529-05**

Filter/Fan Unit

Power	with HEPA Filter Cat. #	with ULPA filter Cat. #
110VAC, 50/60Hz	**6701-99**	**6702-01**
220VAC, 50Hz	**6701-99-220**	**6702-01-220**

PureFlow™ WIP Cabinet: Clean, Cordless Parts Transfer

The onboard DC power cell converts the WIP Cabinet into a PureFlow™ Mobile Storage System—literally, a cleanroom on wheels!

This power cell operates the FFU for up to 90 minutes without AC power, allowing you to move the cabinet through an uncontrolled environment without particle exposure. This application versatility eliminates costly, labor-intensive parts packaging and cleaning and minimizes the risk of contamination. Price includes installation of DC Power Cell on the WIP Cabinet stand. Requires selection of casters. See page 177 for complete specifications.

	Cat. #
110VAC, 50/60 Hz	**1529-16**
220VAC, 50 Hz	**1529-16-220**

Wafer Box Security Cabinets

- **The perfect cabinets for secure work-in-process (WIP) storage inside a cleanroom**
- **Electropolished stainless steel construction ensures clean, durable surfaces that wipe down easily**
- **Wire cage accommodates cleanroom laminar air-flow**
- **Locking doors keep your materials secure!**

Terra Universal's wire cage Security Cabinets keep your wafer lot boxes secure, clean, and visible inside the fab.

Built to the most stringent cleanroom standards, these enclosures are designed to optimize the vertical laminar flow of particle-free air through the storage area. They are fabricated of 1/4" rods on 2" centers, and electropolishing ensures ultra-smooth surfaces that won't snag wipers or harbor contaminants.

The models below feature five slanted shelves, each with 12" of vertical clearance to accommodate most common wafer lot boxes (for wafer sizes up to 200mm). Other shelf configurations are available for other parts sizes, including 300mm wafer boxes—just call with your specifications!

Wafer Box Security Cabinet

Overall Dimensions	Wafer Box Capacity* 150mm	200mm	Cat. #
36"W x 18"D x 76"H	30	15	**6012-67**
36"W x 24"D x 76"H	30	30	**6012-68**
48"W x 18"D x 76"H	50	20	**6012-69**
48"W x 24"D x 76"H	50	40	**6012-71**

**** Based on Empak lot boxes # H3150 (150mm) and HA200 (200mm).***

Wafer Box Storage Cabinets

- **Fully enclosed, locking cabinets are designed specifically for wafer lot box storage**
- **Adjustable shelves accommodate any size wafer box**
- **Electropolished stainless steel construction ensures clean, durable surfaces that wipe down without snags**
- **Static-dissipative viewing windows afford full visibility while controlling static charges and particles**
- **Locking doors prevent unauthorized access**
- **Four-inch locking urethane casters allow easy repositioning**

These adjustable-shelf cabinets provide clean, secure storage of wafer boxes and other particle-sensitive work-in-process.

Their 304 stainless steel doors and panels are electropolished to produce brilliant, smooth surfaces that are easy to wipe down without snagging wipers. Front windows are made of static-dissipative PVC, which safely dissipates static charges to ground. By dissipating surface charges, this material also eliminates particle attraction.

All models come with 4"-diameter, heavy-duty urethane casters (two with locking brakes).

No. 9600-21

No. 9600-22

Wafer Storage Cabinets

Overall Dimensions	No. of Doors	No. of Shelves	Cat. #
47"W x 20"D x 67"H	2	3 adjustable	**9600-21**
47"W x 26"D x 77"H	4	1 fixed, 2 adjustable	**9600-22**

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Chemical Storage Cabinets

- **The ideal safety cabinets for storing chemicals**
- **Fabricated of electropolished stainless steel to meet cleanroom requirements**
- **Complies with OSHA and NFPA fire safety regulations**
- **Double wall construction provides 1½" thermal insulation layer in case of fire, in accord with fire requirements**
- **Self-closing hinged safety doors include locks for added security**
- **Vents with spark arrestors release potentially dangerous vapors and prevent backflash into the cabinet**
- **Available in two configurations to meet your chemical storage needs**

Terra Universal's chemical storage cabinets are ideal systems for storing flammable chemicals in a wet processing area or other clean environment.

The walls are constructed of electropolished stainless steel panels separated by 1½" of air, providing a layer of thermal protection in the event of fire. Additional safety features include 2" NPT vents and spark arrestors that release built-up fumes and prevent backflash flame or spark into the enclosure. A 2" spill containment area allows stored items to sit above a chemical spill and prevents minor spills from leaking into the cleanroom environment.

These features help ensure that these cabinets comply with OSHA/NFPA fire safety regulations.

These cabinets' self-closing doors open to a full 180˚, allowing for safe loading and unloading of chemical bottles and drums. Dual-locking doors provide security of the contents within, and 4"-diameter heavy duty urethane locking casters facilitate stable cabinet transport.

The **Chemical Safety Stocker** is equipped with three adjustable–height shelves. This design allows for storage of larger bottles and drums.

The **Bottle Safety Stocker** features slanted perforated shelves that cradle up to (24) one-gallon bottles individually.

Chemical Safety Stocker No. 6012-70

Closed View

Side View of Bottle Supports

Bottle Safety Stocker No. 9600-23

Specifications

Construction:	18-gauge 304 stainless steel, passivated and electropolished to meet cleanroom particle requirements. Double-wall construction throughout with 1½" air gap and 2" spill containment area.
Vents:	Dual 2" NPT vent port with plugs
Doors:	Self-closing double doors with slam lock deadbolt assembly
Casters:	4"-diameter locking urethane casters with stainless steel hardware. Stainless steel leveling feet included.

CE

Chemical Storage Cabinets

Description	Dimensions (inches, nominal)	Cat. #
Chemical Stocker	43 x 18 x 67¼	**6012-70**
Bottle Safety Stocker	55½ x 24 x 65	**9600-23**

CLEANROOM STORAGE SYSTEMS

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#1683-06
Wafer Tool Cabinet (71"W x 36"D x 72"H)
Adjustable shelf mounts and four drawers (two with dividers)

#1683-08
Wafer Tool Cabinet (47.25"W x 24"D x 72"H)
Adjustable shelf mounts and 12 cubby holes (3.8"W x 12.4"H)

#1684-56
Thermocouple Stocker (70.75"W x 21.625"D x 73"H)
Six angled shelves, each with 6 slots for holding thermocouple rods up to 68" long

#1683-09
Wafer Tool Cabinet (47.25"W x 24"D x 72"H)
Adjustable shelf mounts, 4 drawers (2 with dividers), and 12 cubby holes (3.8"W x 12.4"H)

#1683-01
Wafer Tool Cabinet (47.25"W x 24"D x 72"H)
Adjustable shelf mounts, 4 drawers (2 with dividers), and 12 cubby holes (7.6"W x 12.4"H)

#1684-57
Tool Stocker (47.25"W x 24"D x 72"H)
Six pairs of drawers on bearing runners, with 12"H storage area at bottom

#1684-58
Wafer Tool Cabinet (47.25"W x 24"D x 72"H)
Adjustable shelf mounts with 20 drawers

#1684-59
Wafer Tool Cabinet (47.25"W x 24"D x 72"H)
Two pairs of adjustable shelf mounts separated by center dividing wall, with 4 cubby holes

#1684-72
Tool Stocker (62.75"W x 24"D x 76"H)
Two pairs of adjustable shelf mounts separated by center dividing wall, with six external drawers

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CLEANROOM STORAGE SYSTEMS

Wafer Fab Tool Cabinets

- **Polypropylene outer shell and shelving offer cleanliness and excellent resistance to process chemistries used throughout the wafer fab**
- **Stainless steel reinforcement provides the strength necessary for process tools, quartzware, and other heavy items**
- **Durable stainless steel doors include locking security latches**
- **Transparent viewing windows available in acrylic or static-dissipative PVC**
- **Dozens of standard sizes and configurations available, with adjustable shelving, drawers, cubbies, and many specialized parts fixtures**
- **Can be customized to meet your specific requirements**

Terra Universal's Wafer Fab Tool Cabinets feature steel-reinforced polypropylene construction that resists a wide range of acids and other corrosives, making them ideal for applications in wet processing areas, cleaning areas, and other wafer fab locations.

They provide the strength and cleanliness required for storing wafer processing tools, quartz tubes and vessels, injectors, thermocouples, and other critical components. Specialized parts fixtures ensure safe, secure storage, and locking doors protect against unauthorized access.

The viewing windows are available in acrylic or static-dissipative PVC, which helps control static charges and the contaminants they attract. Both materials are transparent to allow easy identification of cabinet contents.

Terra's wafer tool cabinets are available in many standard sizes and configurations of shelves, drawers, cubbyholes, and other receptacles. These units can also be customized to meet your specific requirements - just send us your specifications.

#1684-78
Wafer Tool Cabinet (47.25"W x 24"D x 72"H)
Adjustable shelf mounts with six drawers

All models come with heavy-duty 4" polyurethane locking casters, allowing these units to be easily moved into place. Adjustable footings facilitate leveling of cabinets.

See page 163 for Quartzware Stockers.

CE

Standard Designs for

✓ **Thermocouples** ✓ **Jigs** ✓ **Probe Cards**
✓ **Injectors** ✓ **Push Rods** ✓ **More!**

Call Terra for a quotation on a system that's right for <u>your</u> application!

Stainless Steel Clipboard

- **Stainless steel construction gives you a clipboard that's up to cleanroom standards**
- **12" x 9½" surface firmly holds writing paper in place**

What is there to say about a clipboard?
They're easy to overlook when you're setting up your cleanroom, yet they're an essential item when it comes time to update information.

This one is completely clean-room compatible. Stainless steel construction ensures a nonshedding, durable, conductive surface for cleanroom paper. Large 12" x 9½" surface and spring-loaded clip securely hold standard sized sheets.

		Cat. #
	Stainless Steel	**1350-00**
NEW	**Polypropylene**	**1350-01**

CLEANROOM STORAGE SYSTEMS

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Quartzware Stockers

- Versatile storage systems optimize the purity, safety and productivity of front-end wafer fabrication
- Support platens securely support delicate quartz tubes of varying diameters to minimize costly damage
- Ergonomic, space-saving designs minimize floorspace requirements, provide easy access
- Stress-relieved polypropylene construction resists acids and other process chemicals, features steel support for strength and durability
- Nitrogen purge and cabinet pressure controls automatically maintain a clean, low-humidity storage environment
- Reinforced shelves and drawers provide convenient storage of quartz vessels, thermocouple rods, and other parts
- Ionizing equipment eliminates static charges and the particles they attract
- Custom systems available for any requirement—call to discuss your application!

See page 538 for quartzware transit carts

#1684-73
Quartz Tube Stocker with Rotary Holder (59"W x 35.5"D x 98"H)
Includes automated nitrogen purge controls for particle-free, low-humidity storage of tubes up to 200mm dia. x 1.5m long

Standard Designs For

- ✓ Quartz tubes
- ✓ Quartz vessels
- ✓ Thermocouples
- ✓ Injectors
- ✓ Jigs
- ✓ Push Rods
- ✓ Probe Cards
- ✓ More!

CE

Call Terra for a quotation on a system that's right for <u>your</u> application!

#1684-74

Quartz Tube Stocker with Eight Platen Holders (78.75"W x 43.4"D x 100"H)
Polypropylene support platens accommodate eight quartz tubes from 200mm up to 360mm diameter x 1.35m long. Includes automated nitrogen purge controls for particle-free, low-humidity storage

#1684-77

Quartzware Stocker (78.75"W x 55.1"D x 89.5"H) Dual-side access doors, with automated nitrogen purge controls for particle-free, low-humidity storage

CLEANROOM STORAGE SYSTEMS

Custom Storage Solutions!

Put Terra's design and fabrication experience to work in your storage application!

- **Ergonomic, space-saving designs optimize existing facility, increase productivity**
- **Automated controls over particles, humidity, ESD, temperature & pressure**
- **Over twenty-five years of experience in cleanrooms and other critical-environment applications**
- **Modifications to your requirements!**

#1684-79 Quartz Tube Rack
(60"W x 60"D x 77.75"H)
All-electropolished stainless steel frame with polypropylene shelf liners for chemical resistance

#1684-94 Injector Stocker
(62"W x 21.5"D x 63.2"H)
All-electropolished stainless steel construction for optimal particle control. Includes 12 slide-out injector fixtures.

Polypropylene Casework
Chemical-resistant materials and variety of drawer and sink configurations optimize laboratory processing. Models shown: Six-drawer cabinet above (Cat. # 2902-72); eight-drawer cabinet with dual cupboards and sink (Cat. # 2902-73).

#9600-25 Quartz Tube/ Thermocouple Cart
For 300mm quartz tubes up to 1500mm long. Overall dimensions: 48"W x 24"D x 72"H (excluding handle).

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Universal Screen Frame Storage System

- Each rigid, durable cabinet securely holds screen frames of varying sizes, allowing you to store all your screen frames practically and economically
- Stainless steel racks with adjustable supports keep frames from tipping, let you mix and match different frame sizes and thicknesses
- Compact, modular design allows library layout
- Sealed design and noncontaminating materials keep screen frames clean
- Select polypropylene or laminated cabinets to suit your requirements
- Access doors available in static-dissipative PVC for enhanced particle control
- Double-door design minimizes clearance requirements

Specifications						Polypropylene Storage Systems*		Laminated Storage Systems*	
TYPE	No. of Tiers	Shipping Weight (pounds)	Overall Dimensions (W x D x H inches)	Frame Size (inches) Max. Depth	Frame Size (inches) Height Range**	Acrylic Doors Cat.#	Static Dissipative PVC Doors Cat.#	Acrylic Doors Cat.#	Static Dissipative PVC Doors Cat.#
A	1	72	25 3/4 x 20 x 22 1/2	19	14 1/2-21	3606-00	3606-17	3600-00A	3600-05A
B	2	100	25 3/4 x 20 x 44 1/2	19	14 1/2-21	3606-01	3606-18	3600-03A	3600-06A
C	3	153	25 3/4 x 20 x 66 1/2	19	14 1/2-21	3606-02	3606-19	3600-04A	3600-07A
A	1	72	25 3/4 x 15 x 18	14	9-15 3/4	3606-03	3606-20	3603-00A	3603-03A
B	2	100	25 3/4 x 15 x 35 1/2	14	9-15 3/4	3606-04	3606-21	3603-01A	3603-04A
C	3	153	25 3/4 x 15 x 53	14	9-15 3/4	3606-05	3606-22	3603-02A	3603-05A
A	1	72	25 3/4 x 15 x 23	14	13 3/4-20 1/4	3606-06	3606-23	3604-00A	3604-03A
B	2	100	25 3/4 x 15 x 45 1/2	14	13 3/4-20 1/4	3606-07	3606-24	3604-01A	3604-04A
C	3	153	25 3/4 x 15 x 68	14	13 3/4-20 1/4	3606-08	3606-25	3604-02A	3604-05A
A	1	72	25 3/4 x 29 x 32	28	22 1/2-29	3606-09	3606-26	3605-00A	3605-04A
B	2	100	25 3/4 x 29 x 63 1/2	28	22 1/2-29	3606-10	3606-27	3605-03A	3605-05A
B	2	100	25 3/4 x 13 1/2 x 22 1/2	12 1/2	5 1/2-9	3606-11	3606-28	3601-00A	3601-05A
D	4	190	25 3/4 x 13 1/2 x 44 1/2	12 1/2	5 1/2-9	3606-12	3606-29	3601-04A	3601-06A
B	2	100	25 3/4 x 15 x 27	14	7-11	3606-14	3606-31	3602-00A	3602-02A
D	4	190	25 3/4 x 15 x 53 1/2	14	7-11	3606-15	3606-32	3602-01A	3602-03A

** Storage system comes with doors made of material specified; order wire supports separately*
*** Using 7 1/2"H wire supports (see illustration on page 165)*

CLEANROOM STORAGE SYSTEMS

Now there's a line of cabinets available to accommodate screens of every size commonly in use today.

A Storage System That Grows With You

The strength and rigidity of these cabinets provide support for heavy screen frames; shelves hold up to 200 pounds over an extended period of time without bowing. They also keep stored screen frames organized, clean—and easy to get at! The practical, modular design makes it easy to select a system for your application.

Cabinets are available with adjustable chrome-plated storage racks that accommodate many different sizes of screen frames. Each chamber includes stainless steel racks mounted along the top and bottom. Slots in these racks accept stainless steel wire supports, which hold screen frames securely in position. You create custom frame holders by positioning supports of the proper size to accommodate the width and height of your screen frame (see ordering table for information on the maximum and minimum frame sizes for each cabinet).

This design lets you use a single cabinet to store frames of different sizes and thicknesses–and eliminates the frustration and expense of more cabinets than you need. But their modular design makes it easy and economical to expand your screen frame library as your needs grow. You can begin with a single cabinet and then add more later; or, you can select a larger cabinet right from the start. Cabinets are available up to four tiers high, and they can be stacked, bench-mounted, or arranged in storage aisles.

Frame Supports adjustable on 1/4" centers

The unique double-door design minimizes floor space needed in front of the cabinet to access any frames inside. And the hardy, chrome-plated throw-over hinges allow the doors to open fully without exceeding the width of the cabinet, permitting cabinets to be positioned snugly next to each other. These hinges are also spring-loaded and, together with gaskets, ensure a tight seal and offer a clean environment for your screens.

Available in Laminated Fiberboard or Polypropylene

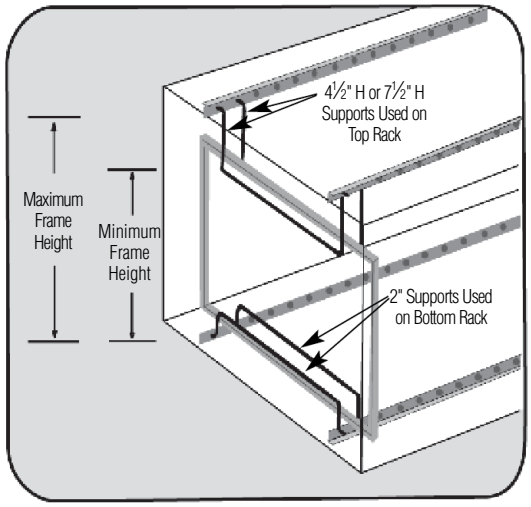
Laminated fiberboard cabinets are completely sealed to minimize particle shedding; standard color is white. For protection against caustic chemicals, select cleanroom-compatible polypropylene units, which feature smooth, noncontaminating surfaces.

Both designs include front access doors of either acrylic or static-dissipative PVC, which helps control particles by eliminating static charges that attract them. With static-dissipative PVC, you can be sure that cabinets will remain clean, inside and out.

Custom Designs Available

If you need a storage cabinet specifically designed for a particular screen size, simply call Terra for a quotation. The flexible design of these systems allows easy—and inexpensive—custom modifications.

Rugged stands are available that are specifically designed to support the Universal Screen Storage System (see ordering table). They raise the cabinets 4" off the ground for more convenient access and are tough enough to withstand the weight of fully-loaded cabinets. Optional casters let you move the storage system from storage area to screen printer.



Adjustable Stainless Steel Wire Frame Supports

These 3/16"-diameter stainless steel supports can be positioned in the slotted racks to form holding bins for many frame sizes. Small supports are advised for the bottom rack. For the top rack, select small supports with large screen frames and larger supports with smaller screen frames (see illustration). Supports are adjustable on 1/4" centers (racks are included with cabinets).

Height	Cat.#
2"	**3607-00**
4½"	**3607-01**
7½"	**3607-02**

Corresponding 3"H Stands	
Without Casters Includes leveling feet Cat.#	**With Casters** (Raises stands 3") Cat.#
3600-01	**3600-02**
3600-01	**3600-02**
3600-01	**3601-02**
3601-01	**3601-02**
3601-01	**3601-02**
3601-01	**3601-02**
3601-01	**3601-02**
3601-01	**3601-02**
3601-01	**3601-02**
3605-01	**3605-02**
3605-01	**3605-02**
3601-01	**3601-02**
3601-01	**3601-02**
3601-01	**3601-02**
3601-01	**3601-02**

Static-Dissipative PVC Eliminates Contamination Magnets

- **Surface resistivity between 10^6 and 10^8 ohms/square**
- **Resists a wide range of acids and corrosive chemicals**
- **Eliminates particle attraction and build-up**
- **Renders nonconductive plastics obsolete in many applications**
- **See page 596 for full specifications and ordering information**

CLEANROOM STORAGE SYSTEMS

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

A *Position glove boxes at a convenient height!*

B *Install next to hand washer*

C

D *Ideal for finger cots*

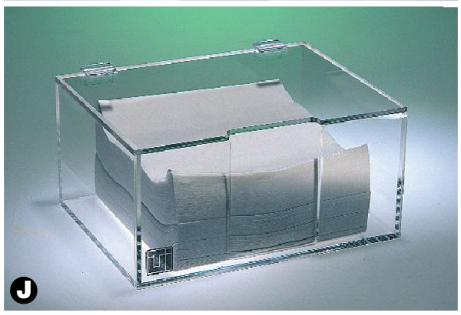
E *For gloves, hoods, face masks*

F

G *Organizes small parts*

H

I


J

K

L

Garb and Parts Dispensers—Space-Saving Convenience!

These handy dispensers save space and organize gloves, safety glasses, wipers, hats, and other garb. They're perfect benchtop storage bins for small parts used in cleanroom processing. Select clear acrylic or static-dissipative PVC, which eliminates static charges and the particles they attract.

Complete Product Listing begins on page 299.

Item (see photos)	Dimensions	Acrylic	Static-Dissipative PVC
	W x D x H, in.	Cat. #	Cat. #
A. Wall-Mount Glove Box Holder	12 x 4.75 x 15.5	**4950-85**	**4950-86**
B. Wall-Mount Glove Dispenser (single)	16.5 x 12.5 x 17	**4950-72**	**4950-74**
C. Wall-Mount Glove Dispenser (triple)	16 x 11.5 x 12	**4005-56**	**4005-57**
D. Multi-Chamber Dispenser	15.75 x 8 x 15	**4005-51**	**4005-50**
E. Benchtop Glove Dispenser	12 x 6 x 6	**4951-03**	**4951-04**
F. Safety Glasses Dispenser Capacity: 98	23.75 x 5.70 x 46	**4951-05**	—
Capacity: 8	6.75 x 5.70 x 17	**4950-45**	**4950-46**
G. Dispensing Bins	5 x 6.25 x 8.25	**4950-12**	**4950-13**
H. Apparel Dispenser	48.5 x 24.5 x 36	**4951-06**	**4951-07**
I. Wall-Mount Cabinet	15 x 6.375 x 11.5	**4950-04**	**4950-05**
J. Wiper Dispenser (enclosed)	12 x 9 x 6	**4951-01**	**4951-02**
K. Wiper Dispenser (open top)	10.5 x 14.5 x 4	**4950-93**	**4950-94**
L. File Holder (4 slots)	10.5 x 5 x 15	**4005-25**	**4005-23**

Explosion-Proof Refrigerators/Freezers

- **Provide total protection against explosion while storing flammable materials at below ambient temperatures**
- **Explosion-proof interior prevents explosions caused by vapors leaking from improperly sealed containers**
- **Explosion-proof exterior prevents explosions caused by fumes in interior or by vapors in hazardous external environment**
- **Meet UL, NFPA, and OSHA standards—suitable for Class 1, Group C and D hazardous environments**
- **Choose from a complete line of Refrigerators, Freezers, and Refrigerator/Freezers, with capacities from 5.6 to 20 cu. ft., temperatures from -26° to 0°C (-15° to 32°F)**

Safeguard your laboratory with our 100% explosion-proof refrigerators/freezers, designed to prevent explosions both inside and outside—even in a hazardous material location.

Our Lab-Line Explosion-Proof Refrigerators/Freezers meet OSHA, UL, and National Fire Protection Association safety standards. Every motor and thermostat is designed to prevent the arcing that could ignite a flammable vapor-air mixture. Each unit has wiring, splices, a thermostat, relay and compressor motor safely housed in an enclosure suitable for use in Class 1, Group C and D hazardous environments. And the surface temperature of the compressor will remain below the flashpoint of any flammable material likely to be found in such environments.

All models feature heavy-gauge, rigid, braced-steel construction with a durable enamel finish. Interiors have porcelain enamel, epoxy enamel, or ABS plastic construction. Each unit is insulated throughout for energy efficiency.

Choose from our complete line of refrigerators, freezers, and combination refrigerator/freezers suitable for storing or using chemicals such as cyclopropane, ethyl ether, ethylene, acetone, alcohol, benzene, butane, gasoline, hexane, lacquer solvent vapors, naphtha, natural gas or propane and many other potentially hazardous materials. Select from various models, including single-door and two-door upright refrigerators and freezers, horizontal chest freezers and undercounter refrigerators.

All units carry a 24-month warranty. All explosion-proof models must be hardwired directly to your power source by rigid metal conduit or mineral-insulated cable with fittings which meet Class 1, Group C and D requirements.

For specifications and ordering information on all Explosion-Proof Refrigerators/Freezers, see page 169.

Ordering information on page 169

Two-Door Explosion-Proof Refrigerator/Freezer
This combination refrigerator/freezer has two separate doors—one for the freezer section, one for the refrigerator section. It features a refrigerator volume of 11 cubic feet, a freezer volume of 3 cubic feet, and an additional 1 cubic foot of storage space in the three door shelves, for an overall capacity of 15 cubic feet. Total shelf space is 8.5 square feet. Refrigerator temperature range is from 0° to 10°C (32° to 50°F); freezer temperature from -20° to 0°C (-4° to 32°F). Includes four adjustable shelves and three door shelves. ABS plastic interior. Manual defrost.

Ordering information on page 169

Explosion-Proof Upright Freezer
This unit provides 20 cubic feet of storage space. It has 8.8 square feet of shelf space provided by six door shelves and four permanently positioned wire shelves; the wire shelves have shelf heights of 11½, 11, 9⅜, 14, and 9⅞inches, top to bottom. The freezer's temperature range is -23° to -5°C (-9° to 23°F). Enameled steel interior with white enameled exterior, locking door. Manual defrost.

Explosion-Proof Refrigerators/Freezers, continued

Undercounter Explosion-Proof Refrigerator, Freezer, and Combination Refrigerator/Freezer

These space-saving units are undercounter models ideal for storing small amounts of flammable material. ABS plastic interior. Manual defrost.

Ordering information on page 169

General Use Laboratory Refrigerators/Freezers

Choose from a complete line of refrigerators, freezers, and combination refrigerator/freezers designed for general laboratory use. Capacities range from 1.9 to 14.4 cubic feet. Refrigerator temperatures range from 0° to 10°C (32° to 50°F); freezer temperatures from -26° to 0°C (-15° to 32°F). All models available in either 120 volts/60 Hz or 240 volts/50 Hz except for the Compact Lab Refrigerator/Freezer, which is available only in the 120/60 version. All models come with a 24-month warranty.

For specifications and ordering information on all General Use Laboratory Refrigerators/Freezers, see page 169.

Ordering information on page 169

Undercounter Laboratory Freezer

This freezer features 5.6 cubic feet of storage space and a conveniently customizable door which can be interchangeably installed to open either to the left or to the right. The cabinet and door are enameled steel, and the ABS plastic liner has rounded corners for easy cleaning. Both cabinet and door contain foamed-in polyurethane insulation and a magnetic gasket to provide a secure seal and increased energy savings. Adjustable thermostatic control maintains a temperature range of -26° to -15°C (-15° to 5°F). With rust-proof shelf. Manual defrost.

Compact Benchtop Laboratory Refrigerator/Freezer (not shown)

This convenient, space-saving unit features an overall capacity of 1.9 cubic feet. Refrigerator temperature range: 0° to 7°C (32° to 45°F); freezer temperature range: -5° to 0°C (23° to 32°F).

Ordering information on page 169

Two-Door Laboratory Refrigerator/Freezer

This refrigerator/freezer has an independent door for both the refrigerator section and the freezer section. Overall capacity is 14 cubic feet with a refrigerator volume of 10 cubic feet and a freezer volume of 3.9 cubic feet. Total shelf space is 8.5 square feet. Refrigerator temperature ranges from 0° to 10°C (32° to 50°F); freezer temperature ranges from -20° to 0°C (-4° to 32°F). With three adjustable shelves, ABS plastic interior, white enameled steel exterior. Automatic defrost.

General Use Laboratory Refrigerators/Freezers, continued

Undercounter Laboratory Refrigerator/Freezer

You can use this versatile model as either an undercounter built-in or a free-standing unit. The temperature range in the refrigerator compartment is from 2° to 7°C (36° to 45°F) and may be set to the desired temperature by the adjustable thermostatic control. The temperature range in the freezer compartment is from -26° to 6°C (-15° to 21°F). The freezer compartment has room for eight standard ice trays or for a supply of biologicals or chemicals of comparable volume.

Standard features of this unit include a white, textured steel cabinet; a seamless ABS plastic liner; magnetic door latches for left or right opening; rust-proof shelving; steel door panels. Manual defrost.

See ordering information below

Specifications and Ordering Information: Explosion-Proof Refrigerators/Freezers

Model	Net Wt. lbs. (kgs.)	Ship. Wt. lbs. (kgs.)	Chamber Dimensions W" x D" x H" (cms) Refrigerator Section	Chamber Dimensions W" x D" x H" (cms) Freezer Section	Total Vol. (cu. ft.)	Exterior* Dimensions W" x D" x H" (cms)	Temp. Range Refrig. Section °C (°F)	Temp. Range Freezer Section °C (°F)	Electrical Characteristics Watts	Electrical Characteristics Volts/Hz	Cat. #
Two-door Refrigerator/Freezer	120 (55)	150 (68)	20 3/4 x 14 x 41 1/2 (53 x 36 x 105)	19 x 15 x 12 3/4 (48 x 38 x 32)	11	23 1/4 x 24 1/2 x 63 (59 x 62 x 160)	0° to 10° (32° to 50°)	-20° to 0° (-4° to 32°)	360	120/60 240/50	**1720-20 1720-21**
Undercounter Refrigerator	100 (46)	120 (55)	19 x 13 x 27 1/2 (48 x 33 x 70)	N/A	5.6	23 3/8 x 23 3/4 x 33 1/2 (59 x 60 x 85)	2° to 7° (36° to 45°)	N/A	160	120/60	**1720-24**
Undercounter Freezer	100 (46)	120 (55)	N/A	18 x 15 x 27 1/4 (46 x 38 x 76)	5.6	21 1/4 x 25 1/4 x 33 1/2 (54 x 64 x 85)	N/A	-26° to -15° (-15° to 5°)	200	120/60	**1720-25**
Undercounter Refrigerator/Freezer	100 (46)	120 (55)	18 x 15 1/4 x 21 (46 x 39 x 53)	15 1/4 x 11 x 5 1/4 (39 x 28 x 13)	5.6	21 1/2 x 25 1/2 x 33 1/2 (54 x 64 x 85)	2° to 7° (36° to 45°)	-26° to -6° (-15° to 21°)	160	120/60	**1720-26**
Upright Freezer	225 (102)	240 (109)	N/A	27 x 18 x 57 (69 x 46 x 145)	20	32 x 33 x 71 1/2 (81 x 84 x 182)	N/A	-23° to --5° (-9° to 23°)	516	120/60 240/50	**1720-27 1720-28**
Specifications and Ordering Information: Laboratory Refrigerators/Freezers											
Undercounter Lab Refrigerator/Freezer	100 (46)	120 (54.5)	18 x 15 1/4 x 21 (46 x 39 x 53)	15 1/4 x 11 x 5 1/4 (39 x 28 x 13)	5.6	21 1/4 x 25 1/4 x 33 1/2 (54 x 64 x 85)	2° to 7° (36° to 45°)	-26° to -6° (-15° to 21°)	160	120/60 240/50	**1720-47 1720-48**
Two-Door Lab Refrigerator/Freezer	170 (77)	190 (86)	25 x 15 1/2 x 36 1/2 (64 x 39 x 93)	24 x 16 x 15 1/4 (61 x 41 x 39)	14.4	28 x 28 x 61 1/2 (71 x 71 x 156)	0° to 10° (32° to 50°)	-20° to 0° (-4° to 32°)	420	120/60 240/50	**1720-49 1720-50**
Compact Lab Refrigerator/Freezer	46 (21)	52 (24)	16 1/4 x 11 x 15 1/4 (41 x 28 x 39)	6 1/4 x 8 1/4 x 6 (16 x 21 x 15)	1.9	18 1/2 x 19 x 19 (47 x 48 x 48)	0° to 7° (32° to 45°)	-5° to 0° (23° to 32°)	132	120/60	**1720-53**
Undercounter Lab Freezer	100 (46)	120 (54.5)	N/A	18 x 15 x 27 1/2 (46 x 38 x 70)	5.6	21 1/4 x 25 1/4 x 33 1/2 (54 x 64 x 85)	N/A	-26° to -15° (-15° to 5°)	200	120/60 240/50	**1720-54 1720-55**

Miniaturized LED monitors humidity and displays set point

Reduces nitrogen cost by 78%!

SmartDesiccator™ Benchtop Storage System

- **Automates dry benchtop storage to eliminate moisture-related degradation and optimize yields**
- **First-of-its-kind gas control system conserves nitrogen!**
- **Fully integrated turnkey system takes seconds to install**
- **Available in stainless steel, acrylic, or static-dissipative PVC**

Detailed data and ordering information starts on page 80.

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Reach-In Environette Chamber

- **Provides complete automatic control over temperature and humidity for a versatile, reliable storage and processing environment**
- **Ideal for a wide range of biological, microelectronics, chemical and food processing applications**
- **Helps you meet FDA requirements for "Stability Testing of New Drug Substances and Products"**
- **Available in 8 models and 4 sizes**
- **"Reach-in" design affords easy access to up to 72 cubic feet of storage space**
- **Select between two temperature ranges: +10°C above ambient to +60°C or 0°C to +60°C**
- **All models maintain temperature uniformity of ±0.5°C**
- **Arrives completely assembled**

These environmental chambers combine 40 years of manufacturing experience with several significant innovations and engineering advances, resulting in the most exacting control of temperature, humidity, and light available.

Versatile Designs Accommodate Broad Range of Applications

They are ideally suited to critical demands that require exacting control and adaptability. Typical applications include B.O.D. (biochemical oxygen demand) testing, genetic studies, shelf life testing, electronic breakdown testing, tissue culture studies, chromatography tests, growth chamber studies, and drug stability tests.

They are also recommended for a wide range of microelectronics and semiconductor applications. Low-temperature, low-humidity models help retard chemical processes (such as oxidation) and are thus ideal for extending shelf lives of sensitive stored materials. High-humidity and above-ambient temperature models are well suited to failure testing components under conditions that approximate real-world extremes.

Construction

Interior walls are 20-gauge smooth aluminum. The exterior is fabricated of 24 gauge galvanized steel finished with a grey polyurethane enamel. All sides feature 2" foamed-in-place polyurethane insulation to ensure stable internal temperature.

The door features self-closing hinges, latch and a 13" x 13" multi-pane viewing window. (Models 6'6" wide feature two 12" x 45" viewing windows). It is finished in black enamel.

Standard equipment includes six heavy-gauge, perforated aluminum shelves, adjustable on 1" centers.

Conditioning System Maintains Constant Temperature and Humidity Levels

The "Environ-Aire" conditioning and air circulation system located above the ceiling plenum eliminates floor ducts and facilitates maintenance.

Air from the chamber is drawn up through the plenum and directed over the heating and/or cooling components by means of a hermetically sealed fan. Intake ducts may be fitted with gauze or other filter material to filter incoming air. The heater(s) have a large radiation surface for fast heat transfer required to maintain close temperature control.

Chambers operating at ambient or below are equipped with air-cooled, quiet-operating hermetic compressors utilizing R-22 or R-502 CFC-free refrigerants. Condensing units are mounted on top of the chamber on shock mounts. The chambers use an exclusive Thermal Moduflo System™ (patent pending) which provides 0 to 100% fully proportional heating and cooling. The system is designed and field proven to operate continuously with minimal maintenance requirements and a long service life.

Microprocessor Controls

The main temperature controller is a microprocessor-based zero-switching controller featuring multi-range auto tuning PID control combined with feed forward circuitry for fast control response without overshooting. Controller is digital set with LED readout.

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

CLEANROOM STORAGE SYSTEMS

Options

		Cat. #
24-Hour Light or Temperature Timer		**5320-66**
Through-Wall Penetrations	**1/2"**	**5320-67**
	1"	**5320-68**
	2"	**5320-69**
	4"	**5320-70**
48" Vertical Fluorescent Fixture		**5320-71**
Vapor Proof Duplex Outlet		**5320-72**

Dehumidification: For Extended Shelf Lives

Dehumidification systems are available that achieve dry conditions through the use of a chemical dryer, refrigeration, or a dry gas (generally nitrogen) purge. These low-humidity chambers retard oxidation and ensure frost-free operation at low temperatures. Call Terra Universal with your requirements!

Humidification: Ideal for Failure Testing and Culture Growth Studies

Humidification can be achieved by either centrifugal atomizer or steam generator. Call for a quotation.

Operating Specification Chart: Reach-In Environette Chambers

Exterior [1] Dimension (W" x D" x H")	Interior Dimension (W" x D" x H")	Interior Capacity Cubic ft.	Temperature Range	Aluminum Interior Cat.#	Stainless Steel Interior Cat.#
2'4" x 2'6" x 7'6 3/4"	2'0" x 2'0" x 5'5"	21.6	+10°C Above Ambient to +60°C	**5320-18 through 5320-20**	**5320-42 through 5320-44**
			0°C to +60°C	**5320-21 through 5320-23**	**5320-45 through 5320-47**
4'4" x 2'6" x 7'0"	4'0" x 2'0" x 5'5"	43.3	+10°C Above Ambient to +60°C	**5320-24 through 5320-26**	**5320-48 through 5320-50**
			0°C to +60°C	**5320-27 through 5320-29**	**5320-51 through 5320-53**
3'4" x 2'6" x 7'0"	3'0" x 2'0" x 5'5"	32.5	+10°C Above Ambient to +60°C	**5320-30 through 5320-32**	**5320-54 through 5320-56**
			0°C to +60°C	**5320-33 through 5320-35**	**5320-57 through 5320-59**
6'6" x 2'6" x 7'0"	5'11" x 2'2" x 5'5"	69.4	+10°C Above Ambient to +60°C	**5320-36 through 5320-38**	**5320-60 through 5320-62**
			0°C to +60°C	**5320-39 through 5320-41**	**5320-63 through 5320-65**

1 Allow 18" above unit for routine maintenance.
2 Two Door Models

Ordering Information: Reach-In Environette Chambers

Comp.** H.P.	Electrical* Volts/Phase/Hz.	Power Required Watts	Shipping Weight lbs.	Aluminum Interior Cat.#	Stainless Steel Interior Cat.#
N/A	120/1/60	1100	380	**5320-18**	**5320-42**
N/A	220/1/60	1100	410	**5320-19**	**5320-43**
N/A	220/1/50	1100	410	**5320-20**	**5320-44**
1/4	120/1/60	1700	450	**5320-21**	**5320-45**
1/4	220/1/60	1700	480	**5320-22**	**5320-46**
1/3	220/1/50	2150	480	**5320-23**	**5320-47**
N/A	120/1/60	1100	460	**5320-24**	**5320-48**
N/A	220/1/60	1100	490	**5320-25**	**5320-49**
N/A	220/1/50	1100	490	**5320-26**	**5320-50**
1/2	120/1/60	2060	530	**5320-27**	**5320-51**
1/2	220/1/60	2060	560	**5320-28**	**5320-52**
1/2	220/1/50	2060	560	**5320-29**	**5320-53**
N/A	120/1/60	1100	415	**5320-30**	**5320-54**
N/A	220/1/60	1100	445	**5320-31**	**5320-55**
N/A	220/1/50	1100	445	**5320-32**	**5320-56**
1/3	120/1/60	1850	525	**5320-33**	**5320-57**
1/3	220/1/60	1850	555	**5320-34**	**5320-58**
1/2	220/1/50	2060	555	**5320-35**	**5320-59**
N/A	120/1/60	1800	650	**5320-36**	**5320-60**
N/A	220/1/60	1800	680	**5320-37**	**5320-61**
N/A	220/1/50	1800	680	**5320-38**	**5320-62**
1/2	120/1/60	2900	680	**5320-39**	**5320-63**
1/2	220/1/60	2900	710	**5320-40**	**5320-64**
3/4	220/1/50	3920	710	**5320-41**	**5320-65**

**** Other electrical requirements available upon request***
***** Compressor included only with refrigerated models***

Call for Custom Modifications!

Any of the chambers on these pages can be customized to accommodate special size requirements. Refrigeration units are also available for storage at sub-freezing temperatures, in either an air or inert gas environment.

Simply give us your specification and we'll provide a quotation on a system tailored to your application!

Walk-In Environette Chambers Also Available!

These walk-in chambers provide additional capacity—up to 218 cubic feet!

Call for more information on a system configured to your requirements.

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Environmental Test Chambers
(Incubators)

- **Repeatable environmental conditions for component burn-in, shelf life monitoring, package testing, light exposure and temperature evaluation studies**
- **Microprocessor PID controllers provide precise temperature and humidification**
- **Two chamber sizes available (10 cubic foot and 30 cubic foot)**

These chambers provide the ideal environment for a wide range of testing and evaluation studies in many industries.

Their stainless steel interiors are durable and easy to clean. Large chambers feature a key-lockable full-view glass door; small chambers include a key-lockable interior glass door. All chamber are designed for horizontal air flow and feature one 2" access port and two fresh air vents.

10 Cubic-Foot Model

30 Cubic-Foot Model

Select among three configurations:

Refrigerated Incubators provide precise temperature control.
Diurnal Incubators add a light package.
Stability Chambers incorporate a relative humidity system with a solid state humidity sensor and controller that allows humidification and de-humidification for operation from 20 to 98%RH (limited by 4°C minimum dewpoint).

All incorporate microprocessor PID controls to ensure the absolute repeatability required in critical applications, a stainless steel sheath RTD temperature probe, and LED temperature display. Audible and visual temperature alarms alert the operator if the temperature deviates from the active setpoint or exceeds a high limit threshold. Non-volatile memory allows the chamber to return to the original setpoint in the event of power failure. Both temperature and humidity controllers include two separate displays: one for process and one for setpoint.

The chambers utilize environmentally friendly HFC refrigerant and CFC-free insulation, and are designed to meet NEC, UL and CSA standards for safety and performance. All U.S. models are covered by a 12-month parts and labor warranty.

Environmental Test Chambers

Type	10 Cubic-Foot Capacity		30 Cubic-Foot Capacity	
	115VAC, 60Hz Cat. #	230VAC, 50Hz Cat. #	115VAC, 60Hz Cat. #	230VAC, 50Hz Cat. #
Refrigerated Incubator	**5757-03**	**5757-03-220**	**5757-00**	**5757-00-220**
Diurnal Incubator	**5757-04**	**5757-04-220**	**5757-01**	**5757-01-220**
Stability Chamber	**5757-05**	**5757-05-220**	**5757-02**	**5757-02-220**

Two-Pen Chart Recorders
Provides cost-effective, dependable pen-drawn analog traces. Dual pens allow separate humidity and temperature recordings. Microprocessor controls ensure high precision.

	Cat. #
10"-Diameter, 7-Day, 0 - 60°C Chart Recorder (side or wall mounted)	**5757-12**
100mm-wide Strip Chart Recorder (front panel mounted)	**5757-13**

Light Package (for Stability Chambers)
Includes cycle timer for day/night temperature settings (included standard on Diurnal Incubators).

	Cat. #
10 cu. ft Chamber	**5757-16**
30 cu. ft. Chamber	**5757-17**

Extra Shelf

For 10 cu. ft. Chamber	**5757-18**
For 30 cu. ft. Chamber	**5757-19**

Chromasoft Datalogging Software and Dry Air Purge options also available; call Terra.

Specifications

	10 Cubic Feet	30 Cubic Feet
Work Space		
Exterior Dimension	44"W x 35"D x 37.5"H (111.8cm x 88.9cm x 95.3cm)	36"W x 39"D x 90"H (91.4cm x 99.0cm x 228.6cm)
Interior Dimensions	23"W x 25.8"D x 29.8"H (58.4cm x 65.5cm x 75.7cm)	30"W x 27.5"D x 63.5"H (76.2cm x 69.9cm x 161.3cm)
Temperature Range		
Without Lights	5°C to 60°C	5°C to 60°C
With Lights*	10°C to 60°C	10°C to 60°C
Light Package*	Four 20-watt fluorescent lights (two/shelf on two shelves)	Eight 20-watt fluorescent lights (two/shelf on four shelves)
Heater	580 Watts @ 115VAC	1160 Watts @ 155VAC
Compressor	⅛ HP, 1400 BTU/Hr. (both @ 7°C Evaporator)	¼ HP, 2940 BTU/Hr.
Temperature Control	±0.1°C	±0.1°C
Temperature Uniformity	±0.3°C	±0.3°C
Relative Humidity**	20 to 98% RH**	20 to 98% RH**
Humidity Control**	±2%	±2%
Shelves		
No. of Shelves	4 stainless steel, wire rod	5 stainless steel, wire rod
Shelf Spacing	1.5" on center (15 positions)	1.5" on center (37 positions)
Shelf Size	22.8"W x 25.4"D (57.9 x 64.5cm)	29.25"W x 26.5"D (74.3 x 67.3cm)
Shelf Area	4 sq. ft. each; 16 sq. ft. total	5.4 sq. ft. each; 26.9 sq. ft. total
Materials/Finishes		
Interior	Cabinet - all stainless steel Interior Door - tempered glass	Cabinet - all stainless steel
Exterior	Cabinet - powder-coated metal Door - aluminum, powder-coated	Cabinet - powder-coated metal Door - triple-pane glass
Feet	Adjustable leveling glides	Adjustable leveling glides

* Light package standard on Diurnal Incubators only; includes cycle timer for day/night temperature settings.
** Stability Chamber only. RH levels limited by 4°C minimum dewpoint.
Specifications established at 20°C with 5% RH ambient conditions, 115VAC, 60Hz, without lights.

CLEANROOM STORAGE SYSTEMS

Cleanroom Storage Cabinets

- **Certified Class 10 and 100 cabinets provide clean, secure storage space**
- **Select between stainless steel and epoxy-finished steel to meet your cleanliness requirements**
- **All cabinets are available in either a 5-drawer or 7-drawer configuration**
- **Stainless steel ball bearing slides provide clean, feather-light drawer motion, even when fully loaded**
- **Five-inch nonmarking polyurethane casters are specially selected for clean operation**
- **Cabinets can be customized to meet your specific dimensional requirements**

No. 9120-68

No. 9120-62

Slides feature self-cleaning bridged retainers to prevent dust particle build-up, keeping drawers operating smoothly for years

These heavy-duty cabinets provide the perfect storage solution for a host of cleanroom and laboratory tools and small parts.

Configurations for Every Application!

Several models are available to suit varying requirements for capacity and cleanliness. Class 10 and Class 100 Cleanroom certified models are fabricated of 304 brushed-finished stainless steel. Painted cabinets feature a durable off-white powder-coated polyester finish.

Five-drawer and seven-drawer models are available, with capacities of either 125 or 150 pounds (see ordering chart below).

Customized units are available to meet your specific dimensional requirements - just give us your specification.

All of these units come with 5" x 1½" non-marking polyurethane casters and feature ball bearing slides except for the autoclave units #9120-67 and #9120-68, which feature stainless steel ball bearing draw slides. All include a tubular key high-security lock and key set. (Nos. 9120-64 and 9120-65 feature a push-button combination lock.)

Cleanroom Storage Cabinets

Type	Drawer Capacity (lbs)	Overall Dimensions* W" x D" x H"	Drawers Qty.	Drawers Dimensions W" x D" x H"	Drawers Qty.	Drawers Dimensions W" x D" x H"	Drawers Qty.	Drawers Dimensions W" x D" x H"	Cat. #
5-drawer SS Class 10	125	29 x 20 x 35	1	25 x 18.5 x 2	3	25 x 18.5 x 4	1	25 x 18.5 x 10	**9120-64**
7-drawer SS Class 10	125	29 x 20 x 35	3	25 x 18.5 x 2	3	25 x 18.5 x 4	1	25 x 18.5 x 6	**9120-65**
5-drawer SS Class 100	125	29 x 20 x 35	1	25 x 18.5 x 2	3	25 x 18.5 x 4	1	25 x 18.5 x 10	**9120-60**
7-drawer SS Class 100	125	29 x 20 x 35	3	25 x 18.5 x 2	3	25 x 18.5 x 4	1	25 x 18.5 x 6	**9120-61**
5-drawer SS Class 100**	150	29 x 20 x 35	1	24.375 x 18.5 x 2	3	24.375 x 18.5 x 4	1	24.375 x 18.5 x 10	**9120-67**
7-drawer SS Class 100**	150	29 x 20 x 35	3	24.375 x 18.5 x 2	3	24.375 x 18.5 x 4	1	24.375 x 18.5 x 6	**9120-68**
5-drawer Painted Steel	125	29 x 20 x 35	1	25 x 18.5 x 2	3	25 x 18.5 x 4	1	25 x 18.5 x 10	**9120-62**
7-drawer Painted Steel	125	34 x 20 x 40	3	30x 18.5 x 2	3	30x 18.5 x 4	1	30 x 18.5 x 10	**9120-63**

Height dimension includes casters. ** These units are autoclavable

Cleanroom Top Chest and Portable Carry Box

- **The perfect cleanroom benchtop tool kits!**
- **Fabricated of brushed 304 stainless steel for easy cleaning and contamination prevention**
- **Top chest's ball bearing draw slides provide effortless, feather-light movement, even when fully loaded**
- **Both units feature keyed high security lock for safe, secure tool storage**

These heavy-duty cabinets provide the perfect storage solution for a host of cleanroom and laboratory tools and small parts.

No. 9120-69 Storage Chest

No. 9120-66 Carry Box

Tool Chests

Description	Dimensions (Inches)	Fits on top of Models	Cat. #
SS Cabinet Top Chest	26.625 x 14.5 x 11.75	9120-60, 9120-64, 9120-61, 9120-65	**9120-69**
SS Portable Hand Carry Box	20.125 x 8.625 x 9.75	—	**9120-66**

Stainless Steel Mobile Drawer Cabinet

- **Ideal as a sanitary storage unit and a mobile workstation**
- **Durable stainless steel construction is contaminant-free and easy to wipe down**
- **Countertop edge prevents spills**

Terra Universal's Mobile Drawer Cabinet meets two critical cleanroom and laboratory needs: it functions as a clean, sanitary storage unit and as a mobile workstation.

These satin-finished stainless steel cabinets are sturdy and durable and will last for years. They are easy to clean and maintain, while offering a contaminant-free surface. The top is furnished with a 1½" x 1" die-embossed no-drip countertop edge.

The three large capacity drawers have ball bearing NSF-approved slides for easy mobility, and drawer inserts are removable for cleaning. This unit comes standard with four 5" swivel rubber casters (two with brakes) for easy movement and stability.

No. 5656-33

Stainless Steel Mobile Drawer Cabinets

Dimension (Inches) W x L x H	Drawer Size (Inches) W x L x H	Cat. #
24 x 27 x 35.5	19 x 27 x 5	**5656-32**
30 x 27 x 35.5	24 x 27 x 5	**5656-33**

Enclosed Base Work Table With Sliding or Hinge Doors

- **Durable stainless steel cabinets are easy to wipe down**
- **Available in sliding or hinged door configurations**
- **Sound-deadened top is polished to a satin finish**

Terra Universal's Closed Base Worktables with sliding or hinged doors are fabricated of stainless steel for durability and easy cleaning. All exposed welds are finished to match the adjacent satin finishes.

Hinged doors feature a highlighted, die-formed edge. Door interiors have double panels for extra rigidity.

Both configurations can be ordered with a flat top or a 5" splash top (see ordering charts). All units come with a 1⅝ rolled rim on the front for the worker's comfort, and the sides and the rear edge are flat and turned down on a 90° angle for alignment with walls or other equipment. The 5" splash model further enhances the protection of adjacent surface or equipment from accidental spills and splashes.

Either unit comes standard with 1" adjustable metal bullet feet for stationary placement, or can be supplied with optional casters for mobility.

Flat Top with Sliding Doors (No. 5656-10)

5" Splash with Sliding Doors (No. 5656-13)

Flat Top with Hinged Doors (No. 5656-16)

5" Splash with Hinged Doors (No. 5656-19)

Stainless Steel Enclosed Work Tables—Sliding Door Style

Table Top Design	Dimensions (Inches) W x L x H	Shipping Weight (lbs.)	Cat. #
Flat Top	30 x 48 x 35.5	240	**5656-10**
Flat Top	30 x 60 x 35.5	290	**5656-11**
Flat Top	30 x 72 x 35.5	370	**5656-12**
5" Splash	30 x 48 x 35.5	240	**5656-13**
5" Splash	30 x 60 x 35.5	290	**5656-14**
5" Splash	30 x 72 x 35.5	370	**5656-15**

Stainless Steel Enclosed Work Tables—Hinged Door Style

Table Top Design	Dimensions (Inches) W x L x H	Shipping Weight (lbs.)	Cat. #
Flat Top	30 x 48 x 35.5	220	**5656-16**
Flat Top	30 x 60 x 35.5	270	**5656-17**
Flat Top	30 x 72 x 35.5	330	**5656-18**
5" Splash	30 x 48 x 35.5	220	**5656-19**
5" Splash	30 x 60 x 35.5	270	**5656-20**
5" Splash	30 x 72 x 35.5	330	**5656-21**

CLEANROOM STORAGE SYSTEMS

Casters	
Description	Cat. #
Swivel Casters (set of 4)	**5656-22**
Brakes on all casters	**5656-23**
Extra HD Urethane Wheels	**5656-24**
Flanged Stainless Steel Foot	**5656-25**

No. 5656-22
No. 5656-24

No. 5656-23

No. 5656-25

Wall Cabinets with Sliding or Hinged Doors

- **Fabricated of stainless steel for durability and cleanliness**
- **Welded seams are finished to match adjacent satin surface**
- **Available in sliding or hinge door configuration**

These Wall Cabinets are fabricated of stainless steel. They are available with either a sliding or hinged door, and all of the welded seams are finished to match the adjacent satin surfaces. The hinge door model features a highlight die-formed edge, and interiors are doubled paneled for rigidity.

These cabinets also include a welded mid shelf and a sloping top that enhances its sanitary design. Cabinets are wall mounted, increasing valuable cleanroom floor space (mounting hardware not included).

No. 5656-26

Stainless Steel Enclosed Work Tables—Hinged Door Style			
Style Design	**Dimensions** (Inches) W x L x H	**Shipping Weight** (lbs.)	Cat. #
Sliding Door	15 x 36 x 32.5	85	**5656-26**
Sliding Door	15 x 48 x 32.5	105	**5656-27**
Sliding Door	15 x 60 x 32.5	125	**5656-28**
HInged Door	15 x 36 x 32.5	85	**5656-29**
HInged Door	15 x 48 x 32.5	105	**5656-30**
HInged Door	15 x 60 x 32.5	125	**5656-31**

Mobile Storage Cabinet

- **Secure, mobile storage for tools, components and supplies**
- **Drawers feature greaseless ball bearing Delrin slides for clean operation**
- **Each drawer supports up to 40 lbs. when fully extended**
- **Includes non-marking, 5"-diameter casters, two with brakes**

This convenient 304 stainless steel storage cabinet is ideal for tools and other small parts that are moved frequently around a cleanroom.

It includes one 2", three 4", and one 10" drawers, each of which is designed for optimal cleanliness. They feature greaseless ball-bearing Delrin slides and support 40 lbs. each. Each cabinet includes stainless steel drawer pulls, handle and hardware, and a tubular key security lock and key set. Overall dimensions: 29"W x 20"D x 35"H. Approx. shipping weight: 141 lbs.

Cat. #
2650-12

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

PureFlow™ Laminar Flow Transport Cart

- **Maintains a Class 1 particle-free storage environment to protect sensitive work-in-process during transit**
- **A low-cost, versatile alternative to vacuum sealing, conveyor transport, and other transfer methods**
- **Onboard rechargeable power cell ensures uninterrupted filter/fan unit operation for up to 90 minutes**
- **Ergonomic designs are easy to maneuver through standard doorways, hallways**
- **Heavy-duty, cushioned casters ensure smooth, safe rolling over industrial floors**
- **PowerAlert! feature provides visible and audible reminder to reconnect AC power cord for recharging**
- **Materials and configurations for every requirement**

The PureFlow™ Laminar Flow Transport Cart provides a safe, economical, contamination-free way to transfer materials throughout a manufacturing facility.

A Mini-Cleanroom on Wheels!

The system's motorized impeller blower and filter ensure cleanroom conditions inside the storage area. Select HEPA filters (rated 99.99% efficient @ 0.3µm particles) or ULPA filters (rated 99.999% efficient @ 0.12µm particles).

Once connected to a power source, the system provides a continuous vertical laminar flow of filtered air through the clean storage area to ensure product integrity. Stainless steel wire shelves ensure an uninterrupted laminar flow through the cabinet. Any particles that enter the system when a door is opened are quickly purged through the bottom shelf.

Standard systems are available in several sizes and shelf configurations, in either stainless or electropolished stainless steel. In addition, Terra offers a variety of applications-specific models made of acrylic, polypropylene, and other polymers to meet special requirements (see facing page). Heavy-duty, nonshedding 6" casters provide smooth rolling over rough surfaces to safeguard delicate parts. Polyurethane bumpers protect the entire perimeter of the cabinet.

Several standard door configurations

Shown with optional Self-Recharging Power Cell

Onboard Power Cell: Clean, Cordless Operation!

When you select the optional self-recharging power cell, you maintain cleanroom conditions inside the PureFlow™ for up to 90 minutes without AC power.

This uninterrupted FFU operation keeps stored parts clean as you transport them across a facility. Flashing lights and an audible alarm remind you that the system is operating under battery power. Two power cell options are available; refer to order chart for more information.

Specifications (see ordering chart for additional specifications)

Construction:	All-welded 2"-square stainless steel frame tubing; 304 stainless steel panels (electropolishing available); static-dissipative PVC viewing windows. Locking LiftLatches™ are chrome plated.
Blowers:	740 CFM or 1200 CFM continuous-duty impeller blower (see ordering chart for application information). Includes retractable power cord.
Filter:	High-Efficiency Particulate Air (HEPA) filters, rated 99.99% efficient @ 0.3µm particles; Ultra-Low Penetration Air (ULPA) filters, rated 99.999% efficient @ 0.12µm particles (see page 422 for specifications). Order desired filters separately.

CLEANROOM STORAGE SYSTEMS

PureFlow™ Laminar Flow Storage Cart (order filter and power cell separately)

Dimensions (W" x D" x H")	Shelves Qty.	Shelves Size (W" x D")	Door Opening (W" x H")	No. of Doors	Blower Rating* (CFM)	Stainless Steel 115VAC/60Hz Cat. #	Stainless Steel 230VAC/50Hz Cat. #	Electropolished Stainless Steel 115VAC/60Hz Cat. #	Electropolished Stainless Steel 230VAC/50Hz Cat. #	Filter** HEPA Cat. #	Filter** ULPA Cat. #
66 x 52 x 23.5	5	40.5 x 18	18.5 x 5.8	10	1200	**1529-02**	**1529-02-220**	**1529-92**	**1529-92-220**	**1529-35**	**1529-33**
					740	**1529-03**	**1529-03-220**	**1529-93**	**1529-93-220**	**1529-35**	**1529-33**
73 x 51.5 x 23.5	6	48 x 18	22.25 x 12.25	6	1200	**1529-04**	**1529-04-220**	**1529-94**	**1529-94-220**	**1530-61**	**1530-62**
					740	**1529-05**	**1529-05-220**	**1529-95**	**1529-95-220**	**1530-61**	**1530-62**
73 x 52.5 x 29.5	6	48 x 24	20.75 x 13	6	1200	**1529-06**	**1529-06-220**	**1529-96**	**1529-96-220**	**1529-35**	**1529-33**
					740	**1529-07**	**1529-07-220**	**1529-97**	**1529-97-220**	**1529-35**	**1529-33**

***Rated at 0" static pressure. 1200 CFM models provide 90+ fpm air velocity under filter load and require DC Power Cell for cordless operation (up to 90 minutes between charges). 740 CFM models provide 60 fpm air velocity under filter load and operate with either DC Power Cell or UPS.**
****Order separately (see ratings on previous page).***

Self-Recharging Power Packs

These units deliver power to the PureFlow filter/fan unit when AC power is disconnected, protecting sensitive materials against contaminants as they are transferred between processes.

They are activated the second the AC cord is unplugged. Flashing status lights and a warning alarm indicate that PureFlow is under Power Pack operation and serve as a reminder to re-connect AC power for recharging. Select the appropriate pack for your application. Includes installation below PureFlow™ storage area.

Typical maximum operational time when used with the recommended blower.

90 minute operation of 1200 CFM blower

60 minute operation of 740 CFM blower

PureFlow™ Power Packs

Type	Recommended Blower	Operation Rating*	115VAC, 60Hz	230VAC, 50Hz
Self-recharging DC Cell	1200 CFM	90 min.	**1529-16**	**1529-16-220**
Extended Operation UPS	740 CFM	60 min.	**1529-76**	**1529-76-220**

Additional PureFlows™

A. Acrylic PureFlow™

This compact, easy-to-maneuver PureFlow™ is made of rigid acrylic with stainless steel-reinforced doors. A continuous-duty 740 CFM impeller draws clean air downward through a stainless steel perforated shelf into a HEPA filter, which removes 99.99% of particles 0.3µm and larger. The onboard UPS (included) ensures continuous filtration when disconnected from AC power. Dimensions: 43.5"W x 30.5"D x 54"H (including hardware and 4" casters).

	Cat. #
115VAC, 60Hz	**3505-01**
230VAC, 50Hz	**3505-01-220**
HEPA Filter (order separately)	**1681-02**

B. Chemical-Resistant PureFlow™

Made of stress-relieved polypropylene, this PureFlow is ideal for use with acids and other aggressive chemicals. Includes 740-CFM impeller and transparent static-dissipative windows. Order power pack separately above. Dimensions: 25.75"W x 20"D x 55"H.

	Cat. #
115VAC, 60Hz	**1001-37**
230VAC, 50Hz	**1001-37-220**
HEPA Filter	**1681-02**
Epoxy-finished Castered Stand (24"H)	**1001-37**

C. Recirculating PureFlow™

Air inside this model is continuously recirculated through a HEPA filter to produce an ultra-clean environment. An activated charcoal filter removes chemical vapors. Perforated shelves and chamber dividers ensure free gas circulation. Includes 740 CFM blower and UPS. Dimensions: 35.75"W x 32.5"D x 68.5"H.

	Cat. #
115VAC, 60Hz	**1530-34**
230VAC, 50Hz	**1530-34-220**
HEPA Filter	**1681-02**

D. WIP Cabinet

This economical stainless steel cabinet is ideal for transporting work-in-process. Can be equipped with a Power Pack for cordless filter/fan unit operation. See page 157 for ordering information.

DesiCart™

Low Humidity Transport Carts

- **Low-humidity, contamination-free environment protects sensitive materials during process transfer**
- **Optional Quick-Connect fitting and Automatic RB® Valve facilitate dry gas purging**
- **Cushioned casters ensure smooth rolling over uneven surfaces**
- **Select acrylic or static-dissipative PVC enclosure**
- **Dozens of standard configurations for wafer boxes, flat panel displays, chemicals, pharmaceuticals, and other sensitive materials**

These mobile storage carts transport components from one location to another while maintaining critical low-humidity and low-particle conditions.

A Controlled Environment Wherever It Goes!
The DesiCart™ is available in two versions (see facing page for additional application-specific configurations. Each houses a hermetically sealed desiccator storage chamber, which maintains clean, dry storage conditions during parts transport. Desiccators feature opposing access doors for pass-through convenience, and every door is equipped with a locking latch and key (see ordering chart for door configurations).

Quick connect/disconnect fittings (optional) enable you to purge the system with nitrogen while it is stationary. Reinforced door construction and gasketing provide air-tight seals that maintain a clean, dry storage environment while the DesiCart is in motion.

Stainless Steel Frame (shown with optional shelves)

Polyethylene Frame

High-density polyethylene DesiCarts provide excellent chemical resistance and include an integral one-piece handle. Wrap-up rails make for safe transport of materials carried on top of the cart, and corners are rounded for easy cleaning. Each of these carts features four chambers and includes chrome-plated racks.

Stainless steel DesiCarts feature a solid stainless steel top and a two-chamber desiccator. Chrome-plated wire racks mounted inside the desiccator allow easy adjustment of optional stainless steel shelving.

All models feature 5"-diameter polyurethane swivel casters for smooth quiet operation and Class 100 cleanroom-compatibility. Other stem casters are available; see page 145 for ordering information.

Static-Dissipative PVC: ESD and Particle Control
The DesiCart is available in either acrylic or Terra Universal's transparent Static-Dissipative PVC, which features surface resistance of between 10^6 and 10^8 ohms/square. This durable material safely dissipates static charges that can damage sensitive parts and also eliminates static attraction of contaminants. It also resists a wide range of chemicals (see page 596 for a full description of this material).

	Cat. #
Quick Connect/Disconnect Fitting (installed; requires RB Valve)	**1601-06**
Automatic RB™ (Relief/Bleed) Valve (Required for safe gas purging)	**1600-60B**

Note: Models below feature chrome-plated racks and opposing doors for pass-through access.

Polyethylene Frame: Dimensions			Ordering Information		Corresponding Shelves*	
Overall H x W x L (inches)	Shelving W x D (inches)	Doors (8) H x W (inches)	with Acrylic Desiccator Cat. #	with Static-Dissipative PVC Desiccator Cat. # ⊗	Acrylic Cat. #	Stainless Steel
						Shield Cat. # **4002-53**
						Tray Cat. # **4002-54**
33 1/4 x 27 x 39 1/2	15 x 22	9 x 15	**4002-50**	**4002-51**	**4002-52**	Shelf Cat. # **4002-55**

Stainless Steel Frame: Dimensions			Ordering Information		Corresponding Shelves*	
Overall H x W x L (inches)	Shelving W x D (inches)	Doors (8) H x W (inches)	with Acrylic Desiccator Cat. #	with Static-Dissipative PVC Desiccator Cat. # ⊗	Acrylic Cat. #	Stainless Steel
						Shield Cat. # **4001-96**
						Tray Cat. # **4001-97**
38 x 24 x 36	13 3/4 x 20	20 1/2 x 15 3/4	**4001-90**	**4001-91**	**4001-92**	Shelf Cat. # **4001-95**

CLEANROOM STORAGE SYSTEMS

Shown with optional hygrometer and acrylic shelves.

Cushioned ride for optimal product protection

DesiCart™ Mobile Work Station

Ideal for kitting small parts!

- **Controlled low-humidity, low-particle system protects sensitive parts during transit**
- **Stainless steel work surface and external shelf racks provide a convenient kitting area (order desired shelves separately)**
- **Optional hygrometer allows continuous monitoring of humidity level (0 - 100%RH)**

This versatile DesiCart™ provides dual storage chambers, each 16.5"W x 24"D x 37.75"H (clearance: 16"W x 24"D x 36.25"H). Chrome-plated racks allow placement of adjustable acrylic shelves. In addition, a 10"W x 24"D x 37.75"H kitting area, located between the storage chambers, allows convenient placement of kitting trays on adjustable acrylic shelves. Five-inch casters allow smooth rolling over a variety of floor surfaces.

Overall dimensions (including hardware): 48"W x 25.5"D x 49.25"H.

	Cat. #
Acrylic	**1001-35**
Static-Dissipative PVC	**1001-36**
Acrylic Shelf (for storage chamber)	**1001-38**
Acrylic Shelf (for kitting area)	**1001-39**
Hygrometer (see page 585)	**1600-22**

Order Quick Connect Fitting and Automatic RB® Valve on page 178.

Wafer Box DesiCart™

- **Perforated electropolished stainless steel shelves hold wafer boxes securely in position during transit**
- **Spring-loaded casters provide a cushioned ride, eliminate wafer chatter**
- **Each cart holds up to twelve 200-mm wafer boxes***

This DesiCart™ ensures clean, dry, secure transport of delicate wafers. Its 6"-diameter spring-loaded casters provide a cushioned ride, and ultra-clean materials of construction, including electropolished stainless steel shelves, ensure surfaces that won't slough or outgas.

Perforated shelves ensure uniform gas distribution. Their angled design keeps boxes securely in position during transit. Stainless steel door frames ensure tight seals and a long service life. Overall dimensions: 50.88"W x 26.25"D x 38"H (including hardware). Select Quick Connect Fitting and Automatic RB® Valve for nitrogen purging (see previous page). Shelf clearance: 11.25"H.

Perforations facilitate uniform gas distribution

	Enclosure Material	Cat. #
Wafer Box DesiCart™	Acrylic	**4002-48**
	Static-Dissipative PVC	**4002-49**

* Based on Empak model TR-08A. Custom sizing is available for other carrier sizes.

Custom Configurations

Specify any custom modifications you require for your transport requirements!

A. Large-Capacity DesiCart™

Ideal for large assemblies. Double doors afford unrestricted access to the complete storage area. Dimensions: 60"W x 36"D x 54"H.

Cat. # **1001-41**

B. Electropolished Stainless Steel Domed Cart

This ultraclean cart features sliding acrylic access door and a "dead man" braking system that prevents rolling when unattended. The curved top assists in cleaning and also prevents personnel from setting objects on top.

Cat. # **1001-42**

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

More Mobile Storage Solutions!

Transfer sensitive materials under the optimal storage conditions—

Horizontal Storage Cabinet
CNC-routed HDPE slides position reticles securely during transit.

Vertical Storage Cabinet
Electropolished stainless steel trays and fixtures optimize storage density.

Photomask and Reticle Storage Cabinets

Systems available for vertical or horizontal reticle storage. Specialized fixtures for secure positioning and easy retrieval. Integral HEPA filter/fan unit maintains particle-free conditions. Spring-loaded casters ensure cushioned ride over uneven floors.

See page 150.

Probe Equipment Cart
Polyurethane rollers and retainers for abrasion-free placement of delicate probes.

Injector Cart
Electropolished stainless steel cabinet features recessed inserts for secure positioning.

Wafer Fab Carts

Specialized carts for fab tools, probes, quartz tubes, injectors, thermocouple rods, and more. Materials include acid-resistant polypropylene and ultraclean electropolished stainless steel. Wide range of drawers, slides and fixtures customized to your specs!

See page 538.

CLEANROOM STORAGE SYSTEMS

Acid Transport Carts

Polypropylene construction resists most acids and corrosives. Removable inserts for easy cleaning. Containment reservoirs capture spills. Foot-operated safety brakes prevent accidents.

See page 542.

All-Polypro Acid Cart
Holds up to 18 one-gallon or four-liter bottles.

Steel-Reinforced Acid Cart
Holds up to 24 bottles; includes storage bin for safety glasses, gloves and small tools.

Chemical Safety Carts

Material selection ensures chemical compatibility. Specially designed fixtures for any chemical container. Fire prevention features meet OSHA and other codes.

See page 540.

"Dead Man" Safety Cart
Dead Man braking system ensures unattended cart can't roll.

Flammable Materials Cart
Spark arrestor and onboard fire extinguisher contains potential hazards

Mobile Drawer Units

- **Polymer construction features all smooth surfaces and rounded corners for easy cleaning**
- **Select among 3", 6" and 12" drawers**
- **Stainless steel castered stands permit easy transport of stored parts**

These clean, practical drawer units put your parts on wheels! Their smooth design eliminates sharp edges and corners where dust can accumulate, and the polymer material resists dents, corrosives, and oxidation. Casters (two swivel and two with brakes) let you move the unit easily and lock in place when desired.

To order, select the desired number of drawers of the desired height from the table below, then select the castered stand. Price includes mounting of drawers (unless otherwise specified, larger drawer sizes will be mounted on the bottom).

Drawer Units		Castered Stand	
Drawer Height	Cat. #	**Height***	Cat. #
3"	**1740-23**	6"	**1704-01**
6"	**1740-02**	9"	**1704-02**
12"	**1740-98**		

**** Including 3"H casters.***

TERRA UNIVERSAL.COM
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800 S. Raymond Ave., Fullerton, CA 92831 CA

Electropolished Stainless Steel Work-In-Process (WIP) Racks

- **Clean, secure enclosure protects WIP materials from breakage or contamination during processing**
- **Ergonomic design increases productivity**
- **17° shelf slope ensures safe product positioning against rear retaining bar**
- **All-electropolished stainless steel construction won't particulate, wipes down without snags**
- **Wafer WIP box sizing conserves valuable cleanroom floor space by optimizing shelf capacities**
- **Custom dimensions and enclosure panels available - just give us your specs!**

These WIP racks safeguard delicate products while making optimal use of valuable cleanroom space.

Certified Class 1-Compatible

Fabricated of 1"-square stainless steel tubes, these racks feature continuous seam welds and extensive surface finishing to prevents snags or crevices. The all-electropolished stainless steel surfaces won't shed particles or outgas chemicals. They have been independently certified compatible for use in Class 1 cleanrooms (see page 3 for more information).

Their shelves optimize the vertical laminar airflow inside a cleanroom and minimize the possibility of particle accumulation. Choose between rod shelves, made of ¼"-diameter rods on 2" centers, or shelves with ¾"-diameter perforations, which provide approximately 40% open space. Both shelf types are mounted at a 17° angle to position WIP boxes securely against a rear retaining rod. Side flanges keep materials from slipping off the side edges. Shelves are designed for optimal storage densities of common wafer transport cassettes and WIP boxes (see ordering chart for capacities).

All models feature polypropylene leveling feet. Stainless steel mounting plates are also available (see below). Racks can also be customized to accommodate special parts or capacity requirements; just let send us your specifications.

Rod Shelf WIP Rack

Other WIP Storage Solutions

Select a standard unit, or put Terra's design and fabrication experience to work on a system customized to your specs!

Wall-Recessed WIP Storage Cabinet

Made of all-electropolished stainless steel, this cabinet fits into a cleanroom wall cut-out to eliminate floorspace requirements altogether!

The model shown features five shelves made of ¼"-diameter rods on 2" centers. Dimensions: 48"W x 12"D x 60"H. Call for specify other sizes or configurations!

Cat. #
9611-90

CLEANROOM STORAGE SYSTEMS

NOTE: 150mm capacities are based on the following: lower end, Fluoroware model PA182-50MB wafer cassette, upper end, Empak model TR15-01 wafer box. 200mm capacities are based on Empak model HA200 wafer box.

WIP Racks—12" Shelf Clearance (for 150mm and 200mm wafers)

Dimensions W x D x H, in.	No. of Shelves	Capacity 150mm	Capacity 200mm	Rod Shelves* Cat. #	Perforated Shelves Cat. #
38 x 12 x 36	2	6-10 •	6	**9611-00***	**9611-24***
38 x 12 x 48	3	9-15 •	9	**9611-01***	**9611-25***
38 x 12 x 60	4	12-20 •	12	**9611-02***	**9611-26***
38 x 12 x 72	5	15-25 •	15	**9611-03***	**9611-27***
38 x 18 x 36	2	12-20 ••	6	**9611-04**	**9611-28**
38 x 18 x 48	3	18-30 ••	9	**9611-05**	**9611-29**
38 x 18 x 60	4	24-40 ••	12	**9611-06**	**9611-30**
38 x 18 x 72	5	30-50 ••	15	**9611-07**	**9611-31**
38 x 28 x 36	2	18-40 •••	12	**9611-08**	**9611-32**
38 x 28 x 48	3	27-60 •••	18	**9611-09**	**9611-33**
38 x 28 x 60	4	36-80 •••	24	**9611-10**	**9611-34**
38 x 28 x 72	5	45-100 •••	30	**9611-11**	**9611-35**
48 x 12 x 36	2	8-12 •	6	**9611-12***	**9611-36***
48 x 12 x 48	3	2-18 •	9	**9611-13***	**9611-37***
48 x 12 x 60	4	16-24 •	12	**9611-14***	**9611-38***
48 x 12 x 72	5	20-30 •	15	**9611-15***	**9611-39***
48 x 18 x 36	2	16-24 ••	6	**9611-16**	**9611-40**
48 x 18 x 48	3	24-36 ••	9	**9611-17**	**9611-41**
48 x 18 x 60	4	32-48 ••	12	**9611-18**	**9611-42**
48 x 18 x 72	5	40-60 ••	15	**9611-19**	**9611-43**
48 x 28 x 36	2	24-36 •••	12	**9611-20**	**9611-44**
48 x 28 x 48	3	36-54 •••	18	**9611-21**	**9611-45**
48 x 28 x 60	4	48-72 •••	24	**9611-22**	**9611-46**
48 x 28 x 72	5	60-90 •••	30	**9611-23**	**9611-47**

**** Require 2½" Diameter Mounting Feet, Cat. # 1540-04-2***
• Cassettes are loaded one row across per shelf
•• Cassettes are loaded two rows across per shelf
••• Cassettes are loaded three rows across per shelf

NOTE: Capacities are based on Empak model HS300-02B. All capacities are based on one row of cassettes per shelf.

WIP Racks—14" Shelf Clearance (for 300mm wafers)

Dimensions W x D x H, in.	No. of Shelves	Capacity 150mm	Rod Shelves* Cat. #	Perforated Shelves Cat. #
38 x 12 x 38	2	4	**9611-48***	**9611-60***
38 x 12 x 52	3	6	**9611-49***	**9611-61***
38 x 12 x 66	4	8	**9611-50***	**9611-62***
38 x 18 x 38	2	6**	**9611-51**	**9611-63**
38 x 18 x 52	3	9**	**9611-52**	**9611-64**
38 x 18 x 66	4	12**	**9611-53**	**9611-65**
55 x 12 x 38	2	6	**9611-54***	**9611-66***
55 x 12 x 52	3	9	**9611-55***	**9611-67***
55 x 12 x 66	4	12	**9611-56***	**9611-68***
55 x 18 x 38	2	8**	**9611-57**	**9611-69**
55 x 18 x 52	3	12**	**9611-58**	**9611-70**
55 x 18 x 66	4	16**	**9611-59**	**9611-71**

**** Require 2½" Diameter Mounting Feet Cat# 1540-04-2***
***** Based on cassettes loaded with wafers facing to the side. Models without asterisks load with cassettes facing front.***

Mounting Feet

Electropolished stainless steel leveling feet feature cut-outs to allow bench to be bolted to the floor.

	Cat. #
2½" Diameter	**1540-04-2**
3½" Diameter	**1540-05-2**

See next page for more WIP solutions!

Wall-Mount WIP Racks

Made of electropolished stainless steel rods, these wall-mount WIP racks can be modified to accommodate other WIP storage boxes. Call with your requirements!

For 200mm Wafer Lot Boxes

Capacity	Cat. #
One	**9611-91**
Two	**9611-92**
Three	**9611-93**
Four	**9611-94**

WIP Rack with Polypropylene Liners

These racks are ideal for WIP storage of quartz tubes and large fab tools that may have surface chemical residues. The polypropylene liners resist most acids and can be easily removed for cleaning. Racks can be customized for your application.

	Cat. #
Model shown	**9611-95**

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Cleanroom Shelving

- **Modular construction lets you configure a cleanroom-compatible solution for any requirement**
- **Variety of shelf designs accommodate many part sizes and types**
- **Aluminum post sleeves make shelving completely conductive, prevent ESD**
- **High quality, rugged construction**
- **Patented split sleeve design allows fast, secure assembly**
- **Super Adjustable Super Erecta™ shelves allow fast, easy, no-tools positioning**

This modular shelving can be arranged and rearranged to suit your particular needs—literally hundreds of shelf configurations are possible. Shelves can be set up within a matter of minutes without any special tools. You can choose among a wide range of shelf sizes, materials, and constructions; all can be interchangeably mounted on standard 1" posts to make the most effective use of space.

Terra offers many shelf styles:

Open wire shelving gives maximum visibility of shelf contents, as well as maximum air circulation and light penetration, and minimum dust and moisture accumulation.

Solid flat shelving serves best where a smooth, continuous surface is needed to hold small items, to provide a horizontal barrier, or to serve as a work top.

Solid louvered-embossed shelves promote uniform temperature and air flow while retaining basic solid-shelf characteristics.

Easy-to-clean chrome-plated wire shelves

CLEANROOM STORAGE SYSTEMS

Application-specific shelves provide secure, organized storage of reticles, wafer boats, SMT component reels, and other semiconductor parts.

All shelves feature two-piece construction with a heavy-gauge wire deck supported by a four-sided tubular steel frame, providing maximum load capacity and impact resistance. Wire shelving is available either in nickel-chrome-plated carbon steel or electropolished stainless steel. All solid shelving is made of electropolished stainless steel. A bag of four plastic split sleeves is provided with each shelf (see description of shelf assembly).

All units feature two-fold thickness and reinforced edges; this unique design provides exceptional strength in these shelves. The 1/8" raised "Ship's Edge" on solid shelves helps contain spills and adds all-around rigidity and strength. Plastic corner pieces with galvanized screws provide a tapered opening in each corner that firmly locks into the split sleeves and posts.

Now with Easy-Adjust Corner Release System!
Wire shelves are now available with quick-release fasteners that allow easy shelf adjustment. See details below.

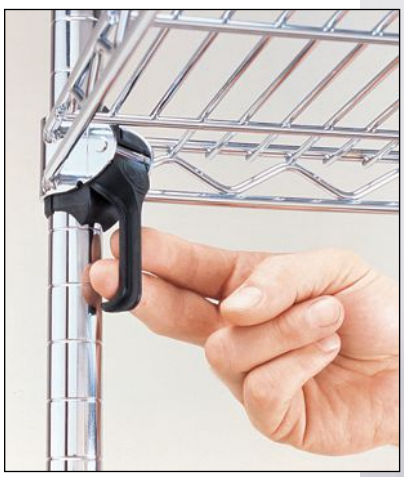
Flat Stainless Steel Shelving

Super Adjustable™ Wire Shelves

- **Easy-adjust corner release system saves time and space**
- **Lets you raise and lower any shelf without tools and without disturbing other shelves**
- **Optimizes your storage area in seconds!**

This revolutionary adjustable system means you'll never have to make do with anything less than the optimal storage solution!

Just lift the release on each corner, and adjust your shelf at precise 1" increments, and clamp the release lever shut. In seconds, you can optimize your storage system to changing load requirements, with no tools, no wasted time, and no wasted space.



SiteSelect™ Posts Make It Easy!

SiteSelect™ posts are grooved every inch and numbered every 2" to simplify shelf positioning. Double-groove indicators every 8" provide a convenient visual height reference.

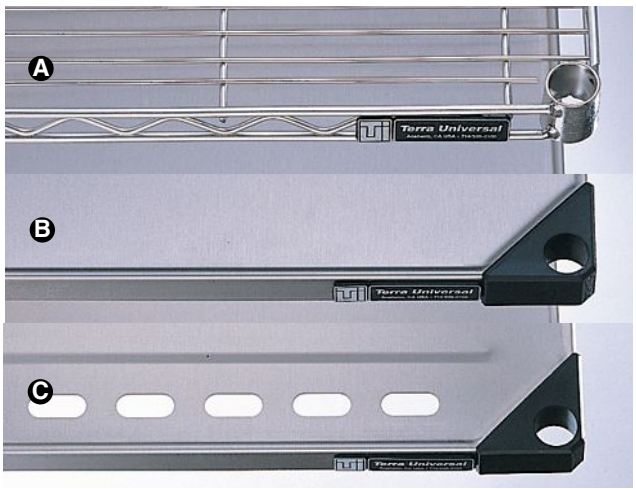
See ordering information on page 187.

Solid and Wire Shelves
Split-Sleeve Assembly System

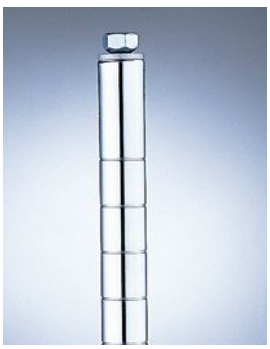
The split-sleeve shelf assemblies allow you to position and reposition shelves in one-inch increments along SiteSelect™ Posts. Sleeves snap into rolled grooves along the posts and then seat beneath tapered openings in the shelves, forming a positive lock that becomes stronger under shelf load. Four pairs of plastic split sleeves are packed with each shelf. For shelf grounding in static-sensitive applications, specify aluminum split sleeves (only one aluminum sleeve per shelf is required). Order SiteSelect™ Posts below.

	Cat. #
Replacement Plastic Split Sleeve	**1100-04**
Aluminum Split Sleeve	**1303-70**

See grounding cable on page 187.



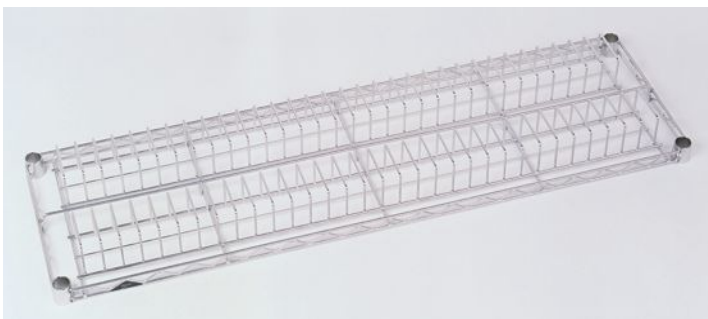
Dimensions	A. Wire Shelves		B	C
W x L (inches)	Chrome Plated Cat. #	Stainless Steel Cat. #	Flat Stainless Steel Cat. #	Louvered Embossed Cat. #
14 x 24	1300-28	1300-56	1301-00	1301-48
14 x 30	1300-29	1300-57	1301-01	1301-49
14 x 36	1300-30	1300-59	1301-02	1301-50
14 x 42	1300-31	1300-60	1301-03	1301-51
14 x 48	1300-32	1300-61	1301-04	1301-52
14 x 60	1300-33	1300-62	1301-05	1301-53
14 x 72	1300-34	1300-63	—	—
18 x 24	1300-35	1300-64	1301-06	1301-54
18 x 30	1300-36	1300-65	1301-07	1301-55
18 x 36	1300-37	1300-66	1301-08	1301-56
18 x 42	1300-38	1300-67	1301-09	1301-57
18 x 48	1300-39	1300-68	1301-10	1301-58
18 x 54	1697-49	1697-55	—	—
18 x 60	1300-40	1300-69	1301-11	1301-59
18 x 72	1300-41	1300-70	—	—
21 x 24	1300-42	1300-71	1301-12	1301-60
21 x 30	1300-43	1300-72	1301-13	1301-61
21 x 36	1300-44	1300-73	1301-14	1301-62
21 x 42	1300-45	1300-74	1301-15	1301-63
21 x 48	1300-46	1300-75	1301-16	1301-64
21 x 54	1697-50	1697-56	—	—
21 x 60	1300-47	1300-76	1301-17	1301-65
21 x 72	1300-48	1300-77	—	—
24 x 24	1300-49	1300-78	1301-18	1301-66
24 x 30	1300-50	1300-79	1301-19	1301-67
24 x 36	1300-51	1300-80	1301-20	1301-68
24 x 42	1300-52	1300-81	1301-21	1301-69
24 x 48	1300-53	1300-82	1301-22	1301-70
24 x 54	1697-51	1697-57	—	—
24 x 60	1300-54	1300-83	1301-23	1301-71
24 x 72	1300-55	1300-84	—	—



SiteSelect™ Posts
For Split-Sleeve or Corner Release System

Each post features rolled, circular grooves along its entire length at one-inch increments. Numbers every 2" and double-groove indicators every 8" provide convenient visual height references. Adjustable leveling feet with caps compensate for uneven surfaces in stationary models. Select mobile models for use with casters (see page 191).

SiteSelect™ Posts				
	Stationary		Mobile	
Height (inches)	Chrome Plated Cat. #	Stainless Steel Cat. #	Chrome Plated Cat. #	Stainless Steel Cat. #
14 1/2	1300-85	1300-91	—	—
34 1/2	1300-86	1300-92	1307-98	2650-01
54 9/16	1300-87	1300-93	1307-90	2650-02
62 9/16	1300-88	1300-94	1307-91	2650-30
74 5/8	1300-89	1300-95	1307-92	2650-03
86 5/8	1300-90	1300-96	1307-93	2650-04

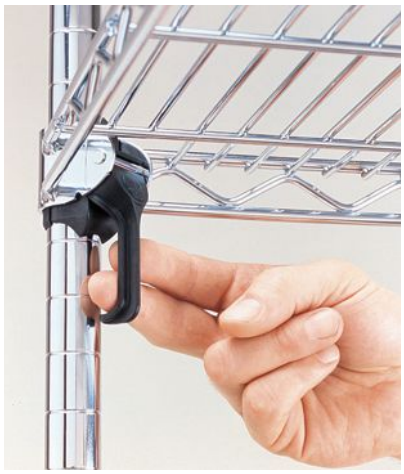


Specialized Applications!
Reticle Storage Shelving

Electropolished Type 304 stainless steel shelf is compartmentalized for upright storage of reticles and masks. Shelf is divided for two-sided storage. Compartments are 1.167". Order posts separately (above). Dimensions: 14" x 48". Shipping weight: 13.5 lbs.

Cat. #
2650-14

Super Adjustable Wire Shelves
Corner Release System



Used with the SiteSelect™ Posts on the previous page, this unique Corner Release System enables you to adjust shelf levels quickly and easily—without tools and without affecting other shelves. Simply flip the corner release open, adjust the shelf level, and clamp the release lever shut to lock the shelf in place. The open-wire design of these heavy-gauge shelves minimizes dust accumulation and allows a free circulation of air, greater visibility of stored items, and greater light penetration. Four corner release levers and four plastic corner wedges are included with each shelf. For shelf grounding in static-sensitive applications, order conductive wedges.

Order SiteSelect™ Posts on page 186.

	Cat. #
Replacement Sleeves/Wedges (pack of 4)	**1571-00**
Conductive Sleeves (pack of 4)	**1571-01**

See below for grounding cable.

Super Adjustable Wire Shelves

Dimensions W x L (inches)	Chrome Cat. #	Stainless Steel Cat. #
18 x 24	**1701-75**	**2650-35**
18 x 30	**1697-20**	**2650-36**
18 x 36	**1701-76**	**2650-37**
18 x 42	**1697-21**	**2650-38**
18 x 48	**1701-77**	**2650-39**
18 x 54	**1697-22**	**2650-40**
18 x 60	**1701-78**	**2650-41**
18 x 72	**1697-23**	**2650-42**
21 x 24	**1697-24**	**2650-43**
21 x 30	**1697-25**	**2650-44**
21 x 36	**1701-79**	**2650-45**
21 x 42	**1697-26**	**2650-46**
21 x 48	**1701-80**	**2650-47**
21 x 54	**1697-27**	**2650-48**
21 x 60	**1697-28**	**2650-49**
21 x 72	**1697-29**	**2650-50**
24 x 24	**1701-81**	**2650-51**
24 x 30	**1697-30**	**2650-52**
24 x 36	**1701-82**	**2650-53**
24 x 42	**1697-31**	**2650-54**
24 x 48	**1701-83**	**2650-55**
24 x 54	**1697-32**	**2650-56**
24 x 60	**1701-84**	**2650-57**
24 x 72	**1697-33**	**2650-58**

Specialized Applications!
Work-in-Process Shelving

These electropolished 304 stainless steel wire shelves provide the ideal storage solution for wafer boats. Their 2" slope seats materials against a rear retaining ledge, without tipping. Open wire construction maintains the laminar air flow. Each shelf supports up to 200 lbs. Order shelves, posts, ledges and wire frames separately.

Work-in-Process Shelving

Dimensions	Shipping Weight	Cat. #
18" x 36"	10 lbs.	**2650-59**
18" x 48"	12 lbs.	**2650-60**
18" x 60"	16 lbs.	**2650-61**

Four-Sided Wire Frames*

Dimensions	Shipping Weight	Cat. #
18" x 36"	6.5 lbs.	**2650-62**
18" x 48"	7.8 lbs.	**2650-63**
18" x 60"	8 lbs.	**2650-64**

*Recommended to provide support for units in which the lowest shelf is higher than 12" off the floor. See photo.

SiteSelect™ Posts—See page 186.
Shelf Ledges—see page 189.

Grounding Cable
Attaches to a bottom wire shelf with clip (included) or to a bottom solid shelf with a drilled hole.

Cat. #
1305-91

Grounding Cable and Universal Bracket
Universal bracket fits wire and solid shelves, as well as open-wire support frames.

Cat. #
2650-11

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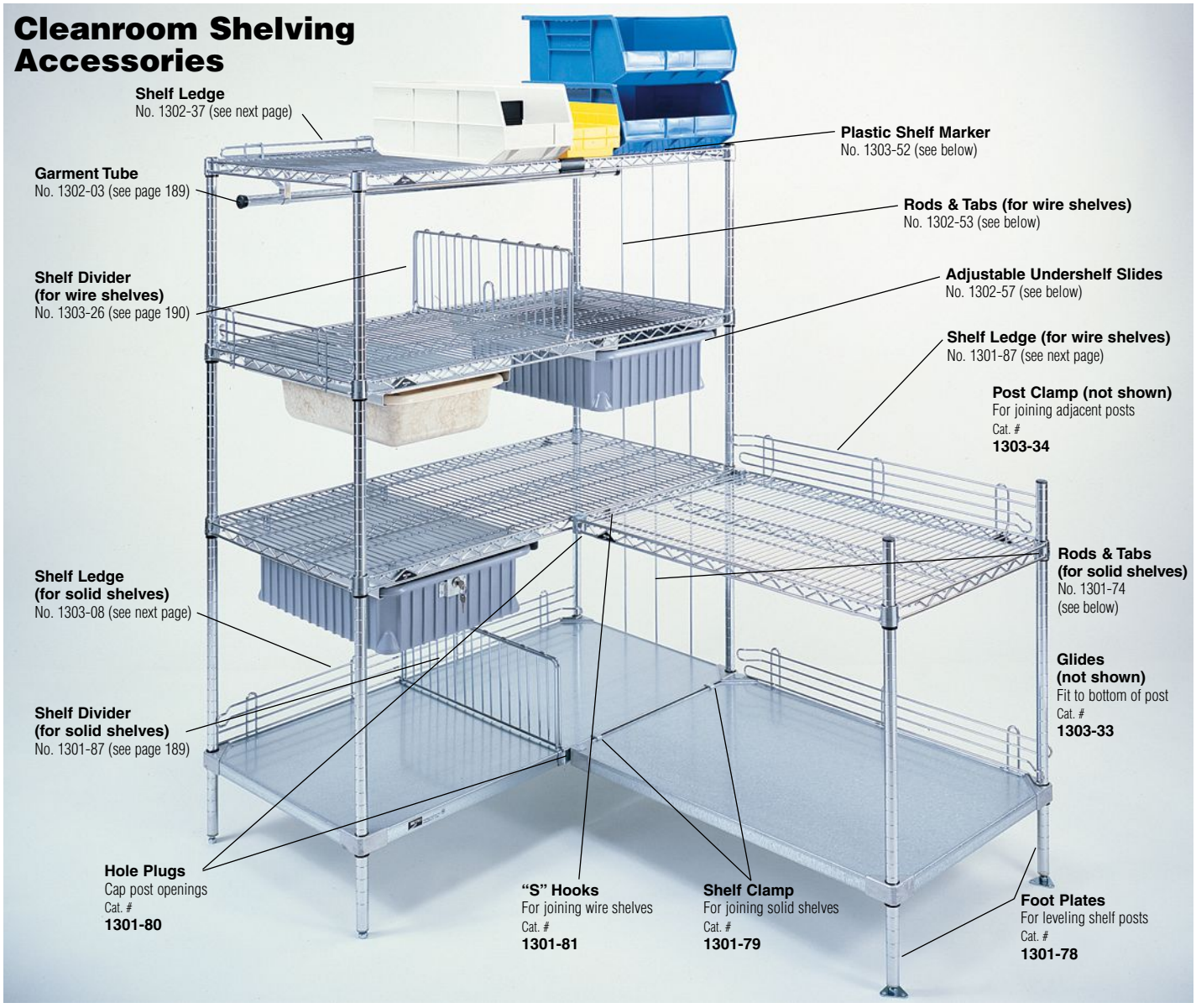
Cleanroom Shelving Accessories



Rods and Tabs (See photo above)
Rods hook over top shelf and are attached to each of the other shelves with a spring-clip tab. Each rod requires one tab for each shelf except the top shelf. Rods are shipped with sufficient tabs for a 4-shelf unit.

For Wire Shelves			
Post Number (minimum)	**Rod Length** (inches)	**Approx. Pkd. Weight**	Cat. #
54	52	1 lb.	**1302-53**
63	61	1 lb.	**1302-54**
74	72	1½ lbs.	**1302-55**
86	84	1¾ lbs.	**1302-56**

For Solid Shelves			
Post Number (minimum)	**Rod Length** (inches)	**Approx. Pkd. Weight**	Cat. #
54	52	1 lb.	**1301-74**
63	60	1 lb.	**1301-75**
74	72	1½ lbs.	**1301-76**
86	84	1¾ lbs.	**1301-77**

Adjustable Undershelf Slides
(For wire shelves only; see photo above)
Allow mounting of tote boxes under wire shelves.

For Wire Shelves		
Item	**Approx. Pkd. Weight**	Cat. #
For 18" wide shelf	1 lb.	**1302-57**
For 21" wide shelf	1 lb.	**1302-58**
For 24" wide shelf	1 lb.	**1302-59**

Plastic Shelf Marker
Snaps over shelf edge to provide a means of identifying contents of shelf or shelf section. Made of molded plastic, each of these units holds a 1½" x 3" label.

Cat. #
1303-52

Shelf Ledges
For Solid and Wire Shelves

- **Keep stored materials from falling off wire shelves**
- **Provide 1", 4" or higher barriers**
- **Available in Chrome or Stainless Steel**

To prevent items from protruding from or falling off shelves, ledges can be installed on the shelf edges.

In many cases a one-inch ledge will serve the purpose while allowing full access to the shelf from all sides. When a higher ledge is needed, the four-inch size can be used. Four-inch ledges can also be stacked to form an eight-inch or higher barrier.

For complete enclosure of the sides and/or back of a shelving unit, select rods and tabs or enclosure panels (see separate description).

1-Inch Shelf Ledges for Wire Shelves

For Wire Shelves			
Length (inches)	Approx. Pkd. Weight/Each	Chrome Cat. #	Stainless Steel Cat. #
14	.6 lbs.	**1302-32**	**1302-42**
18	.8 lbs.	**1302-33**	**1302-43**
21	.8 lbs.	**1302-34**	**1302-44**
24	1 lbs.	**1302-35**	**1302-45**
30	2 lbs.	**1302-36**	**1302-46**
36	2.5 lbs.	**1302-37**	**1302-47**
42	2.8 lbs.	**1302-38**	**1302-48**
48	3.5 lbs.	**1302-39**	**1302-49**
54	4.4 lbs.	**1697-58**	**1697-59**
60	3.8 lbs.	**1302-40**	**1302-50**
72	4 lbs.	**1302-41**	**1302-51**

4-Inch Shelf Ledges for Wire Shelves

For Wire Shelves			
Length (inches)	Approx. Pkd. Weight/Each	Chrome Cat. #	Stainless Steel Cat. #
14	.8 lbs.	**1302-82**	**1302-92**
18	1.5 lbs.	**1302-83**	**1302-93**
21	1.8 lbs.	**1302-84**	**1302-94**
24	2 lbs.	**1302-85**	**1302-95**
30	2.3 lbs.	**1302-86**	**1302-96**
36	2.8 lbs.	**1302-87**	**1302-97**
42	3.3 lbs.	**1302-88**	**1302-98**
48	3.8 lbs.	**1302-89**	**1302-99**
54	3.8 lbs.	**1697-60**	**1697-61**
60	4 lbs.	**1302-90**	**1301-72**
72	5 lbs.	**1302-91**	**1301-73**

4-Inch Shelf Ledge for Wire Shelves.

4-Inch Shelf Ledges for Solid Shelves

For Solid Shelves			
Length (inches)	Approx. Pkd. Weight/Each	Chrome Cat. #	Stainless Steel Cat. #
14	1.25 lbs.	**1303-03**	**1303-12**
18	1.5 lbs.	**1303-04**	**1303-13**
21	1.75 lbs.	**1303-05**	**1303-14**
24	2 lbs.	**1303-06**	**1303-15**
30	2.25 lbs.	**1303-07**	**1303-16**
36	2.75 lbs.	**1303-08**	**1303-17**
42	3.25 lbs.	**1303-09**	**1303-18**
48	3.75 lbs.	**1303-10**	**1303-19**
60	5 lbs.	**1303-11**	**1303-20**

Garment Hanger Tube
These chrome-plated tubes convert any of the wire shelves above into a garment storage rack. Tube attaches with brackets to the underside of wire shelves. Available in all standard shelf lengths (brackets vary with the width of the shelf and the length of the tube).

Garment Hanger Tube				
Tube Length (inches)	Approx. Pkd. Weight	Shelf Width 18" Chrome Cat. #	Shelf Width 21" Chrome Cat. #	Shelf Width 24" Chrome Cat. #
24	2 1/2 lbs.	**1302-01**	**1302-08**	**1302-15**
30	2 1/2 lbs.	**1302-02**	**1302-09**	**1302-16**
36	3 lbs.	**1302-03**	**1302-10**	**1302-17**
42	3 1/2 lbs.	**1302-04**	**1302-11**	**1302-18**
48	3 1/2 lbs.	**1302-05**	**1302-12**	**1302-19**
60	4 lbs.	**1302-06**	**1302-13**	**1302-20**
72	4 1/2 lbs.	**1302-07**	**1302-14**	**1302-21**

8" Shelf Dividers
For Solid or Wire Shelves

- **Enhance organization of stored materials**
- **Can be positioned at any point on shelving**
- **Available in chrome or stainless steel**

Shelf dividers enable you to compartmentalize shelves to keep shelf contents orderly.

Because they snap into place, they can be positioned and repositioned to suit the exact size of the section needed. All models are 8" high.

8-Inch Shelf Divider for Wire Shelves (No. 1303-25)

For Wire Shelves

Shelf Width	Approx. Pkd. Weight/Each	Chrome Cat. #	Stainless Steel Cat. #
14"	1.8 lbs.	**1303-25**	**1303-29**
18"	2.25 lbs.	**1303-26**	**1303-30**
21"	2.5 lbs.	**1303-27**	**1303-31**
24"	2.75 lbs.	**1303-28**	**1303-32**
30"	3.25 lbs.	**1402-81**	**1697-63**
36"	3.75 lbs.	**1402-82**	**1697-65**

For Solid Shelves

Shelf Width	Approx. Pkd. Weight/Each	Chrome Cat. #	Stainless Steel Cat. #
14"	2 lbs.	**1301-86**	—
18"	2.25 lbs.	**1301-87**	**1301-91**
21"	2.5 lbs.	**1301-88**	—
24"	2.75 lbs.	**1301-89**	**1301-93**

Surface Mount Component Reel Shelving

- **Provides efficient storage for 7", 13" and 15" (178, 330, and 381mm) Surface Mount Component Reels**
- **Super Erecta Brite plated finish is clean and durable**
- **Two shelf capacities available, along with optional casters, rods and tabs**
- **Makes the efficient use of floor and shelf space!**

This SMT Component Reel Shelving offers an efficient method of storage and transport for standard-size component reels.

Super Erecta Brite plated shelves can be mixed and matched with standard Super Erecta shelving, posts and casters to create a reel handling and storage system to address the existing needs of PCB manufacturers.

To order, select desired chrome-plated post type (for use with or without casters); then, select desired shelf type to meet your reel size and capacity requirements. Shelves can be positioned at 1"-intervals along the post by means of a split-sleeve assembly. Select aluminum split sleeves for conductivity.

Shelves (include 4 plastic split sleeves for post mounting)

Dimensions (W x L x H, inches)	Handles (inches)	Reel* Capacity	Compartment Opening (inches)	Shipping Weight	Cat. #
18 x 36 x 3.75	7	78	0.625	11.0	**1307-94**
18 x 36 x 4.25	13 - 15	15	2.0	7.5	**1307-95**

**** Capacity shown assumes standard reels (per EIS standards) are used. Capacity may increase if multiple reels can be fit into single compartments (use "compartment opening" to calculate actual capacity for your application).***

Rods & Tabs
Form side and back enclosures for a shelving unit. Can serve as uniform dividers when passed through shelves from top to bottom. Rods are shipped with 4 tabs per rod.

For Post Height	Cat. #
54"	**1302-53**
63"	**1302-54**
74"	**1302-55**
84"	**1302-56**

Foot Plates — Cat. # **1301-78**

Replacement Plastic Split Sleeves — Cat. # **1100-04**

Aluminum Split Sleeve with Stainless Steel Ring — Cat. # **1303-70**

Chrome-Plated Posts (4 required)

Height	For Use Without Casters Cat. #	For Use With Casters (order separately) Cat. #
54 9/16"	**1300-87**	**1307-90**
62 9/16"	**1300-88**	**1307-91**
74 5/8"	**1300-89**	**1307-92**
86 5/8"	**1300-90**	**1307-93**

Stem Casters — Cat. #
With Brake **1303-44**
Without Brake **1303-43**

Stem Casters for Cleanroom Carts

The casters we offer on our carts are selected specifically to provide optimal performance in the cleanroom environment. They feature smooth-profile designs to enhance cleanliness, nonmarking materials to protect cleanroom floors, and durable construction to ensure a long service life. Stem casters mount inside the bottom of the vertical posts used in our carts.

Polyurethane is a synthetic rubber with significant resistance to temperature, shock, fuels, oxidation, detergent and oils. It offers a long life, with the wear resistance of hard rubber and the resilience of soft rubber, and high floor protection for use in a cleanroom environment.

These casters are available in 4" and 5" wheel diameters. For a given tire material, the larger the wheel, the easier it will roll. While 4" casters are suitable for light loads and ideal floor condition, 5" casters should otherwise be considered optimal. Select larger sizes if you anticipate very rough surfaces or obstacles such as elevator entrances or door sills.

High Modulus Cleanroom-Approved casters provide vibration dampening in controlled environments. Each includes a nickel horn, resilient tread wheel, dust cover and Celcon bearing. Resists virtually all cleaners, solvents, oils and acids. Not recommended for wet or humid environments.

High Modulus Cart-Washable Cleanroom-Approved casters can be washed with the power washers commonly used to clean carts. They are grease sealed with zerk fittings in the swivel and axle.

A Note on Load Ratings

"Rated Capacity" is, by definition, the maximum load per caster recommended by the manufacturer for use over smooth floors at operating speeds of 3 mph or less. As a general rule, the true load-bearing capacity of a four-caster cart is rarely more than three times the rated capacity of a single caster. Unbalanced loads, acceleration forces, cornering, uneven floors, and other obstacles place too great a demand on each wheel to permit extensive operation at full rated capacity.

Stem Casters

Wheel Tread	Wheel Dia. (inches)	Type	Face (inches)	Load Rating (lbs.)	Weight (lbs.)	Cat. #
Polyurethane	5	Stem/Swivel	1 1/4	300	2 1/8	**1303-43**
Polyurethane	5	Stem/Brake	1 1/4	300	2 1/4	**1303-44**
Polyurethane	5	Stem/Rigid	1 1/4	300	2	**1303-45**
High Modulus	5	Stem/Swivel	1 1/4	300	2 1/2	**2080-55**
High Modulus	5	Stem/Brake	1 1/4	300	2 5/8	**2080-56**
High Modulus Donut	5	Stem/Swivel	1 1/4	250	2 1/2	**2080-57**
High Modulus Donut	5	Stem/Brake	1 1/4	250	2 5/8	**2080-58**
High Modulus	5	Stem/Swivel	1 1/4	150	2 1/2	**2650-96**
Donut/ Washable	5	Stem/Brake	1 1/4	150	2 5/8	**2650-97**

Notes:
1. Stem casters are shipped with donut bumpers at no additional charge.
2. Rigid casters are held in place by a connecting channel. When ordering rigid casters, provide the shelf depth.
3. When adding casters to an InterMetro shelving unit to create a mobile storage system, specify caster-compatible mounting posts.

Grounding Cable—see page 187
Site Select™ Posts—see page 186

Specialized Applications! Stainless Steel Security Trucks

These type 304 stainless steel security units provide maximum protection of valuable contents in a controlled environment. They also offer maximum visibility of contents for sight management of inventory. Heavy-gauge open-wire construction allows unimpeded laminar air flow. Includes 270°-opening double doors with latches.

Notes: Models below include 5½" donut bumpers; order casters and intermediate shelves separately.

Dimensions	Stainless Steel Security Truck		Corresponding Intermediate Shelf	
(W x D x H)	Shipping Wt.	Cat. #	Shipping Wt.	Cat. #
27¼" x 40-¾" x 62"	133 lbs.	**2650-65**	13 lbs.	**1300-80**
27¼" x 52-¾ x 62"	156 lbs.	**2650-66**	16 lbs.	**1300-82**
27¼" x 65" x 62"	179 lbs.	**2650-67**	21 lbs.	**1300-83**

Order casters and intermediate shelves separately.

Post-Type Wall-Mount Shelving

- **The perfect overhead or above-bench storage solution!**
- **Versatile design makes optimal use of valuable cleanroom space**
- **Electropolished stainless steel wire shelves ensure cleanliness**
- **Select 14" or 18" depths, lengths of 36" or 48"**

These wall-mounted shelves turn unused cleanroom wall space into valuable storage space.

Each shelf unit below consists of two stainless steel end posts, four stainless steel shelf supports, and two stainless steel wire shelves. Posts are 33⅝" high and support two tiers of shelves; each comes with two end mounting brackets and one center mounting bracket. Note: Mounting hardware is not included, and must be selected according to the type of wall material.

Wall-Mount Shelving		Shelf Size			
	Req. Qty.*	14"D x 36"L Cat. #	14"D x 48"L Cat. #	18"D x 36"L Cat. #	18"D x 48"L Cat. #
Stainless Steel Post	2	**2650-10**	**2650-10**	**2650-10**	**2650-10**
Stainless Steel Shelf Support	4	**1306-72**	**1306-72**	**1306-74**	**1306-74**
Stainless Steel Wire Shelf	2	**1300-59**	**1300-61**	**1300-66**	**1300-68**

Order quantity indicated of each component to create one storage unit of specified shelf size

Cleanroom Utility Carts

Series 500 Cart with 4-inch shelf ledges (top shelf) and 1-inch shelf ledges and 8-inch divider (bottom shelf)

- **Two- and three-shelf designs suit a wide range of applications in and out of the cleanroom**
- **Patented split-sleeve construction lets you adjust shelf height at 1" increments**
- **Available with wire and solid shelves, in many materials, sizes and configurations**

See complete descriptions and ordering information beginning on page 527.

Gowning Room Shelving from InterMetro Industries

- **Chrome-plated and electropolished stainless steel construction meets cleanroom standards**
- **Upright and wall-mount garment racks provide convenient garment storage**
- **Adjustable shelving and dividers create storage bins for cleanroom supplies and apparel**

A/B. Upright and Wall-Mount Garment Racks

Electropolished stainless steel construction and open wire design promotes ultra-clean conditions. Features unique hanger capture mechanism to ensure proper positioning at 3" intervals and to deter theft. Both models include electropolished stainless steel hangers; upright models include leveling feet. To meet ESD requirements, select aluminum split sleeves (below). All units are 24"D; upright models are 74"H.

Width	No. of Hangers	A. Upright Cat. #	B. Wall-Mount Cat. #
36"	11	**2650-16**	**2650-20**
48"	15	**2650-17**	**2650-21**
60"	19	**2650-18**	**2650-22**
72"	23	**2650-19**	**2650-23**

C. Gowning Bench

Made of 14-gauge, 304 stainless steel, with stainless steel leveling footplates. To meet ESD requirements, select conductive wedges (below).

Dimensions	Cat. #
16" x 36"	**2650-24**
16" x 48"	**2650-25**
16" x 60"	**2650-26**
16" x 72"	**2650-27**
Conductive Wedges Package of 4	**1571-01**

D. Economy Garment Rack

Made of chrome-plated wire racks, this configuration of Metro Super Erecta shelving creates a versatile garment storage rack.

Required Quantity	Item	Cat. #
4	74.625" H Corner Post	**1300-89**
2	24" x 48" Chrome Wire Shelf	**1300-53**
4	Footplate	**1301-78**
1	Chrome Support Frame	**2650-28**
1	Chrome Hanger Tube	**1302-19**
15	Closed Top Loop Chrome Hanger	**2650-29**

E. Garment Storage Rack

Specify quantities below to create this convenient 20-bin mobile storage rack.

Required Quantity	Item	Cat. #
4	62.563"H SS Corner Post	**2650-30**
5	24" x 48" SS Wire Shelf	**1300-82**
15	8"H SS Shelf Divider	**1303-32**
5	4"H SS Rear Ledge	**1302-99**
10	4"H SS Side Ledge	**1302-95**
2	5" Stem Caster	**2080-55**
2	5" Stem Caster with Brakes	**2080-56**

F. Bootie/Shoe Rack

Items listed below create a bootie/shoe rack. All components are stainless steel.

Required Quantity	Item	Cat. #
4	62.563"H SS Corner Post	**1300-94**
5	24" x 48" SS Wire Shelf	**1300-82**
12	52" SS Rods/Tabs	**2650-31**

For Terra's complete line of gowning room storage products, see page 284.

Cleanrooms and Accessories

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Modular Cleanrooms

Manufactured by Terra Universal

Facility Optimization—Create the production environment you require without the expense or disruption of a major fab upgrade! Expand or reconfigure as your requirements change.

Unsurpassed Cleanliness—Filtration and ventilation efficiency required to meet the most rigorous cleanliness standards. Independently certified Class 1.

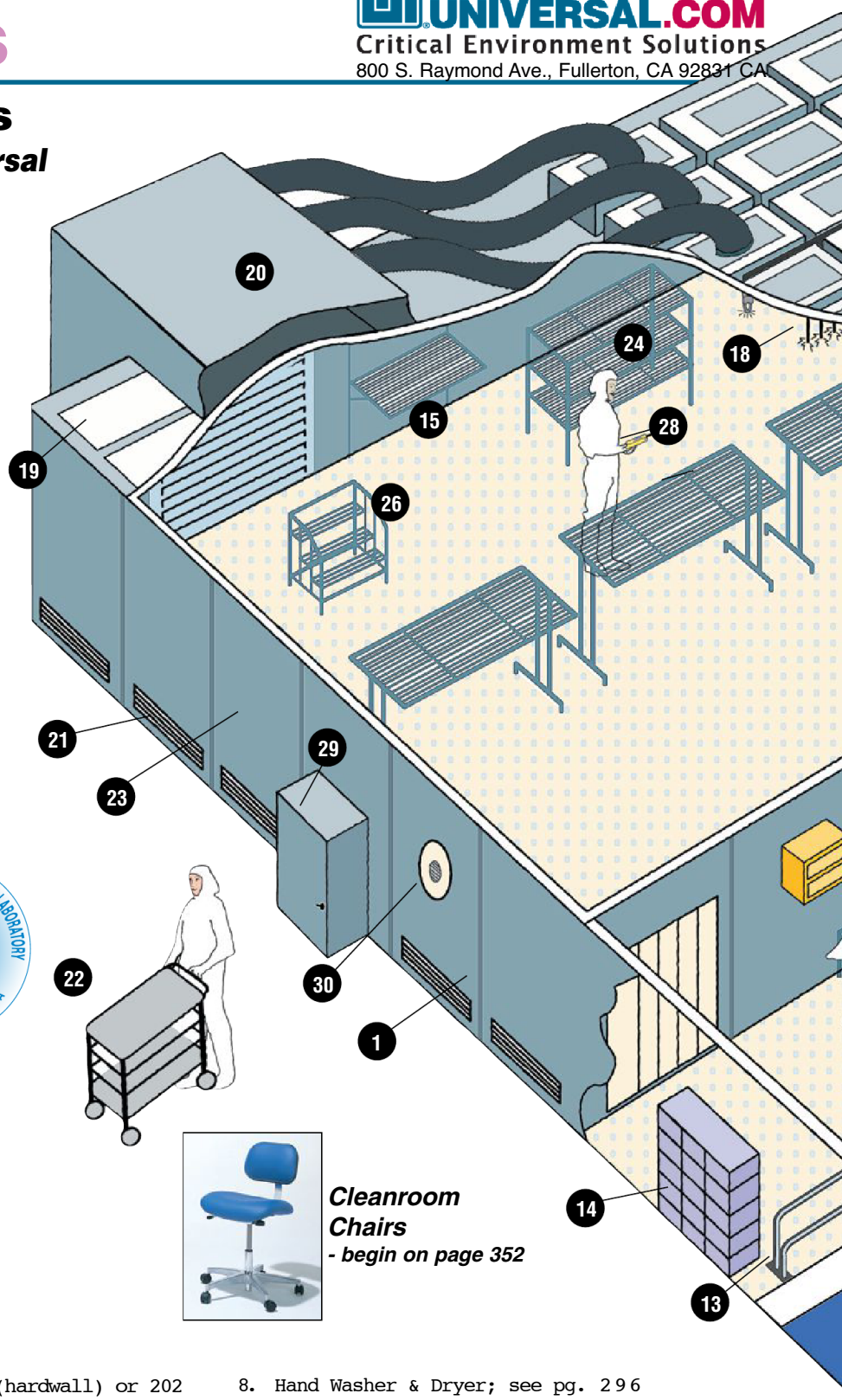
Hardwall and Softwall Designs—A style for every requirement, schedule, and budget!

Comprehensive Environmental Controls—over particulates, humidity, temperature, and ESD (electro-static discharge)

Industry-leading Quality—Over 20 years of engineering and manufacturing experience and latest-generation CNC equipment provide standardized quality you can count on.

Certified Designs and Fabrication Techniques—Terra has received independent certification as a Cleanroom Manufacturing Specialist.

Delivered to Your Production Schedule—Terra understands the critical importance of timely delivery and works closely with you to accommodate tight schedules. Expanded QuickShip configurations provide a wide variety of "need it now!" cleanrooms.



Cleanroom Chairs
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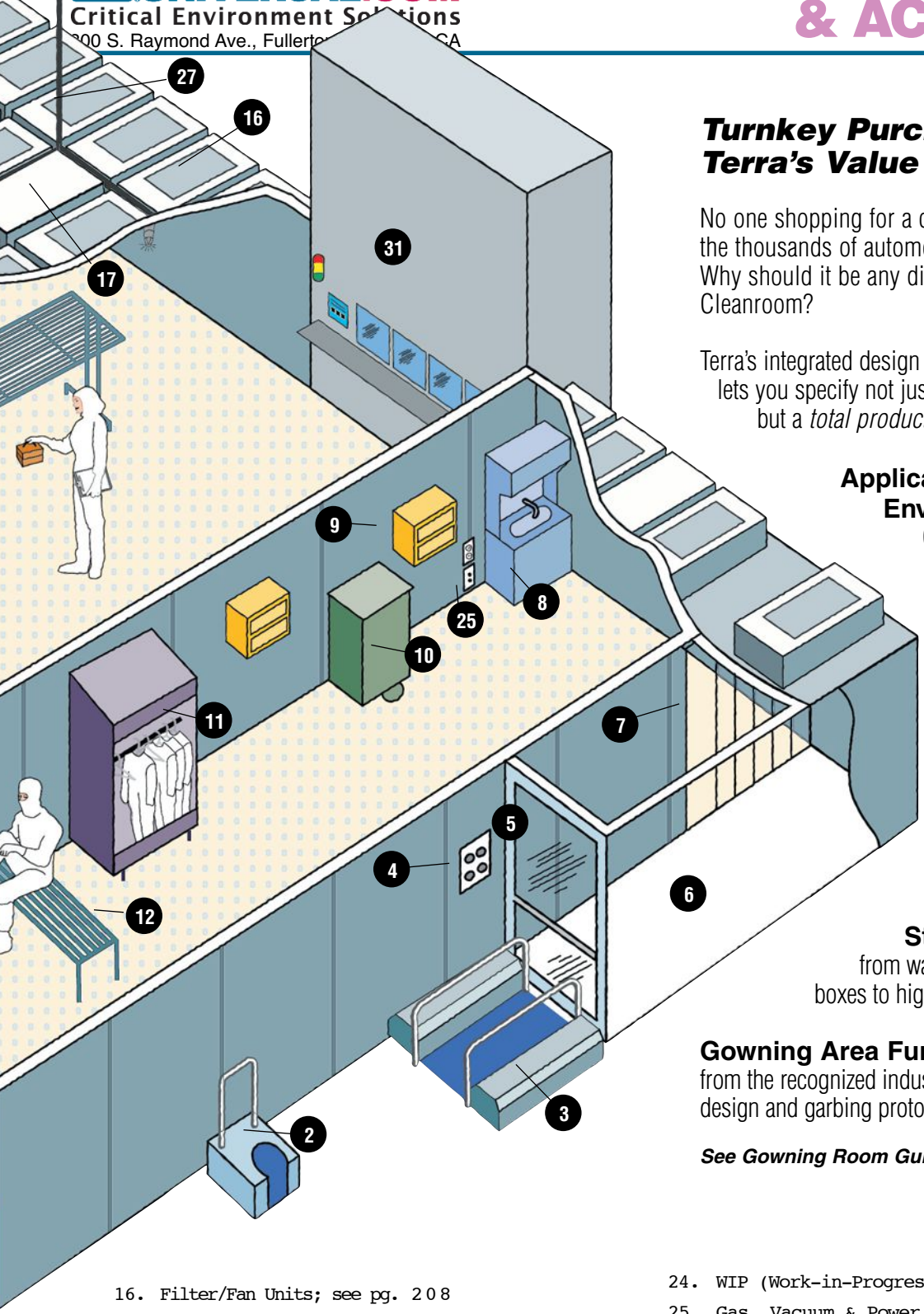

Turnkey Purchasing: Terra's Value Advantage!

No one shopping for a car would think of sourcing the thousands of automobile components separately. Why should it be any different with a Modular Cleanroom?

Terra's integrated design and manufacturing know-how lets you specify not just a clean work environment, but a *total production solution:*

Application-Appropriate Environment—
Over 20 years of design and manufacturing experience in all areas of environmental control: particles, humidity, static, temperature.

Work Stations—
ergonomic, space-saving, ultra-clean designs, including laminar flow and exhaust purification systems.

Storage Solutions—
from wall-mount and benchtop dry boxes to high-volume automated stockers

Gowning Area Furnishings—
from the recognized industry leader in change room design and garbing protocol

See Gowning Room Guide on page 286

16. Filter/Fan Units; see pg. 208
17. Light Modules; see pg. 209
18. Ionization Modules; see pg. 209
19. Blank Panels; see pg. 209
20. Air Conditioning Unit; see pg. 210
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22. Cleanroom Transport Carts; see pg. 524
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24. WIP (Work-in-Progress) Racks; see pg. 232
25. Gas, Vacuum & Power Services; see pg. 210
26. UltraClean Step Stools & Ladders; see pg. 230
27. Fire Suppression System; see pg. 211
28. Particle Counters; see pg. 578
29. Cleanroom Pass-Through; see pg. 215
30. Cleanroom Talk-Through; see pg. 213
31. Automated Stocker; see pg. 30
32. Cleanroom Chairs; see pg. 352

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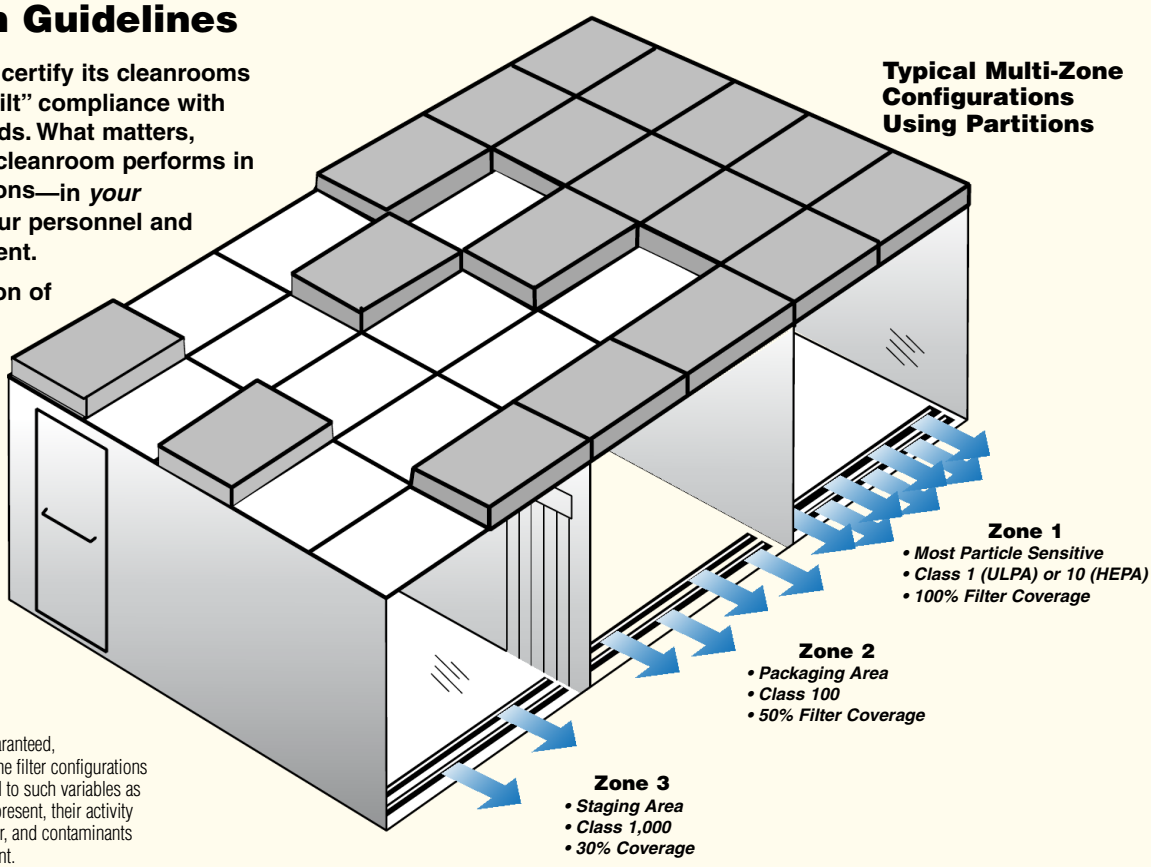
Application Guidelines

Terra Universal will certify its cleanrooms to guarantee "as built" compliance with cleanliness standards. What matters, though, is how the cleanroom performs in real world applications—in *your* application, with your personnel and processing equipment.

Careful consideration of these operating conditions will help you select the configuration that meets your requirements and fits your budget!



Note: These are typical, not guaranteed, contamination levels for each of the filter configurations depicted. Actual values are related to such variables as the number of garbed personnel present, their activity level, the cleanliness of outside air, and contaminants emanating from process equipment.

Cost vs. Coverage: Evaluating FFU Placement

The cleanest modular cleanroom incorporates filter/fan units (FFUs) in every 2' x 4' ceiling bay. This near-100% ceiling coverage provides a laminar flow of filtered air to quickly remove contaminants from the cleanroom, meeting Federal Standard 209(E) for Class 10 or Class 1 environments (depending on the filter types selected, HEPA or ULPA).

Of course, 100% ceiling coverage requires substantial investment in FFUs, especially if the cleanroom is very large. In most applications, adequate cleanliness can be achieved with substantially less filter coverage. How many modules you need depends on several operational variables.

Table 1:
Recommended Air Velocity Rates

Class (per Federal Standard 209E)	Average Airflow Velocity	Air Changes Per Hour
M 7 and M 6.5 (Class 100,000)	0.005 - 0.041 m/sec (1 - 8 ft/min)	5 - 48
M 6 and M 5.5 (Class 10,000)	0.051 - 0.076 m/sec (10 - 15 ft/min)	60 - 90
M 5 and M 4.5 (Class 1,000)	0.127 - 0.203 m/sec (25 - 40 ft/min)	150 - 240
M 4 and M 3.5 (Class 100)	0.203 - 0.406 m/sec (40 - 80 ft/min)	240 - 480
M 3 and M 2.5 (Class 10)	0.254 - 0.457 m/sec (50 - 90 ft/min)	300 - 540
M 2 and M1.5 (Class 1)	0.305 - 0.457 m/sec (60 - 90 ft/min)	360 - 540
M 1 and cleaner	0.305 - 0.508 m/sec (60 - 100 ft/min)	360 - 600

Note: Actual average velocity and air changes required may vary depending on the application and floor plan. Source: Institute of Environmental Sciences

Cleanliness Rating: Most cleanroom facility engineers agree that Class 1 and Class 10 applications require near-100% ceiling coverage, producing a laminar flow of clean air traveling downward at a velocity of about 90 feet/minute (measured 12" below the filter face). This design ensures a positive pressure inside the cleanroom, which blocks the influx of contaminants through leaks in the cleanroom wall or curtain, and guarantees swift removal of particles generated by people or process equipment inside the enclosure.

Ventilation Efficiency: For less critical contamination requirements, experts correlate ventilation efficiency (i.e., the ability to remove contaminants and meet a cleanliness standard) with both the velocity of filtered air passing through the room and also the number of air changes completed in a given time. The air-change figures are usually expressed as a range (see Table 1).

Table 2:
Recommended Ceiling Filter Coverage

Class	Ceiling Coverage
M 7 & M 6.5 (Class 100,000)	5 - 15%
M 6 & M 5.5 (Class 10,000)	15 - 20%
M 5 & M 4.5 (Class 1,000)	25 - 40%
M 4 & M 3.5 (Class 100)	35 - 70%
M 3 & M 2.5 (Class 10)	50 - 90%
M 2 & M 1.5 (Class 1)	60 - 100%*
M 1 & Cleaner	80 - 100%*

Note: Actual average velocity and air changes required may vary depending on the application and floor plan.

* ULPA filters required in Class 1/10 applications. HEPA filters required for all others.

The breadth of these ranges reflects how dramatically people and processes affect cleanliness. Low-end figures within each contamination class generally indicate air velocity and air change requirements for an "as built" or "at rest" facility—one in which no people are present and no contaminating processes are under way. In the presence of higher degrees of contamination (resulting from many cleanroom workers or contaminating manufacturing processes), more air

changes are required to maintain the desired cleanliness standard. In fact, many manufacturers insist on as many as 720 air changes per hour to meet Class 10 or cleaner requirements.

Deciding on the appropriate velocity and air changes for your application generally requires careful evaluation of such factors as number of personnel, effectiveness of garbing protocol, frequency of access, and cleanliness of process equipment. Once you have established the required air change figure, you can calculate the number of FFUs required by using this formula:

No. of FFUs = (Air Changes/Hour ÷ 60) x (Cubic ft. in room ÷ 650*)

* CFM output of a loaded FFU

Thus, to meet Class 100 standard using the low-end air change recommendation (240/hour) inside a 12' x 12' x 7' cleanroom, with 1008 cu. ft. of volume, requires 6 FFUs. To meet the same standard using the high-end air change recommendation (480/hour) requires 12 FFUs.

Applying this formula to the remaining cleanliness classifications gives us guidelines for ceiling filter coverage (see Table 2).

Partitions: Creating "Clean Zones" to Optimize Performance and Economy

Of course, not every square inch of cleanroom space is used the same way. Often, performance can be optimized—and costs reduced—through the use of partitions to create multiple clean zones with varying degrees of cleanliness.

As requirements change, partitions can be removed and filter modules added or rearranged as needed. Highest ceiling filter density can be reserved for areas with the cleanest requirements and the most particles generated. Areas with fewer people or less demanding particle requirements are configured more economically with fewer filters.

Cleanroom Clean or Picture Perfect?

Terra appreciates the many comments we have received from cleanroom professionals regarding our catalog photos.

True, our cleanroom "workers" take liberties in their dress that yours cannot. Whether to demonstrate a product feature or simply to produce a more attractive image, our models occasionally forego their masks or hoods.

Rest assured: we wouldn't think of letting them in a cleanroom until they followed proper gowning protocol!

See page 286 for recommended gowning procedures

Cleanroom Lighting

Terra offers three lighting modules.

For applications that do not require 100% FFU ceiling coverage, 2' x 4' illuminators can be positioned in unused ceiling grids.

For applications that require total or near-total FFU ceiling coverage, teardrop and flow-through lighting modules are available. Teardrop fluorescent lights mount to the ceiling grid below the FFU. Their aerodynamic design does not interfere with the laminar airflow. Each of these single-tube lights requires 6" of vertical clearance below the FFU filter face.

As an alternative to teardrop lights, you can select 2' x 4' flow-through lights, which are stacked below the FFU. Flow-through lights add 4¾" to the ceiling height but require no vertical clearance below the filter face, making them ideal for low-ceiling cleanrooms.

Use these guidelines in selecting the appropriate number of lighting modules for your application:

Light Level	Viewing Requirements	Foot-Candles/Sq. Ft.
Dim	Large Part Sizes, High Contrast	20 - 50
Average	Small Part Sizes, Medium Contrast	100 - 200
Bright	Small Part Sizes, Low Contrast	200 - 500

No. of Fixtures
= (Desired foot-candles/sq. ft. x Room Area) ÷ 4560 (for 2' x 4' lights)
= (Desired foot-candles/sq. ft. x Room Area) ÷ 1260 (for teardrop lights)
= (Desired foot-candles/sq. ft. x Room Area) ÷ 3150 (for flow-through lights)

See page 209 for more information on lighting modules.

Your Best Approach? Thorough Evaluation and Careful Monitoring

Because no simple formula is right for every application, Terra cleanroom specialists work with you to design an effective, economical cleanroom configuration and monitoring program. If requirements change, terra's modular design allows you to add filters, lighting, ionization, or additional floor space—all at a fraction of the cost you'd face with other systems.

Static-Dissipative PVC Eliminates Contamination Magnets

- **Surface resistivity between 10^6 and 10^8 ohms/square**
- **Resists a wide range of acids and corrosive chemicals**
- **Eliminates particle attraction and build-up**
- **Renders nonconductive plastics obsolete in cleanroom applications**
- **See page 596 for full specifications and ordering information**

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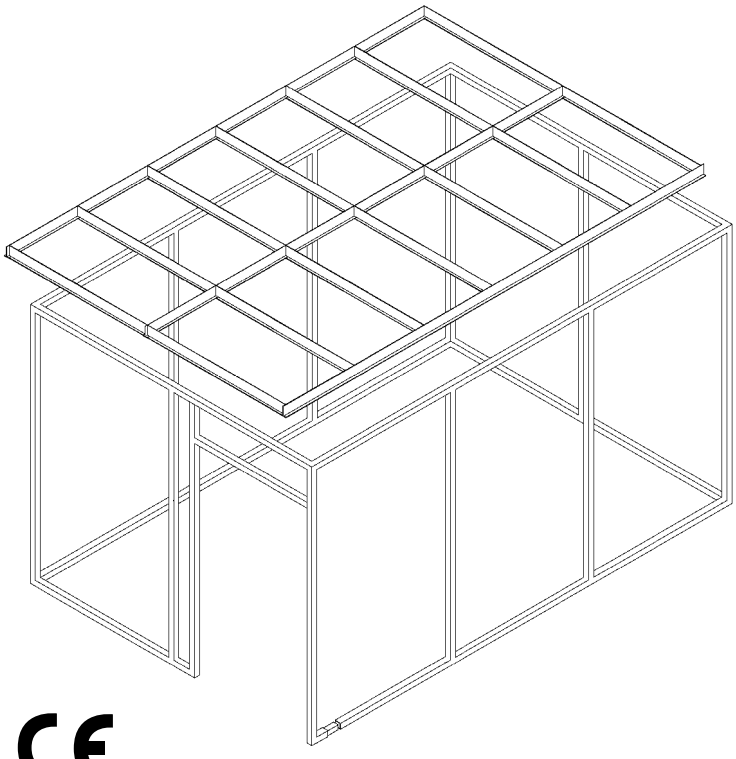
800 S. Raymond Ave., Fullerton, CA 92831 CA

Hardwall Cleanrooms

Terra's Hardwall Modular Cleanrooms provide the rigidity and durability of a freestanding room. All components are factory-assembled and tested before shipping, and on-site installation is usually completed in less than a day. Most standard models ship within 2 - 3 weeks.



CE

Cleanroom Support Frame

The support frame is fabricated of interlocking 1¾" powder-coated or epoxy-finished square steel uprights, cross sections, and ceiling members. Ceiling members are welded to steel T-bars, forming the 2' x 4' bays that support filters and lights. Vertical finishing strips, fabricated of mirror-finished 304 stainless steel, hold hardwall panels securely in place. Standard height is 7' measured from filter face to floor (8'3" overall), allowing installation beneath a standard 9' ceiling. Other heights are available.

Mirror-finish stainless steel panels and trim strips—durable and easy to clean.

Note: Spans over 12' require a center support post. Call for up-to-the-minute Fast-Track delivery times!

Standard Fast-Track Sizes: Call for current delivery times								Hardwall Cleanrooms—order Filter/Fan units separately	
Nominal* Dimensions	No. of Ceiling Bays	No. of Filter Modules to meet Fed Std 209 Class Standards (see pg. 12)						With Acrylic Panels Cat. #	Static-Dissipative PVC Panels Cat. #
		1	10	100	1,000	10,000	100,000		
8' x 8'	8	5 - 8	4 - 8	3 - 6	2 - 3	1 - 2	1	**6703-00**	**6703-07**
8' x 12'	12	7 - 12	6 - 12	4 - 8	3 - 5	2 - 3	1 - 2	**6703-01**	**6703-08**
8' x 16'	16	10 - 16	8 - 16	6 - 11	4 - 6	2 - 4	1 - 3	**6703-02**	**6703-09**
12' x 12'	18	11 - 18	9 - 18	6 - 13	5 - 7	3 - 5	1 - 3	**6703-03**	**6703-10**
12' x 16'	24	14 - 24	12 - 24	8 - 17	6 - 10	4 - 6	2 - 4	**6703-04**	**6703-11**

Prices include frame, ceiling T-grid , control panel, and side panels specified. Order access door(s), ceiling modules and other accessories separately. Standard door placement is on the right panel of the shorter-dimension wall (see illustration). Specify other desired location. Additional packaging and crating charges apply.
**** The inside and outside room dimensions are within an inch of the nominal sizes shown.***

Other Dimensions

Terra offers the engineering and fabrication expertise to meet your requirements for customized hardwall or softwall cleanrooms. Call to discuss your application!

To calculate prices for custom sizes, see page 206.

Operating/Installation Manual — Cat. # **6710-30**

Cleanroom Talk-Through

Several styles available, including amplified Talk-Through with messaging system. See page 213

Model shown — Cat. # **5050-50**

Hardwall Panels

Modular hardwall panels are cut in 4'-wide x 7'-high panels. They are available in two rigid materials:

Acrylic Panels offer full visibility and outstanding tensile strength. These economical panels are lightweight and easy to clean. Standard panels are clear, but black and amber panels are also available for an additional charge of $500 per cleanroom (tinted panels may extend lead time).

Static-Dissipative PVC Panels are recommended for the most contamination-sensitive applications because of their ability to control particles along with static charges. The friction created by a laminar airflow generates surface charges on nondissipative walls, which in turn attract and hold particles. Your cleanroom wall becomes a particle magnet!

Dissipative PVC safely conducts these surface charges to ground, protecting against potentially damaging ESD (electrostatic discharge) as well as particulate contamination. Dissipative layers are molecularly embedded for optimal durability. Surface resistivity: 10^6 - 10^8 ohms/sq. cm (ASTM-D257). See page 596 for specifications.

IsoVent™ Air Release Vent

Each of the standard plastic panels features a series of exhaust vents, covered by a flexible static-dissipative PVC strip to prevent particulate influx. These IsoVents ensure adequate positive pressure inside the enclosure, independent of filter configuration.

Standard Swing Door

Sliding Door

Strip Shield Door

Standard Door

Aluminum frame with choice of acrylic or static-dissipative PVC panel and magnetic closure. Standard mounting is on center panel of longer wall; specify other desired location.

Door Panel Material	Single Door (80"H x 36"W) Cat. #	Double Door (80"H x 72"W) Cat. #
Acrylic	**6710-14**	**6704-00**
Static-Dissipative PVC	**6710-15**	**6704-01**

Sliding Door

This aluminum-frame door slides open along an extruded aluminum track to an opening of 36". Requires two 4-foot panels for installation. Standard model slides open from right to left; specify left to right slide, if desired. Overall dimensions: 40" W x 82" H

Door Panel Material	Cat. #
Acrylic	**6704-02**
Static-Dissipative PVC	**6704-03**

Strip Shield Door

Strip shields can be mounted in place of a standard door or 4-foot hardwall panel at any location along the perimeter of the cleanroom. ***See page 205 for ordering information.***

Control Panel (included standard)

Mounted to the right of the access door, this panel allows convenient control of filter/fan units, lights, ionizing modules, and other environmental monitoring equipment selected for your hardwall modular cleanroom. Fabricated of stainless steel. A Control Panel, configured to accommodate options specified with the order, is included with each hardwall cleanroom.

Removable Service Panel

Allows convenient servicing of equipment installed inside the enclosure, with minimal disruption of the internal environment.

Cat. #
6704-04

Partitions & Ante-Chambers

Antechambers serve as cleansing air showers to remove loose contaminants from personnel entering the cleanrooms; as staging areas where materials are kitted, cleaned, or otherwise prepared for cleanroom processing; or as gowning areas. ***Partitions*** create multiple clean zones to meet varying cleanliness requirements inside a single cleanroom (see page 198). Partitions can be ordered with any standard panels, including strip curtains or access doors to divide adjacent areas. Call Terra for assistance in configuring an antechamber or partition for your requirements!

Note: Partitions and antechambers must be specified when cleanroom is ordered.

Order Access Doors Separately	Acrylic Cat. #	Panel Material Static-Dissipative PVC Cat. #
Partitions*		
8'	**6703-21**	**6703-28**
12'	**6703-22**	**6703-29**
16'	**6703-23**	**6703-30**
Ante-Chambers		
4' x 4'	**6703-25**	**6703-32**
4' x 8'	**6703-26**	**6703-33**
4' x 12'	**6703-27**	**6703-34**

**** For other partition lengths, use these per-foot prices: $175.00 (acrylic), $350.00 (SDPVC).***

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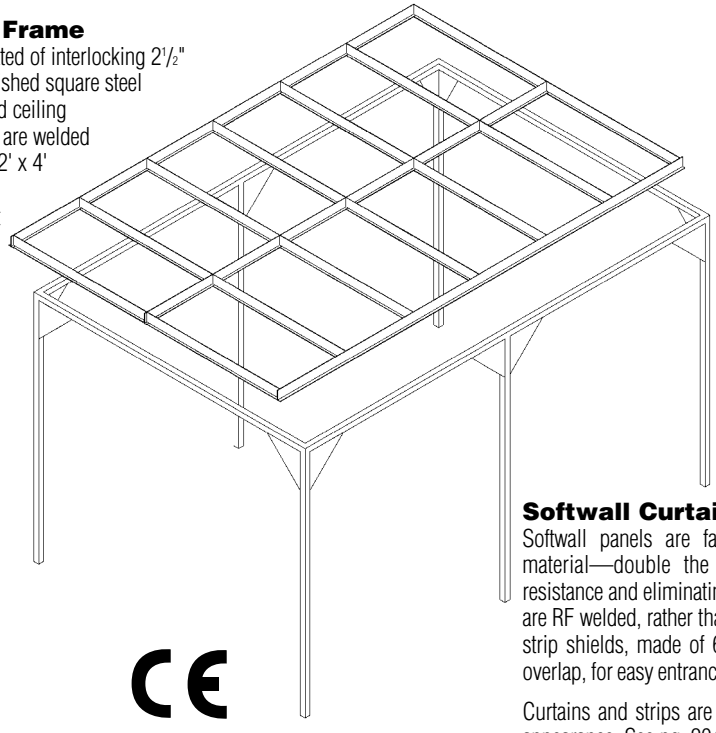
800 S. Raymond Ave., Fullerton, CA 928

Softwall Cleanrooms

Terra's Softwall Modular Cleanrooms provide an economical, versatile solution to clean manufacturing requirements in semiconductor, medical device, and many other industries. Portable, expandable, and easy to assemble/disassemble, these cleanrooms are also available on an accelerated delivery program to meet your tight production schedule!

Softwall Support Frame

The support frame is fabricated of interlocking 2½" powder-coated or epoxy-finished square steel uprights, cross sections, and ceiling members. Ceiling members are welded to steel T-bars, forming the 2' x 4' bays that support filters and lights. Corner reinforcement gussets ensure a rigid structure. Optional heavy-duty casters allow easy repositioning after installation. Standard height is 7' measured from filter face to floor (8' 3" overall), allowing installation below a standard 9' ceiling.



Note: Walls over 8' long require an additional vertical support member. Spans over 12' require

CE

Softwall Curtains & Strip Shields

Softwall panels are fabricated of heavy-duty, blur-free 40 mil material—double the industry standard—ensuring enhanced tear resistance and eliminating the need for unsightly sewn sash weights. Curtains are RF welded, rather than sewn, for improved cleanliness and durability. Vinyl strip shields, made of 60-mil material, come standard in 8" widths, with 2" overlap, for easy entrance or exiting. Polysim shields are 12" wide, 40 mil thick.

Curtains and strips are available in three materials, in either clear or frosted appearance. See pg. 204 for ordering information.

Cleanroom-Grade Vinyl is fire retardant and low outgassing.

Static-Dissipative Vinyl is manufactured with permanent built-in static inhibitors that, unlike topical treatments, will not wear off.

Call for up-to-the-minute Fast-Track delivery times!

Fast-Track Sizes: Softwall Modular Cleanrooms								Frame Only	Softwall Panel Kits*		
Nominal** Dimensions	No. of Ceiling Bays	No. of Filter Modules to meet Fed Std 209 Class Standards (see pg. 198)						Order Panel Kit at right (or see pg. 204) Cat. #	Standard Vinyl Cat. #	Anti-Static Vinyl Cat. #	Polysim (non outgassing) Cat. #
		1	10	100	1,000	10,000	100,000				
8' x 8'	8	5 - 8	4 - 8	3 - 6	2 - 3	1 - 2	1	**6703-42**	**6703-49**	**6703-56**	**6703-63**
8' x 12'	12	7 - 12	6 - 12	4 - 8	3 - 5	2 - 3	1 - 2	**6703-43**	**6703-50**	**6703-57**	**6703-64**
8' x 16'	16	10 - 16	8 - 16	6 - 11	4 - 6	2 - 4	1 - 3	**6703-44**	**6703-51**	**6703-58**	**6703-65**
12' x 12'	18	11 - 18	9 - 18	6 - 13	5 - 7	3 - 5	1 - 3	**6703-45**	**6703-52**	**6703-59**	**6703-66**
12' x 16'	24	14 - 24	12 - 24	8 - 17	6 - 10	4 - 6	2 - 4	**6703-46**	**6703-53**	**6703-60**	**6703-67**
16' x 16'	32	19 - 32	16 - 32	11 - 22	8 - 13	5 - 8	2 - 5	**6703-47**	**6703-54**	**6703-61**	**6703-68**
20' x 20'	50	30 - 50	25 - 50	18 - 35	13 - 20	8 - 13	3 - 8	**6703-48**	**6703-55**	**6703-62**	**6703-69**

**** Order frame separately. Kits include 6'6"-H 40 mil clear curtains of material indicated and 4'-wide 60 mil strip door with alternating clear/frosted 8"-W strips. (Polysim strips are 40 mil, 12"W).***

***** The inside and outside room dimensions are within an inch of the nominal sizes shown. Additional packaging and crating charges apply.***

Other Dimensions

Terra offers the engineering and fabrication expertise to meet your requirements for customized hardwall or softwall cleanrooms. Call to discuss your application!

	Cat. #
Operating/Installation Manual	**6710-30**

Non-outgassing Polysim X1200 is made from inherently static-dissipative polyurethane that provides permanent, humidity-independent ESD protection for sensitive manufacturing conditions. Polysim contains no plasticizer, making it virtually non-outgassing.

Softwall panels and strip shields attach to the support frame by means of a unique noncontaminating Flex Track mounting system that eliminates cracks and seams where germs or particles can collect. Other mounting systems are available.

Note: Softwall curtains are notched and heat-formed to ensure a snug fit at all corners. In standard installations, curtains do not exceed runs of 16 feet (or else they become difficult to install). Where two curtains join, the curtain panels overlap by 6". To prevent personnel from parting curtains at these seams, order optional Dual-Lock Velcro®, magnetic closures, or attachment clips at right. See following pages for more information.

Strip Doors

Strip shields can be ordered in convenient widths to create access doors for softwall or hardwall cleanrooms. By alternating strips of clear vinyl with frosted vinyl, you eliminate both sticking and air gaps, creating entrances that are cleaner and easier to walk through.

Note: Strip doors are free-hanging—standard installations do not include attachment of the two sides to adjacent curtains or frame. If you prefer side attachments, order optional Dual Lock Velcro® or magnetic strips.

Casters

Stainless steel swivel casters feature nonshedding polyurethane wheels. Capacity: 300 lbs. each. Order one per vertical post. Price includes installation.

	Cat. #
6"-diameter locking caster (Raises cleanroom $7^{3}/_{16}$")	**6704-08**

Dual-Lock Velcro® Strips

For sealing curtains or strip shields to frame supports or overlap areas, Terra offers non-particulating, clear 3M Dual-Lock Velcro® with plasticizer-resistant adhesive. These strips are ideal for application along the vertical frame uprights or along the vertical length of a curtain or strip, allowing corner or overlap attachment that minimizes air leaks. Price includes sewing of mating strips to specified curtains. Use quantity to specify desired number of feet.

Cat. #
6704-05

Flexible Magnet Strip Self-Closures

Flexible, chemical-resistant magnet strips are ideal for a variety of custom closure needs. Price includes sewing to specified curtain. Use quantity to specify desired number of feet.

Cat. #
6704-06

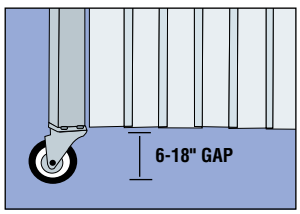
Snap-Tite™ Clips

Ideal for securing two curtains together. Each two-piece plastic clip snaps together through a hole in the curtains.

Cat. #
6704-07

See following pages for other closures and fastening options!

Selecting the Proper Panel Length



All softwall cleanrooms require some gap between the curtain and the floor to allow air to escape. If this gap is too narrow to accommodate the flow of air generated by the ceiling filter fans, then curtains and strips will billow outward. If it is too big, the cleanroom will not maintain adequate positive pressure.

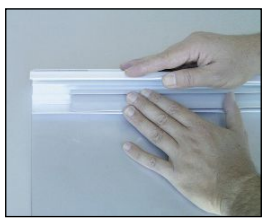
In general this formula helps you determine how long the curtains should be:

$$\text{Gap between curtain and floor} = \frac{\text{Total surface area of filters in ceiling grid}}{\text{Perimeter of cleanroom}}$$

For a 16' x 16' cleanroom with 7 ceiling filter fans, this gap should be about 10.5" (56 sq. ft. of filter ÷ 64 ft. [perimeter] = .875 ft. gap). This is exactly the gap produced when a 6' curtain is installed on a standard cleanroom frame, since the curtain bead is mounted about 1.5" below the filter face (6'10.5" above the floor). If the same cleanroom included casters, which raise the cleanroom about 6", then a 6'6" curtain would be appropriate.

Refer to curtain ordering chart on the following pages to select the curtain height for your application. The plastic curtain material is easy to trim to the exact size you require.

Unique Flex Track System: Cleanest in the Industry!



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Softwall Curtains and Strip Shields

- **Industry-leading fabrication and mounting technology gives you the cleanest, most durable curtains and strip panels available**
- **Ideal for creating partitions inside a hardwall or softwall enclosure**
- **Suitable for all classes of cleanrooms and all levels of process isolation**
- **Available in three materials, including nonoutgassing, static-safe Polysim X1200**
- **Standard one-piece Flex Track mounting system is easy to clean, eliminates exterior crevices where contaminants can collect**
- **Heavy-gauge materials hang straight, without the need for sewn hems or cumbersome sash weights**
- **Unique T-Bar Mounting System allows suspension of curtains or strip shields from existing cleanroom T-grids**
- **Many additional configurations available, including other colors, thicknesses and strip shield widths—call Terra with your requirements!**

These softwall curtains and strip shields are ideal for use with Terra's free-standing Softwall Cleanrooms on the previous pages. They can also be installed directly onto existing walls or ceilings using the versatile Flex Track mounting system.

Either way, you receive the cleanest, most durable panels available. Standard softwall curtains are fabricated of heavy-duty, blur-free 40 mil material—double the industry standard—ensuring enhanced tear resistance and eliminating the need for unsightly sewn sash weights. Curtains are RF welded, rather than sewn, for improved cleanliness and durability. Strip shields, made of 60 mil material, come standard in 8" widths, with 2" overlap, to form parting doors or reach-throughs. Polysim shields are 40 mil x 12"W.

Select the panel material to meet your application requirements. Cleanroom-Grade Vinyl is fire retardant and low-outgassing. Static-Dissipative Vinyl adds permanent built-in static inhibitors that, unlike topical treatments, will not wear off. Tests performed per ASTM D257 show surface resistivity of 1.8×10^{10} ohms/sq.

Non-outgassing Polysim X1200 is made from an inherently static-dissipative polyurethane that provides permanent, humidity-independent ESD protection from sensitive manufacturing conditions. Polysim contains no plasticizer, making it virtually non-outgassing. All materials meet California Fire Marshall Code, passing UL 94V-0 flame test criteria.

Ordering Guide

Select the height and material desired for flexible curtain panels. Pricing is per linear foot. Use quantity to indicate the length in feet of the curtain or strip panel (e.g., quantity 8 = an eight-foot run of material of the specified height). Flex Track mounting is standard; specify any other desired mounting system (see top of facing page).

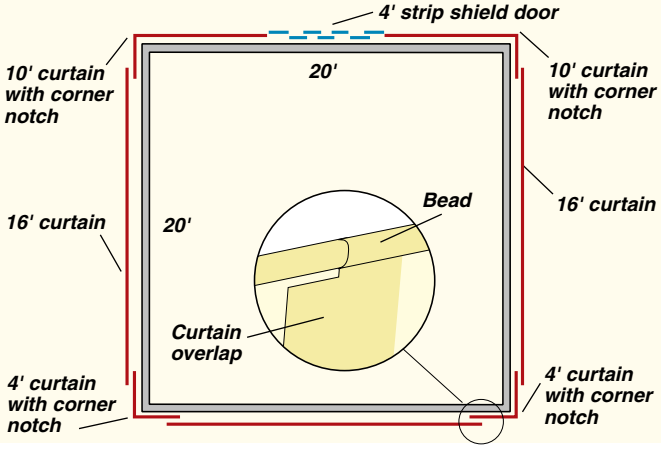
When ordering with Terra's Softwall Cleanroom, provide a drawing that shows the nominal dimensions and floorplan of your cleanroom. If you select curtain panels, indicate the location and width of any desired access door.

Based on your drawing, Terra will configure the optimal curtain placement. On a standard basis, an access door, made of alternating clear/frosted strip shields of the curtain panel material specified, will be installed at the location you indicate.

In the example below, an order for 80' of panel would be processed according to the drawing to include four corners and four feet of alternating clear and frosted strip shields positioned in the center of one side.

Please note these construction details:

- Maximum curtain length is 16 feet (to facilitate installation).
- Corners are notched and heat-formed to ensure a snug fit against frame corners.
- Adjacent panels overlap by 6", which generally provides an adequate air barrier.
- To prevent personnel from using these overlaps as entries, select Snap-Tite™ clips, Dual-Lock Velcro®, or magnetic closures from page 203.

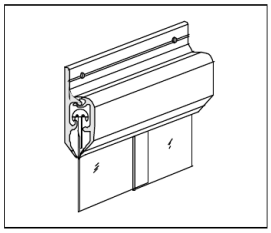


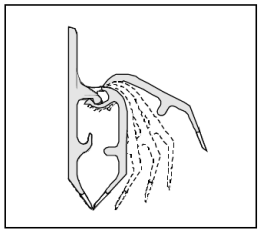
Clear Panels—Flex Track mounting system included in all softwall cleanrooms.

40 mil Clear Softwall Curtain Panels

Height	Vinyl Cat. #	Anti-Static PVC Vinyl Cat. #/Linear ft.	Polysim (non outgassing) Cat. #/Linear ft.
4'	1320-00	1320-12	1320-24
5'	1320-01	1320-13	1320-25
6'	1320-02	1320-14	1320-26
6' 6"	1320-03	1320-15	1320-27
7'	1320-04	1320-16	1320-28
7' 6"	1320-05	1320-17	1320-29
8'	1320-06	1320-18	1320-30
8' 6"	1320-07	1320-19	1320-31
9'	1320-08	1320-20	1320-32
9' 6"	1320-09	1320-21	1320-33
10'	1320-10	1320-22	1320-34

Flex Track mounts are included for all panels listed below. Call Terra for pricing on other mounting systems.





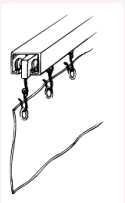
Flex Track (standard)

Industry-first design eliminates all cracks and crevices where dust and germs can collect. One-piece mounting track, made of rigid white PVC, incorporates flexible hinge and bottom flanges. Snaps open and shut for quick, easy assembly. Compatible with T-Bar Mount for use with existing ceiling T-grids. Non-corrosive and easy to clean.

Suspended T-Bar Mount

Available for the Flex Track, the T-bar mount allows suspension of a curtain from standard T-grid ceiling without the need for ceiling disassembly. Perfect for partitioning a hardwall or softwall cleanroom into multiple clean zones, or for establishing temporary isolation areas!

	Cat. #
For 2" Ceiling Grid Supports	**6704-23**
For 1.5" Ceiling Grid Supports	**6704-24**



Bi-Folding Curtain Mount

Available in anodized aluminum or stainless steel, this system allows softwall curtains to be easily retracted or extended along a heavy-duty, smooth rolling track. Contact Terra for ordering information.

Closures

See page 203 for several ways to fasten curtains and strips together or to attach either to a vertical frame, thereby minimizing air leaks and preventing personnel from using overlaps as entries.

Clear Strips

Alternating Clear and Frosted Strips

	Clear Strip Shields (2" overlap)			Alternating Clear/Frosted Strip Shields (2" overlap)		
Height	**Vinyl** 60 mil x 8" w Cat. #/Linear ft.	**Anti-Static Vinyl** 60 mil x 8" w Cat. #/Linear ft.	**Polysim** (non outgassing) 40 mil x 12" w Cat. #/Linear ft.	**Vinyl** 60 mil x 8" w Cat. #/Linear ft.	**Anti-Static Vinyl** 60 mil x 8" w Cat. #/Linear ft.	**Polysim** (non outgassing) 40 mil x 12" w Cat. #/Linear ft.
4'	**1320-36**	**1320-48**	**1320-61**	**1320-73**	**1320-85**	**1320-97**
5'	**1320-37**	**1320-49**	**1320-62**	**1320-74**	**1320-86**	**1320-98**
6'	**1320-38**	**1320-50**	**1320-63**	**1320-75**	**1320-87**	**1320-99**
6' 6"	**1320-39**	**1320-51**	**1320-64**	**1320-76**	**1320-88**	**1321-00**
7'	**1320-40**	**1320-52**	**1320-65**	**1320-77**	**1320-89**	**1321-01**
7' 6"	**1320-41**	**1320-53**	**1320-66**	**1320-78**	**1320-90**	**1321-02**
8'	**1320-42**	**1320-54**	**1320-67**	**1320-79**	**1320-91**	**1321-03**
8' 6"	**1320-43**	**1320-55**	**1320-68**	**1320-80**	**1320-92**	**1321-04**
9'	**1320-44**	**1320-56**	**1320-69**	**1320-81**	**1320-93**	**1321-05**
9' 6"	**1320-45**	**1320-57**	**1320-70**	**1320-82**	**1320-94**	**1321-06**
10'	**1320-46**	**1320-58**	**1320-71**	**1320-83**	**1320-95**	**1321-07**

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Customized Terra Cleanrooms: *Made to Your Specs, Delivered to Your Schedule!*

When you specify a custom Terra Modular Cleanroom, you receive a processing environment designed to meet the most critical particle requirements at a faction of the expense of a fixed installation. In fact, the square-foot cost of a Terra enclosure is typically less than one-tenth that of a fixed (permanent) cleanroom.

These systems provide unsurpassed value and performance. Unlike other modular cleanrooms, Terra enclosures are fabricated from powder-coated or epoxy-finished steel, unique in an industry that supplies aluminum frames with far lower strength

Softwall Cleanroom Frame

For standard Fast-Track designs, see pg. 202. For other sizes,

a. Add wall lengths together to figure total perimeter (in feet). Use this figure to select softwall curtains on page 204.
b. Calculate the area of the filter grid (in square feet) by multiplying the side dimensions. For an irregular floorplan, add areas of the component rooms.
c. Divide the total area by 8 (the area, in square feet, of one FFU) to get number of 2' x 4' grid sections. You will need this number to calculate the number of FFUs.
d. The frame cost = $960.00 + ($12.00 x square feet).

Hardwall Cleanroom Frame and Panels

For standard Fast-Track designs, see pg. 200.
For other sizes,

a. Add wall lengths together to figure total perimeter (in feet).
b. Multiply perimeter by the appropriate pricing constant:

	For Acrylic Panels	For Dissipative PVC Panels
7' high	$175	$350
8' high	$210	$420
9' high	$235	$445
10' high	$260	$470

c. Calculate the area of the filter grid (in sq.feet) by multiplying the side dimensions. For an irregular floorplan, add areas of the component rooms.
d. Divide the total area by 8 (the area, in square feet, of one FFU) to get number of 2' x 4' grid sections.
e. Multiply the number of grid sections (rounded up to the nearest whole number) by $96.
f. Add perimeter cost (from line b) to ceiling grid cost (line e) to determine total frame cost.

Example—see illustration above

a. 15 + 15 + 15 + 12 + 20 + 12 + 5 = 94 feet (excluding antechamber)
b. 94 feet x $210 (for 8-foot acrylic hardwall cleanroom) = $19,740.00
c. Filter Grid Area = (20' x 12') + (15' x 15') = 465 square feet
d. 465 ÷ 8 = 58.125
e. 59 x $96 = $5,664.00
f. $19,740.00 + $5,664.00 = $25,404.00 (excluding antechamber)

Filter/Fan Units (FFUs)

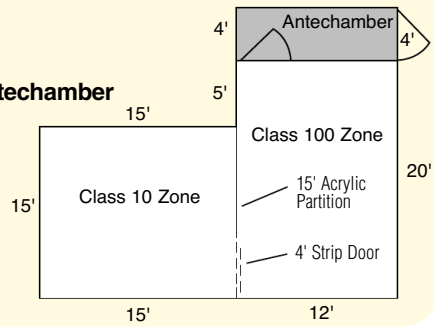
a. Refer to page 198 for guidelines on selecting the appropriate number of FFUs for your cleanliness requirements. Use Table 2 to determine the desired ceiling coverage (expressed as a percentage).
b. Divide the total area of your cleanroom by 8 to determine the number of sections in your cleanroom grid. Multiply this value by the appropriate percentage of ceiling filter coverage to determine the required number of FFUs.
c. Select the appropriate FFU type (110/220VAC, HEPA or ULPA filter).

Example

a. Because the multi-zone design tends to minimize operator-generated contamination in cleanest areas, mid-range coverage values are recommended. Hence,
For Antechamber (Class 10,000): 20% (HEPA filters)
For Class 100 Zone: 50% (HEPA filters)
For Class 10 Zone: 70% (ULPA filters)
b. Antechamber = (4' x 8') ÷ 8 = 4 sections x 20% = 1 FFU
Class 100 = (20' x 12') ÷ 8 = 30 sections x 50% = 15 FFUs
Class 10 = (15' x 15') ÷ 8 = 28 sections x 70% = 20 FFUs*
*A 15' x 15' ceiling grid accommodates only (21) 2' x 4' FFUs, which provide 75% ceiling coverage. If this figure is inadequate to meet Class 10 conditions, optional 2' x 2' FFUs are provided for placement in the smaller bays around the periphery of the ceiling grid.
c. 16 x $695.00 = $11,120.00 for HEPA FFUs
20 x $795.000 = $15,900.00 for ULPA FFUs

EXAMPLE

Height: 8 feet
Material: Acrylic
Cleanliness:
Class 10,000 Antechamber
Class 100 zone
Class 10 zone



Lights

Each 4-tube, 2' x 4' lighting fixture provides 4560 foot-candles. Each 4' single-tube teardrop light provides 1260 foot-candles. Lighting recommendations:

	Dim Lighting	Average Lighting	Bright Lighting
Viewing Requirements:	Large Part Sizes, High Contrast	Small Part Sizes, Medium Contrast	Small Part Sizes, Low Contrast
Foot-Candles/sq.ft.:	20 - 50	100 - 200	200 - 500

No. of Fixtures
= (Desired foot-candles/sq. ft. x Room Area) ÷ 1260 (for teardrop lights)
= (Desired foot-candles/sq. ft. x Room Area) ÷ 4560 (for 2' x 4' lights)
= (Desired foot-candles/sq. ft. x Room Area) ÷ 3150 (for 2' x 4' flow-through lights)

Example

Based on average (150 fc/sq. ft.) lighting requirement, recommended quantities are 10 standard 2' x 4' light modules (for Class 10,000/100 zones) and 11 2' x 4' flow-through lights (for Class 10 zone).

Blank Ceiling Panels

Once you have selected the desired number of FFUs and ceiling lights, you will need to specify blank ceiling panels to cover all unused sections of the ceiling grid.

a. Subtract the combined number of FFUs and lights from the total number of ceiling grid sections in your cleanroom.
b. Select this number of ceiling panels.

Example

For Antechamber: 4 bays - (1 FFU + 1 light) = 2 panels
For Class 100 Zone: 30 bays - (15 FFUs + 9 lights) = 6 panels
For Class 10 Zone: 32 bays - (20 FFUs) = 12 panels (11 are cut to fit irregular ceiling panel sections)

Access Doors

Don't forget to specify the door style and location! See page 201.

Example

(2) Standard Doors @ $ 750.00 each = $ 1,500.00
(4) Linear feet of Strip Shield Door @ $ 47.00 each = $ 188.00

Other Options—Refer to the pages below for more information

Partitions and Antechambers	— ***201***	Ionizing Modules	— ***209***
Electrical, Vacuum & Gas Utilities	— ***210***	Fire Detection System	— ***211***
EnviroWatch & Airflow Meters	— ***212***	Wall-Mount Benches & Shelves	— ***214***
Pass-Throughs	— ***215***	Air Conditioning	— ***210***
Service Utility Panel	— ***201***	Talk-Throughs	— ***213***

Example

Partition: 15 ft. x $210.00 / foot (for 8' acrylic panels) = $3,150.00
Antechamber: $2,532.00 for 4' x 12' acrylic chamber (see page 201)

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FAX-BACK CLEANROOM CHECK LIST

ratings. Our application specialists carefully review your contamination, lighting, and temperature requirements to guarantee the optimal configuration (see pages 198 - 199 for technical guidelines).

Finally, Terra fully assembles and tests each room before shipping. You can be sure it arrives ready for rapid re-assembly and use, without the hassles, delays and expenses associated with contractor-installed facilities.

Use the guidelines below to assist you in estimating the expense of a room customized to your specifications. Begin by sketching your desired floorplan (see sample application). To help us configure the room you need, please complete the fax-back form below.

For pricing on standard cleanrooms, or for an electronic checklist, click on "Modular Cleanrooms" at Terra's website: www.TerraUniversal.com.

FAX-BACK **Cleanroom Check List:** ***I want*** ❑ ***Hardwall (pg. 200)*** ❑ ***Softwall (pg. 202)***

Client			Contact	Function
End User		Job Title	Phone	Fax
City/State	Terra Install?	Voltage	e-mail	

		Main Room	Ante-Chamber
1	Size of the room in feet (length x width)		
2	Class (10, 100, 1,000, 10,000, 100,000)		
3	Cleanroom height—floor to filter face (Standard is 7' without casters)		
4 a 4 b	Hardwall Material: Acrylic or static dissipative PVC Softwall Material: Vinyl or static-dissipative vinyl		
5	Light intensity needed (low, medium [general work], high [small parts])		
6 a 6 b	Hardwall Doors—Specify type (hinge or slide) and wall position. Specify swing—standard is out of cleanroom. Softwall Doors—Specify Clear or Clear/Frost, lengths and wall positions		
7	Electrical outlets—specify number, voltage & locations		
8	Vacuum connections—specify number and locations		
9	Gas connections—specify number and locations		
10	Ionizing equipment needed (Y/N)?		

11	Pass throughs – specify material, size & locations (hardwall only)	Material	Size	Locations
12	Room partitions – Strip or solid, partition length & location?	Type	Length of Partition	Location
13	Height of the room into which the cleanroom will be built, in feet.			

If air conditioning is needed, please supply the following information (hardwall designs only):

14 a	Temperature and RH of the room into which the cleanroom will go.	Fahrenheit	RH
14 b	What heat sources (people, machinery) will be in room?		
14 c	What temperature and RH are to be maintained inside the cleanroom?	Fahrenheit	RH

15 Accessories to consider:	Magnehelic® (airflow monitor)	RH Controls (hardwall only)	Removable Service Panel (hardwall only)
Casters (Y/N) - softwall only	Wall Mount Shelves (#, size, Hardwall only)	Wall Mount Tables (#, size, hardwall only)	EP Work stations
Garment Racks	Garment / Storage Cabinets	Gowning Bench / Bootie Racks	Cleanroom Chairs
Air Guard Velocity Meter	EnviroWatch Monitor	Particle Counters Step	Ladders / WIP Racks
Sticky Mats	Shoe Cleaner / Vacuum Cleaner	Waste Receptacles (#, size)	Hand Washer/Dryer

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Interchangeable Ceiling Modules—for the Ideal Work Environment

The following pages provide ordering information on Filter/Fan Units (FFUs), Fluorescent Light Modules, Ceiling Panels, and Ionizing Bars, which are installed on the cleanroom ceiling T-bar grid.

All ceiling modules can be used in any standard Terra hardwall or softwall cleanroom. Prices include installation using NEC-compliant electrical connections. Controls are mounted on the cleanroom control panel next to the main access door, accessible from the outside of the cleanroom (see page 201). You receive a turnkey cleanroom that's ready for service!

Refer to the "Application Guidelines" on page 198 for recommendations on quantities to meet specified requirements for cleanliness and lighting.

Filter/Fan Unit (FFU)

- **Fits all standard Terra T-bar ceiling grids**
- **Provides an average air flow velocity of 90 feet per minute (.45 m/sec) and air flow of 650 CFM (1102 m³/hour) under filter load, per FED-STD-209 cleanroom requirements (2 x 4 model)**
- **Lowest noise level of any low-profile fan unit: 50dBA, measured 30" from filter face @ 90 FPM**
- **Low-Profile design allows installation of a 7'-high cleanroom beneath a standard 9' ceiling**
- **Exceeds IES RP-2 recommendations**

2 x 4 Model

These reliable, self-powered Filter/Fan Units provide a reliable flow of microfiltered air to meet any cleanliness standard down to Class 1 (per FED-STD-209).

Patented baffling technology ensures uniform airflow across the filter face and attenuates sound for the lowest noise level in the industry: approximately 53 dBA (measured no more than 30" from the filter face) with ambient sound level less than 45 dBA. Select HEPA (High-Efficiency Particulate Air) filter, rated 99.99% efficient @ removal of particles 0.3µm and larger, or ULPA (Ultra-Low Penetration Air) filter, rated 99.9995% efficient @ removal of particles 0.128µm and larger.

The durable aluminum lid and body enclose a forward-inclined centrifugal-type fan/motor with permanently lubricated bearings. Exceeds IES RP-2 recommendations. 2 x 4 models are UL listed; 220V models are CE marked.

Specifications

Average airflow velocity:	90 (±10) FPM (.45 m/sec) at low speed, measured 6" below filter face
Sound level:	50 dBA (with optional speed control), measured no more than 30" from filter face @ 90 FPM
Vibration level:	0.09 MILS
Housing:	0.63-inch thick aluminum with mill finish; includes integral air baffle system to ensure even air distribution
Power Requirements:	115/230VAC, 50/60Hz (see chart below).
Fan/motor:	Direct drive, forward curve, centrifugal type with sealed bearings; rated for continuous duty; furnished with overload protection and a two-speed switch. Rated ¼ HP @ low speed (⅓ HP at high speed).
Air flow (2 x 4):	650 CFM (.329 m/s) of air at filter pressure drop from 0.35 to 0.795 inches W.G. (87 Pa to 198 Pa), at 90 FPM
Prefilter:	16" x 23.25" x .5" Polyurethane foam (washable)

Ordering information includes turnkey installation at specified location(s) and includes wiring and panel-mount on/off control. Gel-sealed and DOP-tested and certified units available; call Terra for pricing.

See page 198 for filter application guidelines!

Filter Fan Units

Model	Dimensions Inches (mm)	Weight Lbs. (Kg)	Avg. CFM @ 90 FPM Low Speed	Motor Size (HP) Low Speed	Motor Size (HP) High Speed	Power Requirements	Run Amps* Low 50Hz	Run Amps* Low 60Hz	Run Amps* High 50Hz	Run Amps* High 60Hz	Watts @90 FPM	Sensible Heat (BTU/Hr.) @90FPM	With HEPA Filter Cat. #	With ULPA Filter Cat. #
2 x 4	23.63 x 47.63 x 12.25	63	650	¼	⅓	115VAC, 60Hz	—	2,5	—	3.2	312	1065	**6701-99**	**6702-01**
	(600 x 1209 x 311)	(28.58)				220 VAC, 50/60Hz	1.7	2.0	2.1	2.4	305	1042	**6702-99-220**	**6702-01-220**
2 x 3	23.63 x 35.63 x 12.25	50	480	¼	⅓	115VAC, 60Hz	—	2.3	—	3.1	238	812	**6702-08**	**6702-12**
	(600 x 905 x 311)	(22.68)				220 VAC, 50/60Hz	1.5	1.9	1.8	2.3	232	792	**6702-08-220**	**6702-12-220**
2 x 2	23.65 x 23.65 x 12.25	40	360	¼	⅓	115VAC, 60Hz	—	2.0	—	2.8	242	824	**6702-10**	**6702-13**
	(600 x 600 x 311)	(18.14)				220 VAC, 50/60Hz	1.5	1.6	1.7	1.9	180	615	**6702-10-220**	**6702-13-220**

**** Full Load Nameplate Amps @ 115VAC=4.5; A 220VAC=1.7***

Ionizing AeroBar®

- **Provides a continuous stream of static-neutralizing ions to protect sensitive materials against ESD**
- **Attaches to ceiling T-grid without disrupting the laminar flow in the cleanroom**
- **Patented IsoStat technology guarantees intrinsically balanced ionization without complicated feedback circuits**
- **Requires no calibration—automatically maintains ion balance of ± 50 volts**

The Ionizing AeroBar® generates a balanced stream of positive and negative ions to neutralize surface static charges, safeguarding ESD-sensitive materials.

Patented IsoStat technology makes it one of the most reliable ionizers available. It emits equal numbers of positive and negative ions and requires no calibration or adjustments. Steady-state DC ion emission provides effective discharge, and mounting beneath ceiling filter/fan units ensures even distribution throughout the area below.

Discharge times directly under the AeroBar average 28 seconds (from ± 1,000 volts to 100 volts, measured in a 4-foot laminar flow hood in accordance with Ionization Standard ANSI ESO/ESD S3.1-1991 of the ESD Association).

Price includes installation (specify desired location).

CE

Specifications

Input	24 VAC, from wall transformer (included)
Power Indicator	Green LED
Ion Emission	Steady-state DC, 15 micro-amps maximum output current
Emitter Points	Replaceable machines titanium, 3-year estimated life (field replaceable)
Air flow	60 fpm (.045 m/s) minimum required at bar for proper operation
Dimensions	2.1"H x 1.2"W x 44" (5.3 x 3.0 x 111.8 cm)
Weight	35.2 oz. (1 kg)
Warranty	2-year limited warranty

	Cat. #
110VAC, 50/60Hz	**6704-17**
220VAC, 50/60Hz	**6704-18**

Fluorescent Lights

- **Make it easy to configure the optimal lighting for your application (see page 198 for guidelines)**
- **Select 2' x 4' ceiling module for placement in the ceiling grid, or Teardrop Lights for installation below the grid**
- **Flow-Through units are ideal with dense FFU ceiling coverage**

Teardrop Lights

Ideal for Class 1 or Class 10 cleanrooms, in which near-100% filter coverage of the ceiling leaves no space for standard fluorescent light modules. Teardrop lights are suspended beneath filter modules, and their aerodynamic design ensures minimal interference of the laminar airflow. Dimensions: 48"L x 2"D x 6"H. Intensity: 1,260 foot candles. Price includes installation (specify desired location when ordering).

2' x 4' Ceiling Module

This 2' x 4' aluminum housing includes four fluorescent light tubes, providing 4,560 foot candles. Price includes installation (specify desired location when ordering).

Flow-Through Module

Low-profile, fluorescent-tube module stacks beneath a 2' x 4' FFU. Adds 4¾" to ceiling height. Intensity: 3,150 foot candles.

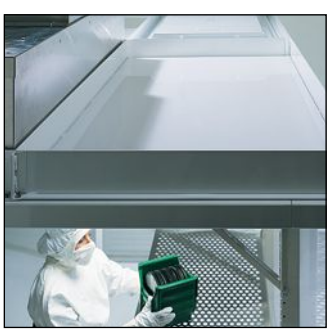
Ordering Information	Fluorescent Illuminators		
Module Type	Intensity (Foot candles)	115VAC, 60Hz Cat. #	277VAC, 60Hz Cat. #
2' x 4' Ceiling Module	4,560	**3800-80**	**3800-80**
2' x 4' Replacement Ballast	—	**6704-12**	**6704-12**
Teardrop Light (48"L)	1,260	**6704-15**	**6704-15**
Teardrop Light Ballast	—	**6704-75**	**6704-75**
2' x 4' Flow-Through Module	3,150	**6704-77**	**6704-77-277**
2' x 4' Flow-Through Ballast	—	**6704-78**	**6704-78-277**

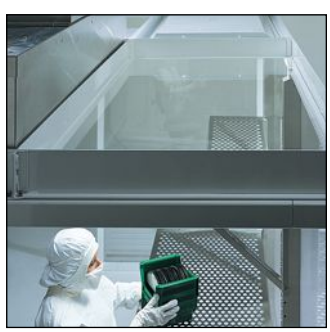
Includes installation at specified locations.
Yellow filters available; call for pricing.

Ceiling Panels

- **Cover unused 2' x 4' bays in the ceiling grid**
- **Select transparent material (acrylic or static-dissipative PVC) to allow light transmission**
- **Each panel seals against gaskets in the grid frame**

	Cat. #
Clear Acrylic	**6704-19**
Clear Static-Dissipative PVC	**6704-21**
White Polypropylene	**6704-20**





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Cleanroom Air Conditioning

Terra recommends three options for air conditioning in hardwall cleanrooms.

1. Use of Existing HVAC System

An existing high-volume air conditioning (HVAC) system provides the most effective and economical means to cool your modular cleanroom.

Because filter/fan units (FFUs) draw air from the surrounding room, they pass cooled air directly into the cleanroom without the need for ducting or special exhaust systems. The additional load on an existing HVAC system can be calculated by adding the heat dissipated by the specified number of FFUs (@ approximately 1,000 BTU/hour/unit) and by equipment and personnel inside the cleanroom.

2. Air Conditioning Modules

The modules below provide economical cooling in facilities without adequate HVAC. Based on the cleanroom size, desired temperature, and heat dissipated inside the cleanroom, Terra will configure the appropriate number of units.

Note: In these applications, heat removed from the cleanroom is vented into the room outside. In the case of large cleanrooms and/or significant heat-generating equipment, this vented heat will raise the ambient temperature and place greater load on the A/C modules and well as any existing HVAC system.

For most efficient operation, exhaust ducts and ventilation fans should be installed to vent heat outside the facility.

3. Auxiliary Central Air System

In large modular cleanrooms, an external central A/C system is preferable to the A/C modules. In such applications, Terra will provide a ducting and recirculation system that routes exhaust air to the A/C system and delivers cooled feed air to the ceiling FFUs in ample volume to maintain the desired air velocity inside the enclosure. In addition, Terra will work with a local A/C contractor to connect this recirculation system to a central air unit that meets cooling requirements and local codes.

Call Terra to discuss the most economical, efficient air conditioning solution for your application.

Cleanroom Air Conditioning Module

- **Ideal for ensuring the comfort and productivity of garbed personnel**
- **External air baffles allow quick, easy control over percentage of recirculated/make-up air**
- **Models with humidity control maintain steady RH level**
- **Low noise and vibration levels**

Terra's HVAC modules maintain the narrow temperature range required by garbed personnel and sensitive equipment inside a modular cleanroom.

Each A/C unit is mounted to a polypropylene plenum chamber installed on the exterior cleanroom wall. An intake manifold inside the cleanroom allows recirculation of filtered air. An adjustable baffle mounted outside the cleanroom lets you adjust the percentage of fresh make-up air. Cooled air is directed into the filter/fan units for filtration before being introduced into the cleanroom.

Selection Guide

Choosing the proper A/C unit for your application requires close attention to the following operating variables: number of filter fan units, heat generated by process equipment and personnel, and air temperature outside the cleanroom. Call Terra for assistance in selecting the appropriate A/C module for your application.

A/C Modules: Includes air distribution plenum. All models operate on 220VAC, 50/60Hz.

Cooling Net BTUH	AC Control Only Cat. #	AC and RH Control Cat. #
18,000	**6704-27**	**6704-30**
48,000	**6704-28**	**6704-31**
57,000	**6704-29**	**6704-32**

Power and Gas Utilities

Specify desired location of any of these service utilities.

Duplex Power Outlets

Includes wiring (up to a 30' run from ceiling junction box) and installation of one UL-approved outlet box, in conformance with NEC specifications.

	Cat. #
110VAC, 50/60Hz	**6704-33**
220VAC, 50/60Hz	**6704-34**

Vacuum/Gas Connections

Includes plumbing of ⅜"-diameter polypropylene vacuum line (up to 30' run) and installation of quick connection fitting.

	Cat. #
Vacuum (to 29.9"Hg)	**6704-35**
Nitrogen/Compressed Air (100 psi)	**6704-36**

Fire Safety Solutions

Effective fire detection requires careful placement of sensors capable of detecting all kinds of fires, large and small, often in the presence of chemical vapors that restrict visibility. This is exactly the capability provided by the FS System 7 Fire Detection System listed below.

CO_2 or Water Suppression?

The FS System 7 is ideal for semiconductor wet bench applications, as well as pharmaceutical or chemical mixing operations involving flammable materials.

In these applications, a CO_2-based fire suppression system can be integrated with FS System 7 to ensure that any fire that exceeds the critical 14 kW energy level is promptly extinguished. The dual-level response of this system provides an opportunity for very small (4kW - 13kW) fires to self-extinguish before a fire suppression system is activated. In wet benches and mixing stations, CO_2 nozzles can be installed so that their discharge affects only fire-likely locations.

In other cleanroom applications, however, CO_2 suppression systems could be hazardous to personnel, and a water-based fire suppression system is therefore preferable. Such a water sprinkler system is activated directly by heat sensors located at each water nozzle. In such applications, the FS System 7 can be used as an alarm/documentation system, alerting personnel of fires too small to be sensed by overhead sprinklers.

Whatever your applications, Terra engineers will work with you to determine the fire suppression system most appropriate to your requirements, as well as to local fire codes.\

Cat. #

Fire Suppression Water Sprinkler **6704-66**
Installed at user-selected overhead locations.
Includes heat sensor and all necessary plumbing and operation controls.

FS System 7 Fire Detection System

- **The ideal monitoring system for wet benches, exhaust fume lines, and other potentially hazardous cleanroom equipment involving volatile chemicals**
- **Multi-spectral IR flame detector senses all types of fires, even through gases and vapors**
- **Electro-optical sensor design meets Factory Mutual (FM) requirements**
- **Sensor range of 120° within 8 feet allows a pair of sensors to monitor most cleanroom processes thoroughly**
- **PLC module includes warning light and alarm, fire siren, and low-voltage output to activate fire suppression system (order separately)**
- **Unique FirePic™ software stores the pre-fire and actual fire detector-sensor spectral data from the last six fire events in non-volatile memory for subsequent analysis**

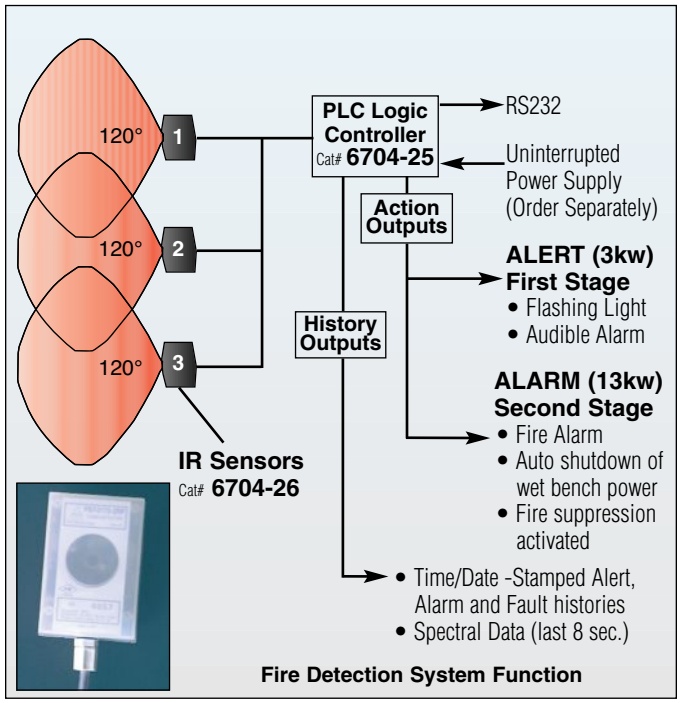
The FS System 7 electro-optical fire detectors provide an intelligent, two-stage response to fires. This allows time for the fire to self-extinguish, thereby averting equipment shutdown and the costly destruction of work in process. This two-stage response alerts that a fire exists, provides fast detection response should the fire not self-extinguish, and initiates suppression, if necessary.

Unique Two-Stage Fire Response

ALERT-1™: This first-stage response triggers external audible and visual signals when a fire with a heat energy output of 3 kW (the equivalent of a 4-inch diameter polypropylene pool fire) is exceeded. These alarms alert the operator that a fire exists before suppression begins, but gives non-hazardous fires time to self-extinguish before invasive fire suppression is activated. The FS System 7 fire detector will record a time- and date-stamped FirePic™ digital fire signature. This numerical spectral evidence enables analysis of the probable cause of the fire event for use in preventing a subsequent, damaging fire.

ALARM-2™: If the fire does not self-extinguish, and grows to the second-level heat energy threshold of 13 kW (the equivalent of an 8-inch diameter polypropylene pool fire), this second-stage response signals suppression release. In applications with wet benches, electrical power is shut down. In systems that incorporate electronic CO_2 extinguishers, a low-voltage signal activates fire suppression. A FirePic™ is again recorded to provide information for use in analyzing the cause of the fire.

The fire detectors are digital, 100% solid-state with quantum electro-optical multi-spectral Wide Band IR (1.2—3.5 micron band width), Near Band IR (.7—1.1 micron band width), and Visible Band sensor array, (0.4 – 3.5 micron band width). This broad bandwidth sensitivity allows it to detect all hydrocarbon and non-hydrocarbon fires, even through the gases and vapors found in chemical wet benches. Detectors are housed in a heat-sealed, Clean Room Class-1 rated polypropylene material to protect against acids or caustics. It requires no field calibration or other maintenance. Sensor Dimensions: 4.7" x 3.2" x 1.7"



Fire Detection System Function

FirePic™ software provides digital spectral data that enables analysis of the probable cause of a fire. It will store 6 fire events in non-volatile digital memory, 8 seconds of pre-fire, actual detector sensor spectral data, and time and date for each event. The stored data include a graphical display of the relative spectral intensities versus time preceding and during the fire. All data can be downloaded to PC via RS-232 serial port.

All part numbers below include installation. Call Terra for assistance in configuring the F7 Fire Detection System.

Cat. #

Dual-Spectrum IR Sensor **6704-26**
Several typically required, depending on application

PLC Controller **6704-25**
Includes warning light/alarm and fire siren.

Uninterrupted Power Supply **6705-05**
Ensures system operation in the event of power failure.

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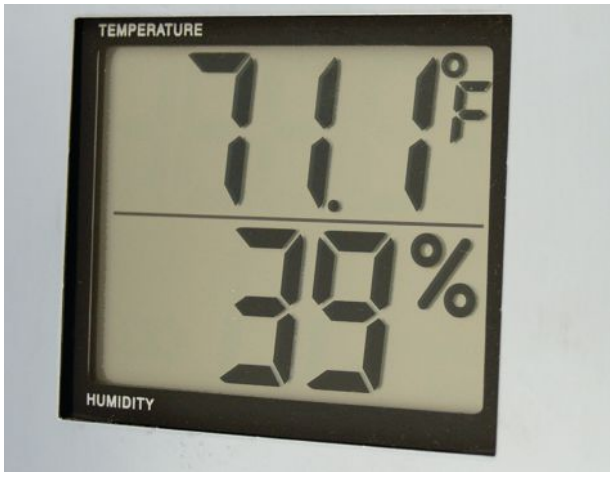
EnviroWatch™ ThermoHygrometer

- **Allows convenient temperature and humidity monitoring**
- **Price includes control panel mounting on Terra's Modular Cleanroom**
- **Large-format LCD display is easy to read**

Terra's EnviroWatch™ provides a convenient, inexpensive solution to temperature and humidity monitoring inside a modular cleanroom.

Designed for easy mounting on Terra cleanroom control panels, the EnviroWatch™ includes separate LCD dual readouts for temperature (°C or °F) and % relative humidity. The 3" x 3" LCD display is easy to read.

Dimensions:	4"W x 4.25"H (overall) 3.5"W x 3.25"H (panel cut-out)
Power:	Single "AAA" battery (included)



Cat. #
EnviroWatch™ ThermoHygrometer **5401-30**

AirGard® Air Velocity Monitor

- **Provides constant reading of air velocity for easy monitoring of cleanroom performance**
- **Audible and visual alarms let you know when air speed falls below 90 fpm (or other critical velocity)**
- **Flush mounts to Terra Modular Cleanroom control panel**
- **Easy to field calibrate**

This flush-mount air velocity monitor allows you to monitor the vertical speed of air inside a Terra cleanroom.

Its dual setpoint capability enables you to determine critical high/low air speed thresholds. When the air speed exceeds the "safe" range, the AirGard® issues audible and visual alarms to alert you to a clogged filter or other problem. Price includes installation is specified cleanroom. See page 586 for more complete specifications.

Specifications

Dimensions:	5.25"L x 3.0"W x 0.625"D
Display/Alarm Range:	50 - 250 fpm (0.25 - 1.27 m/s)
Alarm Delays:	User configurable through menu
Units:	English and Metric (user-selectable)
Visual Display:	Analog bargraph: Red zone - alarm Yellow zone - marginal Green zone - normal Jumbo LEDs (digital LCD can be enabled)
Alarm Indications:	Jumbo red LED and audible alarm (85 dB @ 4")
Calibration:	2-point field calibration
Accuracy:	± 10% or 10 fpm, whichever is greater
Operating Temperature:	-40 to +150°F (-40 to +65°C)

Cat. #
AirGard® 110VAC/60Hz **6704-65**
220VAC/50Hz **6704-65-220**

MAGNEHELIC® Differential Pressure Gauge
Provides an ideal way of monitoring the positive pressure differential required for effective contamination control inside a hardwall Modular Cleanroom.

Exclusive MAGNEHELIC® principle eliminates wear, backlash and hysteresis. Available in many pressure ranges; refer to page 583 for complete ordering information.

Cleanroom Talk-Throughs

- **Ideal for cleanrooms, laboratory and hospital isolation areas, and other restricted environments**
- **Mounts on 7¾"-diameter cut-out (custom installation panels available for other cut-out requirements)**
- **Mechanical model features overlapping mylar "S" diaphragms for clear communication and visibility**
- **Electronic model includes pushbutton-activated amplifier**

Terra's Cleanroom Talk-Throughs give you a clear line of communication into your cleanroom. Both incorporate noncontaminating materials and construction techniques to ensure cleanroom compatibility.

Select Mechanical or Electronic Model
The standard mechanical model features a clean plastic frame and transparent mylar diaphragms. It allows workers on both sides of a cleanroom wall to communicate freely, thereby reducing the need to enter the cleanroom or to rely on a cleanroom telephone.

The electronic model incorporates a speaker to amplify voice communication. Powered by a 9VDC battery, it is activated by the press of a button.

Both units are easy to mount in either a standard cleanroom wall or a Terra hardwall modular cleanroom. They require a 7¾"-diameter cut-out and six screws. PVC seals hold the positive internal air pressure. Max. outside diameter: 10". Diameter of grille: 6½". Screw hole pattern: 7¼".

Cleanroom Talk-Through	Cat. #
Mechanical Design	**5050-50**
Electronic Design	**5050-51**

Garb and Parts Dispensers—Space-Saving Convenience!

These handy dispensers save space and organize your change room gloves, safety glasses, wipers, hats, and other garb. Also perfect benchtop storage bins for small parts used in cleanroom processing. Select clear acrylic or static-dissipative PVC, which eliminates static charges and the particles they attract.

See pages 299-306 for complete information.

Stainless Steel Clipboard

- **Stainless steel construction gives you a clipboard that's up to cleanroom standards**
- **12" x 9½" surface firmly holds writing paper in place**

What is there to say about a clipboard?
They're easy to overlook when you're setting up your cleanroom, yet they're an essential item when it comes time to update information.

This one is completely clean-room compatible. Stainless steel construction ensures a nonshedding, durable, conductive surface for cleanroom paper. Large 12" x 9½" surface and spring-loaded clip securely hold standard sized sheets.

	Cat. #
Stainless Steel	**1350-00**
Polypropylene	**1350-01**

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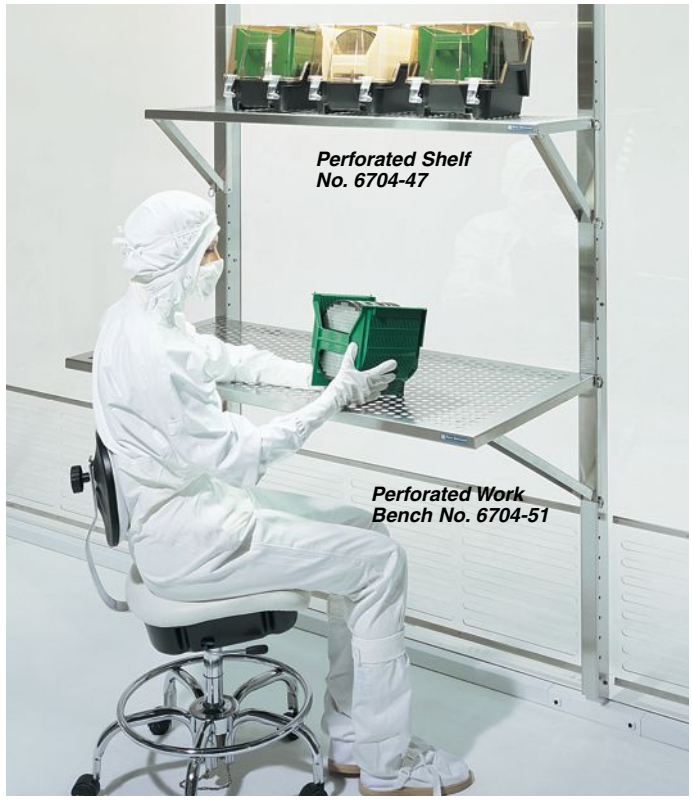

Wall-Mount Cleanroom Benches and Shelves

For Terra Hardwall Modular Cleanrooms

- **Adjustable at 2" height increments**
- **Electropolished for optimal cleanliness**
- **Leaves floors unobstructed for operator comfort and easy floor cleaning**

These all-electropolished stainless steel benches and shelves provide the optimal cleanroom work, storage, or seating surface.

The rigid wall mounting system supports up to 400 lbs., providing ample strength for heavy process equipment or for a gowning bench. This mounting system leaves the floor clear of support legs for easy cleaning and unrestricted leg movement. Benches can be positioned in 2" increments from 16" to 72" above floor level. Adjustment requires no tools—simply remove and reinsert the fastening pin.

Select the top style to suit your applications. Perforated and rod tops allow optimal flow-through of filtered air and are ideal for stringent particle requirements and for shelves positioned above a processing area.

Dimensions (W x D)	Solid Top Cat. #	Perforated Top* Cat. #	Rod Top** Cat. #
50.75" x 16"	**6704-39**	**6704-47**	**6704-55**
98.75" x 16"	**6704-40**	**6704-48**	**6704-56**
50.75" x 24"	**6704-41**	**6704-49**	**6704-57**
98.75" x 24"	**6704-42**	**6704-50**	**6704-58**
50.75" x 30"	**6704-43**	**6704-51**	**6704-59**
98.75" x 30"	**6704-44**	**6704-52**	**6704-60**
50.75" x 34"	**6704-45**	**6704-53**	**6704-61**
98.75" x 34"	**6704-46**	**6704-54**	**6704-62**

** ¼"-diameter holes. ** ¼"-diameter rods on 1" centers.*

Modular Cleanroom Pass-Throughs

For Use on Terra's Hardwall Cleanrooms only (page 200)

- **Modular panel mounting system allows installation at any modular cleanroom location**
- **Allows easy transfer of materials without contamination**
- **Keeps particle counts low by eliminating unnecessary personnel entry**
- **Optional mechanical interlocks minimize the risk of cross contamination**
- **Available in many sizes to meet your application requirements**
- **Custom sizes, designs and materials are no problem—just let us know your specs!**

These pass-throughs enhance cleanliness of a Terra hardwall Modular Cleanroom by eliminating unnecessary personnel entry.

Clean, Durable

Available in several standard sizes, these chambers make it easy and convenient to pass items in and out of a cleanroom without contaminating the controlled environment. Each features dual stainless-steel reinforced access doors for strength and rigidity. The unique door construction ensures a long, low-maintenance service life. Locking chrome-plated LiftLatches™ provide security and won't strain door hinges.

Optional mechanical interlocks prevent cross-contamination by making it impossible to open a door as long as the facing door is open or ajar. These no-maintenance, highly reliable devices require no power or other service. Optional stainless steel shelves can be installed on chrome-plated racks that allow height adjustment in 2" increments.

Select among four materials, in many standard sizes. A separate mounting panel allows installation at any location you specify on a Terra hardwall Modular Cleanroom.

Modular Cleanroom Pass-Throughs					Corresponding Accessories			
Outside Dimensions (W" x D" x H")	Electropolished* Stainless Steel Cat. #	Stainless Steel* Cat. #	Acrylic Cat. #	Static-Dissipative PVC Cat. #	Mounting Panel Cat. #	Interlock Cat. #	Shelf** Cat. #	Shelf Rack*** Cat. #
12 x 12 x 12	**6704-80**	**6704-85**	**6704-90**	**6704-95**	**6704-70**	**1994-27**	**1992-70**	**1600-58**
18 x 18 x 16	**6704-81**	**6704-86**	**6704-91**	**6704-96**	**6704-71**	**1994-27**	**1992-71**	**1600-58**
18 x 18 x 24	**6704-82**	**6704-87**	**6704-92**	**6704-97**	**6704-72**	**1994-27**	**1992-71**	**1600-58**
24 x 24 x 24	**6704-83**	**6704-88**	**6704-93**	**6704-98**	**6704-73**	**1994-27**	**1992-72**	**1600-58**
24 x 24 x 36	**6704-84**	**6704-89**	**6704-94**	**6704-99**	**6704-74**	**1994-27**	**1992-72**	**1600-58**

**** Includes static-dissipative PVC viewing windows.***
***** Made of perforated stainless steel. Requires installation of shelf racks (order two separately)***
****** Chrome plated racks allow shelf adjustment. Order two racks per chamber.***

Other Pass-Throughs Available!

See the following pages for Pass-Throughs designed for installation in permanent cleanrooms.

Standard Pass-Throughs
In six materials and many sizes. See page 216.

Slide-Up Door Pass-Throughs
Counterbalanced sliding doors eliminate clearance requirements. See page 219.

Roll-Up Door Pass-Throughs
PLC keypad opens door with the press of a button. See page 220.

Fire-Rated Pass-Throughs
Independently certified fire-safe! See page 220.

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Pass-Through Chamber

- **Contamination-free transfer of materials in and out of the cleanroom**
- **Eliminates unnecessary personnel entry**
- **Full range of sizes meets any application**
- **Stainless steel doors extend service life of plastic and laminate chamber—a must in a production environment!**
- **Foolproof interlock mechanism prevents cross-contamination, is reliable and maintenance-free**
- **Material options accommodate many application requirements, from chemical resistance to static control to fire safety**
- **Accessories include LockLatch™, safety sprinkler, air shower, and Class 10 HEPA filter/blower module**
- **Easy to install**

The best way to minimize particle counts is to keep people out of the controlled environment. Unfortunately, day-to-day processing routines often work against that goal.

All too often, support personnel are required to enter a cleanroom each time a piece of equipment must be delivered or removed or a form must be signed. Even when they take the trouble to change into cleanroom garb (a time-consuming and thus expensive operation), they inevitably track in contaminants. The problem is even more acute in cleanrooms that lack air showers. Each entry creates air turbulence that dislodges contaminants already in the lab and increases particle counts tremendously.

Shutting the Door on Contamination

These Pass-Through Chambers cut down significantly on traffic and contamination by providing a better, safer way to transfer equipment and paperwork.

Terra's comprehensive line includes a size, material, and configuration for nearly any application requirement. Our most economical models are constructed of a fiber core with a white nonconductive laminate fused and sealed to all exposed sides. Stainless steel models ensure clean operation. For especially stringent particle requirements, select an UltraClean™ electropolished stainless steel pass-through.

Polypropylene and PVC models are suitable for chemical pass-through applications, and Static-Dissipative PVC models combine excellent chemical resistance with a surface resistivity of about 10^7 ohms/square for enhanced static and particle control. Each model features viewing windows of a compatible material (indicated on the ordering chart on page 218).

Doors on either side can be outfitted with an interlocking device that keeps personnel from passing particles through the chamber. This device allows only one door at a time to open, and thus the amount of air that can enter the cleanroom is restricted to a very small volume. The no-maintenance interlock mechanism has no power, gas, or other facility requirement, so it continues to operate when other systems shut down.

Acrylic (Model No. 1936-00)

Polypropylene (Model No. 1992-36)

HEPA Filtered Air Shower Clears the Air!

Terra offers a HEPA filtered air shower for enhanced particle control.

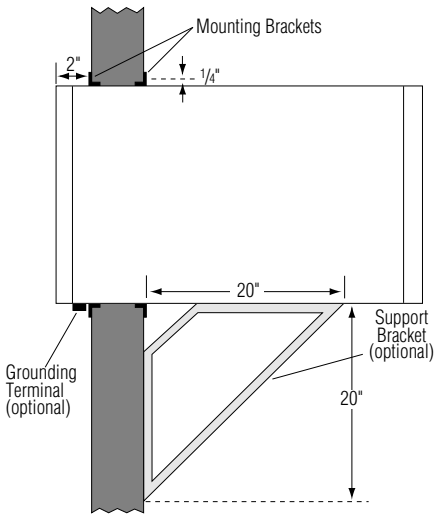
This option incorporates a brushless motor and 125 CFM variable-speed impeller to draw air from the "clean" side of the pass-through into a HEPA filter (rated 99.97% efficient with 0.3µm-diameter particles).

A magnetic sensor switch, installed on the "dirty" side door, activates the unit after the door has been opened and then closed. The shower washes the chamber with HEPA-filtered air to remove any contaminants that might have entered the chamber (the operation period is adjustable from 15 to 180 seconds). During operation, a red status light in the "cleanroom" side of the shower glows to warn operators not to open a door. When the shower shuts off, a green status light indicates that the door may be opened.

Exhaust air flows out of vents on the "dirty" side of the pass-through chamber (a microporous filter eliminates the chance of contamination in the event of a negative pressure). The cleanroom intake ensures a long filter life, and filter change-out can be performed in a matter of seconds.

Other options include a LockLatch™ keyed security lock-out, a safety sprinkler for use with flammable materials, and a fluorescent illuminator with a Static-Dissipative PVC sealed housing. A Fire-Rated Pass-Through is made of a wireless glass fire-rated for up to two hours (see descriptions on the following pages). A stainless steel protective shield guards the bottom of plastic chambers against scratching, and optional reinforced doors can be ordered to lend added rigidity and durability to laminate and plastic chambers.

Installation



Pass-Through Chambers can be installed in a number of ways, depending on the wall or door that will support them. The ordering chart indicates the cut-out size necessary to support each model size (simply add ½" to the chamber width and height). Terra offers mounting brackets and hardware to ensure secure mounting. In most cases, a bracket kit provides ample support. Models are available for either wall mounting (at a convenient standing height) or floor mounting (to allow passage of carts and other equipment along the floor). Select support brackets for 36"D wall-mount models. **Note:** Brackets are mounted to allow chambers to protrude 2" on the cleanroom side (specify other desired position).

Stainless Steel (Model No. 1992-12)

Ordering Guide

The following pages list all of Terra's standard Pass-Through Chambers.

Consider the following options in making your selection:

Wall or Floor Mount? Wall-mount models can be positioned at a comfortable standing height; floor-mount models include a low-profile ramp to allow carts to be wheeled into the chamber. Special mounting bracket sets are available for each design. Order support brackets for larger wall-mount models (see illustration above). Your wall cut-out should be ½" larger than the overall height and width of your chamber.

Chamber Material? Select among seven standard materials. Others (including polycarbonate and dissipative polycarbonate) are also available.

Sliding Doors? These easy-open doors eliminate clearance requirements.

Interlocks? Interlocks are recommended to prevent cross contamination.

Reinforced Doors—Plastic cabinets come with stainless steel reinforced door frames on a standard basis.

Other Options include a filter/blower module, shelves (with electropolished stainless steel racks), illuminator, and grounding terminals.

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HEPA Filtered Air Shower

Fits on top of any Terra Pass-Through 18"D or larger. Includes ON/OFF status light and door sensor switch (for connection to "dirty" side access door).

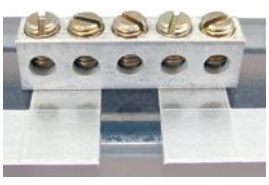
Standard housing material is stainless steel; other materials are also available. Price includes installation on specified pass-through chamber.

Cat. #
1993-11A

Removable Shelves

Can be adjusted on electropolished stainless steel wire racks. Stainless steel shields, mounted to the bottom of the chamber, prevent scratching of plastic pass-throughs.

See ordering table below.



Grounding Terminals

Recommended on stainless steel and static-dissipative PVC pass-throughs. Price includes installation on cleanroom side (see illustration on page 217 for location).

Cat. #
1686-12

Grounded Door Latch

Specify affected door latch(es). **1600-59A**

Stainless Steel Doors

Extend the service life of plastic and laminate pass-throughs. They lend added strength to the parts of a pass-through that receive the most wear, thereby protecting your cleanroom investment. An important feature in a production environment!

Included standard on all Terra Pass-Throughs.

Fluorescent Illuminator

Provides easy viewing of the chamber. The lighting fixture, mounted to the top of the chamber, features a static-dissipative PVC seal to ensure clean, static-safe conditions.

	Cat. #
For models up to 18" wide	**1993-33**
For models over 18" wide	**1993-34**

Double-Door Pass-Throughs

Available for 36"W models, double door models minimize door clearance to preserve valuable cleanroom space. Practical design requires no center post.

Call for a quotation

Sprinkler Module

Cat. #
Is installed in the pass-through for safe operation with flammable materials. **1993-30**

Stainless Steel Support Bracket

Cat. #
Pair recommended for chambers 36"D (see page 217 for illustration). Price includes installation. **1993-60**

Ordering Information

The chart below provides detailed information on standard Pass-through Chambers. Refer to the previous page for a step-by-step guide to selecting the model just right for your application!

Custom Sizes and Designs are No Problem!

Don't see the right size or design? Let us know your requirements—we'll customize a system to your specs!

See page 220 for Fire-Rated and Roll-Up Pass-Throughs.

Pass-Through Chambers (Doors are made of material indicated in parenthesis; other designs available.)

Type (1) Order Installation Brackets Separately	Outside Dimensions (W" x D" x H") Add ½" to W x H for cut-out)	Electropolished Stainless Steel (Stainless Steel Doors/ Dissipative PVC Windows) Internal Access = W x H minus 2" Cat. #	Stainless Steel (Stainless Steel Doors/ Dissipative PVC Windows) Internal Access = W x H minus 2" Cat. #	Nonconductive Laminate (Acrylic Doors) Internal Access = W x H minus 2" Cat. #	Polypropylene (Nondissipative PVC Doors) Internal Access = W x H minus 1" Cat. #	Static Dissipative PVC (Dissipative PVC Doors) Internal Access = W x H minus 2" Cat. #	Acrylic (Acrylic Doors) Internal Access = W x H minus 2" Cat. #
Wall Mount	12 x 12 x 12	**1992-01**	**1992-09**	**1991-00**	**1992-26**	**1992-37**	**1993-12**
	12 x 12 x 24	**1992-02**	**1992-10**	**1992-18**	**1992-27**	**1992-38**	**1948-20**
	18 x 18 x 16	**1992-03**	**1992-11**	**1992-00**	**1992-28**	**1992-39**	**1992-48**
	18 x 18 x 24	**1992-04**	**1992-12**	**1992-19**	**1992-29**	**1992-40**	**1992-49**
	24 x 24 x 16	**1992-05**	**1992-13**	**1993-00**	**1992-30**	**1992-41**	**1992-50**
	24 x 24 x 24	**1992-06**	**1992-14**	**1992-20**	**1992-31**	**1992-42**	**1992-51**
	24 x 36 x 24	**1992-07**	**1992-15**	**1992-21**	**1992-32**	**1992-43**	**1992-44**
	36 x 36 x 24	**1992-74**	**1997-03**	**1992-22**	**1992-33**	—	**1992-52**
	24 x 24 x 36	**1992-08**	**1992-16**	**1992-23**	**1992-34**	**1992-45**	**1992-46**
	36 x 36 x 36	**1992-99**	**1997-06**	**1992-24**	**1992-35**	—	**1992-53**
	36 x 36 x 48	**1997-01**	**1997-08**	**1992-25**	**1992-36**	—	**1992-80**
Floor Mount[1] with Ramp	24 x 24 x 36	**1992-81**	**1992-84**	**1993-01**	**1993-04**	**1993-07**	**1993-08**
	36 x 36 x 36	**1992-82**	**1992-85**	**1993-02**	**1993-05**	—	**1993-09**
	36 x 36 x 48	**1992-83**	**1992-86**	**1993-03**	**1993-06**	—	**1993-10**

(1) Floor Mount models include low-profile access ramps for easy transport of carts (subtract 1" from internal vertical clearance to compensate for ramps).

(2) Sliding doors require vertical overhead clearance equal to the door height, so 36"H model should be mounted no closer than 36" below the cleanroom ceiling.

(3) Mounting brackets are made of stainless steel. All brackets require ¼" clearance between wall cut-out and pass-through. Standard mounting is 2" from the front of the cleanroom side (specify other desired location). Price is for one set of four brackets. Two sets are typically required for installation of one pass-through. One is welded on the cleanroom side. See page 217 for sketch of typical installation.

Sliding Access Doors

- **Conserves valuable cleanroom space by eliminating door clearance requirements**
- **Counterbalanced slides ensure nonparticulating, feather-light operation**
- **Specify optional interlock to prevent cross contamination**

Sliding access doors can be specified for any pass-through chamber (see ordering chart below).

These opposing doors feature stainless steel door tracks mounted flush with the wall on the cleanroom side (tracks on other side protrude above front edge of chamber). The viewing windows are available in any of the materials listed on the ordering chart. To order, you simply select the desired pass-through size and material and then specify the corresponding "Sliding Doors" part number listed below.

Pass-through chambers equipped with these doors include all necessary mounting hardware; no additional brackets are necessary.

Viewed from cleanroom side

Note: If you require an interlock mechanism on a sliding door pass-through (to prevent cross contamination), add "-S" to the part number for the interlock that corresponds to your chamber size.

Note: Door tracks of counterweighted sliding doors are 304 stainless steel (electropolished with electropolished pass-throughs). Viewing windows are made of the material specified for the pass-through ordered. No mounting brackets are necessary for installation (vertical tracks are mounted flush with walls).

Pass-Through Interlock

Ensures that one door of the pass-through always remains closed, thereby minimizing the risk of cleanroom contamination (see ordering chart below).

Note: Interlocks must be ordered together with the pass-through (they cannot be retrofitted).

Corresponding Accessories

Sliding Doors (2) (See description above)	Mounting Brackets (3)		Mechanical Interlocks (4) Cannot be retrofitted		Stainless Steel Shield (5)	Stainless Steel Shelf (5)	Stainless Steel Racks (5) (one pair)
	For Standard Pass-Throughs	For Pass-Throughs With Sliding Door	For Standard Pass-Throughs	For Pass-Throughs With Sliding Door			
Cat. #	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #
—	1994-01	1994-14	1994-27	1994-28	1992-65	1992-70	1993-40
—	1994-02	1994-15	1994-27	1994-28	1992-65	1992-70	1993-41
—	1994-03	1994-16	1994-27	1994-28	1992-66	1992-71	1993-42
1993-16	1994-04	1994-17	1994-27	1994-28	1992-66	1992-71	1993-43
1993-17	1994-05	1994-18	1994-27	1994-28	1992-67	1992-72	1993-44
1993-18	1994-06	1994-19	1994-27	1994-28	1992-67	1992-72	1993-45
1993-19	1994-06	1994-19	1994-27	1994-28	1992-68	1992-73	1993-46
1993-20	1994-07	1994-20	1994-27	1994-28	1992-69	1993-27	1993-47
1993-21	1994-08	1994-21	1994-27	1994-28	1992-67	1992-72	1993-48
1993-22	1994-09	1994-22	1994-27	1994-28	1992-69	1993-28	1993-49
—	1994-10	1994-23	1994-27	1994-28	1992-69	1993-29	1993-50
1993-24	1994-11	1994-24	1994-27	1994-28	1992-67	1992-72	1993-51
1993-25	1994-12	1994-25	1994-27	1994-28	1992-69	1993-38	1993-52
1993-26	1994-13	1994-26	1994-27	1994-28	1992-69	1993-39	1993-53

(4) Light duty interlocks are installed on pass-throughs up to 18"D; heavy-duty interlocks are installed on models over 18"D. All use a fail-proof mechanical design that requires no maintenance. Made of stainless steel. Must be specified when Pass-Through is ordered (cannot be retrofitted).

(5) Shields are recommended in all plastic pass-throughs to prevent scratching. Racks allow adjustable shelf placement and are required for use with shelves (their price includes installation). For electropolishing, add "-2" to the part number and 30% to the price (standard racks are electropolished).

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Fire-Rated Cleanroom Pass-Throughs

- **Independently certified to meet fire safety requirements**
- **Optional 10" x 10" clear, polished fire-rated ceramic glass viewing windows afford full visibility of materials**
- **Double-wall stainless steel construction is clean and durable (electropolished models available)**
- **Mechanical interlock prevents cross contamination (electronic security interlock also available)**

CE

These stainless steel pass-throughs carry an independent fire-safety rating.

Their Warnock Hersey certification meets the requirements of UBC STD 7-2 (1997), NFPA 252 (1999) and UL 10C (1998), which calls for 90 minute fire exposure followed by a 20 second hose stream test. In addition, such components as the self-closing doors and optional polished fire-rated glass are independently fire rated.

Double-wall stainless steel construction ensures durability and cleanliness. Their smooth design eliminates lips that can collect particles or impede transfer of materials in and out of the cleanroom. Models are available with electropolished surfaces to meet the most stringent cleanroom requirements.

Redundant Interlocks Ensure Cleanroom Integrity

All models come with mechanical interlocks on a standard basis. These no-maintenance devices require no power or other service lines and are highly reliable. As soon as the handle on either of the doors is opened, the facing door becomes inoperable, preventing the possibility of cross-contamination.

Select among three standard sizes, or let Terra customize a pass-through to your specifications

In addition, electronic interlocks are available. Pass-throughs equipped with this feature incorporate a keypad that requires entry of a security code.

Dimensions		Fire-Rated Pass-Throughs			
Outside	Inside	Stainless Steel		Electropolished Stainless Steel	
		With Windows*	No Windows	With Windows*	No Windows
(W" x D" x H")	(W" x D" x H")	Cat. #	Cat. #	Cat. #	Cat. #
39.5 x 28 x 38.25	36.5 x 24.5 x 29.5	**6705-00**	**6705-01**	**6705-02**	**6705-03**

**** 10" x 10" dual viewing windows are made of clear, polished fire-rated ceramic glass.***

Electronic Interlocks

Includes installation of electronic interlocks and a PLC keypad on the specified Fire-Rated Pass-Through. Security key codes can be established to restrict access. Renders a door inoperable as soon as the facing door has been opened.

Cat. #
6705-04

Roll-Up Pass-Throughs

- **Hands-free automatic door enables an operator to open the pass-through while holding delicate objects**
- **Roll-up door design requires no clearance, optimizes valuable cleanroom floorspace**
- **Transparent static-dissipative PVC access doors eliminate static charges and the particles they attract**
- **Security pass codes can be established to prevent unauthorized operation**
- **IR safety beams stop door motion**

This unique, space-saving pass-through features dual-side segmented access doors that automatically roll up and down at the push of a PLC control pad. This design eliminates door clearance requirements and makes it easy for gloved personnel to open and close doors while holding parts.

PLC control system includes electronic interlocks to prevent the possibility of cross contamination. Iris reader and security card system also available.

Clean, Secure, Static-Safe

Motorized lifters are sealed inside a noncontaminating housing, and doors slide up and down in ultra-smooth polyethylene tracks. The segmented access doors are made of static-dissipative PVC, which helps control particles by eliminating the charges that attract them. The door rolls into a stainless steel housing located at the top of the unit. IR safety beams stop door motion if a hand or other object protrudes into the door track.

Dimensions		Roll-Up Pass-Throughs			
Outside	Inside	Wall Mount		Floor Mount (Includes Ramps)	
		Stainless Steel	Electropolished Stainless Steel	Stainless Steel	Electropolished Stainless Steel
(W" x D" x H")	(W" x D" x H")	Cat. #	Cat. #	Cat. #	Cat. #
38 x 30 x 62.5	29 x 27 x 48.75	**6704-38**	**6704-68**	**6704-37**	**6704-69**

Air Showers and Tunnels

- **Completely self-contained, pre-wired, fully equipped Air Shower/Tunnel systems help solve decontamination problems**
- **Modular design lets you order a system to suit your cleanroom**
- **HEPA filter/blower modules (rated 99.97% efficient @ 0.3 micron particles) wash personnel with Class 100 air to dislodge and remove particles**
- **Solid-state microprocessor panel provides programmable control over access door operation**
- **Interlocking doors minimize contamination, release automatically in the event of power failure**
- **Fluorescent lighting is housed in the ceiling for minimal turbulence**
- **Available in white epoxy-finished CR steel, stainless steel, or plastic laminate to meet various cleanroom requirements**
- **Variety of sizes and door configurations**
- **Economical to operate, easy to maintain**
- **System options include HEPA-filtered ceiling, ionized grid, and safety glazing**

These Air Showers and Tunnels offer an effective way to remove surface-deposited particles from personnel—before they get to the cleanroom.

Enter the Cleanroom . . . and Leave Your Particles Behind!

Each unit is a fully equipped, protected passageway that allows large numbers of personnel to pass into controlled areas without sacrificing convenience or cleanliness.

Air Showers and Tunnels supply concentrated Class 100 clean air flows to lift off contamination while an individual stands in, or walks through, a specially constructed air chamber. Whenever an automatic floor switch inside the unit is activated, pressurized air streams from adjustable nozzles* at a velocity between 6,000 and 8,000 feet per minute, a force that ensures efficient scrubbing action necessary to remove particulate matter. (Air showers in units without floors are activated by motion sensors.)

Nozzles* are arranged on walls and ceilings in a uniform pattern to ensure effective distribution of filtered air; the lowest nozzle is positioned 19" off the floor. The closed-loop circulation design directs contaminated air downward through grills and hollow walls of the Air Shower and back to the filter, which removes 99.97% of all particles as small as 0.3 microns.

Interlocking doors prevent unnecessary contamination inflow and thereby prevent cross-contamination of the cleanroom and the Air Shower or Tunnel. They automatically release in the event of a power failure to ensure operator safety. Fluorescent lighting, built into the ceiling to allow unimpeded air circulation, ensures full visibility no matter what size or configuration you select. In addition, an emergency stop button on each Air Shower/Tunnel sounds an alarm and releases the door lock for exiting.

Control Panel Enhances Convenience and Security

Each unit includes a solid-state microprocessor panel (located at the front entrance) that provides complete control over access to the Air Shower/Tunnel (and hence to the cleanroom itself).

It includes a light switch, audible alarm, and alarm reset, and a 4-line, 64-character alpha-numeric LCD display that monitors system function during normal operation and displays menu functions for service and system changes. A 16-key membrane keypad allows a user to turn the system on and off (with a 4-digit code), to get into systems set-up mode (with a 4-digit code), and to program such information as a system clock, cycle time, access door delay, time lock feature, and single-direction access code. These capabilities let you program as much security into your system as you require!

This system also includes full microprocessor diagnostic capabilities, covering operation of the blower, door switch, door lock, and presence sensor/mat switch.

Clean, Durable Construction

Select models in any of three materials to suit your cleanroom requirements: white epoxy-finished 16-gauge cold rolled steel, 304 stainless steel, or particle board with a plastic laminate that seals all exposed edges.* All models feature anodized aluminum access doors with transparent plexiglass windows.

* 1. The air nozzles for all three unit categories (epoxy-finished CR steel, plastic laminate and stainless steel) are fabricated of PVC (stainless steel nozzle is not available).

2. The doors on all three unit categories (epoxy finished, plastic laminate, and stainless steel) are fabricated of anodized aluminum. Optional stainless steel doors are available for the stainless steel shower/tunnel units. Call Terra for a quotation.

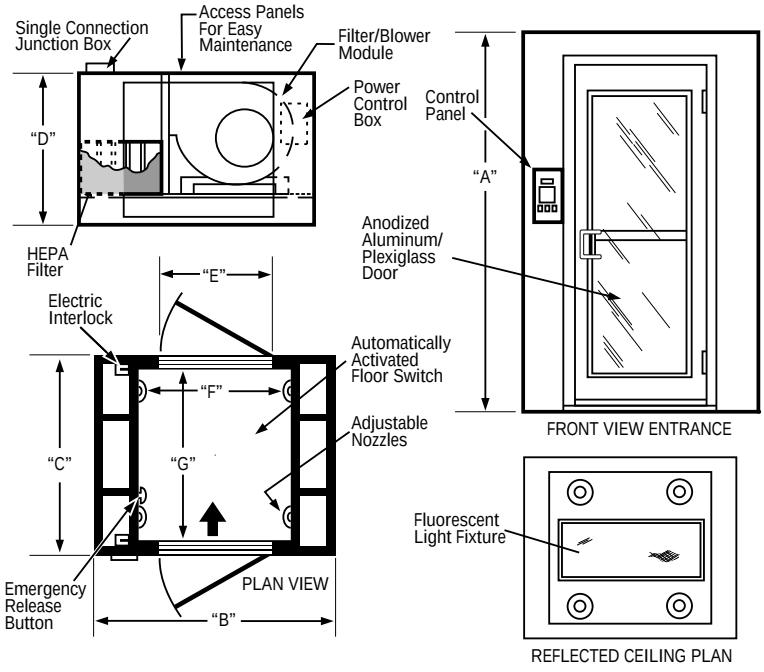
Available in stainless steel

Cleanroom Air Showers are available from 52" to 90" wide and up to 96" long. Air Tunnels, available in 52" and 58" widths, extend from 96" to 240" long and include all the standard features of the Air Showers. All models are 90" high (add 6" to height for HEPA filter ceiling models; see ordering tables below). The double-door models listed below are specially designed to allow carts and large equipment to be passed into the cleanroom; these models do not feature floors.

Customized Systems—on a Standard Basis

The tables below provide ordering information on standard configurations of Air Showers and Air Tunnels. In addition to these, many other configurations are available to suit your application requirements. These include:

Custom Door Configurations: You may specify doors at many positions along an Air Shower or Tunnel, including a third door. Refer to the floor plans below. (**Note:** Three-door designs are not available for Air Showers less than 60" in length.)



HEPA Filtered Ceiling Air Shower: This option adds filter/blower modules mounted in the ceiling for enhanced particle control (functions most effectively with 6" raised floor; see description below). Typical air flow is 90 FPM (can be configured to meet individual specifications).

Custom Floor Configurations: Any unit may be ordered either with no floor (for placement directly on existing floor), or with 6" raised aluminum floor grates (for improved air circulation, especially with the HEPA filter ceiling option).

Side Mount: Used where space restrictions do not allow use of standard 10-foot high unit. In this configuration, the blower is mounted to the side of the shower chamber.

Knock Down: When adding a shower to an existing cleanroom, the shower is broken down to wall and ceiling sections for field assembly.

Safety Plate-Glass Doors: replace the standard plexiglass ones.

Explosion-Proof Design: for safe operation with explosive or flammable materials.

Static Ionized Grid: for safe, effective neutralization of static charges on personnel or equipment in the Air Shower/Tunnel.

Bumpers: for protecting nozzles along the interior wall from carts.

Filter/Blower Module Specifications

See ordering tables for type and number of modules installed in each Air Shower/Tunnel. All filters are HEPA rated 99.97% efficient @ 0.3µm particles. All module motors use 3-phase power only; international voltages are available at no extra cost.

Module Type (see table)	**1**	**2**
H.P.	2	5
Power Requirements:	208VAC, 7.0 Amps 230VAC, 6.6 Amps 460VAC, 3.3 Amps (Other voltages available)	208VAC, 15.3 Amps 230VAC, 13.6 Amps 460VAC, 6.8 Amps
C.F.M. @ 2" WG	1010	1820
RPM	3600	3600
Wheel diameter	12½"	13½"
Filter Size:	11½"D x 18" x 24"	11½"D x 24" x 24"

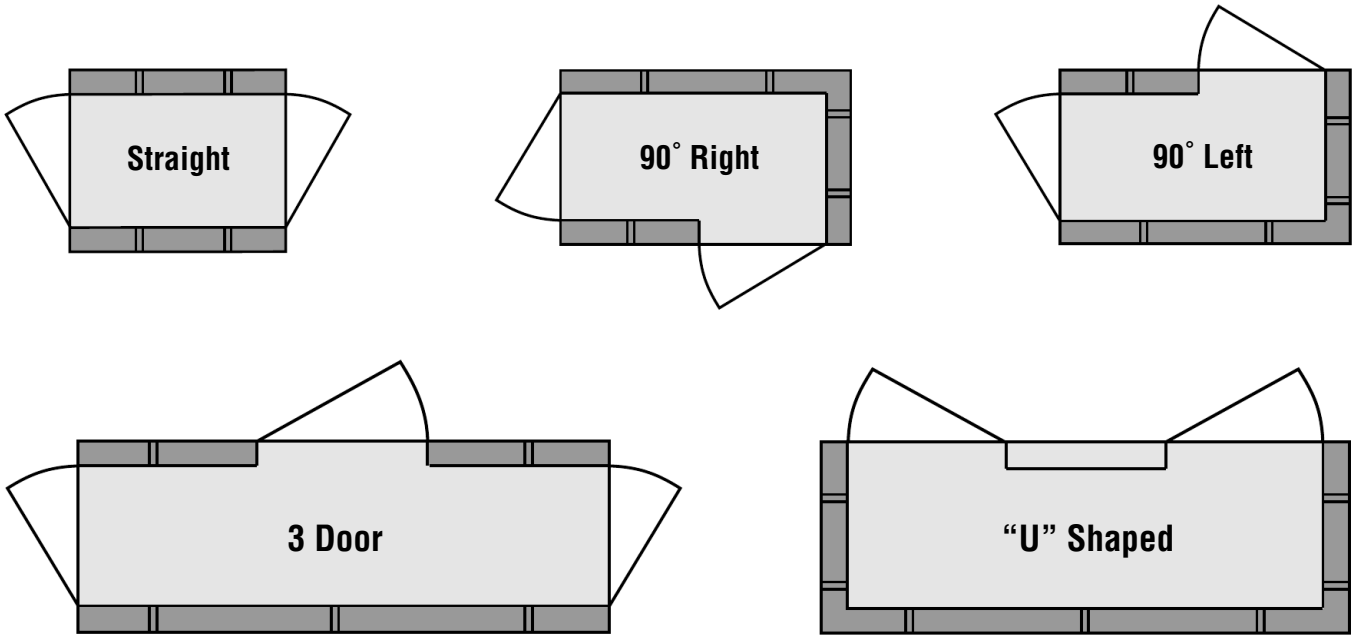
Air Showers

Dimensions (inches; see diagram above)							Blower/ Filter Type*	No. of Filter/ Blowers	No. of Nozzles	Shipping Weight (lbs.)	Stainless Steel Cat. #	Epoxy-Finished CR Steel Cat. #	Laminated Fiber Core Cat. #
A	B	C	D	E	F	G							
90	52	44	26	32	35½	35	1	1	20	1600	**6010-00**	**6010-14**	**6010-28**
90	52	56	26	32	35½	47	1	1	20	1800	**6010-01**	**6010-15**	**6010-29**
90	52	60	30	32	35½	51	2	1	32	1900	**6010-02**	**6010-16**	**6010-30**
90	52	72	30	32	35½	63	2	1	36	2100	**6010-03**	**6010-17**	**6010-31**
90	52	84	30	32	35½	75	2	1	40	3500	**6010-04**	**6010-18**	**6010-32**
90	58	44	26	36	39½	35	1	1	20	2200	**6010-05**	**6010-19**	**6010-33**
90	58	56	30	36	41½	47	2	1	32	1800	**6010-06**	**6010-20**	**6010-34**
90	58	60	30	36	41½	51	2	1	32	2000	**6010-07**	**6010-21**	**6010-35**
90	58	72	30	36	41½	63	2	1	36	2200	**6010-08**	**6010-22**	**6010-36**
90	58	84	30	36	39½	75	2	1	40	3800	**6010-09**	**6010-23**	**6010-37**
90	64	60	30	42	47½	51	2	1	32	2000	**6010-10**	**6010-24**	**6010-38**
90	64	72	30	42	47½	63	2	1	36	2200	**6010-11**	**6010-25**	**6010-39**
90	70	72	**30**	48	53½	63	2	1	40	2400	**6010-12**	**6010-26**	**6010-40**
90	90	96	30	72**	75½	87	2	2	64	5100	**6010-13****	**6010-27****	**6010-41****

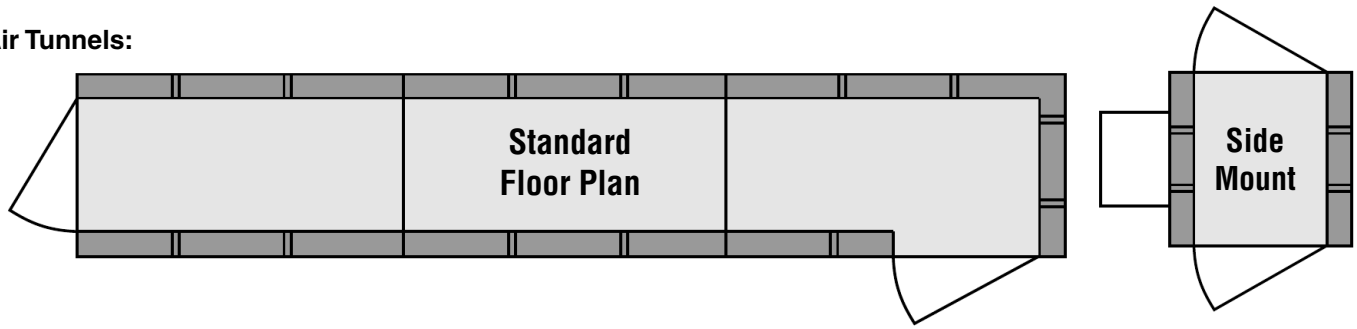
**** See specifications above for complete information.***

***** This extra-wide unit features double doors (3'0" x 6'8" each) at each end. It is ideal for passing large equipment into the cleanroom (features no floor so that carts can roll smoothly.***

Optional Floor Plans:



Air Tunnels:



When ordering...
Please specify the desired floor plan, door mounting (left or right opening), and voltage (208, 230, or 460VAC).

Air Tunnels: See dimensional sketch on preceding page.

Dimensions (inches)							Blower/ Filter Type*	No. of Filter/ Blowers	No. of Nozzles	Shipping Weight (lbs.)	Stainless Steel Cat. #	Epoxy-Finished CR Steel Cat. #	Laminated Fiber Core Cat. #
A	B	C	D	E	F	G							
90	52	96	26	32	35 1/2	87	1	2	40	4000	**6010-42**	**6010-52**	**6010-62**
90	52	120	30	32	35 1/2	111	1	2	64	4600	**6010-43**	**6010-53**	**6010-63**
90	52	144	30	32	35 1/2	135	1	3	60	5300	**6010-44**	**6010-54**	**6010-64**
90	52	180	30	32	35 1/2	171	2	3	96	5700	**6010-45**	**6010-55**	**6010-65**
90	52	240	30	32	35 1/2	231	2	4	128	8000	**6010-46**	**6010-56**	**6010-66**
90	58	96	30	36	39 1/2	87	2	2	64	4400	**6010-47**	**6010-57**	**6010-67**
90	58	120	30	36	39 1/2	111	2	2	64	4700	**6010-48**	**6010-58**	**6010-68**
90	58	144	30	36	39 1/2	135	2	2	64	5200	**6010-49**	**6010-59**	**6010-69**
90	58	180	30	36	39 1/2	171	2	3	108	7200	**6010-50**	**6010-60**	**6010-70**
90	58	240	30	36	39 1/2	231	2	4	144	8400	**6010-51**	**6010-61**	**6010-71**

**** See specifications above for complete information.***

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Clean Phone™ Cleanroom Telephone

- **Completely smooth polyester front panel will not trap particulate matter**
- **Auto-answer setting allows personnel to answer calls, in a normal speaking voice, without leaving stations**
- **Volume and microphone sensitivity are easy to adjust with just a small standard screwdriver**
- **Two autodial numbers can be programmed for one-touch dialing of often-called or emergency numbers**
- **Oversized buttons are easy for gloved hands to use**
- **"Flash" button allows phone to use all features of a PBX system**
- **Phone can be programmed locally or remotely**
- **Available in flush-mounted or wall-mounted design**

The Clean Phone's hands-free answering is ideal for cleanroom environments, and its surface is designed so that it will not trap or shed particulates when you initiate outgoing calls.

Hands-Free Auto-Answer Capability

When you activate its auto-answer feature, the Clean Phone will go off-hook automatically, after ringing the number of times that you select, and broadcast the incoming call through the speaker. A light goes on under the ON/OFF button to indicate when the phone is off-hook. The technician called can respond, in a normal speaking voice, without leaving the work station. When the auto-answer feature is deactivated, the phone will not go off-hook until someone actually touches the ON/OFF button

Ambient Noise Level

The maximum ambient noise level limit for the Clean Phone is 75dBA (similar to the sound of a freight train at 100 feet). Higher noise levels will interfere with the hands-free switching of the microphone and speaker. Speaker volume and microphone sensitivity are factory set to a nominal background noise value. Adjustments to different values can be made with a standard screwdriver.

What's So Clean About It

The Clean Phone is constructed of 16-gauge stainless steel, with a completely smooth 12" x 12" (30.5 x 30.5 mm) polyester front panel that won't trap particulates, sealed with an overlay that keeps the phone particulate-free and makes cleaning quick and easy. The ink labeling the buttons is printed on the reverse side of the overlay, further guarding against shedding, at the same time that it ensures a long life for the legibility of the markings. The oversized buttons are easy to operate, so callers have no reason to expose the pressure-sensitive surface to ungloved hands. The graphic overlay is designed to withstand exposure to a great many chemicals (list available upon request), and can thus clean up easily after contact with gloves bearing chemical residues.

The Choice is Yours

Besides programming the Clean Phone to activate or deactivate the auto-answer feature, and selecting the number of rings before it activates, you have the option of programming one or two emergency or frequently-called numbers, and using the one-touch Autodial method of originating a call. You can also use standard dialing procedure on the fully functional keypad. You operate the phone with either DTMF or Pulse dialing, and using either long (350 ms) or short (50 ms) called-party loop current disconnect mode.

Any of the programmable features can be programmed either locally, on the phone's own keypad, or remotely, through any DTMF telephone, and the password used to initiate remote programming can be left at its factory setting or changed to any four-digit number. In addition, a "Flash" button allows the phone to use all features of a PBX system. All of the programmable options have factory-set default settings, which will remain in effect until you change them by following the simple, step-by-step programming instructions provided in the Operating Manual.

The Clean Phone is available in either a flush-mount or wall-mount style (each comes with mounting bracket). Accessories available are a Maintenance Cover and a Plug-In Transformer.

Specifications

Construction:	8 mil tactile polyester membrane panel over 16 gauge stainless steel, 12" x 12" (30.5 x 30.5 mm)
FCC Registration No.:	ADCUSA-60747-MT-E
Ringer Equivalence:	0.4B
Autodial Capacity:	Two 16-digit numbers
Call Initiation:	Push-activated
Call Termination:	Push-activated loop current disconnect
Programming:	Remote DTMF
Signaling:	DTMF or Pulse
Max. Speaker Output:	85 dBA spl @ 1 M
Ambient Noise Level Limit:	75 dBA
Operating Temperature:	-4°F to +140°F

	Cat #
Flush-Mount Clean Phone™	**2121-20**
Wall-Mount Clean Phone™	**2121-21**
Maintenance Cover Plugs into enclosure when phone is removed for maintenance.	**2121-22**
Plug-In Power Supply 120VAC to 48VDC	**2121-23**

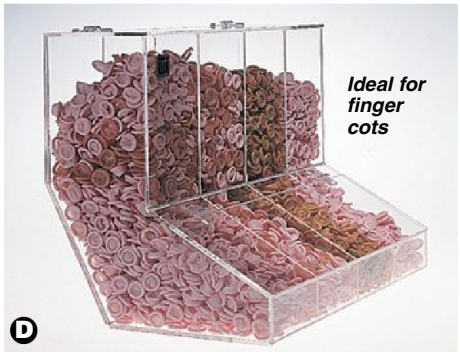
Note: The clean phone is compatible with analog phone systems only. Call Terra for assistance in evaluating your application.

CLEANROOMS & ACCESSORIES

A *Position glove boxes at a convenient height!*

B *Install next to hand washer*

C


D *Ideal for finger cots*

E *For gloves, hoods, face masks*

F

G *Organizes small parts*

H

I

J

K

L

Garb and Parts Dispensers—Space-Saving Convenience!

These handy dispensers save space and organize gloves, safety glasses, wipers, hats, and other garb. They're perfect benchtop storage bins for small parts used in cleanroom processing. Select clear acrylic or static-dissipative PVC, which eliminates static charges and the particles they attract.

Complete Product Listing begins on page 299.

Item (see photos)		Dimensions W x D x H, in.	Acrylic Cat. #	Static-Dissipative PVC Cat. #
A. Wall-Mount Glove Box Holder		12 x 4.75 x 15.5	**4950-85**	**4950-86**
B. Wall-Mount Glove Dispenser (single)		16.5 x 12.5 x 17	**4950-72**	**4950-74**
C. Wall-Mount Glove Dispenser (triple)		16 x 11.5 x 12	**4005-56**	**4005-57**
D. Multi-Chamber Dispenser		15.75 x 8 x 15	**4005-51**	**4005-50**
E. Benchtop Glove Dispenser		12 x 6 x 6	**4951-03**	**4951-04**
F. Safety Glasses Dispenser	Capacity: 98	23.75 x 5.70 x 46	**4951-05**	—
	Capacity: 8	6.75 x 5.70 x 17	**4950-45**	**4950-46**
G. Dispensing Bins		5 x 6.25 x 8.25	**4950-12**	**4950-13**
H. Apparel Dispenser		48.5 x 24.5 x 36	**4951-06**	**4951-07**
I. Wall-Mount Cabinet		15 x 6.375 x 11.5	**4950-04**	**4950-05**
J. Wiper Dispenser (enclosed)		12 x 9 x 6	**4951-01**	**4951-02**
K. Wiper Dispenser (open top)		10.5 x 14.5 x 4	**4950-93**	**4950-94**
L. File Holder (4 slots)		10.5 x 5 x 15	**4005-25**	**4005-23**

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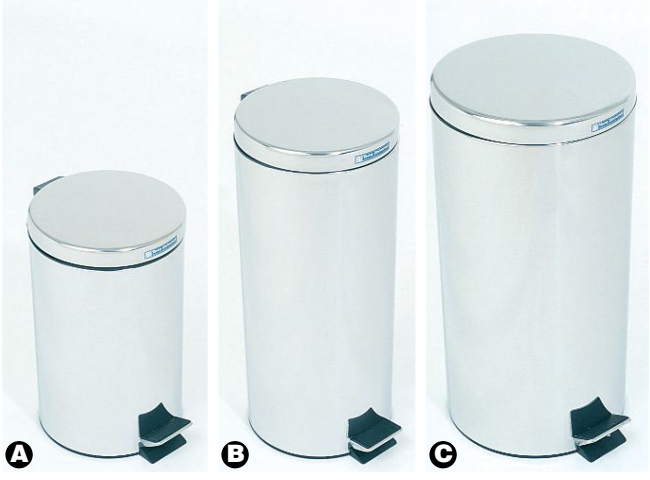
Light-Gauge Cleanroom Waste Receptacles

- **Mirror-finish stainless steel surfaces wipe down clean, won't shed particles**
- **Contoured, tight-fitting lid safely contains cleanroom waste**
- **Foot pedal and self-closing lid keep operator's hands free**
- **Rigid plastic liners are easy to remove and empty, with minimal disruption to cleanroom environment**

Plastic liner makes disposal a cinch!

These foot-pedal operated receptacles provide the perfect solution to cleanroom waste disposal problems.

Made of 304 nonmagnetic stainless steel, they won't particulate and wipe down easily, without snagging cleanroom wipers. The rigid plastic liner features a convenient handle for easy removal. The no-spring foot pedal lets an operator dispose of waste without the need to touch the receptacle, and the tight-fitting, gasketed lid forms a tight seal to contain waste safely.



Hands-free pedal-activated lid for clean, easy operation (Model shown: 1456-22)

Cleanroom Waste Receptacles — Light Gauge

Type (Gal)	Cap.	Dimensions W" x D" x H"	Ship. Wt. lbs.	Cat.#
A	2.6	9.5 dia. x 16	6	**1456-20**
B	4	9.5 dia. x 22.5	9	**1456-21**
C	8	12 dia. x 24	12	**1456-22**

Stainless Steel Clipboard

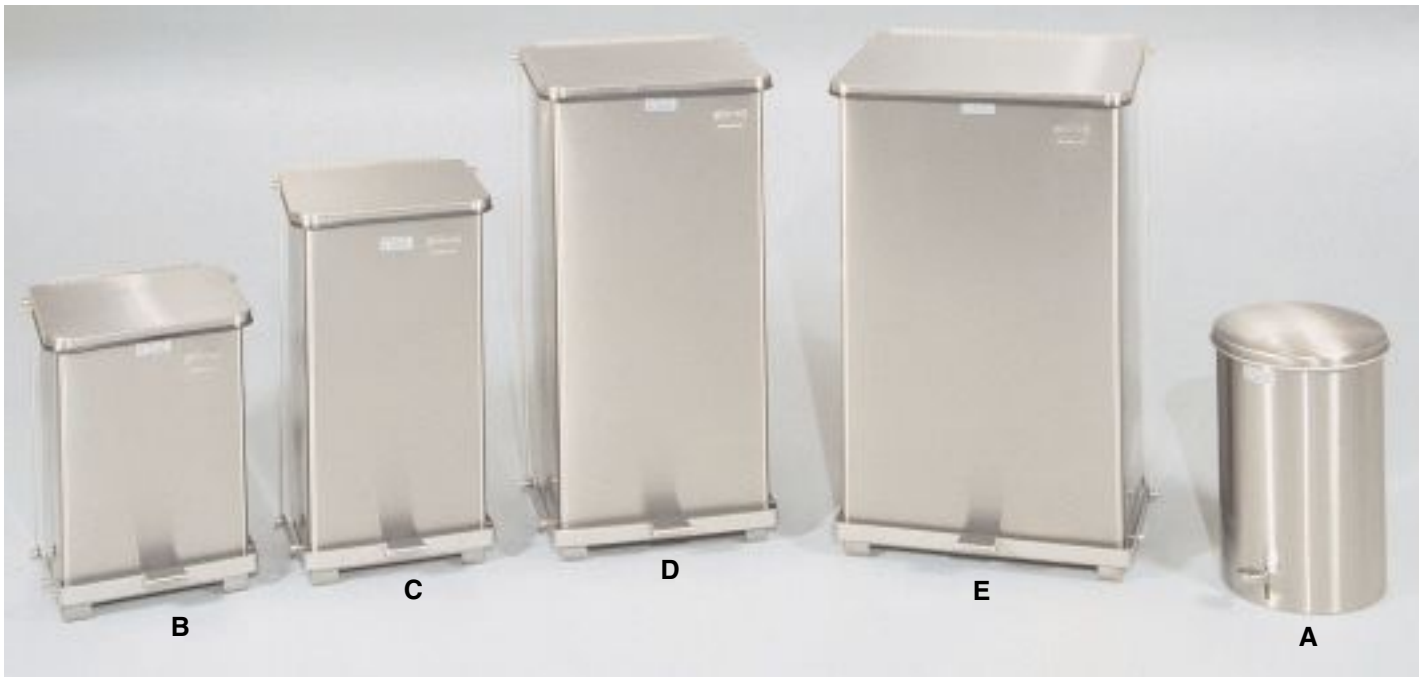
- **Stainless steel construction gives you a clipboard that's up to cleanroom standards**
- **12" x 9½" surface firmly holds writing paper in place**

What is there to say about a clipboard?

They're easy to overlook when you're setting up your cleanroom, yet they're an essential item when it comes time to update information.

This one is completely clean-room compatible. Stainless steel construction ensures a nonshedding, durable, conductive surface for cleanroom paper. Large 12" x 9½" surface and spring-loaded clip securely hold standard sized sheets.

		Cat. #
	Stainless Steel	**1350-00**
NEW	**Polypropylene**	**1350-01**



Heavy-Gauge Cleanroom Waste Receptacles

- **Contoured tight-fitting lid ensures safe, clean disposal of cleanroom waste**
- **Select electropolished stainless steel for optimal cleanliness**
- **Easy-open foot-pedal design and self-closing lid keep operator's hands free**
- **Gasketed seal eliminates particle outflow**
- **Rigid, durable plastic liner allows easy cleaning**
- **All models comply with OSHA requirements; all except #1456-00 are Factory Mutual Systems approved and UL listed**
- **Available in five capacities**

These foot-pedal operated receptacles provide the perfect solution to cleanroom waste disposal problems.

Fabricated at 304 nonmagnetic stainless steel and available with electropolishing, they are designed to provide years of constant service in the cleanroom without contamination. Their no-spring foot pedal lets an operator dispose of waste without the need to touch the receptacle, and the tight-fitting, gasketed lid forms a nearly air-tight seal to contain waste safely.

They also feature rigid, reusable plastic liners that allow easy removal of waste. Liners are treated with an EPA-registered anti-microbial compound for additional protection. Legs raise the receptacles ¾" to provide air circulation and minimize particle accumulation.

Note: These receptacles are not intended for containment of radioactive waste. Order receptacles and corresponding liners from the ordering table. Each receptacle comes with a rigid plastic liner; replacement liners are packaged one per carton.

Cleanroom Waste Receptacles						Corresponding Rigid Liner	
Type	Capacity (Gallons)	Dimensions W x D x H (in.)	Ship. Wt. (lbs.)	Stainless Steel Cat. #	Electropolished Stainless Steel Cat. #	Ship. Wt. (lbs.)	Cat. #
A	3.5	11 dia. x 17 H	9	**1456-00**	**1456-15**	**3**	**1456-05**
B	7	12 x 12 x 17	19	**1456-01**	**1456-16**	**4**	**1456-06**
C	12	12 x 12 x 23	24	**1456-02**	**1456-17**	**5**	**1456-07**
D	24	15 x 15 x 30	36	**1456-03**	**1456-18**	**7**	**1456-08**
E	40	19 x 19 x 30	48	**1456-04**	**1456-19**	**8**	**1456-09**

MicroVac™ Portable Cleanroom Vacuum

Ideal for removing microcontaminants from hard-to-reach places! The MicroVac™ incorporates a four-stage filtering system to trap particles as small as 0.12 microns. Made of stainless steel, it includes a mini-tool kit for use in drawers, computer keyboards, and other hard-to-clean surfaces.

	Cat. #
110VAC/60Hz	**5100-00**
220VAC/50Hz	**5100-00-220**

See page 281

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Sneeze Guard™

- Fits onto most microscopic eyepieces
- Shields work stage against contaminants
- Acrylic model acts as a contamination magnet, keeping workplace clean
- Static-Dissipative PVC model eliminates electrostatic charges and the particles they attract
- Available in five sizes; custom models available
- Eliminates bothersome face masks

The Sneeze Guard™ is used in hybrid assembly, research and development, testing, inspection, and all other microelectronics operations that involve microscopes. It hangs at the proper angle on most microscope eyepieces, shielding the work stage against contaminants emanating from the operator. Tests have shown that it functions as effectively as a face mask, without the inconvenience and expense.

The Sneeze Guard™ is available in both acrylic and Static-Dissipative PVC. The acrylic Sneeze Guard™ is economical, and in time generates a static charge that actually attracts contaminants, making this unit in effect a "contamination magnet."

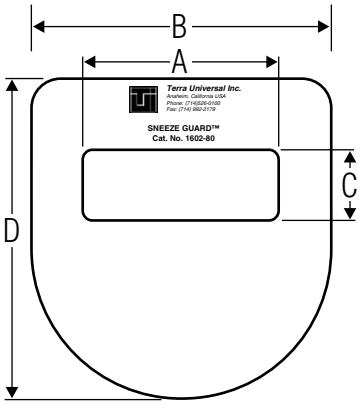
The Static-Dissipative PVC model features a surface resistivity of 10^6-10^8 ohms per square—effectively dissipating electrostatic charges. (For more information about Terra's Static Dissipative PVC, see page 596 of this catalog.)

Custom Sizes/Configurations Available

Terra can create Sneeze Guards™ in custom sizes and configurations to suit your needs. Whether you need larger or smaller units, eyepiece holes, or modifications to accommodate other specific needs for your application, simply call Terra!

Terra Universal Manufactures Solutions

In fact, we can manufacture any enclosure or shield out of acrylic or static-dissipative PVC. From the cleanroom to the laboratory to the assembly line; from R&D to substrate processing; from desiccators to file holders, Terra will manufacture a solution to suit your application.



Call today for a free acrylic sample.

Sneeze Guard™ Ordering Information

Dimensional Guide

A	B	C	D	Material	Cat. #
4 3/4"	7 1/8"	1 3/4"	7 3/4"	Dissipative PVC	**1601-51**
4 3/4"	11"	1 5/8"	11"	Dissipative PVC	**1602-75**
4 3/4"	7 1/8"	1 3/4"	7 3/4"	Acrylic	**1601-50**
4 3/4"	11"	1 5/8"	11"	Acrylic	**1600-25**
4 3/4"	7"	1 3/4"	7 1/2"	Acrylic	**1602-80**

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Electropolished Stainless Steel Step Stools and Step Ladders

- **A step up in cleanliness and safety!**
- **Spring-loaded casters retract when weight is applied**
- **¾"-diameter perforations accommodate vertical laminar air-flow and minimize particle accumulation**
- **Custom sizes and configurations available—call with your specifications!**

These step stools and ladders are ideal for performing maintenance tasks (like replacing filters) in a cleanroom environment.

Their spring-loaded casters ensure that they won't roll during use, and safety rails on larger models further enhance personnel safety. Standard models include perforations; other designs are available on a custom basis.

Stainless Steel Step Stools and Step Ladders

Overall Dimensions (W" x D" x H")	No. of Steps	Electropolished Stainless Steel Cat. #
30 x 20 x 24	2	**2805-50**
30 x 24 x 34	3	**2805-51**
30 x 24 x 60	3*	**2805-53**
30 x 30 x 70	4*	**2805-52**
30 x 40 x 80	5*	**2805-54**

**** Includes hand safety rail extending 29" above top step (No. 2805-52 is not pictured).***

No. 2805-54
Step heights: 11", 21", 31", 41", 51"

No. 2805-53
Step heights: 11", 21", 31"

No. 2805-51
Step heights: 11", 21", 31"

No. 2805-50
Step heights: 11", 21"

Monitor Stand

- **Securely supports monitor while freeing-up valuable cleanroom floor space**
- **Low-profile frame flush mounts to the cleanroom wall**
- **Fabricated of electropolished stainless steel to meet today's ultra-clean requirements**

Terra Universal's Monitor Stand provides easy access to your computer monitor and keyboard without consuming valuable cleanroom floorspace.

Designed for wall-mounting at a convenient standing height, this unit features a smooth-sliding keyboard tray and a gasketed monitor viewing frame, all made of high-grade electropolished stainless steel for optimal cleanliness. Its low-profile, smooth surfaces won't trap particles and are easy to wipe down without snags.

	Cat.#
For 15" monitors	**9602-41**
For 17" monitors	**9602-61**

Other sizes available; call for a quotation!

Mounts flush in cleanroom wall, with monitor accessible from "chase" area

Monitor Cabinet

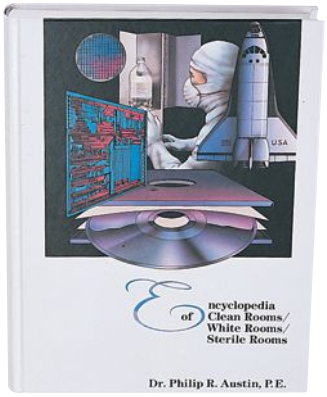
- **Fabricated of electropolished stainless steel for optimal cleanliness**
- **Includes two storage shelves for CPU and other materials**
- **Cam style locking LiftLatch™ secures contents**

Terra Universal's Monitor Cabinet is fabricated of ultra-clean electropolished stainless steel that is easy to clean.

It positions the monitor at a convenient viewing height, and it provides a locking cabinet with two adjustable stainless steel shelves for housing the CPU, storage media, and other items. Comes standard with Teflon® leveling feet; casters are also available for easy relocation throughout your facility.

Overall dimensions: 21"W x 21"D x 39"H.

	Cat.#
Monitor Cabinet	**9602-60**
Stainless Steel Stand (Raises cabinet 4", including leveling feet)	**2450-00**
Casters (set of four, two with locking brakes)	**1700-44**



Encyclopedia of Clean Rooms/ White Rooms/Sterile Rooms

Dr. Philip R. Austin, P.E. 1,000 pp., 3rd ed.

This indispensable reference book covers every aspect of contamination control in cleanrooms, biotech rooms, and aseptic areas. The book provides thousands of vital facts and figures and discusses all types of clean facilities in terms of design, construction, operation, and management. Topics include Class 500,000 through cleaner than Class 1 cleanrooms; bio-clean rooms; sterile rooms; the latest laser monitoring techniques; major governmental standards and specifications; air, fluid, and gas filtration; air showers, air locks and pass-thru; employee training; vertical and horizontal laminar flow facilities; cleanroom laundries; personnel and equipment; and contaminant emissions.

Cat. #
5012-01

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Electropolished Stainless Steel Work-In-Process (WIP) Racks

- **Clean, secure enclosure protects WIP materials from breakage or contamination during processing**
- **Ergonomic design increases productivity**
- **17° shelf slope ensures safe product positioning against rear retaining bar**
- **All-electropolished stainless steel construction won't particulate, wipes down without snags**
- **Wafer WIP box sizing conserves valuable cleanroom floor space by optimizing shelf capacities**
- **Custom dimensions and enclosure panels available - just give us your specs!**

These WIP racks safeguard delicate products while making optimal use of valuable cleanroom space.

Certified Class 1-Compatible

Fabricated of 1"-square stainless steel tubes, these racks feature continuous seam welds and extensive surface finishing to prevents snags or crevices. The all-electropolished stainless steel surfaces won't shed particles or outgas chemicals. They have been independently certified compatible for use in Class 1 cleanrooms (see page 3 for more information).

Their shelves optimize the vertical laminar airflow inside a cleanroom and minimize the possibility of particle accumulation. Choose between rod shelves, made of ¼"-diameter rods on 2" centers, or shelves with ¾"-diameter perforations, which provide approximately 40% open space. Both shelf types are mounted at a 17° angle to position WIP boxes securely against a rear retaining rod. Side flanges keep materials from slipping off the side edges. Shelves are designed for optimal storage densities of common wafer transport cassettes and WIP boxes (see ordering chart for capacities).

All models feature polypropylene leveling feet. Stainless steel mounting plates are also available (see below). Racks can also be customized to accommodate special parts or capacity requirements; just let send us your specifications.

Rod Shelf WIP Rack

Other WIP Storage Solutions

Select a standard unit, or put Terra's design and fabrication experience to work on a system customized to your specs!

Wall-Recessed WIP Storage Cabinet

Made of all-electropolished stainless steel, this cabinet fits into a cleanroom wall cut-out to eliminate floorspace requirements altogether!

The model shown features five shelves made of ¼"-diameter rods on 2" centers. Dimensions: 48"W x 12"D x 60"H. Call for specify other sizes or configurations!

Cat. #
9611-90

NOTE: 150mm capacities are based on the following: lower end, Fluoroware model PA182-50MB wafer cassette, upper end, Empak model TR15-01 wafer box. 200mm capacities are based on Empak model HA200 wafer box.

WIP Racks—12" Shelf Clearance (for 150mm and 200mm wafers)

Dimensions W x D x H, in.	No. of Shelves	Capacity 150mm	Capacity 200mm	Rod Shelves* Cat. #	Perforated Shelves Cat. #
38 x 12 x 36	2	6-10 •	6	**9611-00***	**9611-24***
38 x 12 x 48	3	9-15 •	9	**9611-01***	**9611-25***
38 x 12 x 60	4	12-20 •	12	**9611-02***	**9611-26***
38 x 12 x 72	5	15-25 •	15	**9611-03***	**9611-27***
38 x 18 x 36	2	12-20 ••	6	**9611-04**	**9611-28**
38 x 18 x 48	3	18-30 ••	9	**9611-05**	**9611-29**
38 x 18 x 60	4	24-40 ••	12	**9611-06**	**9611-30**
38 x 18 x 72	5	30-50 ••	15	**9611-07**	**9611-31**
38 x 28 x 36	2	18-40 •••	12	**9611-08**	**9611-32**
38 x 28 x 48	3	27-60 •••	18	**9611-09**	**9611-33**
38 x 28 x 60	4	36-80 •••	24	**9611-10**	**9611-34**
38 x 28 x 72	5	45-100 •••	30	**9611-11**	**9611-35**
48 x 12 x 36	2	8-12 •	6	**9611-12***	**9611-36***
48 x 12 x 48	3	2-18 •	9	**9611-13***	**9611-37***
48 x 12 x 60	4	16-24 •	12	**9611-14***	**9611-38***
48 x 12 x 72	5	20-30 •	15	**9611-15***	**9611-39***
48 x 18 x 36	2	16-24 ••	6	**9611-16**	**9611-40**
48 x 18 x 48	3	24-36 ••	9	**9611-17**	**9611-41**
48 x 18 x 60	4	32-48 ••	12	**9611-18**	**9611-42**
48 x 18 x 72	5	40-60 ••	15	**9611-19**	**9611-43**
48 x 28 x 36	2	24-36 •••	12	**9611-20**	**9611-44**
48 x 28 x 48	3	36-54 •••	18	**9611-21**	**9611-45**
48 x 28 x 60	4	48-72 •••	24	**9611-22**	**9611-46**
48 x 28 x 72	5	60-90 •••	30	**9611-23**	**9611-47**

**** Require 2½" Diameter Mounting Feet, Cat. # 1540-04-2***
• Cassettes are loaded one row across per shelf
•• Cassettes are loaded two rows across per shelf
••• Cassettes are loaded three rows across per shelf

NOTE: Capacities are based on Empak model HS300-02B. All capacities are based on one row of cassettes per shelf.

WIP Racks—14" Shelf Clearance (for 300mm wafers)

Dimensions W x D x H, in.	No. of Shelves	Capacity 150mm	Rod Shelves* Cat. #	Perforated Shelves Cat. #
38 x 12 x 38	2	4	**9611-48***	**9611-60***
38 x 12 x 52	3	6	**9611-49***	**9611-61***
38 x 12 x 66	4	8	**9611-50***	**9611-62***
38 x 18 x 38	2	6**	**9611-51**	**9611-63**
38 x 18 x 52	3	9**	**9611-52**	**9611-64**
38 x 18 x 66	4	12**	**9611-53**	**9611-65**
55 x 12 x 38	2	6	**9611-54***	**9611-66***
55 x 12 x 52	3	9	**9611-55***	**9611-67***
55 x 12 x 66	4	12	**9611-56***	**9611-68***
55 x 18 x 38	2	8**	**9611-57**	**9611-69**
55 x 18 x 52	3	12**	**9611-58**	**9611-70**
55 x 18 x 66	4	16**	**9611-59**	**9611-71**

**** Require 2½" Diameter Mounting Feet Cat# 1540-04-2***
***** Based on cassettes loaded with wafers facing to the side. Models without asterisks load with cassettes facing front.***

Mounting Feet

Electropolished stainless steel leveling feet feature cut-outs to allow bench to be bolted to the floor.

	Cat. #
2½" Diameter	**1540-04-2**
3½" Diameter	**1540-05-2**

See next page for more WIP solutions!

Wall-Mount WIP Racks

Made of electropolished stainless steel rods, these wall-mount WIP racks can be modified to accommodate other WIP storage boxes. Call with your requirements!

For 200mm Wafer Lot Boxes

Capacity	Cat. #
One	**9611-91**
Two	**9611-92**
Three	**9611-93**
Four	**9611-94**

WIP Rack with Polypropylene Liners

These racks are ideal for WIP storage of quartz tubes and large fab tools that may have surface chemical residues. The polypropylene liners resist most acids and can be easily removed for cleaning. Racks can be customized for your application.

	Cat. #
Model shown	**9611-95**

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A *Available with onboard power cell for cordless operation — see page 176*

C *HEPA filtered drying*

B *Secure WIP storage*

D *Many door and shelf configurations*

Specialized Work-In-Process Solutions

A. HEPA-Filtered WIP Cabinet

This stainless steel enclosure provides a particle-free storage environment for sensitive work-in-process. The filter/fan unit includes a 99.99% efficient HEPA filter (rated @ 0.3 µm particles) and operates at a whisper-quiet 50 dBA. Shelf perforations are ¾"-diameter to allow 40% open space. Shelves are adjustable at 1" increments. Overall dimensions: 48¼"W x 24⅜"D x59½"H (with standard leveling feet). Storage area: 47½"W x 22½"D x 40"H (filter face to bottom shelf).

See page 157 for complete ordering information.

B. Security Cage WIP Cabinet

This electropolished stainless steel cabinet features a wire-cage design and five slanted rod shelves. The locking doors provide access security for storing valuable WIP materials. Standard model shown in 48"W x 24"D x 76"H, with five shelves spaced 12" apart.

See page 158 for complete ordering information.

C. Laminar-Flow Curing/Drying Cabinet

This cabinet is ideal for clean-air drying of sensitive materials after epoxy deposition, solvent cleaning, or other processes involving noxious fumes.

It provides a continuous horizontal laminar flow of HEPA-filtered air though the enclosure. An optional exhaust purification modules on the opposing side of the enclosure houses activated charcoal filters that safely remove a wide range of chemical vapors, allowing safe, ductless exhaust release. Enclosure is available in acrylic or static-dissipative PVC, which eliminates static charges and the particles they attract.

See page 154 for complete ordering information.

D. Wafer Box Storage Cabinets

These fully enclosed locking cabinets feature adjustable shelves that accommodate any wafer box size. Electropolished stainless steel construction ensures cleanliness, and static-dissipative PVC viewing windows afford full visibility of stored contents. Locking doors prevent unauthorized access.

See page 158 for models shown.
Nitrogen-purged systems begin on page 92

A *Fully adjustable shelves in many styles*

C *Protects against moisture and contaminants*

B *Convenient, safe wiper wetting cart!*

D *Secure, convenient wafer lot box transport*

Cleanroom Work-In-Process Carts

A. Series 500 Cart, from InterMetro

Model shown features 4-inch shelf ledges (top) and one-inch shelf ledges with 8-inch divider (bottom). Many solid and wire shelf configurations available.

Full product line begins on page 527.

B. IPA Wetting Cart

Provides a handy supply of cleanroom wipers wetted with IPA. Wiper platform includes ¼"-diameter perforations for easy wetting. Double-wall construction for fire safety.

See page 532 for more information.

C. DesiCart™ Low-Humidity Transport Cart

Fully enclosed transport cart is can be purged with nitrogen to maintain clean, dry conditions that retard oxidation and prevent particulate contamination. Available in many shelf and side panel configurations.

Refer to page 116 for full specifications and ordering information.

D. Wafer Box Transport Cart

Sized for secure, space-efficient transport of 150mm, 200mm and 300mm wafer boxes, this electropolished stainless steel cart features spring-loaded casters for cushioned rides on uneven floors. Available with rod or perforated shelves.

To order, see page 526.

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

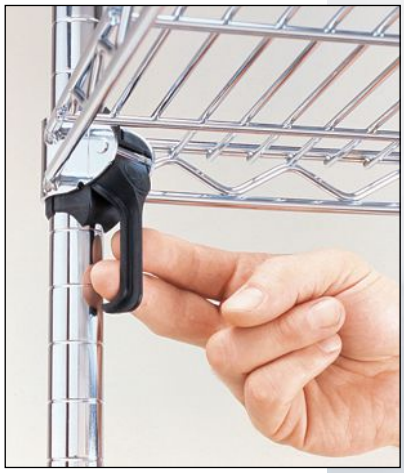
From InterMetro

Super Adjustable™ Wire Shelves

- **Easy-adjust corner release system saves time and space**
- **Lets you raise and lower any shelf without tools and without disturbing other shelves**
- **Optimizes your storage area in seconds!**

This revolutionary adjustable system means you'll never have to make do with anything less than the optimal storage solution!

Just lift the release on each corner, and adjust your shelf at precise 1" increments, and clamp the release lever shut. In seconds, you can optimize your storage system to changing load requirements, with no tools, no wasted time, and no wasted space.



SiteSelect™ Posts Make It Easy!
SiteSelect™ posts are grooved every inch and numbered every 2" to simplify shelf positioning. Double-groove indicators every 8" provide a convenient visual height reference.

See ordering information on page 187.

From InterMetro

Cleanroom Shelving and Accessories

- **Many designs and materials, including chrome plated and electropolished stainless steel wire shelves**
- **Select dividers, ledges, undershelf slides and other optional features**
- **Specialized storage solutions include reticle shelves, component reel shelving, and security trucks**

Complete product information begins on page 184.

Berkshire®

Cleanroom Wipers, Swabs and Paper Products

- **Manufactured in the world's first fully integrated cleanroom-wiper manufacturing facility for guaranteed cleanliness**
- **Extensively tested before packaging (using MIL-STD-105E) for particles, absorbency, extractables and ions**
- **Select from dozens of sizes, materials and absorbencies, in several cleanliness ranges: Class 1-10, Class 100 and Class 1,000**
- **Sterile wipers available for aseptic environments**
- **Cleanroom paper, notepads and notebooks are made to meet stringent cleanliness requirements**

This complete line of cleanroom wipers and documentation products meets very specific cleanroom requirements.

Engineered, Manufactured and Certified Clean

Cleanroom wipers designated for the most stringent cleanroom conditions (Class 1 and Class 10) are made of cleanroom-laundered, knitted polyester, and pass through five basic manufacturing steps: knitting, finishing, converting, cleanroom laundering and packaging. Each stage plays an integral role in the final performance of the product you take into your cleanroom. No other single manufacturer has ever controlled all of these production stages from yarn to finished product. Each stage is completed in the world's first fully integrated cleanroom wiper manufacturing facility.

Laundering—perhaps the most crucial stage in this operation—takes place in a certified Class-10 facility that uses a dual-pass, reverse osmosis water filtration system to ensure purity and cleanliness in the wash cycle. And 100% HEPA-filter coverage (99.999% efficient at 0.12 microns) in the cleanroom and dryers creates the cleanest possible environment for the final drying and packaging process.

Wipers are tested in accordance with the manufacturer's Statistical Quality Control Program for Cleanroom Wipers. This ensures that QC standards are met at each stage of the production process, from incoming raw materials to shipping of packaged products.

Part of this SQC program entails testing, using MIL-STD-105E sampling plan, for a number of crucial physical characteristics, including particle counts, absorbency and the presence of extractables and ions (see ordering table for each product line for complete information on these data).

The SQC program thus ensures that product quality will never vary beyond stated control limits and relieves the end user of the burden of continual incoming QC.

Test Results You Can Count On

Cleanliness—Particle Generation: Biaxial Shake Test: A wiper is washed in water using a biaxial shaker for five minutes. The particles released into the water are counted by a liquid-borne particle counter. By dividing the total number of particles released by the area of the wiper, you arrive at the results expressed in particles ≥ 0.5µm per square centimeter of wiper.

Cleanliness—Particle Generation: Dry "Flex" Test: This test measures how many particles can potentially be generated when handling a dry wiper. A sample of material is rigorously flexed and twisted during testing. Particles are measured by an airborne particle counter, and the results are expressed in particles ≥ 0.5µm per cubic foot of air sampled.

Absorbency: A sample piece of material is saturated with as much fluid as it can hold. The material is weighed, and results are expressed in cubic centimeters per square meter.

Specific Absorbency: This calculation indicates how well a material absorbs, relative to others. Results, expressed in cubic centimeters of liquid per gram of material, assist in comparing one raw material with another.

Time to Half-Sorption: This test is a measurement of the time it takes a wiper to absorb half the total liquid it can hold. Results are expressed in seconds.

Purity—Metallic Ions: Tests are conducted for sodium, potassium, calcium, and magnesium extractable ions. Results are stated in parts per million.

Purity—Extractables: Tests generate extraction data using both deionized water and 2-Propanol. Results are expressed in percent by weight, (the percent of material left behind as non-volatile residue), and in grams per square meter of material, which is a useful guide to the relative purity of wipers.

Comprehensive Lines to Meet Every Application

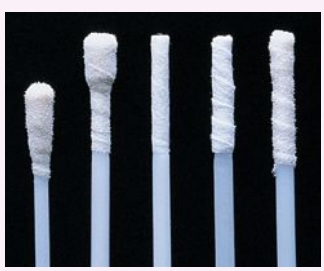
The following pages provide more detailed information on several lines of cleanroom wipers and paper products. Wipers are available within each cleanliness designation with more specific application characteristics (such as static-dissipation, high absorbency and nonabrasive wiping).

For…	*See page(s)*
Class 1 & 10 Cleanroom Applications	238, 239
Class 100 Cleanroom Applications	240-243
Class 1,000 Cleanroom Applications	244
Sterile Applications	244
Cleanroom Documentation Needs	246
Miscellaneous Cleanroom Products	247

Durx® 770, Page 241

MicroSeal® 3000, Page 238

Berkshire® Bond, Page 246



BCR® Swabs, Page 247

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Cleanroom Wipers *for Class 1 and Class 10 Applications*

MicroSeal® 3000
Polyester Sealed-Edge Wipers

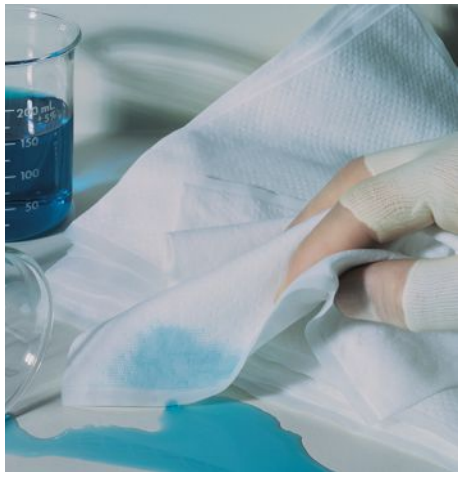
- **Sealed-edge process minimizes particle contamination**
- **Tear resistant for tough cleaning**

This 100% continuous-filament double-knit polyester cleanroom wiper is ideal for critical applications. It features an absorbent tubular (two-ply) knit, sealed-edge design ultrasonically sealed and cut on two sides. Laundered and packaged in an ISO4 (Class 10) cleanroom, each pack features its own traceable lot number. The microdenier material is designed for soft, dry wiping.

ValuSeal™ 1000/1500
Economical Laser-Cut, Sealed-Edge Wipers

- **Extremely low particles, fibers, ions and residues**
- **Unique double-knit construction is strong, tear and abrasion resistant**

Combines quality, performance and low cost. These 100% double-knit polyester, laser-cut and sealed wipers are cleanroom laundered and packaged. Highly adsorbent, they hold more liquid than other polyester knits and pick up more contamination, so you'll use fewer wipers. Available in two weights.



Ultra-Seal® 3000
Highly Absorbent Wiper for Class 1 and 10 Cleanrooms

- **Sealed-edge design reduces contamination**
- **Enhanced surface features entrap contaminants**

Engineered specifically for the most critical applications, Ultra-Seal® 3000 is made from the highest quality, continuous-filament polyester yarn and knitted in a tube to reduce exposed edges and the potential for abrasion and contamination. This durable, two-ply material has two to three times the absorbency of single-ply materials.

Wipers	See Page 237 for Test Info.		Cleanliness		Absorbency			Purity					
Class 1/10	**Basis Weight** (g/m^2)	**Caliper** (µm)	**Particles—Dry Flex Test** (No. ≥ 0.5 µm/cu. ft. of air sampled)	**Particles Biaxial Shake Test** (No. ≥ 0.5 µm x $10^3/cm^2$)	**Absorbency** (cc H_2O/m^2)	**Specific Absorbency** (cc H_2O/g)	**Time to Half-Sorption** (Seconds)	**Sodium** (PPM)	**Potassium** (PPM)	**Calcium** (PPM)	**Magnesium** (PPM)	**Extractables with DI-H_2O** (%; g/m^2)	**Extractables with 2-Propanol** (%; g/m^2)
MicroSeal® 3000	131	443	120	1.5	492	3.8	1	0.089	0.14	0.096	0.016	0.027 0.033	0.093 0.12
ValuSeal™ 1000	91.6	423	26	0.82	438	4.8	2	0.094	0.049	0.25	0.064	0.020 0.018	0.073 0.067
ValuSeal™ 1500	117	440	23	0.87	453	3.9	1	0.096	0.038	0.31	0.049	0.023 0.026	0.074 0.085
Ultra-Seal 3000	134	440	76	1.2	494	3.7	2	0.078	0.14	0.12	0.018	0.027 0.036	0.098 0.013
Super Polx 1200	142	508	73	1.4	458	3.2	1	0.12	0.11	0.13	0.023	0.026 0.037	0.094 0.13
Super Polx 1500	114	443	76	1.4	424	3.7	1	0.15	0.088	0.12	0.16	0.028 0.032	0.094 0.11
MicroFirst®	56.3	258	330	20	284	5.0	3	13	2.9	270	37	0.079 0.044	0.037 0.021

These wipers are designed to meet the most rigorous cleanroom requirements. All are manufactured, laundered and packaged in the world's first fully integrated wiper manufacturing facility and closely monitored at each stage of the manufacturing process to ensure that each lot of material performs within specification (refer to page 237 for complete information on manufacturing and testing procedures).

Super Polx®1200
Most Popular Cleanroom Wiper

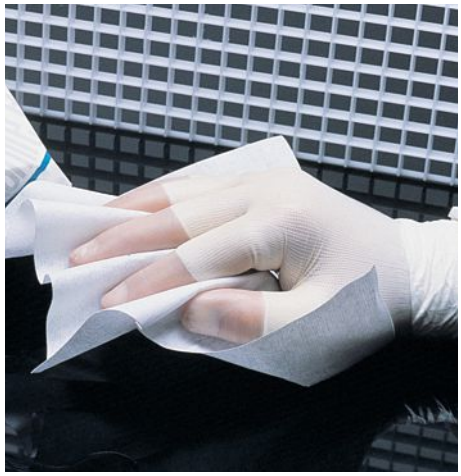
- **Made of 100% knitted polyester**
- **"Non-run" construction and superior strength make this wiper ideal for coarse surfaces**
- **Highly absorbent**

This popular wiper is suitable for use in the most critical cleanroom applications. It is extremely low in particle generation, ion content and extractable residue. Knitted with the highest-quality, continuous-filament polyester, it features a non-run construction that will not tear or abrade even under the most rigorous applications. Super Polx® 1200 is ideal for equipment cleaning, spill control and general maintenance where cleanliness and strength are a must.

Super Polx®1500
Highly Absorbent Wiper

- **Knitted construction makes for excellent specific absorbency**
- **Made of continuous-filament, non-run 100% polyester**
- **Extremely low particle generation, extractables and metallic ion content**

Economical Super Polx® 1500 is a continuous filament, non-run, 100% polyester wiper. While typical polyester wipers tend to be low in absorbency, and in some cases even hydrophobic, a unique knit construction and finishing process give Super Polx® 1500 one and one-half times the specific absorbency of other polyester wipers.

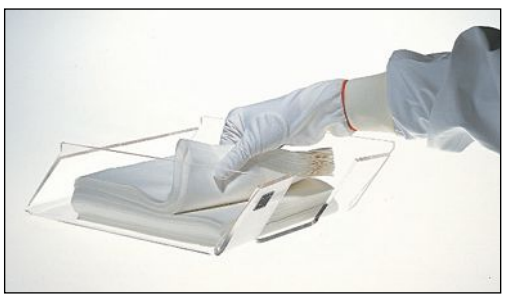


MicroFirst®
Non-Woven Cleanroom Wiper

- **First-of-its-kind wiper engineered specifically for microcontamination control**
- **Combines high absorbency, strength and cleanliness**

MicroFirst® is the first non-woven wiper engineered and manufactured specifically for cleanroom applications. Unlike other cleanroom wipers, which use materials designed originally for non-cleanroom uses, these wipers rely on a spun-lace process developed specifically for controlling microcontamination. No binders or chemical treatments are used, and fiber blend of the highest quality cellulose and polyester, with its unique surface pattern, yields absorbency and strength superior to that of other non-woven materials.

Wipers	Ordering Information			
Class 1/10	Size (in.)	Sheets/ Pkg.	Pkgs./ Case	Cat. #/Case
MicroSeal® 3000	9 x 9	100	8	5604-41
ValuSeal™ 1000	9 x 9	150	8	5604-42
ValuSeal™ 1500	9 x 9	150	8	5604-43
Ultra-Seal 3000	9 x 9	100	8	5603-50
Super Polx 1200	9 x 9	150	8	5603-51
Super Polx 1500	9 x 9	150	8	5603-52
MicroFirst®	9 x 9	300	20	5604-21



Cleanroom Wiper Dispenser
Simplifies single-sheet dispensing of 9" x 9" wipers.
Also available for other sizes.

	Cat.
Acrylic Dispenser	**4950-93**
Static-Dissipative PVC Dispenser	**4950-94**

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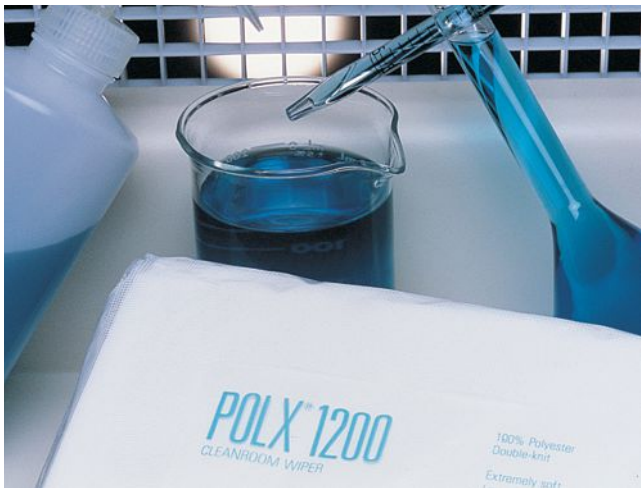
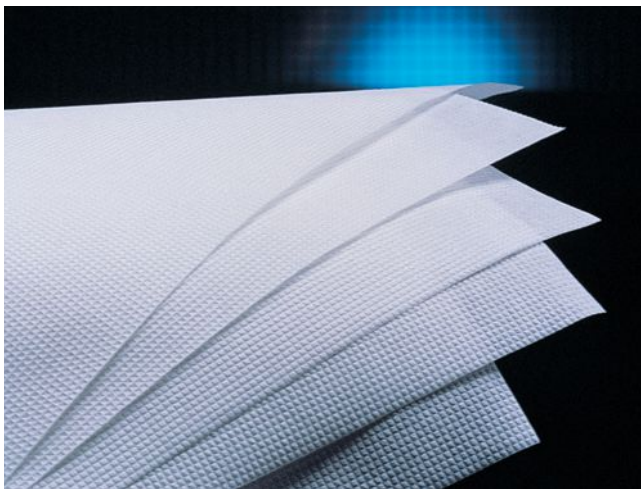
Cleanroom Wipers *for Class 100 Applications*



Polx® 1200
Strong, Economical Wiper

- **100% double-knit polyester for very low particle generation**
- **Will not abrade or shed**
- **Soft for sensitive surfaces**

Made of 100% double-knit polyester, Polx® 1200 is an economical wiper choice—stronger than nonwoven materials and more economical than high-end synthetic wipers. Its extreme softness makes it ideal for cleaning optical and other sensitive surfaces or surfaces that would normally shed or abrade a nonwoven material. It has low extractable characteristics and can be used for a variety of general cleanroom applications.



Surex® 805
Cleanest Nonwoven Wiper Available

- **Polyester-cellulose material with low particle generation**
- **Specially designed for use in critical areas**
- **Unique texture helps to lift and trap dried-on spills**

Featuring the lowest particle generation of any non-woven wiper in the industry, Surex® 805 has an embossed surface pattern that makes it ideal for trapping contaminates in various types of cleaning applications. It is recommended for spill control, general lab maintenance, equipment cleaning, work mats and parts cleaning.

Wipers	See Page 237 for Test Info.		Cleanliness		Absorbency			Purity					
Class 100	**Basis Weight** (g/m^2)	**Caliper** (μm)	**Particles—Dry Flex Test** (No. ≥ 0.5 µm/cu. ft. of air sampled)	**Particles Biaxial Shake Test** (No. ≥ 0.5 µm x $10^3/cm^2$)	**Absorbency** (cc H_2O/m^2)	**Specific Absorbency** (cc H_2O/g)	**Time to Half-Sorption** (Seconds)	**Sodium** (PPM)	**Potassium** (PPM)	**Calcium** (PPM)	**Magnesium** (PPM)	**Extractables with DI-H_2O** (%; g/m^2)	**Extractables with 2-Propanol** (%; g/m^2)
Polx 1200	107	417	180	12	405	3.8	2	1.7	0.34	0.50	0.14	0.023 0.025	0.082 0.088
Durx 670	68.8	259	680	24	294	4.3	2	1.5	3.6	270	42	0.11 0.016	0.025 0.017
Durx 770	65.7	250	160	8.7	258	3.9	3	53	5.6	260	40	0.32 0.21	0.44 0.29
Surex 805	39.8	166	170	8.2	170	4.2	10	110	14	240	31	0.91 0.36	1.4 0.56

These cleanroom wipers combine outstanding cleanliness with economy. A complete range of materials and designs lets you select the wiper that's best for your application, whether you require strength, absorbency, or softness.

Durx® 670
General Cleaning and Absorption Wiper

- **Low-particle, polyester-cellulose wiper for general applications**
- **High wet and dry strength with excellent instant absorption**
- **Also available in disk form as a wafer interleaver**

This popular, general-purpose, non-woven wiper is made from a combination of polyester and cellulose. Superior strength and absorbency, combined with low levels of ions and organic extractables, make it the ideal wiper for absorbing spills of solvents and DI water. A mechanical hydroentanglement manufacturing process gives DURX® 670 its strength and sorptive properties without the use of binders or surfactants which are often accessible to water and organic solvents. Other applications include general surface and equipment cleaning; it can be used as a wafer separator, as a laboratory workmat, or as a blotter for drying wet components.

Durx® 770
Low-Particle, Highly Absorbent Wiper

- **Specially treated for extremely low particle generation**
- **Maintains high strength and absorption with low extractables**

Like the DURX® 670, this wiper combines the strength of polyester with the absorbency of cellulose to make a highly absorbent wiper with excellent wet strength. It is manufactured without the use of surfactants to ensure a clean, pure material. In order to enhance product cleanliness, it is treated in a finishing process with a proprietary formula that dramatically improves particle generation while keeping other critical attributes in balance. Its extremely low particle generation makes it ideal for more stringent cleanroom requirements.

More Class 100 Wipes on pages 242-243.

Durx® 670 Disks/Wafer Interleavers

Diameter	Sheets/Pk.	Pks./Case	Cat. #/Case
3"	150	32	**5603-55**
4"	300	40	**5603-56**
5"	150	20	**5603-57**
6"	150	20	**5603-58**
8"	150	24	**5604-46**

Wipers	Ordering Information			
Class 100	Size (in.)	Sheets/ Pkg.	Pkgs./ Case	Cat. # / Case
Polx 1200	9 x 9	150	8	**5603-59**
Durx 670	9 x 9	300	20	**5603-60**
Durx 770	9 x 9	300	20	**5603-61**
Surex 805	9 x 9	300	16	**5603-62**

Cleanroom Wiper Dispenser
Simplifies single-sheet dispensing of 9" x 9" wipers.
Also available for other sizes.

	Cat.
Acrylic Dispenser	**4950-93**
Static-Dissipative PVC Dispenser	**4950-94**

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Cleanroom Wipers *for Class 100 Applications (cont'd.)*

Exsorbx® 400

Supersoft Wiper for Optics and Other Delicate Parts

- **Made of soft, smooth 100% polyester—an ideal protective cushioning for packing delicate parts**
- **Good absorbency with low dry-particle generation**

Made from 100% non-woven polyester, Exsorbex® 400 is an extremely soft, pliable wiper ideal for all types of sensitive surfaces. It also exhibits extremely low particle generation and excellent absorbency, making it suitable for picking up solvent with DI water spills. Other applications include general cleanroom maintenance, as well as wrapping sensitive parts for protection during shipping.

Fastsorb® 820

Highly Absorbent, Non-Abrasive Wiper

- **Rayon-polyester material is both soft and absorbent**
- **Special fiber entanglement permits stretching without tearing**
- **Clean, economical alternative to cotton twill**

Made of a rayon-polyester blend, Fastsorb® 820 possesses excellent strength and softness, combined with tremendous absorbency. It is manufactured using a mechanical entanglement process without the use of binders or surfactants. The result is a material with very low particle generation, minimal extractable matter, and low ion content. Fastsorb® 820 is recommended for spill control and wiping delicate, abrasion-sensitive surfaces.

Wipers	See Page 237 for Test Info.		Cleanliness		Absorbency			Purity					
Class 100 (cont.)	Basis Weight (g/m^2)	Caliper (µm)	Particles—Dry Flex Test (No. ≥ 0.5 µm/cu. ft. of air sampled)	Particles Biaxial Shake Test (No. ≥ 0.5 µm x $10^3/cm^2$)	Absorbency (cc H_2O/m^2)	Specific Absorbency (cc H_2O/g)	Time to Half-Sorption (Seconds)	Sodium (PPM)	Potassium (PPM)	Calcium (PPM)	Magnesium (PPM)	Extractables with DI-H_2O (%; g/m^2)	Extractables with 2-Propanol (%; g/m^2)
Exsorbx 400	38.1	187	1,400	34	219	5.7	2	24	4.5	16	3.9	0.1076 0.028	0.22 0.084
Fastsorb 820	79.3	364	1,100	2.8	580	7.3	2	19	4.7	360	45	0.13 0.10	0.034 0.027
Sunsorb 300	28.5	238	12,000	56	356	12	2	120	6.5	0.76	0.26	0.080 0.025	0.016 0.0046
Bluesorb 750	67.3	253	970	26	298	4.4	2	26	3.3	310	34	0.17 0.11	0.039 0.026
SatPax™	52.1	214	—	21	257	4.9	3	11	2.8	290	43	0.086	0.029

These cleanroom wipers combine outstanding cleanliness with economy. A complete range of materials and designs lets you select the wiper that's best for your application, whether you require strength, absorbency, or softness.

Sunsorb® 300
Ultra-Absorbent Wiper

- **Thermally bonded rayon wiper is extremely absorbent**
- **Low in extractables and ions**
- **Ideal for cleaning diffusion furnaces**

This wiper is made of 100% spunbonded rayon and, with an absorbency capacity of 13 times its own weight, is the most absorbent nonwoven cleanroom wiper available. It is also an excellent performer where extractables and ions are a concern. A unique manufacturing process, which excludes the addition of any binders or surfactants, ensures a pure and consistent product time after time. The Sunsorb® 300 is quarter-folded into a 4-ply 5" x 5" pad for easy use and quick absorbency.

Bluesorb® 750
Visual Absorption Indicator

- **Blue color provides instant absorption indicator**
- **Ideal as a work mat/surface for visual inspection**
- **Low particle generation and low extractables**

The Bluesorb® 750 is an extremely pure, strong, nonwoven blend of polyester and cellulose. The blue color makes this wiper ideal for use as an inspection background or workmat. It is also ideal for use as an immediate absorption indicator, as well as for equipment cleaning or general maintenance.

SatPax™ 1000
Presaturated Nonwoven Polyester/Cellulose Wiper

- **Resolves safety issues associated with storing, mixing, and dispensing solvents**
- **Semiconductor grade 2-Propanol is metered for consistency**
- **Reverse osmosis/deionized water filtered to 0.1 µm**

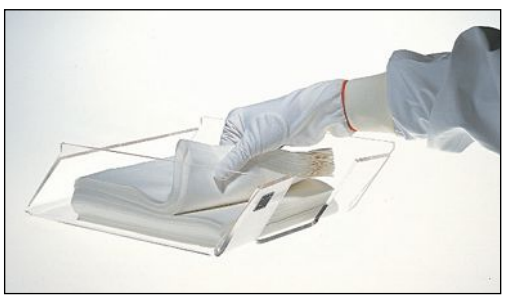
SatPax™ wipers are presaturated with 2-propanol and DI Water for convenient, safe general-purpose cleaning. A lot number on each resealable pouch ensures traceability. Each pouch contains 100 sheets. Two 2-Propanol/DI water solutions are available.

Class 100 Wipers

	Size (in.)	Sheets/ Pkg.	Pkgs./ Case	Cat. #/Case
Exsorbx 400	9 x 9	150	16	**5603-63**
Fastsorb 820	9 x 9	100	16	**5603-64**
Sunsorb 300	5 x 5	100	30	**5603-65**
Bluesorb 750	9 x 9	300	20	**5603-66**
SatPax™ 1000	9 x 9	75	12	**5604-44*** **5604-45****

**** 70% 2-Propanol/30% DI H_2O ** 10% 2-Propanol/90% DI H_2O***

More Class 100 Wipes on pages 240-241.



Cleanroom Wiper Dispenser
Simplifies single-sheet dispensing of 9" x 9" wipers. Also available for other sizes.

	Cat.
Acrylic Dispenser	**4950-93**
Static-Dissipative PVC Dispenser	**4950-94**

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Cleanroom Wipers *for Class 1,000 & Sterile Applications*

These general purpose, low-cost wipers are ideal for a wide range of applications. Twillx® wipers offer durability, absorbency and acid resistance. Gamma Wipes are independent-lab certified for sterile applications.

Twillx® 1622
Strong and Absorbent Wipers

- **100% cotton twill with 2x2 weave construction**
- **Solvent-compatible and acid-resistant**
- **Highly durable**

Made of 100% cotton twill, Twillx® 1622 is tightly woven in a 2 x 2 weave to produce the most durable, highest quality all-purpose cotton wiper. It is cut on a bias to eliminate the chance of loose fibers or unraveling edges. The aggressive weave pattern makes Twillx®1622 ideal for applications in which durability, absorbency and cleanliness are critical.

Gamma Wipe® 67
Wipers for Aseptic Environments

- **Absorbent, polyester-cellulose material**
- **Sterilized with Cobalt 60 gamma radiation**
- **Meets sterility requirements for AAMI Guidelines, Method 1, for use in aseptic environments**
- **SAL = 10-6 (Sterility Assurance Level of 10-6)**

Made from a blend of polyester and cellulose, Gamma Wipe® 67 is sterilized by gamma radiation to meet sterility requirements according to AAMI guidelines. The Certificates of Sterility included with each case of Gamma Wipe® 67 are a guarantee that each lot of material has been processed to meet a Sterility Assurance Level of 10.6 and meets stringent aseptic cleanroom requirements. Gamma Wipes are packaged in small quantities (of 20 per pack) to minimize exposure when each package is opened. Suitable for Class 100 applications.

Wipers	Ordering Information			
Class 1,000	Size (in.)	Sheets/ Pkg.	Pkgs./ Case	Cat. #/Case
Twillx 1622	9 x 9	300	8	5603-83

Wipers	Ordering Information			
Class 100	Size (in.)	Sheets/ Pkg.	Pkgs./ Case	Cat. #/Case
Gamma Wipe® 67	12 x 12	20	25	5604-00

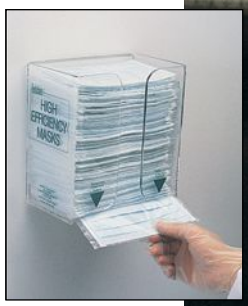
Wipers	See Page 237 for Test Info.		Cleanliness		Absorbency			Purity					
	Basis Weight (g/m^2)	Caliper (µm)	Particles—Dry Flex Test (No. ≥ 0.5 µm/cu. ft. of air sampled)	Particles Biaxial Shake Test (No. ≥ 0.5 µm x $10^3/cm^2$)	Absorbency (cc H_2O/m^2)	Specific Absorbency (cc H_2O/g)	Time to Half-Sorption (Seconds)	Sodium (PPM)	Potassium (PPM)	Calcium (PPM)	Magnesium (PPM)	Extractables with DI-H_2O (%; g/m^2)	Extractables with 2-Propanol (%; g/m^2)
Twillx® 1622	144	343	54,000	51	354	2.5	3	82	2.8	150	60	0.11 0.16	0.15 0.22
Gamma Wipe® 67	69.6	253	1,400	22	263	3.8	2	15	3.8	260	45	0.048 0.033	0.031 0.022

BCR® Cleanroom Masks

Easy-Breathing Comfort with Superior Performance

- **Comfortable, soft inner layer**
- **High particle and bacteria filtration efficiency**
- **Excellent breathability ensures long-wearing comfort**

Berkshire BCR® masks effectively protect your cleanroom or controlled environment from human contamination while optimizing wearer comfort. Their ultrasonically bonded three-layer polypropylene construction provides superior strength and filtration efficiency. Select among three styles: standard (180 mm), wide (210 mm), and 3-layer with fractured film (180 mm), which provides optimal particle retention. All include polyurethane earloops.



BCR® Cleanroom Masks

Type	Size	Filtration Efficiency		Differential Pressure	Cat. #/Case*
Standard	180	86.8%	92.9%	2.3	**5603-89**
Wide	210	86.8%	92.9%	2.3	**5604-47**
Fractured Film	180	99.3%	96.8%	1.3	**5604-48**

**** Case includes 12 packages of 50 masks each.***

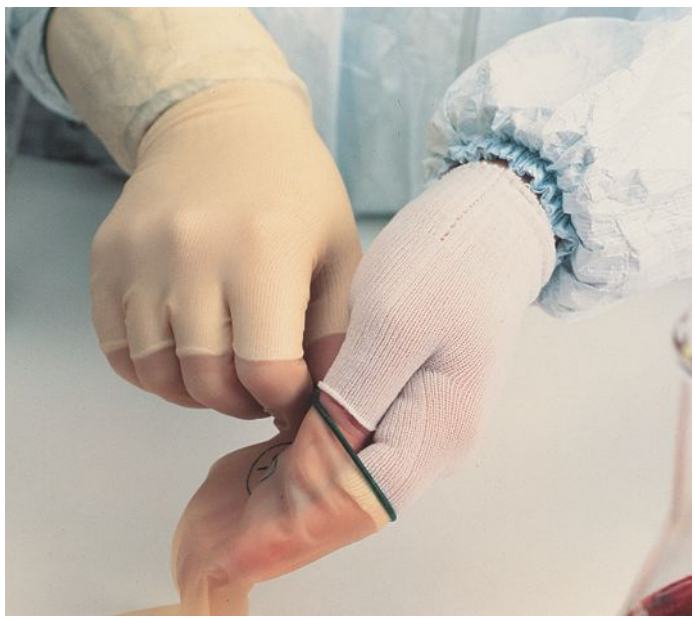
Wall-Mount BCR® Mask Dispenser
Acrylic; dispenses masks one-at-a-time.

Cat. # **5604-33**

BCR® Nylon Glove Liners

- **Protects against skin irritation caused by latex or PVC gloves**
- **Special fiber construction wicks moistures away from the skin during extended wear for greater comfort**
- **Made of 100% continuous filament, knitted nylon for maximum softness and comfort**

These continuous filament glove liners are constructed using a special seamless technique to prevent gloves from raveling. Their ambidextrous design simplifies stock control, and they can be laundered for multiple use. Select between half- and full-finger models in many sizes.



BCR® Nylon Glove Liners

Style	Cuff Color	Size	Prs./ Pk.	Pks./ Case	Cat. #/Case
Half-Finger	Red	S	10	20	**5604-49**
Half-Finger	Black	L	10	20	**5604-50**
Full-Finger	Green	S	10	20	**5604-51**
Full-Finger	Orange	M	10	20	**5604-52**
Full-Finger	Blue	L	10	20	**5604-53**
Full-Finger	Red	XL	10	20	**5604-54**

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Berkshire Documentation Systems

Optimal Flexibility—
Without Compromising Cleanliness

Berkshire cleanroom documentation systems provide a flexible way for you to record information without causing contamination. Berkshire BOND, CleanNotes® and FORMS are specially engineered with latex, introduced into the actual paper slurry during the paper-making process, to offer a more consistent, heat-resistant paper suitable for cleanroom use. Spiral and 3-ring Notebooks complete your cleanroom documentation supplies.

Berkshire® BOND

- **Minimizes particle contamination**
- **Runs through any copier or printer, laser, or impact**
- **Bound by synthetic latex for optimal smoothness and cleanliness**
- **High tear resistance to withstand long periods in use**

BERKSHIRE® BOND is available in several weights, sizes, and colors to allow you to accommodate all your cleanroom documentation needs .

Color	Size (in.)	Weight	Sheets/Pk.	Pks./Case	Cat. #/Case
White	8½ x 11	28 lbs.	250	10	**5604-02**
Pink	8½ x 11	28 lbs.	250	10	**5604-03**
Canary	8½ x 11	28 lbs.	250	10	**5604-04**
Blue	8½ x 11	28 lbs.	250	10	**5604-05**
White	8½ x 14	28 lbs.	250	10	**5604-06**
White	11 x 17	28 lbs.	250	5	**5604-07**
White	8½ x 11	18 lbs.	500	8	**5604-08**
Blue	8½ x 11	18 lbs.	500	8	**5604-09**

BCR® CleaNotes®

- **A convenient way to leave messages without sacrificing cleanliness**
- **Adhesive backing will not shed**

CleaNotes® provide the easiest way to leave a quick message behind. Made from Berkshire® BOND, they are treated with a special adhesive-backing that will not leave contaminants in the cleanroom.

Size (in.)	Sheets/Pad	Pks./Case	Cat. # / Case
2 x 1½	100	72	**5604-10**
3 x 3	100	24	**5604-11**

BCR® FORMS 680

- **Select blank or green-bar format**
- **Available in 9½ x 11" or 14⅞" x 11" sheets**

These forms are made using the same manufacturing process described for the other BCR® documentation items to meet the most stringent cleanroom standards. BCR® FORMS are offered in two sizes, both in white (blank) and green bar styles (for easy reading of lines of text).

Format	Size (in.)	Sheets/ Pack	Packs/ Case	Cat. #/Case
Blank White	9½ x 11	3000	1	**5604-12**
Green Bar	9½ x 11	3000	1	**5604-13**
Blank White	14⅞ x 11	3000	1	**5604-14**
Green Bar	14⅞ x 11	3000	1	**5604-15**

BCR® Spiral Notebook

- **Durable polyethylene cover resists solvents**
- **BCR® bond paper is noncontaminating**

Available in both a college rule and ¼-inch grid format, these cleanroom spiral notebooks come in two sizes, each with 100 printed pages per book. The cover and spiral are made of a durable, solvent-resistant polyethylene, and the pages are printed on ultraclean Berkshire® BOND. Each notebook is double-wrapped to ensure cleanliness.

Format	Size (in.)	Notebk./ Pack	Packs/ Case	Cat. #/Case
College Rule	5½ x 8½	1	20	**5604-16**
¼" Grid	5½ x 8½	1	20	**5604-17**
College Rule	8½x 11	1	10	**5604-18**
¼" Grid	8½x 11	1	10	**5604-19**

BCR® 3-Ring Notebook

- **Designed for cleanliness and durability**
- **Features easy-open plastic slide**
- **One inch spine**

Engineered specifically for cleanroom use, BCR® 3-Ring Notebooks are constructed from a sturdy, solvent-resistant, polyethylene material. They feature easy-to-use plastic sliding three-ring openers, and are bound together with stainless steel rivets to ensure durability and cleanliness. Each notebook is double-wrapped.

	Cat. #/Case
BCR® 3-Ring Notebook Eight per case	**5604-20**

BCR® Swabs

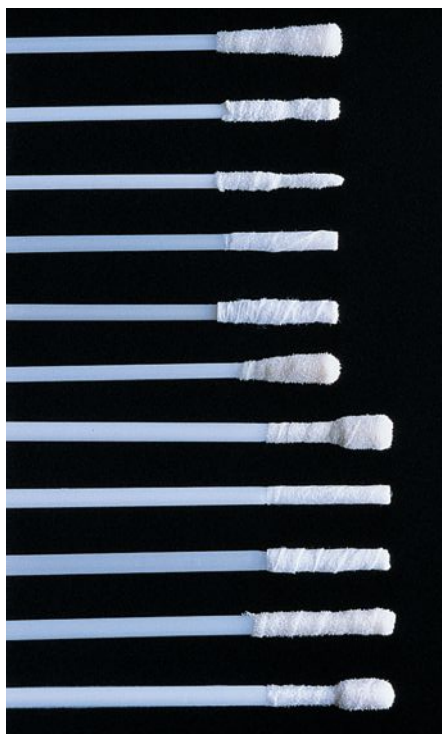
- **Heat-sealed manufacturing process eliminates need for adhesives, ensures low particle generation**
- **Variety of materials meet varying application requirements**

BCR® Swabs are designed for applications in which low particle generation and low extractables are required. Unlike most cleanroom swabs, BCR® Swabs are heat-sealed without the use of adhesives that can contaminate products and environments. They are made with three different materials: Labx (cellulose), Durx (polyester/cellulose) and polyurethane foam. BCR® Swabs are available with 3" and 6" flexible polypropylene handles, and come in a variety of shapes and sizes to meet any cleanroom need.

PF - Polyurethane Foam
CE - Cellulose
PC - Polyester/Cellulose

BCR® Swabs

Material See Below	Size Tip ; Handle	Swabs/ Package	Pkgs./ Carton	Cat. #
PF	3/16 ; 3	100	10	**5604-26**
PF	1/8 ; 3	100	15	**5604-22**
PF	1/16 ; 3	100	15	**5604-24**
CE	1/8 ; 3	100	15	**5604-29**
PC	1/8 ; 3	100	15	**5604-31**
PF	3/16 ; 3	100	10	**5604-25**
PF	3/16 ; 6	50	10	**5604-28**
PF	1/8 ; 6	50	10	**5604-23**
PC	1/8 ; 6	50	10	**5604-32**
CE	1/8 ; 6	50	10	**5604-30**
PF	3/16 ; 6	50	10	**5604-27**



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Safeskin Hypoclean Critical™ Cleanroom Latex Gloves

- **Suitable for Class 10 or Class 100 (ISO 4 or 5) Critical Cleanroom Environments**
- **Specially formulated latex minimizes rubber proteins to reduce allergic reaction**
- **Oxyglazed powder-free surface eases donning, reduces extractables, enhances liquid permeation resistance**
- **Tapered beaded cuff and textured non-slip grip for improved performance**
- **Exceeds ASTM D3578 glove standards for tensile strength and barrier defects**

These powder-free HypoClean gloves are the ideal cleanroom latex gloves. Their "oxyglazed" surfaces reduce particle shedding and extractables while leaving them easier to don, even when double-gloving, than other powder-free gloves. The specially formulated latex reduces allergens and chemicals that can irritate skin or affect delicate samples. The tapered, beaded cuff allows easier donning and holds securely on the sleeve.

Select Appropriate Cleanroom Grade*

The standard powder-free models below are rated Class 100 (ISO 5) compatible. For optimal cleanliness, select the Class 10 (ISO 4) models, which receive multiple deionized water rinses to reduce particles and extractables. These gloves are also packaged in a critical cleanroom environment using cleanroom-compatible packaging and labeling materials.

All models feature an ambidextrous design and are available in a double-poly bag of 100, or 10 double-poly bags per poly-lined case (1,000 total). Length: 11.8". Thickness (nominal): 6 mil.

* Gloves are tested to IES-RP-CC005.2.

Size	Class 10		Class 100	
	Bag of 100 Cat.#/Bag	Case of 1,000 Cat.#/Case	Bag of 100 Cat.#/Bag	Case of 1,000 Cat.#/Case
Small	1674-60	1674-64	1674-76	1674-80
Medium	1674-61	1674-65	1674-77	1674-81
Large	1674-62	1674-66	1674-78	1674-82
X-Large	1674-63	1674-67	1674-79	1674-83

Safeskin Hypoclean Critical™ Cleanroom Nitrile Gloves

- **100% Acrylonitrile-butadiene contains no natural rubber latex**
- **Suitable for Class 10 or Class 100 (ISO 4 or 5) Critical Cleanroom Environments**
- **Surface resistivity of 10^{11} (at 50%RH) helps protect ESD-sensitive devices**
- **Tapered beaded cuff and textured non-slip grip for improved performance**
- **Exceeds ASTM D3578 glove standards for tensile strength and barrier defects**

These powder-free HypoClean nitrile gloves combine cleanliness with user comfort. They include none of the accelerators, antiozonants or antioxidants that have been known to cause allergies. The tapered, beaded cuff allows easier donning and holds securely on the sleeve. The bisque finish enhances dexterity. Manufactured in accord with ISO 9002, they comply with 21CFR 177.2600 for food handling and exceed ASTM D3578 glove standards for critical defects.

Select Appropriate Cleanroom Grade*

The standard powder-free models below are rated Class 100 (ISO 5) compatible. For optimal cleanliness, select the Class 10 models, which receive multiple deionized water rinses to reduce particles and extractables. These gloves are also packaged in a critical cleanroom environment using cleanroom-compatible packaging and labeling materials.

All models feature an ambidextrous design and are available in a double-poly bag of 100, or 10 double-poly bags per poly-lined case (1,000 total). Length: 9.75". Thickness (nominal): 6 mil. Color: light blue.

* Gloves are tested to IES-RP-CC005.2. Class 10 model meets proposed ASTM standard for medical nitrile gloves.

Size	Class 10		Class 100	
	Bag of 100 Cat.#/Bag	Case of 1,000 Cat.#/Case	Bag of 100 Cat.#/Bag	Case of 1,000 Cat.#/Case
Small	1674-68	1674-72	1674-84	1674-88
Medium	1674-69	1674-73	1674-85	1674-89
Large	1674-70	1674-74	1674-86	1674-90
X-Large	1674-71	1674-75	1674-87	1674-91

Oak Technology
Anti-Static Long-Length Gloves

- **Maximum protection from static build-up and contamination—ideal for Class 2 ESD-sensitive devices (≥1000 volts)**
- **Surface resistance of 4.5 x 10^{11} ohms/square in conformance with DOD HDBK 263 and ASTM-D-257**
- **Decay from ± 5 KV to 0 in less than 2 seconds in conformance with MIL-B-81705B**
- **Long-length protection of wrist/forearm**

These anti-static gloves were developed specifically to eliminate damage to delicate microelectronic components caused by ESD and particulate contamination. The effective static dissipation (± 5 KV to 0 in less than 2 seconds) prevents damaging static build-up. And the specially formulated blend of PVC resists a wide range of inorganic acids and alkalis. It also prevents the contamination problems caused by topical coatings: the anti-static dissipative agent is an integral part of the glove and so cannot wear off. The compound does not contain ammonium chloride. Gloves are manufactured and packaged under cleanroom conditions to provide maximum protection against particulate contamination.

These long-length gloves also offer excellent protection of the full hand/wrist/forearm from a variety of industrial irritants, and their tough construction resists tears and abrasion. Rolled cuffs allow easy donning and removal, and ambidextrous design lets them be worn comfortably on either hand.

Packaged 100 pieces to a "zip-lock" poly bag; 500/case.

Specifications

Sizes:	Small – Medium – Large
Weight:	7.0, 9.0, 10.0 ± 1 gram
Wall Thickness:	
Fingertip: .	0035" ± .001"
Body:	(1" from finger).006" ± .001"
Cuff:	(1" from bead) .004" ± .001"
Ringroll Bead:	.085" ± .010"
Physical Properties:	
Tensile Strength:	1300 PSI minimum
Elongation:	230% minimum
Liquidproof:	Prevents sodium migration

Anti-Static Long-Length Gloves

Glove Size	Cat. #/100 Pieces	Cat. #/500 Pieces
Small	**1697-01**	**1689-21**
Medium	**1697-02**	**1689-22**
Large	**1697-03**	**1689-23**

Oak Technology
Powder-Free Disposable Vinyl Gloves

- **Ultra thin for touch sensitivity**
- **Priced low for disposability; durable for prolonged or repeated use**
- **Permanently "velvetized" inside… easy to put on and take off without talc powder**
- **Fit either hand for additional economy**
- **Excellent fit without the constriction of latex**

This high-quality vinyl glove is designed to provide the user with the ideal combination of economy and toughness. Unit cost is low, so it is practical for disposable uses. In most applications, one can use it over and over. It tolerates exposure to lubricants, oils and most chemicals without deterioration. It is ultra-thin (about half the thickness of surgeon's gloves) for optimal comfort and touch sensitivity. Rolled cuff provides tear resistance and easy gripping when putting on or taking off.

These vinyl gloves are ideal for protecting delicate or precision parts from perspiration, body salts or hand creams that might cause microscopic corrosion or deface delicate surfaces. All gloves are white, 11" long, .005" thick, and available in small, medium, and large sizes to fit any hand.

Packaged 100 pieces to a poly bag. 10 bags to a case. Weight per case is 25 lbs.

Powder-Free Disposable Vinyl Gloves

Glove Size	Cat. #/100 Pieces	Cat. #/1,000 Pieces
Small	**1697-04**	**1689-12**
Medium	**1697-05**	**1689-13**
Large	**1697-06**	**1689-14**

Quantity Discounts Available on All Gloves–
Call Terra for a quotation!

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Oak Technology
Long-Length Powder-Free Vinyl Gloves

- **All the advantages of powder-free vinyl gloves with long-length wrist/forearm protection**
- **Minimize particulate contamination**
- **Feature textured finish for improved grip**

These powder-free vinyl gloves provide 20% longer length than standard gloves for complete hand/wrist/forearm protection—and minimal chance of contamination. The additional length eliminates unprotected gaps between garment and glove. The powder-free manufacturing technique helps maintain low particulate conditions but allows optimal dexterity and comfort.

These gloves also offer excellent protection from a variety of industrial irritants, and their tough construction resists tears and abrasion. Rolled cuffs allow easy donning and removal, and ambidextrous design lets them be worn comfortably on either hand.

Packaged 100 pieces to a "zip-lock" poly bag; 1,000/case.

Specifications

Sizes:	Small – Medium – Large
Weight:	7.0, 9.0, 10.0 ± 1 gram
Wall Thickness:	
Fingertip:	.0035" ± .001"
Body:	(1" from finger).006" ± .001"
Cuff:	(1" from bead) .004" ± .001"
Ringroll Bead:	.085" ± .010"
Physical Properties:	
Tensile Strength:	1300 PSI minimum
Elongation:	230% minimum
Liquidproof:	Prevents sodium migration
Packaging:	Long-Length (powder-free): 100 gloves to a poly bag, 1,000 per case. Same as our regular powder-free gloves, but with a 20% larger cuff length to meet the demands for a glove to cover the critical wrist and forearm area.

Long-Length Powder-Free Vinyl Gloves

Glove Size	Cat. #/100 Pieces	Cat. #/1,000 Pieces
Small	**1697-07**	**1689-17**
Medium	**1697-08**	**1689-18**
Large	**1697-09**	**1689-19**

Oak Technology
Class 100 Powder-Free (Long-Length) Vinyl Gloves

- **Specially processed gloves release fewer than 10 particles 5 microns or greater, fewer than 20 particles 3 microns or greater**
- **Will not develop a measurable static charge**

These specially packaged vinyl gloves feature all of the advantages of the long-length gloves described above but can be processed directly into a Class 100 environment without further cleaning.

Their 20% longer length ensures complete hand/wrist/forearm protection—and minimal chance of contamination. The additional length eliminates unprotected gaps between garment and glove. The powder-free manufacturing technique helps maintain low particulate conditions but allows optimal dexterity and comfort.

Like our other vinyl gloves, they also offer excellent protection from a variety of industrial irritants, and their tough construction resists tears and abrasion. Rolled cuffs allow easy donning and removal, and economical ambidextrous design lets them be worn comfortably on either hand.

Packaged 100 pieces to a blue static-shield bag; 1,000/case.

Specifications

Sizes:	Small – Medium – Large
Weight:	7.0, 9.0, 10.0 ± 1 gram
Wall Thickness:	
Fingertip:	.0035" ± .001"
Body:	(1" from finger).006" ± .001"
Cuff:	(1" from bead) .004" ± .001"
Ringroll Bead:	.085" ± .010"
Physical Properties:	
Tensile Strength:	1300 PSI minimum
Elongation:	230% minimum
Liquidproof:	Prevents sodium migration

Class 100 Powder-Free Vinyl Gloves

Glove Size	Cat. #/100 Pieces	Cat. #/1,000 Pieces
Small	**1697-10**	**1689-25**
Medium	**1697-11**	**1689-26**
Large	**1697-12**	**1689-27**

QRP, Inc.
Washed Powder-Free Latex Cleanroom Gloves

- **Suitable for use in Class 100 and better cleanrooms**
- **Washed and processed to remove particulate and reactive ions**
- **Resist chemicals, bases, ketones, salts, and many acids**
- **Curved fingers and paired right and left hands enhance comfort and dexterity, reduce risk of Carpal Tunnel Syndrome**
- **Beaded cuff prevents tearing**
- **Packaged in anti-static, gas-impermeable film flushed with semiconductor-grade nitrogen**

Washed to remove particulates and processed to minimize residual ion contamination, these cleanroom-compatible gloves are designed for IC fabrication, disk-drive and media manufacturing, and precision optics, as well as for handling and assembling of critical components in the semiconductor and electronics industries. They provide unsurpassed sensitivity and comfort, because of their special latex formulation, curved fingers, paired right-hand/left-hand fit, and wide range of available sizes. Gloves are 12 inches long and 6 mil thick. They come in cases of 144 pairs (12 tray packs of 12 individually packaged pairs/tray). Gloves can be ordered sterile.

Size:	6	6½	7	7½	8	8½	9
Cat #/Case	1690-11	1690-12	1690-13	1690-14	1690-15	1690-16	1690-17

QRP, Inc.
Qualatrile® XC Nitrile Gloves

- **100% acrylonitrile butadiene, a dermatologist-recommended latex-free formulation**
- **510(k) formulation, ISO 9002 certified, CFR 21 170-199 USDA compliant**
- **Surpasses ASTM D6319-99 and ASTM F1671**
- **Ambidextrous, textured work area with beaded cuff**

These single-use white nitrile gloves are ideal for your most critical cleanroom environments. Their nitrile formulation is completely free of latex proteins that cause allergic reactions in many wearers. They are also clean — independent testing to IES standards verifies compatibility with cleanroom ratings as low as Class 10 (ISO 4). They are also virtually free of most trace elements, with less than 0.1 µg / cm^2 detectable F, Cl, Br, PO_4, SO_4, Na and K, and contain no plasticizers, silicone or powders.

Qualatrile® XC Nitrile Gloves

Cleanroom Rating*	Size	12" Length Case (1,000 Gloves) Cat. #/Case	12" Length Bag (100 Gloves) Cat. #/Bag	9" Length Case (1,000 Gloves) Cat. #/Case	9" Length Bag (100 Gloves) Cat. #/Bag
Class 10	S	1674-09	1674-29	—	—
	M	1674-10	1674-30	—	—
	L	1674-11	1674-31	—	—
	XL	1674-12	1674-32	—	—
Class 100	S	1674-13	1674-33	1674-01	1674-21
	M	1674-14	1674-34	1674-02	1674-22
	L	1674-15	1674-35	1674-03	1674-23
	XL	1674-16	1674-36	1674-04	1674-24
Class 1,000	S	1674-17	1674-37	1674-05	1674-25
	M	1674-18	1674-38	1674-06	1674-26
	L	1674-19	1674-39	1674-07	1674-27
	XL	1674-20	1674-40	1674-08	1674-28

Cleanroom Packaged for Cleanroom Use!

Qualatrile XC Nitrile gloves are flat-packed for easy donning inside a multi-level interior packaging consisting of an inner heat-sealed bag, identified by lot number; a "bag-within-a-bag" strip-away package; a securely heat-sealed outer bag; and a polyethylene carton liner placed in a shipping carton with fully traceable lot number.

** Particle Sizes 0.5µm and above, tested per IES-RIP-CC-005.2*
Class 10 (ISO 4): 300 - 400 particles/cm^2
Class 100 (ISO 5): 700 - 800 particles/cm^2

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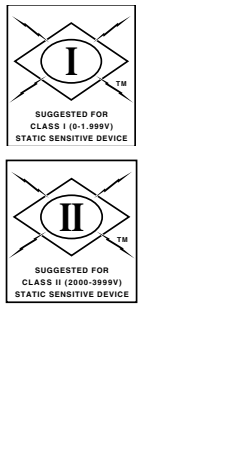
QRP, Inc.
Static-Dissipative No Sweat® Gloves

- **Special formulation provides average surface resistivity of 10^7 ohms/square for use with static-sensitive materials**
- **Non-woven, absorptive material eliminates lint and fibers for cleanroom use**
- **Powder-free design prevents particulate contamination**
- **Ultra-sheer (1.5 mil) thickness ensures optimal comfort and flexibility**
- **Paired gloves are available in Small, Medium, and Large**
- **Reusable/FREON® cleanable**

These gloves are specifically designed for use in semiconductor manufacturing and testing, as a replacement for woven/knit "dry handling" gloves.

Their unique formulation absorbs perspiration during wear, providing increased user comfort and productivity. The seamless non-woven construction prevents lint and fiber contamination. The extremely tough, but ultra-sheer proprietary polyurethane formulation provides unsurpassed sensitivity.

They are also ideal for use with static-sensitive components. Tested in accordance with Fed. Test Std. 101C, Test Method 4046.1, and MIL STD B-81705B for Surface Resistance and Rate of Decay, they demonstrated an average surface resistivity of 3 x 10^7 ohms/square.



Size	Cat. #
Small	**1690-37**
Medium	**1690-38**
Large	**1690-39**

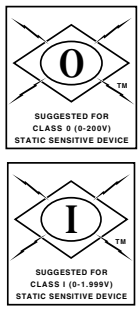
Package of 5 pair

QRP, Inc.
Powder-Free Conductive Gloves for Class 100 Use

- **Conductive material provides surface resistivity less than 10^5 ohms/square for use with ESD-sensitive materials**
- **Powder-free surface for cleanroom use**
- **Carbon black compound will not migrate or contaminate**
- **Paired right and left hands, choice of three sizes, for better fit**
- **Available in ultra-sheer weight (1.5 mil) and medium weight (5 mil) thicknesses**

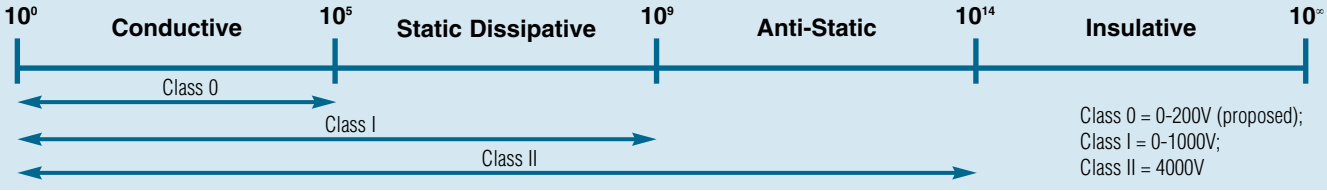
These cleanroom-compatible, reusable gloves are designed specifically for ESD-sensitive applications in which standard disposable gloves (PVC or polyethylene) are unacceptable.

A proprietary polyurethane formulation provides an extremely tough, snag-resistant, ultra-sheer film, with an average surface resistivity of 5 x 10^5 ohms/square (tested in accordance with Fed. Test Std. 101C, Test Method 4046.1, and MIL STD B-81705B for Surface Resistance and Rate of Decay; test results available upon request). They also resist a wide range of solvents, including aliphatic hydrocarbon solvents. Their black color makes them easy to recognize on the bench top, and a selection of sizes (Small, Medium, and Large) and thicknesses (1.5 mil or 5 mil) ensures a glove that's just right for your application. Gloves come in a bag of five pair.



Size	1.5 Mil Thick Cat. #/Bag(5 pair)	5 Mil Thick Cat. #/Bag(5 pair)
Small	**1690-40**	**1690-43**
Medium	**1690-41**	**1690-44**
Large	**1690-42**	**1690-45**

Static-Control Ranges



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QRP, Inc.
High-Temperature Cleanroom Gloves

- **Designed for dry handling (gloves are not liquid-tight) at contact temperatures from -210°F to 1200°F**
- **Contain no fiberglass or other hazardous materials**
- **High-density nylon liner reduces particulate generation when gloves are donned or removed**
- **At lengths of 14", 18", or 27", thoroughly protect wrist area**
- **Individually packaged in ESD-safe material**

These gloves are designed for dry handling of materials with contact temperatures as high as 1200°F.

The tough outer shell does not burn, char, melt, or outgas at temperatures that could cause contamination or shedding. It breaks down into CO_2 and H_2O. And the special, high-density nylon liner reduces particulates that are generated through donning or removal of gloves—the times when highest particle counts occur.

Gloves are individually packed in vacuum-sealed copolymer dispenser bags, with five pairs of the same size per shipping case.

Size	Cat. #/5-pr bag
Large, 14" long	**1690-46**
Medium, 14" long	**1690-47**
One size fits all, 18" long	**1690-48**
One size fits all, 27" long	**1690-49**

QRP, Inc.
Mid-Temperature Cleanroom Gloves

- **Designed for contact temperatures from -78.5°F to +450°F, in both wet and dry environments**
- **Liquid-proof design is ideal for wave solder operations**
- **Poly-Tuff™ material resists solvents, fluxes, abrasions and cuts**
- **Full nylon lining prevents liner shedding and particle generation when gloves are donned or removed**
- **Gloves are shipped in ESD-safe packaging for immediate cleanroom use**

These gloves are specially designed for use in wave-solder operations that require temperature tolerance, liquid resistance, and noncontaminating properties. A specially compounded PolyTuff™ polyurethane material produces a glove that is extremely comfortable for extended wearing. In addition, it has outstanding abrasion and puncture resistance.

Size	Number of Pairs/Bag	Cat. #/Bag
12" Gloves:	5	**1690-50**
23" Gloves:	2	**1690-51**

QRP, Inc.
Qualatherm 300 Economy Mid-Temperature Cleanroom Glove

- **Provides thermal protection to 350°F**
- **Lint-free polyester, loop-in terry combines comfort and cleanliness**
- **Packaged for Class 100 (ISO 5) cleanroom applications**
- **Fully launderable and reusable to reduce glove costs**

The Qualatherm 300 Mid-Temperature Glove is made of clean polyester to ensure cleanroom compatibility. Because it is packaged in a Class 100 cleanroom, it is ready for cleanroom use.

Size	Case 12 pairs/pack, 5 packs/case	Traypack 12 pairs
	Cat. #/Case	Cat. #/Bag
S	**1674-47**	**1647-51**
M	**1674-48**	**1647-52**
L	**1674-49**	**1647-53**
XL	**1674-50**	**1647-54**

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QRP, Inc.
Ultimate Acid/ALKALI™ Gloves

- **Specifically designed to withstand most commonly used cleanroom and laboratory process acids and caustics**
- **Hypalon® provides maximum sensitivity and comfort along with minimal contamination**
- **Cleanroom processed for cleanroom use (Class 100)**
- **Maximum snag, puncture, and abrasion resistance**

These tough 12-mil-thick gloves are especially designed to withstand most commonly used cleanroom process acids and caustics in industries such as semiconductors and electronics.

Ultimate Acid/Alkali™ gloves were shown suitable for cleanroom use, in performance testing that measured particle count per ASTM F-24 and ASTM F-312 and permeation per ASTM F-739. Measurement of extractables found no ionic contamination, and less than 1 percent nonvolatile residue. However, because of the wide divergence in testing practices and applications in the semiconductor industry, the user must conduct specific tests as needed to determine the glove's suitability for his intended use. Gloves are packaged one pair/poly bag; 5 pairs/case.

Specifications

Length:	14"
Thickness:	12 mil
Size:	Large only

Ultimate Acid/Alkali™ Gloves Cat # **1690-52**

QRP, Inc.
Washed Latex Finger Cots

- **Designed to provide sensitive touch for work in electronics and other fields**
- **"Washed" process leaves no free radical reactive sites**
- **Tested for particulates, and extractables/mobile ions**
- **Tapered design eliminates air spaces at tip**
- **Thinner ring-roll reduces finger discomfort and fatigue**
- **Packed in a Class 100 cleanroom**

These finger cots are designed to provide comfort and sensitive touch while helping protect against contamination by particulates, chlorides, and static (see cots listed on following page for static-sensitive applications).

With their sheer latex contoured to fit the taper of the finger, these cots eliminate the air spaces that are caused by bulkiness at the tip. Because of the thinness of the latex, the ring roll is reduced in thickness, leaving less uncomfortable bulge between the user's fingers.

Two types of cot are available: a Low Powder/Mechanically Cleaned type, which is air-shower-tumbled to reduce powder levels; and a Powder Free/Washed & Low Chloride type, which is washed in a proprietary process, using acids, bases, and deionized water to ensure that there is no residual powder. Cots are 2.75 to 3 inches long, and are packed in quantities of either 10 gross (1,440 pieces) or 200 gross (20 10-gross bags). Entire case will be the same size and type of cot.

Washed Latex Finger Cots

Size	Low-Powder Rolled		Powder-Free Rolled	
	10 gross Cat.#	200 gross Cat.#	10 gross Cat.#	200 gross Cat.#
Small	1690-53	1690-57	1690-61	1690-65
Medium	1690-54	1690-58	1690-62	1690-66
Large	1690-55	1690-59	1690-63	1690-67
X-Large	1690-56	1690-60	1690-64	1690-68

Note:
One traypack = 10 gross (200 gross = 20 traypacks)

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QRP, Inc.
Anti-Static Finger Cots

- **Provides average surface resistivity of 5 x 10^{13} ohms**
- **Suggested for Class II (2000- to 3999-V) static-sensitive devices**
- **Powder-free cot surface eliminates particulate contamination**
- **Ultra-low levels of extractables and residual ions prevent product failure**
- **Packed in a Class 100 cleanroom**

These anti-static finger cots are specifically designed for ESD-sensitive applications, where regular washed finger cots are unacceptable. They are suggested for use with Class II (2000- to 3999-V) static-sensitive devices.

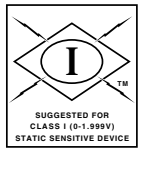
They feature a surface resistivity in the "anti-static" range, and ultra-low levels of extractables/residual ions, with a powder-free finger cot surface to prevent particulate contamination of your products. For added contamination control, they are packed in static shield bags in a Class 100 cleanroom, inert gas-packed inside a nylon copolymer bag. Each cot is 3 mils thick and 2.75 to 3 inches long.

Size	5-Gross Bag Cat. #/Bag	100-Gross Case Cat. #/Case
Small	**1690-69**	**1690-73**
Medium	**1690-70**	**1690-74**
Large	**1690-71**	**1690-75**
X-Large	**1690-72**	**1690-76**

Note: Bag (traypack) = 5 gross
Case price is for 20 traypacks

QRP, Inc.
Static-Dissipative Cleanroom Finger Cots

- **Proprietary formulation provides average surface resistivity of 5 x 10^{7} ohms/square for use with ESD-sensitive materials**
- **Powder-free design and special packaging help prevent particulate contamination and ensure cleanroom compatibility**
- **Carbon black compound will not migrate or contaminate**



These static-dissipative powder-free finger cots are designed for use with static-sensitive materials in a cleanroom environment.

They feature a surface resistivity in the "dissipative" range (average value: 5 x 10^{7} ohms/square) and can be donned and removed without powder. For added contamination control, they are packed in a Class 100 cleanroom, immobilized in a static shielding bag, and sealed in an inert gas atmosphere to prevent triboelectric charge. They also have ultra-low levels of residual/extractable ions.

Each cot is 3 mils thick and 70-75mm in length. Each case

Size	Tray Pack (5 gross bag pieces) Cat. #/Bag	100 Gross Case (14,400 pieces) Cat. #/Case
Small	**1690-77**	**1690-81**
Medium	**1690-78**	**1690-82**
Large	**1690-79**	**1690-83**
X-Large	**1690-80**	**1690-84**

contains 20 shielded, sealed polymer Tray Packs™, each containing 750 cots (= 14,400 pieces total).

QRP, Inc.
Qualatrile® 9C Nitrile Anti-Static Finger Cots

- **100% acrylonitrile butadiene, a dermatologist-recommended latex-free formulation**
- **Suitable for Class 100 (ISO 5) critical environments**
- **Surpasses ASTM D6319-99**
- **Average ESD surface resistivity of < 10^{9} ohms/square; acetone resistant**

These single-use white finger cots are ideal for you most critical cleanroom environments. Their nitrile formulation is completely free of latex proteins that cause allergic reactions in many wearers. They are also clean—independent testing to IES standards verifies compatibility with cleanroom ratings as low as Class 100 (ISO 5). They are also virtually free of most trace elements, with less than 0.1 µg / cm^2 detectable F, Cl, Br, PO4, SO4, Na and K, and contain no plasticizers, silicone or powders.

Size	Traypack (720 cots) Cat. #	Case (14,400 cots) Cat. #
Small	**1674-44**	**1674-41**
Medium	**1674-45**	**1674-42**
Large	**1674-46**	**1674-43**

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Re-Usable Cleanroom Garments

- **Lightweight contamination-control garments provide comfort and durability**
- **Re-usable fabrics reduce costs**
- **Available in designs to meet most cleanroom applications, including static safety and Class 10 particle requirements**
- **Choose among many styles of gloves, boots, shoe coverings, and hoods, plus a knee-length frock or full-length coverall**
- **Electrostatic dissipative ChemStat® 909A protects against ESD**

These re-usable cleanroom garments maximize the comfort and convenience of cleanroom personnel while minimizing garment costs.

Disposable garments might seem convenient at first, but their use creates an endlessly expensive and wasteful cycle of purchase-dispose-purchase. Our re-usable garments will free you and your workers from this costly cycle.

You can choose from two different fabrics to suit your particular cleanroom needs. Dacron polyester taffeta is a dependable fabric ideal for general use. For reliable ESD protection we also offer more sophisticated material, ChemStat® 909A.

ChemStat® 909A

ChemStat 909A is an antistatic cleanroom fabric developed by Stern and Stern Industries, Inc. as a result of years of research requested by NASA for the Space Shuttle program. This fabric offers state-of-the-art solutions to the three most typical problems associated with synthetic multifilament cleanroom apparel: electrostatic interference, worker discomfort, and environmental degradation.

ChemStat 909A is designed for use in Class 10 cleanrooms. It is a 100% polyester high performance fabric employing a patented raised grid of conductive carbon/polyester yarns. The raised grid rises slightly above the plane of the fabric, acting as a wick to draw static electricity out of the fabric and then to dissipate it harmlessly into the surrounding humidified air.

ChemStat 909A is an uncommonly durable antistatic fabric. Unlike conventional antistatic fabrics, the ChemStat conductive yarn is an extruded copolymer of polyester and carbon impervious to over 300 industrial launderings. The basic fabric is composed of 100% industrial tenacity Dacron polyester fibers. The 2/1 twill weave provides over 3 times the tear strength of conventional plain weave fabrics for incredible durability and seam strength. ChemStat 909A is exceptionally light and cool; it features a high moisture vapor transmission rate, a result of its silk-like design. Derived from a methodical French silk weave process, the ChemStat dyeing process uses no chemical carriers or catalysts that might cause microcontamination and a degradation of yarn strength. This more expensive dyeing process results in a much higher quality fabric with fewer particulates, greater durability, and greater depth of color. Our ChemStat garments come in two colors: linen white and light blue.

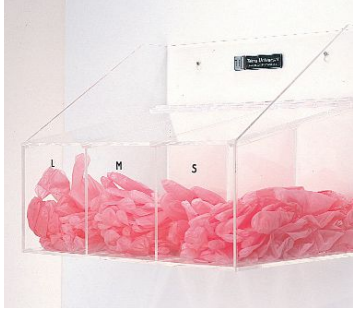
We also use ChemStat 929 face mask material in our Eyes-Only Hood (see page 258) and the ChemStat 939 ESD sole in our 18" High ESD Boot (see page 260).

Specifications: ChemStat 909A

Construction:	2/1 twill
Weight:	3 oz./yd.
Yarn content:	100% multifilament polyester, <1% carbon by weight
Voltage decay (Fed Std 101 Method 4046):	% voltage remaining:
10 washings	0% @ 0.5 secs.
150 washings	0% @ 0.5 secs.
Surface resistivity (AATCC 76-1969):	
10 washings	1.3×10^8 ohms/sq.
150 washings	3.6×10^8 ohms/sq.
NASA triboelectric voltage decay:	41.5 V @ 0.35 secs.
Chemical compatibility:	Ref: Dupont Bulletin D-235
Acids	Good/excellent
Alcohols	Excellent
Organic compounds	Excellent
Oxidizing agents	Excellent
Reducing agents	Excellent
Alkalis and bases	Poor
Laundry compatibility:	Deionized water perchlorethylene Freon TF
Sterilization compatibility:	Steam autoclave gamma radiation (250 Mrad) ETO
Flame retardance:	Meets NFPA 702-1975*
Durability (ASTM D-4157):	15,000 cycles: no noticeable wear
Fabric cooling rating (ASTM E96 Method B, uprt.):	Very high (52 g/m²/hr)
Permeability (Fed Std 101, Method 5450):	<1 cfm
Tear strength (Fed Std 191, Method 5134):	
Warp:	9 lbs.
Fill	5 lbs.

*** Note:** Polyester melts at 380°F (193°C).

See page 261 for reusable cleanroom gloves.



Garb and Parts Dispensers—Space-Saving Convenience!

These handy dispensers save space and organize your change room gloves, safety glasses, wipers, hats, and other garb. Also perfect benchtop storage bins for small parts used in cleanroom processing. Select clear acrylic or static-dissipative PVC, which eliminates static charges and the particles they attract.

See pages 299-306 for complete information.

Eyes-Only Cleanroom Hood
See page 258
Cleanroom Coveralls
See page 259

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Knee-Length Cleanroom Frock

- **Completely washable and reusable**
- **Comfort features include stainless steel post and socket 6-snap front, military collar with 1 snap at neck, raglan sleeves with wrist adjustment snaps**
- **Durable merrowed fabric edges, double folded seams, and double needle containment stitching throughout**
- **Unisex style available in a full line of sizes—from XS through XXL**
- **Available in a Dacron taffeta and advanced antistatic ChemStat® 909A**

Our knee-length frock offers the latest in cleanroom comfort and contamination control.

Ordering Information: Frocks

Fabric / Size	Dacron Taffeta White Cat. #	Dacron Taffeta Light Blue Cat. #	ChemStat 909A Linen White Cat. #	ChemStat 909A Light Blue Cat. #
XS	9305-30	9305-38	9305-94	9306-02
S	9305-31	9305-39	9305-95	9306-03
M	9305-32	9305-40	9305-96	9306-04
L	9305-33	9305-41	9305-97	9306-05
XL	9305-34	9305-42	9305-98	9306-06
XXL	9305-35	9305-43	9305-99	9306-07

Eyes-Only Cleanroom Hood

- **Completely washable and reusable**
- **Permanently attached transparent mask and ear vents constructed of ChemStat® 929 for enhanced comfort and communication**
- **Design features include rear crown snap adjustment for head size, rear elastic neck and snap adjustments**
- **Fabrication features include bias bound edges and crown, merrowed fabric edges, shaped shoulder cowl, double folded seams, and double seam containment stitching throughout**
- **Unisex design available in sizes XS through XL, in non-linting Dacron taffeta and electrostatic dissipative ChemStat® 909A**

Our Eyes-Only Hood offers cleanroom contamination control without interfering with necessary communication. The key feature is its permanently attached face mask and hood, made of sheer ChemStat 929, a 100% Dacron polyester fabric. ChemStat 929 features the same superior durability, chemical resistance, and laundry and sterilization compatibility of ChemStat 909A (see page 256). ChemStat 929 is a plain weave, lightweight (1.5 oz./yd.^{2}), 100% filament polyester with a micron rating of 35 and a permeability of 350 cfm. It meets NFPA standard 702-1980 for flame retardance and does not absorb vapors.

Ordering Information: Eyes-Only Hood

Fabric / Size	Dacron Taffeta White Cat. #	Dacron Taffeta Light Blue Cat. #	ChemStat 909A Linen White Cat. #	ChemStat 909A Light Blue Cat. #
XS	9307-06	9307-11	9307-46	9307-51
S	9307-07	9307-12	9307-47	9307-52
M	9307-08	9307-13	9307-48	9307-53
L	9307-09	9307-14	9307-49	9307-54
XL	9307-10	9307-15	9307-50	9307-55

Cleanroom Coverall

- **Completely washable and reusable**
- **Coverall torso and arms feature covered nylon zipper, military collar with 1 snap at neck, raglan sleeve with wrist adjustment snaps, stainless steel post and socket snaps throughout**
- **Coverall legs feature boot attachment snaps at rear, adjustment snaps at cuffs**
- **Fabrication details include merrowed fabric edges, double folded seams, and double needle containment seam stitching throughout**
- **Unisex design available in sizes XS through XXL, in non-linting materials including Dacron taffeta and electrostatic dissipative ChemStat® 909A**

Our cleanroom coverall offers full-body comfort and contamination control. Choose from two different colors, two dependable fabrics.

Ordering Information: Coveralls

Fabric	Dacron Taffeta White	Dacron Taffeta Light Blue	ChemStat 909A Linen White	ChemStat 909A Light Blue
Size	Cat. #	Cat. #	Cat. #	Cat. #
XS	9306-18	9306-26	9306-82	9306-90
S	9306-19	9306-27	9306-83	9306-91
M	9306-20	9306-28	9306-84	9306-92
L	9306-21	9306-29	9306-85	9306-93
XL	9306-22	9306-30	9306-87	9306-94
XXL	9306-23	9306-31	9306-86	9306-95

3XL and 4XL available. Call for quotation.

Hoods and boots not included

Open-Face Cleanroom Hood

- **Completely washable and reusable**
- **Double adjustment stainless steel post and socket snaps in front, rear snaps for head size adjustment ensure comfortable fit**
- **Fabrication features include bias bound edges, fully bound crown, merrowed fabric edges, draped shoulder cowl, and double needle containment seam stitching**
- **Unisex design available in sizes XS through XL, in non-linting materials including Dacron taffeta and electrostatic dissipative ChemStat® 909A**

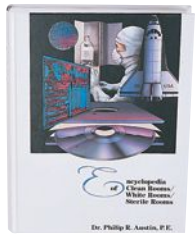
Our Open-Face Hood is ideal for cleanroom use—comfortable, durable, and conveniently launderable and re-usable.

Ordering Information: Open-Face Hoods

Fabric	Dacron Taffeta White	Dacron Taffeta Light Blue	ChemStat 909A Linen White	ChemStat 909A Light Blue
Size	Cat. #	Cat. #	Cat. #	Cat. #
XS	9307-61	9307-66	9308-01	9308-06
S	9307-62	9307-67	9308-02	9308-07
M	9307-63	9307-68	9308-03	9308-08
L	9307-64	9307-69	9308-04	9308-09
XL	9307-65	9307-70	9308-05	9308-10

Encyclopedia of Clean Rooms/White Rooms/ Sterile Rooms

Dr. Philip R. Austin, P.E. 1,000 pp., 3rd ed.



This indispensable reference book covers every aspect of contamination control in cleanrooms, biotech rooms, and aseptic areas. The book provides thousands of vital facts and figures and discusses all types of clean facilities in terms of design, construction, operation, and management. Topics include Class 500,000 through cleaner than Class 1 cleanrooms; bio-clean rooms; sterile rooms; the latest laser monitoring techniques; major governmental standards and specifications; air, fluid, and gas filtration; air showers, air locks and pass-thru; employee training; vertical and horizontal laminar flow facilities; cleanroom laundries; personnel and equipment; and contaminant emissions.

Cat. # **5012-01**

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Cleanroom Boots and Shoe Covers

- **Completely washable and reusable**
- **Two distinct unisex designs available in a wide range of sizes and non-linting fabrics**

Cleanroom Boot with Facile Sole

Cleanroom Boot with ChemStat 939 Sole

Shoe Cover with One-Piece Vinyl Sole

Shoe Cover with Two-Piece Vinyl Sole

Cleanroom Boots

Our 18-inch boots with elastic tops come in two different designs: Polyester-Reinforced Vinyl Sole, Gripper Sole, and ChemStat® 939 Sole.

The Polyester-Reinforced Vinyl Sole Boot is a pull-on booty with bartack reinforced tunnelized elastic cuffs, merrowed sole and top seams, adjustable Delrin plastic buckles at the ankles, rear snaps for coverall attachment, and sealed polyester rear snap reinforcement. The Polyester-Reinforced Vinyl Sole Boot features a two-piece sole and comes in two cleanroom fabrics (see ordering table below). Boots are available in sizes XS through XL.

Our ChemStat Sole Boot features a nylon zipper for convenient side entry. Additional design details include a tunnelized elastic boot top with adjustment straps and snaps, an adjustable Delrin plastic buckle at the ankle, and a rear snap for coverall attachment. Fabrication features include double fold seams, double needle containment seam stitching, merrowed fabric edges, and a special ChemStat 939 anti-static sole.

ChemStat 939 features the same superior durability, chemical resistance, and laundry and sterilization compatibility of ChemStat 909A and 929 (see page 256). ChemStat 939 is light, tough, elastic, and flexible, and it is resistant to chemicals, slips, and scuffs. It features a foot to ground resistance of 2.7×10^6 ohms, an effective surface resistivity of 2.5×10^9 ohms/sq, a voltage decay time of .05 seconds, a flame retardance which meets NASA NHB 8060.1B, a 0.44 static coefficient of friction, and a durometer value (hardness A) of 62.

The ChemStat Sole Boot is available in our full range of cleanroom fabrics in sizes XS through XL.

Ordering Information: Boots

	Fabric / Size	Dacron Taffeta White Cat. #	Dacron Taffeta Light Blue Cat. #	ChemStat 909A Linen White Cat. #	ChemStat 909A Light Blue Cat. #
2-Piece Polyester-Reinforced Vinyl Sole Boot	XS	9308-16	9308-27	9309-04	9309-15
	S	9308-17	9308-28	9309-05	9309-16
	M	9308-18	9308-29	9309-06	9309-17
	L	9308-19	9308-30	9309-07	9309-18
	XL	9308-20	9308-31	9309-08	9309-19
ChemStat Sole Boot	XS	9308-21	9308-32	9309-09	9309-20
	S	9308-22	9308-33	9309-10	9309-21
	M	9308-23	9308-34	9309-11	9309-22
	L	9308-25	9308-36	9309-13	9309-24
	XL	9308-26	9308-37	9309-14	9309-25

Cleanroom Shoe Covers

Our ankle-high slip-on shoe covers are available in two distinct unisex designs: Shoe Cover with One-Piece Reinforced Vinyl Sole and Shoe Cover with Two-Piece Reinforced Vinyl Sole. The vinyl-soled covers are available in our full range of cleanroom fabrics. All covers feature elastic tops are stainless steel adjustment snaps to ensure a snug fit.

Ordering Information: Shoe Covers

	Fabric / Size	Dacron Taffeta White Cat. #	Dacron Taffeta Light Blue Cat. #	ChemStat 909A Linen White Cat. #	ChemStat 909A Light Blue Cat. #
With 1-Piece Vinyl Sole	XS	9309-37	9309-49	9402-33	9402-45
	S	9309-38	9309-50	9402-34	9402-46
	M	9309-39	9309-51	9402-35	9402-47
	L	9309-40	9309-52	9402-36	9402-48
	XL	9309-41	9309-53	9402-37	9402-49
	XXL	9309-42	9309-54	9402-38	9402-50
With 2-Piece Vinyl Sole	XS	9309-43	9309-55	9402-39	9402-51
	S	9309-44	9309-56	9402-40	9402-52
	M	9309-45	9309-57	9402-41	9402-53
	L	9309-46	9309-58	9402-42	9402-54
	XL	9309-47	9309-59	9402-43	9402-55
	XXL	9309-48	9309-60	9402-44	9402-56

Cleanroom Gloves

- **Completely washable and reusable**
- **Choose from a wide range of glove materials and designs, most in gender-specific sizes from small to large for women, small to extra-large for men**
- **Choose task-specific gloves**
- **Color-coded elastic stitching at wrist ensures easy size identification, snug fit**

Our re-usable contamination-control gloves are ideal for a broad array of cleanroom applications. Elastic stitching at the wrist is color-coded for size identification. See table below for color coding.

All gloves come one pair per poly bag, one dozen pair to a larger poly bag. Order by the dozen.

CD/Film Handler (Regular weight) *ESD Glove* *Soft Barrier Glove*

CD/Film Handling Gloves

Our CD/Film Handling Gloves are premium 100% continuous fine-filament polyester gloves for film handling and CD inspection. They are fully breathable for comfort and fully washable for extended life. Choose from standard wrist-length or extended length (+4") gloves.

Soft Barrier Glove

This lightweight glove combines two fabrications to ensure contamination protection in the palm and breathability in the back. The palm is made of 1½ mil vinyl ultra-bonded onto a stretch continuous fine filament polyester. The back is 100% continuous filament stretch tricot polyester. The glove maintains a cool temperature and features exceptional tactile feel.

ESD Gloves

These gloves are designed for handling sensitive parts that are susceptible to breakdown due to static electricity. The gloves offer reliable protection against harmful contaminants and will dissipate an electrostatic charge from 5000 volts to zero in 1/100th of a second. Their constant surface resistivity is 10^7 ohms/square.

Our ESD Gloves are manufactured in 98% continuous filament non-linting stretch tricot polyester and 2% carbon suffused in continuous filament polyester.

Wafer Gloves

Our Wafer Gloves are designed to handle semiconductor and electronic parts and components without mass transfer or particle contamination. The wafer fabrication is a 1½ mil clear urethane which has a tacky feel on the surface and is laminated to a fine polyester knit substrate which enables workers to handle small parts with absolute precision. The urethane is chemically resistant and will withstand high surface temperatures. The back of the glove is 100% stretch polyester, which enables the glove to breathe and keep cool.

We offer these gloves in two designs: the standard wrist-length Wafer Glove and the special Wafer Glove Plus Four, which features an extra 4 inches of length at the forearm.

Polyester/Polyurethane Gloves

These gloves feature exceptional barrier protection and breathability. The exterior is made of breathable .02 micron absolute microporous urethane to resist any pass-through of contaminants. The glove interior is made of 100% polyester stretch tricot for comfort and durability. These gloves surpass IES-RP-CC-005-87-T recommended practices for cleanroom use.

We offer one popular length: the special Polyester/Polyurethane Glove Plus Four, which features an extra 4 inches of length at the forearm.

Multi Barrier Glove

This glove is designed for handling pointed or sharp cleanroom objects. The palm is a total contamination barrier manufactured in 2 mil white vinyl ultra-bonded onto a stretch continuous filament fine nylon. The back is 100% continuous filament stretch tricot polyester, which enables the glove to breathe and maintain a cool temperature.

Ordering Information: Cleanroom Gloves

	Small Cat. #/Dozen	Medium Cat. #/Dozen	Large Cat. #/Dozen	X-Large Cat. #/Dozen	One-Size-Fits-All Cat. #/Dozen
Male Sizes					
CD/Film Handler—Wrist Length	**9402-75**	**9402-76**	**9402-77**	**9402-78**	—
CD/Film Handler +4"	**9402-79**	**9402-80**	**9402-81**	**9402-82**	—
Soft Barrier Glove	**9402-83**	**9402-84**	**9402-85**	**9402-86**	—
2-Piece ESD Glove	**9402-87**	**9402-88**	**9402-89**	**9402-90**	—
Wafer Glove	**9402-93**	**9402-94**	**9402-95**	**9402-96**	—
Wafer Glove +4"	**9403-97**	**9402-98**	**9402-99**	**9403-00**	—
Polyester/Polyurethane +4"	—	—	—	**9403-05**	**9403-06**
Female Sizes					
CD/Film Handler—Wrist Length	**9403-15**	**9403-16**	**9403-17**	—	—
CD/Film Handler +4"	**9403-18**	**9403-19**	**9403-20**	—	—
Soft Barrier Glove	**9403-21**	**9403-22**	**9403-23**	—	—
2-Piece ESD Glove	**9403-24**	**9403-25**	**9403-26**	—	—
Wafer Glove	**9403-28**	**9403-29**	**9403-30**	—	—
Wafer Glove +4"	**9403-31**	**9403-32**	**9403-33**	—	—
Polyester/Polyurethane +4"	—	—	—	—	**9403-37**
Unisex Sizes					
Multi-Barrier Glove	**9403-44**	**9403-45**	**9403-46**	**9403-47**	—

Color Coding

Size	Female	Male
Small	Pink	Beige
Medium	Red	Royal Blue
Large	Orange	Brown
X-Large	—	Grey
One-Size-Fits-All	White	Green

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

IsoClean® and *Pro/Clean*® Disposable Cleanroom Garments

- ***IsoClean***® **biologically and chemically inert *Tyvek***® **ensures maximum particle containment, maximum liquid shielding, minimum shedding**
- **Revolutionary *Pro/Clean***® **garments are made of *Pro/Shield***® **2 fabric, a microporous polypropylene film laminated to a polypropylene non-woven substrate**
- **Lightweight and flexible—easy to put on and remove, comfortable to work in**
- **Recommended for cleanroom applications in electronics, pharmaceuticals, biotechnology, semiconductors**

These protective garments are designed for limited use—they are durable enough to be used more than once, yet inexpensive enough to be economically discarded, thus saving you the time and cost of laundering.

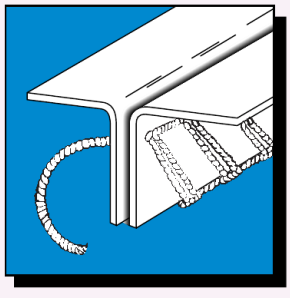
Unsurpassed Cleanliness in Disposable Garments

The key feature of our protective garments is the material used in their construction. Non-woven Tyvek® used in *IsoClean*® garments is a highly effective contamination control fabric resistant to penetration by airborne particles, dirt, grease, biological agents and a broad range of chemicals. It is chemically and biologically inert, low linting and static dissipative.

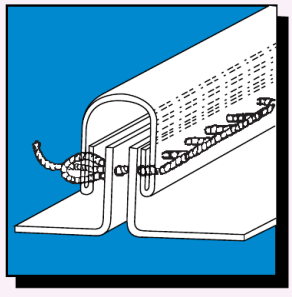
The *Pro/Shield*® 2 non-woven material used in *Pro/Clean*® garments features an outside polypropylene film lamination that provides an excellent protective shield, holding in 100% of all dry particulates down to 0.19 µm in size, while remaining breathable for additional worker comfort. This unique material provides the contamination protection associated with much more expensive, reusable garments. Like the *IsoClean*® fabric, it is chemically and biologically inert, low linting and static-dissipative.

Tunnelized elastic at openings enhances particle containment by a secure fit and reduces the lint associated with exposed elastic. Tapered torso minimizes the "billowing effect" that can cause particulation. Rotated shoulders and curved back design improves comfort and allows easy movement when arms are outstretched. Extended sleeve and leg lengths minimize the potential for skin exposure.

Two seam options allow you to optimize your cost and containment needs. *Pro/Clean*® garments come with serged seams. *IsoClean*® garments come with serged or bound seams. Both the Serged Seam and Bound Seam offer assured sterility with proper processing. You can order your garments uncleaned, cleaned, sterile, or cleaned and sterile.



Serged Seam—Cost-effective marginal containment



Bound Seam—Excellent containment, reduced shedding

***Pro/Shield*® 2 Specifications**

Physical Property	U.S. Testing			European Testing	
	Test Method	Results Imperial	Results Metric	Test Method	Results
Basis Weight	ASTM D751	1.7 oz/yd²	58g/m²	BS2471	61 g/m²
Grab Tensile Strength	ASTM D751	MD 30 lbs XD 26 lbs	MD 133 N XD 115 N	ISO 5081	MD 98 XD 80
Puncture Propagation Tear	ASTM D2582	MD 6.4 lbs XD 9.3 lbs	29 N 41 N	EN 863	7.8 N
Ball Burst Burst Resistance	ASTM D3787	26 lbs	115 N	ISO 2960	61 Kpa
Hydrostatic Water Resistance	ASTM D751	17.7psi	122 cm	ASTM D751	169 cm
Moisture Vapor Transmission Rate (g/m²/24 hrs)	ASTM E-96 Procedure D	1481.5	1481.5	ASTM E-96 Procedure D	1481.5

MD = Machine Direction; XD = Cross Direction. The test data presented here represent typical physical properties. Sources for all test data are from independent laboratories. All tests were performed under laboratory conditions and not under actual use conditions. Tests were performed on material samples, not actual garments.

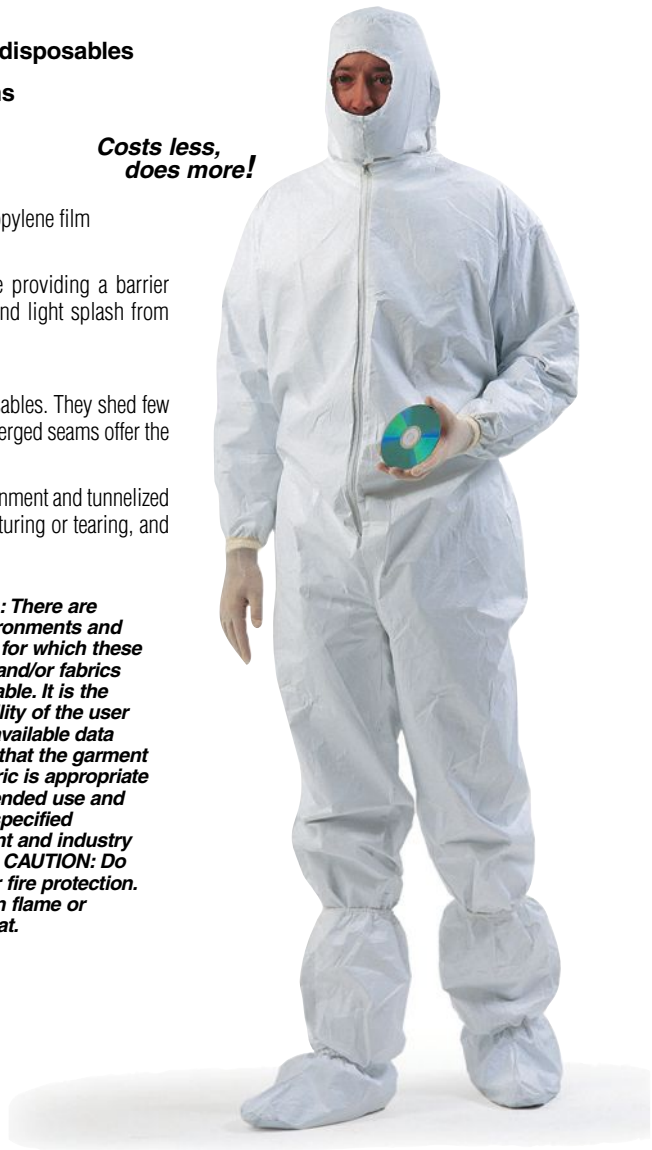
- **Uncleaned garments** come in bulk packs and allow you the choice of laundering or not laundering to suit your specific needs.
- **Cleaned garments** have been thoroughly processed in a Class 10 cleanroom laundry facility to confine particle contamination to the appropriate levels: serged seam garments recommended for Class 10,000 cleanroom environments, bound seam garments for Class 100.
- **Sterile garments** have been thoroughly irradiated to remove organic contamination, ensuring sterility levels of 10-6. (IsoClean® only)
- **Cleaned and sterile garments** have been thoroughly processed to prevent both particle and organic contamination. (IsoClean® only)

Please note that our Accessory Shoe Cover, Accessory Beard Cover, and Accessory Bouffant Hair Cover come unprocessed.

Pro/Clean® Disposable Garments

- **Patented microporous fabric is three times cleaner than traditional disposables**
- **Serged seam offers the cleanliness of more expensive bound seams**
- **Increases wearer's comfort and flexibility, reduces rip-outs**
- **Excellent barrier protection against cleanroom hazards**

Costs less, does more!



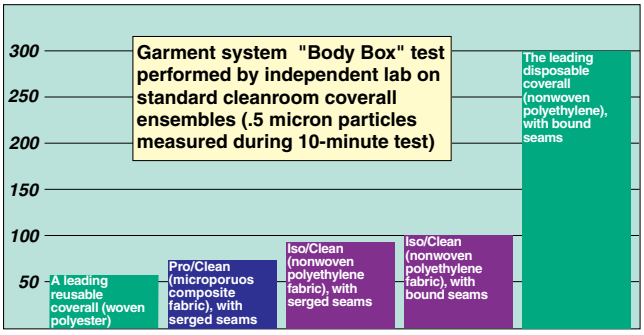
The *Pro/Clean*® disposable garments are fabricated of *Pro/Shield*® fabric, a microporous polypropylene film laminated to a polypropylene non-woven substrate.

These disposable garments protect the worker from particles and biological materials, while providing a barrier against powders and other substances in dust particulate form from .2 µm in size or larger and light splash from liquids or chemicals.

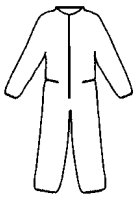
Ideal for the Cleanroom

The *Pro/Clean*® disposable garments are three times cleaner yet cost less than traditional disposables. They shed few if any particulates. These garments are light-weight and soft, yet strong, whether wet or dry. The serged seams offer the same low particle counts as those of more expensive garments with bound seams.

Other features include tunnelized elastic at wrists and ankles which further enhance particle containment and tunnelized back waist elastic for ease of movement and better comfort. They are resistant to abrasion, puncturing or tearing, and are anti-static treated.



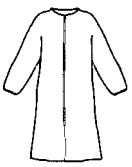
WARNING: There are uses, environments and chemicals for which these garments and/or fabrics are unsuitable. It is the responsibility of the user to review available data and verify that the garment and/or fabric is appropriate for the intended use and meets all specified government and industry standards. CAUTION: Do not use for fire protection. Avoid open flame or intense heat.



All coveralls have serged seams.

Pro/Clean® Coveralls

Processing Style	Description	Case Qty	Size	Cat. #
Bulk	Tunnel elastic in wrist, ankle, waist. Bound neck	25	S	1350-50
			M	1350-51
			L	1350-52
			XL	1350-53
Clean	Tunnel elastic in wrist, ankle, waist. Bound neck	25	S	1350-69
			M	1350-70
			L	1350-71
			XL	1350-72
Clean & Sterile	Tunnel elastic in wrist, ankle, waist. Bound neck	25	S	1350-83
			M	1350-84
			L	1350-85
			XL	1350-86



All frocks have serged seams.

Pro/Clean® Frocks

Processing Style	Description	Case Qty	Size	Snap Closure Cat. #	Zipper Closure Cat. #
Bulk	Bound Neck	30	S	1350-60	1350-64
			M	1350-61	1350-65
			L	1350-62	1350-66
			XL	1350-63	1350-67
Clean	Bound Neck	30	S	1350-79	—
			M	1350-80	—
			L	1350-81	—
			XL	1350-82	—

Good News—
Clean Doesn't Have to Cost More!

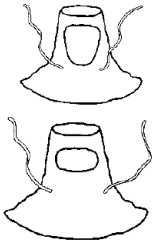
Third-party testing demonstrates that Pro/Clean® particle generation (Helmke) data rival those of much more expensive reusable fabrics costing many times more. These same tests reveal that Pro-Clean® is three times cleaner than the leading disposable coverall with bound seams.

Note: Fabric is not flame retardant and should not be used around heat, flame, sparks or in potentially flammable or explosive environments.

Pro/Clean® Sleeve Protectors

Processing Style	Case	Cat. #
Bulk	100 pairs	**1350-68**

Sleeve protectors have serged seams and tunnel elastic at wrists and top opening.



Pro/Clean® Hoods

Processing Style	Case	Bound Opening	
		Full Face Cat. #	Eyes Only Cat. #
Bulk	100	**1350-59**	**1350-58**
Clean	100	**1350-73**	**1350-74**
Clean & Sterile	100	**1350-87**	**1350-88**

All hoods have serged seams and binding ties.

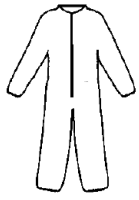
Pro/Clean® Boot Covers

Processing Style	Description	Case Qty	Size	Cat. #
Bulk	Tunnel elastic at calf & at ankle. PVC sole.	50 pairs	S	**1350-54**
			M	**1350-55**
			L	**1350-56**
			XL	**1350-57**
Clean	Tunnel elastic at calf & at ankle. PVC sole.	50 pairs	S	**1350-75**
			M	**1350-76**
			L	**1350-77**
			XL	**1350-78**
Clean & Sterile	Tunnel elastic at calf & at ankle. PVC sole.	50 pairs	S	**1350-89**
			M	**1350-90**
			L	**1350-91**
			XL	**1350-92**

All boot covers have serged seams.

IsoClean® CR Coverall

Hoods and boots not included

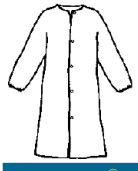


The Tyvek® coverall has a collar, zip front, and tunnelized elastic at wrist and ankles. A tapered torso reduces unnecessary fabric bulk. Lengthened legs and arms and a modified neckline optimize particle containment. Modified shoulder openings and a lengthened back accommodate common cleanroom work positions. Sizes XS to XL; X-Smalls and Smalls with customized shortened torsos for women.

IsoClean® Cleanroom Coveralls

Processing Style	Quantity Per Case	Size	Seam Closure (See p. 262) Serged Cat. #	Bound Cat. #
Bulk Pack	25	XS	**1850-01**	**1850-21**
		S	**1850-02**	**1850-22**
		M	**1850-03**	**1850-23**
		L	**1850-04**	**1850-24**
		XL	**1850-05**	**1850-25**
Clean	25	XS	**1850-06**	**1850-26**
		S	**1850-07**	**1850-27**
		M	**1850-08**	**1850-28**
		L	**1850-09**	**1850-29**
		XL	**1850-10**	**1850-30**
Sterile	25	XS	—	**1850-31**
		S	—	**1850-32**
		M	—	**1850-33**
		L	—	**1850-34**
		XL	—	**1850-35**
Clean and Sterile	25	XS	—	**1850-36**
		S	—	**1850-37**
		M	—	**1850-38**
		L	—	**1850-39**
		XL	—	**1850-40**

IsoClean® Cleanroom Frock

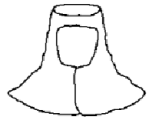


The Tyvek® frock features a 5-snap front, tunnelized elastic wrist, and mandarin collar. Sizes S to XL.

IsoClean® Cleanroom Frocks

Processing Style	Quantity Per Case	Size	Seam Closure (See p. 262) Serged Cat. #
Bulk Pack	30	S	**1850-61**
		M	**1850-62**
		L	**1850-63**
		XL	**1850-64**
Clean	30	S	**1850-65**
		M	**1850-66**
		L	**1850-67**
		XL	**1850-68**

IsoClean® CR Hood *(Open Face)*



Made of Tyvek®, with snap front, no elastic. One size fits all.

IsoClean® Cleanroom Hoods (Open Face)

Processing Style	Quantity Style	Seam Closure (See p. 262) Bound Cat. #
Bulk Pack	100	**1860-14**
Clean	100	**1860-15**

Cleanroom Accessory Shoe Covers

White Tyvek® shoe covers are 5 inches high, with low top, PVC soles. Sizes S-XL.

Accessory Shoe Covers			
Pairs Per Case	Case Weight	Size	Cat. #
100	8 lbs.	S	1860-66
		M	1860-67
		L	1860-68
		XL	1860-69

Cleanroom Accessory Bouffant Hair Cover

The bouffant hair cover is made of white Tyvek® with serged seams. Shipped 250 covers per case; case weight 8 pounds. One size fits all.

Cat. #
1860-71

IsoClean®

Tyvek® boots are 20 inches high, with PVC sole, tunnelized elastic top, ankle ties. Available with serged or bound seam; NSR seam not available. Sizes S-XL.

Cleanroom Boots				
Processing Style	Pairs Per Case	Size	Seam Closure (See p. 262)	
			Serged Cat. #	Bound Cat. #
Bulk Pack	100	S	1860-38	1860-50
		M	1860-39	1860-51
		L	1860-40	1860-52
		XL	1860-41	1860-53
Clean	100	S	—	1860-54
		M	—	1860-55
		L	—	1860-56
		XL	—	1860-57
Sterile	100	S	—	1860-58
		M	—	1860-59
		L	—	1860-60
		XL	—	1860-61
Clean & Sterile	100	S	—	1860-62
		M	—	1860-63
		L	—	1860-64
		XL	—	1860-65

Cleanroom Garment Hamper

- **Polypropylene construction combines cleanliness and chemical resistance**
- **Recessed foot pedal enables hands-free operation**
- **Custom sizes available—call Terra with your requirements**

Terra's Cleanroom Garment Hamper allows clean, easy disposal of soiled cleanroom garments.

Its self-closing lid is easily raised with a press of the recessed stainless steel foot pedal, and polypropylene construction safely contains garments or protective garb splashed with acids or caustic chemicals. The standard hamper features over seven cubic feet of capacity; Terra will also custom fabricate storage hampers of other sizes and materials to suit your requirements

Outside Dimensions: 31"W x 14.5"D x 42"H
Inside Dimensions: 29.5"W x 11.5"D x 35"H

	Cat. #
Cleanroom Garment Hamper	**5151-51**

Cleaning Products

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Cleanroom Ready!

On demand, Terra fabricates, cleans, and packages products in our own on-site Class 10 cleanroom. Call for further information!

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Ultrasonic Cleaners

- **CSA-listed cleaners provide thorough, safe cleaning of small- and medium-sized parts**
- **Seven sizes give you the choice of just the right capacity cleaner for your needs**
- **Recessed cleaning tank minimizes spills and drips**
- **Specialized models accommodate pipets and very small parts**
- **Cleaners available unheated with a mechanical timer, heated with mechanical timer; or heated with digital timer, heat controls and degas function**

These Branson cleaners offer seven ways to get the full, efficient power of ultrasonic cleaning at an affordable price. They give parts the ultrasonic scrub that cleans the way no conventional methods can, but will not damage even the most sensitive components. Their unique penetrating action gets at dirt and grease hidden away in tiny cracks and crevices by generating millions of microscopic vacuum bubbles that scrub the surface as they implode.

These CSA-listed, low-cost ultrasonic cleaners range in capacity from one pint to 5½ gallons and are warranted for two years (one year for Series B3 and PC620). They can be used with a wide variety of aqueous solutions to clean small and medium-sized parts. All units are integrated with cleaning tank and generator in one enclosure. All XX10-series models include 42khz industrial stacked transducers, which increase reliability and power, and a "sweep frequency" that results in uniform cleaning and eliminates hot spots. The tanks are made of rugged stainless steel with no corner welds or other dirt-catching surfaces, and are enclosed in durable, attractive, impact-resistant plastic. Because the tanks are recessed, you won't have to worry about spills and drips. And these cleaners are durable; the toughest cleaning solutions won't hurt them, and bumps won't dent them. The outer plastic case makes these units easier to move and carry. Larger models feature recessed handholds.

All circuitry is solid state for long, trouble-free service (no fans or other moving parts). Every cleaner is equipped with an R.F.I. filter that meets FCC radio frequency standards.

Select among seven basic units and several configurations. The smallest unit (B3 below) is available as an unheated model only. Series PC620 features a rectangular tank that is available in heated and unheated versions without a timer.

The other five models can be ordered in three configurations: unheated with a mechanical timer; heated with a mechanical timer; or heated with digital timer, heat controls and degas function (which allows immediate use at maximum efficiency). Models with mechanical timers include a hold button for continuous-mode operation. Models with digital timers allow exact cleaning cycles up to 99 minutes (mechanical timers are 60 minutes). All models except series PC620 come with a tank cover and are designed for operation at 117VAC, 50/60Hz. Models are also available for 220/240-volt operation.

Safety Notes: These water-based units are not designed for solvent cleaning. To prevent damage, maintain liquid level ½" to 1" from tank top.

Models shown below

Note: All models except B3 and PC620 are available for 220VAC/50Hz operation. To order add "-220" to the part number.

Branson Series**	Tank Dimensions (W x D x H) inches	Overall Dimensions (W x D x H) inches	Tank Capacity (gallons)	Weight (lbs.)	Unheated Cleaners With Mechanical Timers Cat. #	Heated Cleaners With Mechanical Timers Cat. #	Heated Cleaners With Digital Timers, Heat Control, Degas Cat. #
B3	3 1/2 x 3	5 1/4 x 5 1/4 x 6 1/4	1/8	3	**2601-00***	—	—
1510	6 x 5 1/2 x 4	10 x 12 x 11 1/2	1/2	7	**2602-00**	**2630-00**	**2631-00**
2510	9 1/2 x 5 1/2 x 4	13 1/2 x 12 x 11 1/2	3/4	9	**2603-00**	**2604-00**	**2617-00**
3510	11 1/2 x 6 x 6	16 x 12 x 14 1/2	1 1/2	12	**2605-00**	**2606-00**	**2618-00**
PC620	19 1/2 x 5 3/4 x 6	20 1/4 x 6 1/4 x 10 1/2	2 3/4	23	**2607-00***	**2608-00***	—
5510	11 1/2 x 9 1/2 x 6	16 x 15 1/2 x 14 1/2	2 1/2	14	**2609-00**	**2610-00**	**2619-00**
8510	19 1/2 x 11 x 6	24 x 18 x 14 1/2	5 1/2	26	**2613-00**	**2614-00**	**2637-00**

**** Model #2601-00 features a round tank and is not available with heater. Models #2607-00 and #2608-00 feature a long rectangular tank and are ideally suited for cleaning pipets (not available with timers or digital controls).***
***** Tank covers included for all except the PC620 series.***

#8510: Heated with digital controls

#1510: Heated with mechanical timer

#2510: Heated with digital controls

#3510: Heated with mechanical timer

Ultrasonic Cleaning Accessories

We offer a wide line of cleaning accessories to make your cleaning job easier and faster. Exactly which accessories you need will depend on the cleaning method you use.

For **Direct Cleaning** you typically need only a perforated insert tray. This method involves pouring the cleaning fluid directly into the tank and then lowering items either in a perforated tray or suspended by a wire. The chief advantage of this method is its simplicity. It does, however, present several disadvantages: all removed soil remains in the tank; only one solution can be used at a time; and highly acidic or caustic solutions should not be used at all.

Indirect Cleaning solves these problems and provides more flexibility and control over the cleaning cycle. In this method, the tank is filled with a liquid driving medium, such as water, plus a wetting agent (detergent) to improve circulation. Cleaning solutions are poured into one or more beakers or solid insert trays, where parts can then be placed. The beakers fit into a beaker positioning cover which suspends them in the tank. If a solid tray is being used, its handles should fit over the edges of the unit and suspend it in the tank.

This method ensures that removed soil stays in the beaker or tray; it can be easily examined, filtered, or discarded. Indirect cleaning also lets you use one or more solutions at the same time. In a large cleaner, which features inserts for three beakers, one beaker might contain a rinse solution and the other two beakers could contain two different types of cleaning solutions. Whichever method you employ, optimal cleaning occurs in the area of the tank between 1/2" from the top and 1/2" from the bottom. Therefore, parts should not be placed directly on the bottom.

Note: Be sure to maintain a fluid level between 1/2" and 1" from the top of the tank or the unit could be damaged.

Beakers

Beakers come in a variety of sizes and materials and fit into the Beaker Positioning Covers of the corresponding size (order separately). Both 400ml and 600ml beakers fit into the same slots of the positioning covers.

Description	Capacity of Corresponding Cleaner*	Cat. #
Glass 250ml	3/4 gal, 1 1/2 gal.	**2603-10**
Glass 600ml	1/2 gal, 3/4 gal, 1 1/2 gal, 2 1/2 gal, 5 1/2 gal.	**2603-11**
Polypropylene 400ml	1/2 gal, 3/4 gal, 1 1/2 gal, 2 1/2 gal, 5 1/2 gal.	**2603-06**
Stainless Steel 600ml	1/2 gal, 3/4 gal, 1 1/2 gal, 2 1/2 gal, 5 1/2 gal.	**2603-05**

**** Select appropriate positioning cover below.***

Accessories for Branson Series 1510 Cleaners
(Nos. 2602-00, 2630-00, 2631-00)

	Cat. #
Mesh Basket	**2602-11**
Insert Tray (solid)	**2602-01**
Insert Tray (perforated)	**2602-02**
Tank Cover (formed plastic)	**2602-07**
Beaker Positioning Cover for one 600ml or 400ml beaker	**2602-05**

Accessories for Branson Series 2510 Cleaners
(Nos. 2603-00, 2604-00, 2617-00)

	Cat. #
Mesh Basket	**2603-13**
Insert Tray (solid)	**2603-01**
Insert Tray (perforated)	**2603-02**
Tank Cover (formed plastic)	**2603-08**
Beaker Positioning Cover for two 600ml or 400ml beakers	**2603-03**
Beaker Positioning Cover for two 250ml beakers (No. 2603-10)	**2603-09**

Trays, Covers and Baskets

These accessories expand the potential applications of the ultrasonic cleaners listed on the previous page. Select accessories for corresponding cleaner model listed on table (order beakers separately).

Accessories for Branson Series 3510 Cleaners
(Nos. 2605-00, 2606-00, 2618-00)

	Cat. #
Mesh Basket	**2605-06**
Insert Tray (solid)	**2605-02**
Insert Tray (perforated)	**2605-03**
Tank Cover (formed plastic)	**2605-04**
Beaker Positioning Cover for three 250ml beakers	**2605-05**

Accessories for Branson PC620 Cleaners
(Nos. 2607-00, 2608-00)

	Cat. #
Stainless Steel Tank Cover	**2607-01**
Pipet Basket	**2607-02**

Accessories for Branson Series 5510 Cleaners
(Nos. 2609-00, 2610-00, 2619-00)

	Cat. #
Insert Tray (solid)	**2609-02**
Insert Tray (perforated)	**2609-03**
Tank Cover (formed plastic)	**2609-04**
Beaker Positioning Cover for four 600ml beakers	**2609-05**

Accessories for Branson Series 8510 Cleaners
(Nos. 2613-00, 2614-00, 2637-00)

	Cat. #
Insert Tray (solid)	**2613-02**
Insert Tray (perforated)	**2613-03**
Tank Cover (stainless steel)	**2613-04**
Beaker Positioning Cover for six 600ml or 400ml beakers	**2613-05**

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Mini-Ultrasonic Cleaner

- **Small, stylish cleaner is big on value**
- **Features a stainless steel tank with 15-oz. capacity in a compact housing**
- **Contains all solid-state circuitry**
- **Includes contemporary Noryl™ plastic base and smoked plastic cover**

The Mini-Ultrasonic Cleaner includes a five-minute timer to make sophisticated ultrasonic cleaning fast, easy—and affordable.

To operate, simply dip the item you're cleaning into the solution-filled ultrasonic tank. The cleaner uses ultrasonic energy (55KHz) in the form of sound waves to create literally millions of tiny, microscopic bubbles in the solution. These bubbles expand and collapse rapidly, creating a mechanical "scrubbing" action that even works its way into holes and hidden cavities, loosening dirt on all surfaces that the solution touches. This action (called cavitation) occurs thousands of times per second, every second, to scrub dirt off the object being cleaned. That's why, when you lift the item out of the cleaner, it is microscopically clean.

The Mini-Ultrasonic Cleaner comes ready to operate with a plastic cover and two parts baskets. Includes a one-year warranty.

Note: This cleaner is not designed for solvent cleaning. To prevent damage, maintain liquid level 1/2" to 1" from the top of the tank.

Overall Dimensions: 8 3/4"L x 4 1/2"W x 5"H
Internal Dimensions: 6 1/2"L x 3 1/2"W x 2 1/4"H (tank depth)

	Cat. #
Mini-Ultrasonic Cleaner	
110VAC, 60Hz	**2622-00**
220VAC, 50Hz	**2622-00-220**

Industrial Ultrasonic Cleaner

- **Specially designed for medium and heavy-duty industrial applications**
- **Features 10 gallon tank capacity**
- **Includes heater for maximum effectiveness**

This new, low cost ultrasonic cleaner is designed especially for medium and heavy-duty industrial applications. It is fully integrated, with ultrasonic generator and cleaning tank in a single enclosure. Solution capacity is 10 gallons—enough to handle large, bulky parts or for batch cleaning of small components. It is the only industrial-size ultrasonic cleaner of its type available today!

This unit is suitable for use with alkaline, mildly acidic, neutral or caustic aqueous solutions to clean electronic and electrical subassemblies; fabricated metal or plastic components; glass and other materials prior to inspection, assembly or further processing.

Its deep-drawn tank of 316L stainless steel has no corner welds or other moving parts to wear out. Separate heater and generator controls are provided, and the unit is equipped with an R.F.I. filter to meet FCC radio frequency interference standards. Because the Industrial Ultrasonic Cleaner is a completely contained, integrated unit, installation requires only a power connection.

Note: It is not designed for solvent cleaning. To prevent damage, maintain liquid level 1/2" to 1" from the top of the tank.

Specifications

Tank Dimensions:	14"W x 16"D x 10 1/2"H
Overall Dimensions:	17"W x 19"D x 19"H
Heater:	1000 watts
Capacity:	10 gallons
Shipping Weight:	70 lbs.

	Cat.#
Industrial Ultrasonic Cleaner	
120VAC, 1 PH,50/60 Hz	**2623-00**
220VAC, 1 PH,50/60 Hz	**2623-00-220**
Mesh Basket	**2623-01**
Cover	**2623-02**

High-Frequency Ultrasonic Cleaners

- **SweepSONIK2D™ Generators provide effective submicron particle removal on the most delicate substrates without cavitation damage**
- **DualSWEEP technology constantly varies the ultrasonic frequency (± 2 kHz) to ensure the optimal value for each cleaning situation**
- **MultiSONIK™ generator operates at 40, 72, 104, or 170kHz frequencies, according to a predetermined sequence, in a single process tank**
- **Self-diagnostic circuits indicate status of the ultrasonic generator**
- **Process tanks are constructed from 316L stainless steel for noncontaminating, chemical-resistant performance**

Stainless steel heated tanks

These versatile High-Frequency Ultrasonic Cleaners provide the optimal cleaning solution in cost-sensitive, high-purity applications involving sensitive parts.

The unique SweepSONIK2D™ generators drive the universal transducer at 40, 72, 104, or 170kHz. The generators include patented DualSWEEP technology to provide the safest and most efficient ultrasonic cleaning and processing. With DualSWEEP control, the sweep rate is constantly changing among optimum values (± 2 kHz of nominal value). This eliminates the possibility of damaging a part by resonating it at a single sweep frequency. Each generator includes a front-mounted power control knob and the ability to remotely activate the unit through a contact closure.

SweepSONIK™/MultiSONIK™ Generators and Hand-Held PLC Controller for MultiSONIK

MultiSONIK™ Generator: Industry's First Selectable, Multiple-Frequency Generator

The MultiSONIK™ generator is an advanced digital ultrasonic generator with the ability to select single or multiple frequencies for a single process tank. Featuring patented DualSWEEP technology, it operates at 40, 72, 104 or 170 kHz frequencies according to a predetermined sequence, or it can be programmed to alternate randomly between frequencies using the PLC controller (order separately).

With a multi-frequency generator driving the unique universal transducer included with each tank, cleaning performance is optimized to a level not previously achievable with conventional ultrasonic cleaning. This new, advanced technology revolutionizes sub-micron particle removal in the critical cleaning of semiconductors, flat panel displays, disk drive components, and assemblies, optics and more. MultiSONIK™ technology permits the exposure of components to a selectable or continually changing array of application-specific ultrasonic cleaning frequencies from just one generator to optimize your precision cleaning.

The heavy-duty 14-gauge 316L stainless steel tanks are functional, durable and sleek. High-efficiency piezoelectric transducers are metallurgically bonded to the bottom of the tank for superior service. The large upper flange permits easy workbench mounting. Includes a tank drain and valve in stainless steel. Select optional work basket and lid below. Generator Dimensions: 15 x 13 x 6.5 (SweepSONIK/MicroSONIK); 18 x 13 x 6.5 (MultiSONIK)

Options

For Tank Dimensions (L"x W"x H")	Work Basket Cat. #	Lid Cat. #
10 x 8 x 8	**3307-42**	**3307-46**
12.5 x 10 x 10	**3307-43**	**3307-47**
16.5 x 14 x 14	**3307-44**	**3307-48**
20.5 x 18 x 18	**3307-45**	**3307-49**

Hand-held PLC Controller
for use with MultiSONIK generator — Cat# **3307-50**

High-Frequency Ultrasonic Tanks and Generators

Internal Tank Dimensions (L"x W"x H")	External Tank Dimensions (L"x W"x H")	Shipping Weight (lbs.)	Tank Capacity (gallons)	Acoustic Power (watts)	Heat (watts)	Standard Voltage (VAC/Hz)	SweepSONIK2D™ 40kHz Cat. #	SweepSONIK2D™ 72kHz Cat. #	SweepSONIK2D™ 104kHz Cat. #	MicroSONIK 170kHz Cat. #	MultiSONIK™ (all 4 freq.) Cat. #
10 x 8 x 8	14 x 13.5 x 12.25	40	2.5	300	1000	120/60*	**3307-21**	**3307-25**	**3307-29**	**3307-33**	**3307-36**
12.5 x 10 x 10	17 x 16 x 14.25	60	5	600	1000	120/60*	**3307-22**	**3307-26**	**3307-30**	**3307-34**	**3307-37**
16.5 x 14 x 14	20 x 19.5 x 18.25	75	10	900	2000	220/50**	**3307-23**	**3307-27**	**3307-31**	**3307-35**	**3307-38**
20.5 x 18 x 18	25 x 24 x 22.5	130	25	1200	3000	220/50**	**3307-24**	**3307-28**	**3307-32**	**3307-36**	**3307-39**

**** These models are also available in 220VAC/50Hz at no extra charge; add -220 to the standard part number to specify. Other voltages available; call for information.***
***** These models not available in 120VAC (all tanks with heat greater than 1200W require 208V or greater power supply).***

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Critical Environment Solutions
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SnowBox™ Dry Ice Cleaning Station

- **Provides a dry, inert environment to prevent moisture condensation when cleaning with dry ice**
- **Durable stainless steel glove box ensures a clean processing environment**
- **Optional air locks provide separate entrance/exit ports**
- **Tilt-up window and built-in quick connect CGA 320 fitting allows easy connection of SNO GUN™ II (order separately; see page 274)**
- **Includes fluorescent illuminator**

The SnowBox™ Dry Ice Cleaning Station provides the ideal environment for operation of the SNO GUN™ II dry ice cleaning system.

Because the dry ice cleaning medium is extremely cold, it can cause the temperature of parts to drop beneath the dew point of the ambient air. In a humid environment, this will lead to moisture condensation that can contribute to oxidation or other contamination problems.

Automatic Moisture Control

The SnowBox™ Dry Ice Cleaning Station prevents these problems by maintaining a dry nitrogen environment. Nitrogen flow is controlled in two ways. The Dual Purge™ System provides a low-level nitrogen flow to maintain a continuous positive pressure inside the enclosure. When an air lock door of the tilt-up window is opened, it automatically activates a high-level flow, which helps to block out moisture influx and quickly remove any moisture that may enter the chamber.

The optional NitroWatch™ system provides additional moisture control by allowing you to determine a humidity set point down to 0% RH. If the internal humidity level climbs above this setpoint, the NitroWatch sends a signal to the Dual Purge System to activate the high-level purge. Moisture and CO_2 are purged out of the cabinet through Automatic RB® (relief/bleed) valves, which guard against overpressures.

Convenient Pass-Through Access

Terra's air locks provide a convenient, noncontaminating way to move parts in and out of the glove box.

Knife edges along each access door seal against inlaid polyurethane gaskets to form an air-tight seal. Double-wall stainless steel construction, with heavy-duty door latches and hinges, ensures a long service life. Each air lock comes with a safety glass window on the external door. Ports are included for nitrogen purging. Two Automatic RB® Valves ensure safe pressure release.

The front Tilt-Up Window swings open for easy access to large parts or for installation and connection of the SNO GUN™ II. Dual piston mechanisms hold the window securely open. A safety glass window allows full view of the internal chamber.

The SnowBox™ Glove Box also includes a quick connect fitting for CO_2 line required by the SNO GUN™ II. A fluorescent illuminator is also standard. Options include an ionizing bar, stand, and accordion sleeve/glove assembly.

Why Dry Ice Cleaning?

. . . Because particles in the 1-2 micron size range and smaller are difficult if not impossible to remove by conventional blowing with compressed air or dry nitrogen gas.

Such micro-particles are held to the surface not only by electrostatic attraction, but also by bonding forces in the surface layers of absorbed water and organics that are typically integral to the substrate surface. Small particles have a larger percentage of their total surface area in contact with these surface layers, thus giving them greater adhesion. Less of their surface is exposed to any aerodynamic drag forces generated by a nitrogen gun, DI water gun, or other flow of gas or liquid.

Aside from these adhesive forces, small surface contaminants are difficult to remove due to the boundary layer phenomena: a fluid flow (gas or liquid) is only effective at some finite distance away from the surface being cleaned. At the surface itself, the flow velocity must be zero, thus reducing the chance that small particles in the boundary layer will feel the full force of the flow and may not be removed.

Dry Ice Cleaning—Sandblasting Without the Mess!

One way to remove these very small contaminants is to introduce a mass into the cleaning flow, thereby penetrating the boundary layer, transferring energy to the contaminant and knocking it off the surface. The challenge is to perform this sandblasting without damaging the delicate part or generating further contaminant residue.

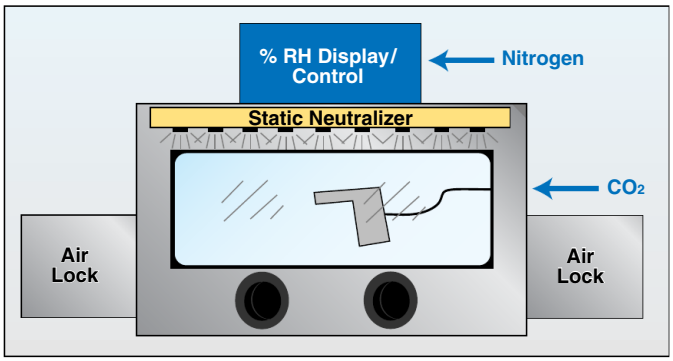
This is precisely what a dry ice cleaning system does. Frozen carbon dioxide particles meet all the requirements for high precision cleaning of delicate components: they are soft and leave no residue, when supplied with precision-grade CO_2.

When liquid CO_2 is released from a room temperature cylinder to atmospheric pressure, it passes through its triple point—the state at which some portion exists in solid, liquid, and vapor phases. The liquid and vapor quickly dissipate with no net effect on the environment, but the solid dry ice "snow" is directed toward the surface to remove the particles. Nozzles supplied with SNO GUN™ II are used to adjust the dry ice particle size and the shape of the spray pattern to fit a wide variety of applications.

Effective as a Hailstorm or as a Gentle Snow

Typical dry ice particle sizes are in the 5 micron range, which produce a rather aggressive "hail storm," but they can be adjusted in size to about 0.5 cm where they produce a very gentle snowfall effect for cleaning the most delicate surfaces.

At higher velocities (up to 1000 fps) the CO_2 not only removes particles, but also dissolves thin organic layers of oils and fluxes—even fingerprints. This solvent action is due to a thin layer of liquid CO_2 that forms at the collision interface between a dry ice particle and the surface. Liquid CO_2 is an excellent solvent for organics. The very short duration of a liquid film at the interface dissolves the organic film contaminants, which are then carried away in the flow of CO_2 snow and vapor. The liquid state of the CO_2 also reduces the impact stress on the surface and permits thorough cleaning without destructive forces.

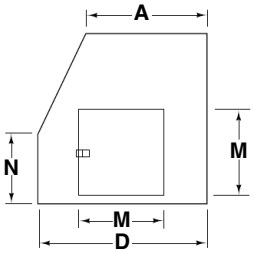


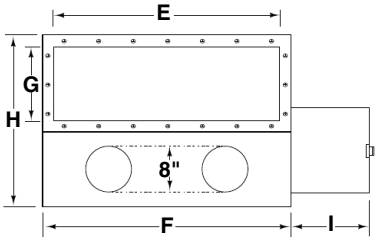
Specifications

Door Openings: 12.5" x 12.5" with gasketed doors supplied with air locks; doors open inward

Arm Ports: 8" round with flange for connecting glove assembly

Gas Ports: Tapped .75" NPT inlet (for connecting flowmeter or Dual Purge System). Includes two automatic RB Vales for safe pressure release. Appropriate adapter inserts are supplied for any Terra gas systems ordered.





Glove Ports	A	D	E	F	G	H	I	M	N
2	16.5	23.81	27.69	34.12	12.38	23.81	16	14.5	10

Also available with other air lock configurations.

Ordering Information

SnowBox™ Glove Box Cat. #
(includes two Relief/Bleed valves, plus one per air lock)

No Air Lock	**1600-87**	Dual Air Locks	**1600-90**
Right-Side Air Lock	**1600-88**	Left-Side Air Lock	**1600-89**

Dual Purge System (see page 472) Cat. # **1603-57**

NitroWatch® (see page 473) Cat. #

Control Module	**9500-00A**
Sensor	**9500-02A**

Ionizing Blower
Provides even ion distribution throughout chamber.
See page 484 for ordering information.

Stand
Fabricated of all-welded 2" square tubes.
Raises chamber 30" above floor (add 3" for casters). Cat. #

Epoxy-finished steel	**1690-03**
Stainless steel	**1694-09**
Heavy-Duty Casters Set of 4, 2 with brakes	**1700-44**

Accordion Sleeve and Glove Assembly
Accordion neoprene sleeve section allows easy arm motion and prevents sleeve blow-back when box is under pressure. Separable gloves allow operators to change glove materials or sizes without removing sleeves. Supplied with one pair of latex industrial gloves (select desired size).

Glove Size	with 12" Sleeve	with 24" Sleeve
8	**1689-05**	**1681-90**
9	**1689-06**	**1681-91**

At lower velocities, larger flakes settle on contaminants and lift them off the surface in the process of sublimation to the vapor state—without disturbing delicate substrates. As the dry ice particle sublimes, it creates a micro-explosive expansion that dislodges contaminants.

Dry Ice Cleaning and Thermal Shock

Although dry ice has a temperature of -109.3°F (-78.5°C) at atmospheric pressure, it rarely poses a threat, even to extremely sensitive micro-components.

This is because the sublimation process occurs so quickly, and the mass of the CO_2 particles is so small relative to that of the components being cleaned, that brief spraying will not cause significant drop in surface temperature. At high ambient humidity, however, even relatively small temperature drops can lead to condensation of water vapor. In these applications, a dry nitrogen environment can prevent moisture-related damage.

Preventing Moisture Contamination

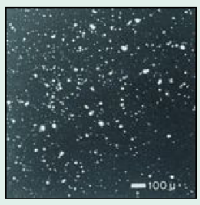
If cleaning causes the temperature of the parts to drop beneath the dew point of the ambient air, moisture will collect on the parts being cleaned. In many applications, this condensation could lead to oxidation or other contamination problems.

For these applications, Terra recommends cleaning in a nitrogen-purged dry box. At the much lower dew point inside such a chamber, parts will remain dry even if dry ice cleaning does cause small, temporary temperature drops.

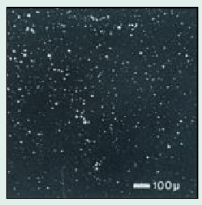
Protecting Against ESD (Electro-Static Discharge)

Although CO_2 is itself non-conductive, the dry ice particles can generate friction as they leave the nozzle of the SNO GUN™ II, leading to potentially hazardous static charge build-ups.

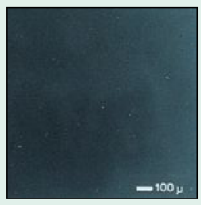
One solution to this problem is grounding ESD-sensitive parts. Another is to direct a convergent stream of ions at any static-sensitive surface. Terra's Ionizing Air Gun provides this ESD protection, and can be configured to work in tandem with the SNO GUN™ II.



Aluminum Oxide Particles on a Silicone Wafer



After Blowing with Dry Nitrogen



After Blowing with SNO GUN™II

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The SNO GUN™ II

High Precision Cleaner

- **Safely removes contaminants—including fingerprints, light hydrocarbon residue, and submicron particles—using dry ice snow**
- **More effective than nitrogen at cleaning wafers, chips, optics, and other particle-sensitive components**
- **Safe for use with microcircuit wires or energized electronic components**
- **Portable, easy-aim design and adjustable nozzles provide broad or very localized cleaning of hard-to-reach surfaces**
- **Environmentally friendly operation eliminates the need for solvent disposal—contaminants are carried away in a stream of inert CO_2**
- **Low operating cost: CO_2 is inexpensive and readily available**

Extension tube adjusts snowflake size

The SNO GUN™ II provides a safe, inexpensive, highly effective alternative to solvent or dry nitrogen cleaning of semiconductor components, PC boards, and other sensitive parts.

Removes Surface Contaminants as Small as 0.1 Micron

Dry ice particles generated by the SNO GUN™ II penetrate the boundary layer immediately adjacent to the surface. Contaminants that are untouched by nitrogen guns are dislodged and carried away in the flowing stream. Light organic contamination may be removed by the localized solvent effect created when dry ice particles impinge on a surface.

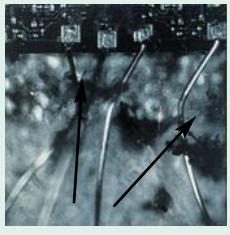
The SNO GUN™ II cleaning process does not scratch delicate semiconductor or precision optical surfaces. Even the finest wires in microcircuitry remain undisturbed. CO_2 is non-conductive, allowing electronic components to be safely cleaned even while energized.

The hand-held SNO GUN™ II is transportable to wherever cleaning is required. Simply attach the SNO GUN™ II to a CO_2 cylinder and start cleaning more effectively.

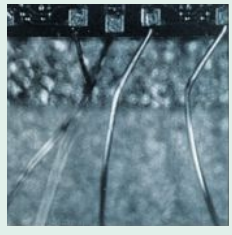
Complete Line of Features to Meet Every Application

The SNO GUN™ II comes with interchangeable nozzles with 9 standard combinations. By changing the nozzle configurations, you can adjust the spray pattern, size, and force of the dry ice particles. Micro-particles can be generated in the < 1mm diameter range with a velocity from 150 fps to 1000 fps that produce an aggressive dry ice storm capable of removing light oils, light greases, and hydrocarbons. Fingerprints can be removed from many surfaces. Three extension tubes provide larger, more gentle snowfall capable of cleaning unadhered particles down to .1 micron without disturbing delicate substrates.

Removal of particles from 0.0005" diameter gold bonding wires with Sno-Gun



Circuit before cleaning. Note contamination.



Circuit after cleaning. All contamination removed.

The SNO GUN™ II includes a .5-micron filter inside the valve for point-of-use filtration, a Teflon-jacketed nozzle design that minimizes condensation, a 10' flexible hose (for connection to a standard gas cylinder), and hard plastic storage case.

See below for information on a CO_2 Purifier and Micro Precision Steam Cleaner.

CO_2 Consumption:	36 lbs./hr. under continuous duty.
Shipping Case Dimensions:	13"W x 18"L x 5.5"H
Shipping Weight:	9 lbs.

	Cat. #
SNO GUN™ II	**4545-00**

The SNO GUN™ II provides safe, effective, economical cleaning in a wide range of critical applications. Refer to page 273 for configurations with Terra DryClean™ Glove Box.

Silicone Wafers—The speedy cleaning process effectively removes contaminants as small as .1 microns from wafer surfaces. Versatile tip configurations allow adjustment of force and pattern of dry ice spray to ensure safe cleaning. Select Terra's DryClean™ Glove Box to prevent moisture condensation.

Hybrid Circuits—Short blasts of dry ice snow typically remove all particles from hard-to-reach recesses in hybrid packages without disturbing delicate wire bonds. Applying and slowing heating Methyl Alcohol to its boiling point and then re-spraying the area with dry ice snow can remove stains.

Disk Drives—The SNO GUN™ II safely removes particles from disk heads, drive cavities, and magnetic media itself. Automated configurations can be installed for continuous operation on assembly lines.

Flat Panel Displays—The SNO GUN™ II is ideal for removal of particles, fingerprints, and other light residues on FPD substrates and glass prior to coating.

Optics—From a 400-inch telescope mirror to 20-mm by 20-mm photoelectric cells, CO_2 cleaning removes dust particles and light hydrocarbon contamination without surface pitting.

Medical Devices—Cardiac and ophthalmic shunts are cleaned to a precision level. Medical tools and instruments have dust, light oils, and fingerprints removed.

Micro-mechanical assemblies and other precision parts—Removes dust and deposits from gyroscopes and microvalving components. Ideal for difficult to reach areas (threads, orifices).

PC Boards—By altering the nozzle configuration, you can pinpoint highly localized contaminants or remove fingerprints and other residues from larger surface areas.

Carbon Dioxide Purifier

- **Economical—converts low-cost CO_2 into high-quality, 99.999999% ultra-pure CO_2**
- **Easy to use—simply connect to a CO_2 vapor source**
- **Select among three capacities for up to 36 lbs. of ultra-pure CO_2/hour**
- **Enhances effectiveness of SNO GUN™ II and other CO_2 cleaning systems**

These CO_2 Purifiers allow the use of inexpensive industrial-grade CO_2 for ultra-pure cleaning with the SNO GUN™ II or other dry ice cleaning systems.

They are easy to set up and operate. Simply install the purifier between a CO_2 vapor cylinder and a dry ice cleaning device by means of two hose fittings and you're ready to clean with laboratory-grade, ultra-pure CO_2. A pressure gauge on the front panel indicates when your pure CO_2 supply is low. Regeneration rates vary with the model; see specifications below. All models feature a stainless steel housing.

Filtration Efficiency*

CO_2 Purity	99.999999%
Water	< 20 ppbwt
Hydrocarbons	3 ppbwt
Other Contaminants	Methane, air and non-volatile resides are rejected in the distillation process (will not condense at ambient temperature)

* Based on independent laboratory analysis of CO_2 before and after purification.

Specifications and Ordering Information

Power	Cat. #	Cat. #	Cat. #
115VAC, 60Hz	**4545-08**	**4545-09**	**4545-10**
230VAC, 50Hz	**4545-11**	**4545-12**	**4545-13**
Duty Cycle*:	25%	50%	100%
Purification Rate (lbs./hour):	9	18	36
Regeneration Rate*	3 min./1 min. use	1 min./1 min. use	Continuous
Dimensions:		26"L x 14"W x 17"H	
Weight:		135 lbs.	

* Based on use with SNO GUN™ II, which uses approx. 36 lbs./hour (0.6 lbs./minute)

Micro-Precision Steam Cleaner

- **Ideal for removing grease, oil, flux, adhesive, fingerprints**
- **Safe, clean design generates super-heated steam on-demand, without high-pressure steam storage**
- **Portable design makes this system ideal for point-of-use applications**
- **Auto shut-off feature safeguards heater**

The Micro-Precision Steam Cleaner is a small, table top, portable steam cleaner that instantly converts distilled water to high-pressure, super-heated steam.

It is safer than other steam cleaners because it does not store steam under pressure. Instead, it superheats steam for on-demand use of up to 20 minutes—long enough for most cleaning applications. Its unique flash-heat design requires less than 8 minutes start-up time and conserves DI or other purified water fed into the system.

The Micro-Precision Steam Cleaner includes a handle for easy transport and 3 quick-connect steam jets: 1) single jet; 2) flat spray; 3) periphery (for hole and tube cleaning).

Specifications

Weight:	18 lbs.
Dimensions:	7.5"W x 11"D x 8"H
Cabinet:	Powder-coated steel. All internal parts are stainless steel or anodized aluminum
Steam Pressure:	150 psi
Steam Temperature:	500°F

Steam Cleaner

Model	Steam Cycle Time	Power	Cat. #
MPS I	2 minutes	115VAC, 60Hz, 9A	**4545-04**
		230 VAC, 50Hz, 4.5A	**4545-06**
MPS II	20 minutes	115VAC, 60Hz, ?A	**4545-05**
		230VAC, 50Hz, ?A	**4545-07**

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Plasma-Preen Cleaner/Etcher
(Patent Pending)

- **First-of-its-kind design uses microwave oven to generate plasma cleaning medium**
- **Safely removes organic and many inorganic contaminants from a wide range of components and substrates**
- **Maintains low processing temperatures (25–200°C controllable)**
- **Produces higher plasma power and densities than comparably priced systems—up to 700 watts**
- **Yields no significant effluent, eliminates waste disposal problems—unlike solvent cleaning**
- **Allows easy adjustment of power levels in both continuous and duty cycling**
- **Easy to use and maintain**

Shown with Controller (#9505-17, see page 277)

The Plasma-Preen Cleaner/Etcher is the first commercial product in its price range that uses microwave energy (2.45 GHz) to clean organic and some inorganic contaminants from a wide range of components and materials, including semiconductors, ceramics and metals.

The microwave energy used by the Plasma Preen Cleaner generates plasma (an electrically neutral, highly ionized gas) under adjustable power, which functions as a safe, effective cleaning medium. This plasma results when microwave energy reacts with a process gas; the highly reactive and/or energetic plasma then "sputters" and/or reacts with contaminants from the surface of the material being cleaned, leaving it atomically clean.

Safe, Efficient Plasma Generation Revolutionizes Cleaning Operations

This method of cleaning revolutionizes existing cleaning operations in a number of ways. Unlike chemical processing, microwave-generated plasma consumes very small quantities of reactants and produces no significant effluent. In the case of argon operations, no waste is produced; oxygen operations produce only small amounts of carbon dioxide and water, which require no elaborate waste disposal. As a result, this cleaning system offers drastically reduced processing costs—only a fraction of what chemical techniques commonly require!

In addition, microwave generation allows you to control process temperatures between 25°C and 200°C. Low process temperatures enable you to clean a wider variety of sensitive components without worrying about heat damage.

This plasma cleaner also offers space-saving portability. Instead of cumbersome exhaust fume hoods, exhaust venting, and protective clothing, you work with a completely safe, compact unit that's literally the size of a breadbox.

Microwave Energy Enhances Versatility

This unit also offers a variety of advantages over conventional methods of plasma generation, which typically rely on capacitance or inductively coupled plasma equipment. Most importantly, it is capable of producing higher plasma power and plasma densities than have ever before been possible in this price range. And because it operates at higher gas pressures, you can achieve higher reaction rates (and more cleaning power). That means more flexible applications, from cleaning laser diode facets or sensitive wire-bond pads to removing certain metal oxides and cleaning solder preforms (see application chart on page 277).

Unlike other plasma-generating methods, the Plasma-Preen System uses 2.45 GHz radiation that reduces the chance of damaging components. It also features fully adjustable power levels for duty cycle and/or analog control. A digital timer, duty cycle, clock and memory allow completely repeatable results and let you design the exact cleaning procedure called for in each application.

Versatile System Configurations For All Your Cleaning Needs

The Plasma-Preen Etcher is available in two versions: a barrel reactor and a water cooled unit (for applications with temperature-sensitive work, for better control, and for a larger reactor chamber).

The barrel reactor is ideal for applications that require high-energy cleaning, such as removing metal oxides from a ceramic surface. If higher temperatures are not a critical problem, you can operate the cleaner at the highest plasma power for faster results. If temperatures must remain lower, you can simply decrease plasma power (and conduct cleaning operations for a longer period), or you can select the water-cooled unit, which allows higher process rates at lower temperatures. This model features a water-cooled base plate that effectively "heat sinks" the work in progress, and is recommended for hybrid cleaning. The optional water recycling system enhances water cooling.

Either design can be operated with oxygen, argon or other process gas (see "Application Notes"). In general, argon is suitable for applications that involve epoxy-bonded surfaces since it will not "sputter" epoxy. It is also the preferred medium for removing metal oxides. Oxygen, because it attacks epoxy, should be used selectively in the presence of epoxy bonding. It is, however, ideal for cleaning contaminants from ceramic or oxide parts.

Select the optional ion trap to protect very sensitive materials (such as laser diode facets or soft solder) from the sputtering action of the plasma. This trap serves a dual function: it neutralizes the charged ions (leaving only neutral radicals to perform the cleaning action), and it acts as a Faraday cage that shields work from microwaves inside the chamber.

Flexible Applications Mean Enhanced Productivity

This cleaner's compact size and flexibility not only vastly improves on existing cleaning methods, it also lets you introduce standard cleaning procedures in operations for which no feasible means has ever existed. You'll be able to improve component reliability (and increase productivity) by carrying out cleaning operations between each step of wafer processing, or by cleaning die before wire-bonding, or by removing organic contaminants from PC boards.

And you won't have to worry about contaminating exhaust, cumbersome hoods, or unrepeatable results.

All systems come complete with a power supply, digital timer, duty cycle, clock, memory, and reaction chamber. The Plasma Preen Controller (order separately) contains all vacuum and gas controls necessary for operation and provides power for the vacuum pump and water recycling system. Requires separate gas supply, vacuum pump, and controller for operation.

Specifications

Chamber Dimensions:	See chart
System Dimensions:	24"W x 10"H x 15"D
Materials:	
Barrel Reactor System:	Pyrex
Water Cooled System:	Pyrex and Aluminum Power
Frequency:	2.45 GHz
Cycle Time:	From 10% to continuous
Utilities Required:	Vacuum Pump Gas Supply (Oxygen or Argon)

Plasma Preen Cleaner

Reactor Type	Chamber Dimensions	Plasma Power	With Ion Trap		Without Ion Trap	
			110VAC/60Hz Cat. #	220VAC/50Hz Cat. #	110VAC/60Hz Cat. #	220VAC/50Hz Cat. #
Water-Cooled*	8" x 6" x 2"	100-550W	**9505-03**	**9505-03-220**	**9505-01**	**9505-01-220**
	9" x 7" x 3"	100-700W	**9505-20**	**9505-20-220**	**9505-19**	**9505-19-220**
Barrel	4.1" dia. x 6"	100-550W	**9505-02**	**9505-02-220**	**9505-00**	**9505-00-220**

**** Cooling is along baseplate.***

Applications*

Argon Plasma Cleaning Without Iontrap**
- Substrates with Epoxy Bonds
- Wire Bond Pads
- Pd-Ag Die Attach Pads
- Gold Plated Parts
- Solder Preforms
- Epoxy Bleed
- Preparation for Soldering
- Photoresist Removal
- Oxidizable Metal Surfaces
- Gold or Aluminum Wire
- Removal of Some Metal Oxides

Argon Plasma Cleaning With Iontrap***
- Devices with Sensitive Chips
- Laser Diode Facets
- Ceramics with Soft Solder
- PC Boards with Soft Solder

Oxygen Plasma Cleaning Without Iontrap
- Photoresist Removal
- Bare Ceramic Substrates
- Removal of Plastic Encapsulants for Failure Mode Analysis
- Glass Parts
- Gold Plated Parts
- Metal Oxide Parts
- Gallium Arsenide
- Silicon
- Preparation of Fluorocarbons and other Plastics for Gluing
- Indium Phosphide

Oxygen Plasma Cleaning With Iontrap
- Functions as Downstream Plasma Etcher
- Sensitive Components with Photoresist

* These are suggested applications. Check with your process engineer to ensure material compatibility. The system may not remove heavy encrustations.

** System includes suitable regulator. Order pump separately.

*** Iontrap forms a Faraday cage to neutralize charged ions and protect work against microwaves.

Plasma Preen Controller

Provides complete control over vacuum and gas purging. Eliminates external gauges and regulators. Allows easy mixing of process gases (such as argon and oxygen). Safely bleeds vacuum after cleaning procedures, at a safe, user-specified rate. Extends the life of your pump. Includes power outlets (for vacuum pump and Plasma Preen water pump), two flow meters (0 - 5 SCFH), two pressure regulators and gauges (0 - 60 PSI), a vacuum pressure gauge (0 - 30"Hg), and ON/OFF rocker switches for vacuum pump, gas control and system vacuum. Dimensions: 6.5"H x 12"W x 10.5"H. Shipping Weight: 20 lbs.

	Cat. #
110VAC, 60Hz	**9505-17**
220VAC, 50Hz	**9505-17-220**

Plasma Preen Water Recirculating System

Provides water recirculation for efficient operation of the water-controlled Plasma Preen. Bottom screen inlet prevents large contaminants from entering pump. Pumps up to 1500 gallons/hour (@ 3'). Rugged, lightweight, compact housing is clean and resists corrosives. To operate, simply place the submersible pump in a 5-gallon utility pan (not included); it pumps with water level as low as 3/16". Includes fittings necessary for connection to Plasma Preen. Dimensions: 9.5"H x 7"D. Weight: 8 lbs. Motor: 1/6 HP, single phase, oil-filled, intermittent-duty.

	Cat. #
110VAC, 60Hz	**9505-24**
220VAC, 50Hz	**9505-24-220**

Other Plasma Preen Options

Process Platform
Recommended for use with Barrel Reactor. Cat. # **9505-08**

Special Tongs
Recommended for use with Barrel Reactor. **9505-09**

Vacuum Pump
See page 494. Cat. # **7901-00**

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Stainless Steel Cleanroom Vacuum

- **316L grade stainless steel tank components and trolley are easy to decontaminate**
- **Safe for autoclaves**
- **Class 10 cleanroom compatible**
- **4-stage HEPA filtration system captures particles 0.3 microns in size with 99.97% efficiency**
- **Liquid or dry pickup**
- **Optional drain valve allows easy disposal of liquid**

Designed specifically for cleanroom applications, this stainless steel vacuum is equipped with a HEPA filter on both the working and cooling airflows.

For dry applications, large particles are trapped in a 12-gallon disposable bag. An impact filter protects the float valve from clogging debris (stage one) and a unique main filter consists of 105 porous polyethylene filter elements (stage 2). Finer particles are trapped as air passes through a 0.5µm, 99.9986% efficient microfilter (stage 3) and then through two final HEPA (0.3µm at 99.97% efficiency) or ULPA (0.12µm at 99.999% efficiency) filters (stage 4). For special applications, an additional HEPA or ULPA filter can be inserted upstream of the motor.

Liquid spills are collected directly into the 19-gallon stainless steel tank. A float valve cuts off vacuum flow when tank is full, and a drain valve option is available for easy emptying and disposal. All critical filters are protected from moisture by splash guard and polyethylene filters.

Specifications

Consumption:	1200 W
Waterlift:	102 inches
Airflow:	95 cubic ft./min.
Suction Power:	390 air watts
Paper Bag Capacity:	12 gallons
Filter Area:	4,397 square inches
Dimensions:	42"H x 24"L x 18"W
Weight:	80 lbs.

Stainless Steel Cleanroom Vacuum	Cat. #
110VAC/60Hz	**1763-02**
220VAC/50Hz	**1763-02-220**

Includes stainless steel cover/motor assembly, stainless steel autoclavable tank and trolley, impact filter, porous polyethylene main filter, double Class 100 HEPA filtration, AES microfilter, 10' hose with stainless steel coupling, stainless steel wands, 14" floor brush, 3" dust brush, 11" crevice tool, package of paper bags (5/pkg.).

Additional Accessories	Cat. #
Class 100 Hepa Filters (replacements)	**1764-50**
Class 10 ULPA Filters (may be substituted for HEPA filters)	**1763-03**
12-gallon paper bags (5/pkg.)	**1763-05**
14" Autoclavable Floor Tool	**1763-04**

For wet pick -up	Cat. #
14" Floor Squeegee	**1763-08**
Drain Valve Assembly (Installed at factory)	**1763-06**
6' Drain Valve Hose Assembly	**1763-07**

Cleanroom Floor Machine

- **Combination floor buffer and high-filtration vacuum**
- **Ideal for cleanroom use**
- **4-stage HEPA filtration system removes particles 0.3 microns in size at 99.97% efficiency**
- **Adjustable suction skirt works with vacuum to capture particles generated by buffing pad**
- **Handle mounted dust container for easy disposal**
- **Positive twist safety latch offers added security**

Designed specifically for cleanroom applications, this Cleanroom Floor Machine comes equipped with a 4-stage filtration system.

Included in this system are a 2¼-gallon disposable bag, polyester main filter (retains 99.26% @ 1µm), micro-filter and a HEPA exhaust filter (retains 99.97% @ 3µm), ensuring that exhaust air is "white room" clean. AES composite micro-filter is 99.9986% efficient @ 0.5µm particles.

The dust container is mounted on the handle for easy access and disposal featuring a positive twist safety latch for added security. This container is linked to the motor and suction skirt by two hoses that keep the handle uncluttered and lightweight. Handle height is easily adjusted to a number of comfortable operating positions, resulting in less fatigue during longer operation.

The suction skirt height is adjustable providing uniform air-flow around the drive pad. This prevents damage and wear on floor, and does not generate dust particle release. A unique rotoflex drive pad ensures that constant pressure is maintained throughout the floor cleaning process.

Specifications

Dimensions:	18"W x 26"L x 46"H
Weight:	119 lbs.
Voltage:	115 volts
Current:	18 amps
Consumption:	2000W
Waterlift:	59"
Airflow:	68 cu. ft./min.
RPM:	200
Paper bag capacity:	2¼-gallons
Filter area:	1,336 sq. inches
Cord length:	50 ft.
Pad diameter:	18"

	Cat.#
Cleanroom Floor Machine	**1763-09**

HEPA Filter **1764-50**
Removes particles 0.3µm in size at 99.97% efficiency

Disposable Paper Bags **1674-03**
Just slide the plastic collar over the intake opening and the bag is installed. When full, the bag slides off for easy disposal. 2¼-gallon capacity. Prevents rescattering of collected dust. Five bags per package.

Microfilter **1764-02**
AES polycomposite with a filtration efficiency of 99.9986% @ 0.5um particles. Microfilters last 3-6 months, depending upon use.

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Cleanroom Vacuum Cleaner

- **4-stage ULPA filtration system removes particles 0.12 microns in size at 99.9995% efficiency**
- **ESD protection with conductive plastic hose and accessories**
- **Ultra-quiet performance won't disturb cleanroom operations**
- **Positive twist safety latches for added security**
- **Meets OSHA electrical safety standards**

This Cleanroom Vacuum Cleaner is used for cleaning the workplace or picking up spills of hazardous dust and particles.

Its unique four-stage filter system removes particles and dust before returning the air to the workplace. In stages one and two, large particles are trapped by a bag (9.25-liter capacity) and napped cotton filters. In stage three, air passes through a specially designed microfilter rated 99.9986% efficient @ 0.5µm particles. In stage four, air passes through an ULPA Exhaust Filter which is 99.9995% effective in removing particles 0.12µm—so that air returns to the workplace "white-room" clean.

Quiet (59dBA at 6.5 feet), this unit is grounded. It meets the electrical safety standards outlined in the Williams Steiger Occupational Safety and Health Act of 1970 (OSHA) and is listed by Underwriters Laboratories, Inc. This cleaner is interference-suppressed, and its single-phase motor is equipped with a thermal protection device to prevent overheating. This unit is designed for intermittent duty.

Specifications

Consumption:	1100 W
Waterlift (on vacuum gauge):	102* inches
Air Flow:	87 cubic ft./min.
Suction Power:	250 air watts
Tank Capacity, dry bulk:	3 1/4 gallons
Paper Bag Capacity:	2 1/4 gallons
Filter Area:	1477 square inches
Dimensions:	12" dia. x 16" H
Weight Without Accessories:	11 lbs.
Cord Length:	30 ft.

* With pressure relief valve inactive.

Complete with exhaust filter assembly, AES microfilter, two 22" stainless steel straight tubes, 3" round brush, combination 12" floor nozzle, 6'-6" conductive plastic hose, trolley, 30' power cord, conductive crevice nozzle, 5" utility nozzle, and package of five paper bags.

Cleanroom Vacuum Cleaner	Current Draw	Cat. #
115VAC, 60 Hz	9A	**1764-00**
220 VAC, 50 Hz	3.9A	**1764-00-220**

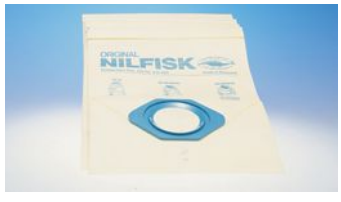
Replacement Parts

A/B. Exhaust Filter Assembly (ULPA) filter is used when exhaust air must be "white-room" clean. Designed specifically for recovery of toxic and super-fine dusts. ULPA filters last 12-14 months, depending on use.

Specifications

Filter casing:	Steel
Filter material:	Glass fiber
Filter cartridge diameter:	5 1/3"
Filter cartridge height:	3"
Filter surface area:	576 sq. in.
Maximum working temperature:	90°C (194°F)

	Cat. #
Exhaust Filter Assembly	**1764-01**
Replacement Filter	**1764-50**



C. Disposable Paper Bags Just slide the plastic collar over the intake opening and the bag is installed. When full, the bag slides back off for easy disposal. 2 1/4 gallon capacity. Prevents rescattering of collected dust. 5 bags per package.

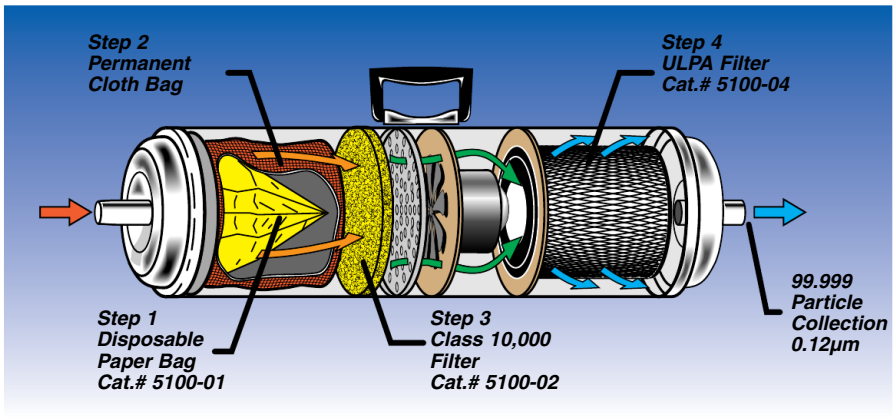
Cat. #
1764-03

D. Microfilter Made of AES Polycomposite material. This filter is 99.9986% efficient @ 0.5µm particles.

Cat. #
1764-02

MicroVac™ Portable Cleanroom Vacuum Cleaner

- **Completely portable, hand-held design lets it clean where no other vacuum can!**
- **Four-stage filtering system**
- **Made of cleanroom-compatible material, including electropolished stainless steel housing**
- **Ideal for cleanroom use (as a vacuum or clean air blower) or for use with chemical powders**



The MicroVac™ is a portable vacuum cleaner suitable for use in cleanroom environments. Like the larger Cleanroom Vacuum Cleaner, it incorporates a four-stage filter system to remove particles and dust from the air before returning the air to the workplace. But the small size, light weight, and flexible attachments of this cleaner make it ideal for cleaning tight corners and delicate equipment that a larger cleaner just can't reach!

During the first and second vacuum stages, large particles are trapped in a disposable bag and a permanent cloth bag, and in stage three, air passes through a Class 10,000 filter. In stage four, air is drawn through an ULPA Exhaust Filter—which is 99.999% effective in removing particles 0.12µm or larger—so that air returns to the environment "white-room" clean.

The sturdy, electropolished stainless steel construction ensures clean and dependable performance; an easily removable cover allows access to the bags for simple replacement. Comes complete with a 3' flexible hose, two 20" extension wands, crevice tool, five Class 10,000 filters, five extra disposable bags, one ULPA Exhaust Filter, Mini-Tool Kit, and carrying case. Dimensions: 15" long x 7" diameter. Weight: 7 lbs. Motor: 1.17 HP with exclusive CFM Power Control.

MicroVac™ Portable Cleanroom Vacuum Cleaner

	Cat.#
110 VAC/60Hz	**5100-00**
220 VAC/50Hz	**5100-00-220**

MicroVac Mini-Tool Kit (included in models above)
Ideal for computer keyboards, PC boards, and other small parts. Includes nozzle adapter and hosing, oval brush, round brush, crevice tool, straight and curved extensions. Can be attached to either side of the MicroVac, allowing service as a vacuum cleaner or a clean-air blower.

Cat.# **5100-05**

Replacement Filters for MicroVac™

	Cat.#
Stage 1 Disposable Paper Bag	**5100-01**
Stage 3 Class 10,000 Filter	**5100-02**
Stage 4 Replacement ULPA Filter	**5100-04**

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Cleanroom Vacuum Cleaner

- **Absolute HEPA filter removes 99.999% of dust particles 0.3 microns and larger, exceeding federal standards**
- **Lightweight, compact design allows unsurpassed portability**
- **Optional harness allows convenient, comfortable "backpack" operation**
- **Muffled motor operates quietly (65 dB 6'6" from the unit), features thermal overload protection**
- **Large capacity (4-gallon) dust bag and 2880 sq. in. filter makes this vacuum suitable for big jobs**
- **Full line of accessories available**

This Cleanroom Vacuum Cleaner combines the power and capacity for heavy-duty operation with a lightweight, compact design that makes it as convenient as it is effective.

The unit's HEPA (High Efficiency Particulate Air) filter removes 99.999% of all particles 0.3µm or larger, exceeding federal standards and accepted HEPA filtration levels. Its 2880 square-inch capacity and diffused exhaust make it practical for use under the most demanding conditions. The air flow directs incoming air through the filter before it reaches the motor to prevent the risk of contaminating the motor.

The 1.3 HP, thermally protected motor provides high suction to help you maintain critical cleanliness conditions. The four gallon (½ bushel) dust collection bag holds as much as larger and heavier cleaners, cutting down on inconvenient interruptions for bag replacement. And because this bag wraps around the motor, it effectively muffles motor noise.

Optional Harness Enhances Cleaning Convenience

This cleaner weighs only 17½ pounds. A convenient carrying handle plus two large wheels and one swivel caster on the base make it easily portable and minimize operator fatigue. The optional carrying harness even lets you operate the vacuum cleaner while it is mounted on your back.

The durable chrome-plated steel tank has a wraparound vinyl bumper to protect walls and furniture. The low profile design enhances maneuverability.

Comes complete with an absolute HEPA filter, motor filter, a 6' hose complete with end fittings, a combination floor tool with telescopic wand, combination brush/small upholstery nozzle, crevice tool, and a pack of 10 paper dust bags.

Specifications

Motor:	1.3 HP
Motor type:	2-stage, non-bypass
Electrical:	115V 60Hz
Current:	920W, 8A
Tank:	Chrome plated steel
Base and cover:	Injection molded plastic
Bumper:	Full wraparound nonmarking vinyl
Cord:	35 feet 189-3 SJT
Vacuum:	96 inches WC
Air flow:	77 cu. ft./min.
Collection bag:	4 gal. (1/2 bushel)
Filter area:	2880 sq. in.
Dimensions:	13"H x 15"W x 17½"L
Weight:	17.5 lbs.
Sound level:	65 dB(A) (6'6" from unit)

	Cat. #
Cleanroom Vacuum Cleaner	**1001-00**

Accessories

	Cat.#		Cat.#		Cat.#
Paper Dust Bags Pack of 10	**1001-01**	**Carrying Harness** For "backpack" operation	**1001-19**	**Absolute HEPA Filter** DOP 99.999% to 0.3µm	**1001-03**
Telescopic Wand	**1001-12**	**Crevice Tool**	**1001-14**	**6' Hose** Complete with end fittings	**1001-06**
1¼" Hose Price per foot; max. 25 feet	**1001-07**	**Hose Connector**	**1001-08**	**Complete Hose End** Bent end section	**1001-09**
Complete Hose End Assembly Twist-on section	**1001-10**	**Turbo Power Floor Nozzle**	**1001-15**	**Combination Brush/ Small Upholstery Nozzle**	**1001-13**

Portable Cleanroom Vacuum Cleaner

- **Absolute HEPA filter removes 99.97% of dust and dirt particles 0.3 microns and larger**
- **Four-filtration system features multilayered disposable paper bag, pre-filter, and HEPA filter**
- **Lightweight, compact design allows unsurpassed portability**
- **Two-stage, 1.3 HP, non-bypass motor is powerful yet quiet—65 dB 6'6" from the unit**
- **Collection bag with 2½ gallon capacity requires less frequent changing**
- **Comes complete with full range of accessories**

This Portable Cleanroom Vacuum Cleaner combines power and capacity for heavy-duty operation with a lightweight, compact, portable design that makes it as convenient as it is effective.

The unit's HEPA (High Efficiency Particulate Air) filter removes 99.97% of all particles 0.3µm or larger, effectively freeing the workplace of dust, dirt, allergens, bacteria and other harmful particulates. The HEPA filter works in conjunction with the other filters in our unique four-filtration system, which consists of a multilayered disposable paper bag, a pre-filter, a diffuser defrost filter, and HEPA filter.

The powerful two-stage, 1.3 HP, non-bypass motor provides high suction to help you maintain critical cleanliness. It also operates at a surprisingly low noise level (65dB 6'6" from the unit), and its on/off switch is conveniently located on top of the housing to eliminate stooping.

Additional design features include impact-resistant polypropylene construction of the tank and cover to protect furniture and walls; large rear and front swivel wheels for greater maneuverability and less operator fatigue; and a 35-foot power cord for a wider coverage area. The unit is conveniently portable, with a weight of just 14 pounds.

This Vacuum Cleaner operates at 115 V, 60 Hz, and comes complete with an accessory tool kit consisting of a 6-foot suction hose, 2-piece wand, dual mode floor tool, crevice tool, combination brush/small upholstery nozzle, and HEPA filter.

	Cat. #
Portable Cleanroom Vacuum Cleaner	**1001-30**
Portable Cleanroom Vacuum Cleaner 230V	**1001-34**

Specifications

Motor:	1.3 HP
Motor type:	2-stage, non-bypass
Electrical:	115V 60Hz
Tank and cover:	Polypropylene injection molded
Cord:	35 feet
Vacuum:	91 inches WC
Air flow:	69 cu. ft./min.
Collection bag:	2½ gallons
Filter area:	350 sq. in.
Dimensions:	15¼"L x 12½"W x 18¼"H
Weight:	14 lbs.
Sound level:	65 dB(A) (6'6" from unit)

Replacement Parts	Cat. #
2½ Gallon Collection Bag (10 pack)	**1001-31**
Prefilter	**1001-32**
HEPA Filter	**1001-33**

Precision Cleaning Station

Manufactured of stainless steel, this fully enclosed cleaning station features three swing-up front access windows, made of static-dissipative PVC, which allow easy loading and unloading of wafer spin rinsers, solvent washers, and other cleaning equipment.

Waste fluids drain through a perforated work surface into a reservoir for easy disposal. This station also includes a side fresh air intake flange and a top exhaust flange. Overall dimensions: 120"W x 36"D x 71"H. Custom sizes and configurations are available; just let us know your requirements!

Cat. #
7018-42

See page 565 for other solvent cleaning systems.

Gowning Room Products

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Change Rooms: Dirty Link in the Ultra-Clean Chain?

Semiconductor manufacturers invest hundreds—even thousands—of dollars per square foot of cleanroom space to meet the stringent particle standards required for profitable yield rates.

Shouldn't the same standards be required of the people who enter and potentially contaminate this ultra-clean environment?

Proper cleanroom garments, including hoods, face masks, booties and gloves, help to contain particles that people emit. Yet improper gowning procedures can negate your investment in cleanliness and threaten yields of sensitive semiconductor devices. Once a garment is contaminated—violated by contact with a dirty surface—it spreads particles everywhere it goes.

Sure, you can train personnel on proper garmenting procedures, but how do you guarantee compliance? A violated garment doesn't set off alarms, and few facilities can afford quality control monitors to supervise every person through every washing and dressing stage. Yet if strict controls are not observed, dirty gloves and coveralls almost certainly will come in contact with clean operations.

A Gowning Area that Supports Clean Protocol

The simplest and most economical approach to this dilemma is a correctly designed gowning area, complete with well designed change room products, that keeps personnel on a clean track.

This design starts with a room that meets the same cleanliness specifications you require of your cleanroom itself. It includes a laminar flow of HEPA-filtered air, typically emitted through ceiling filter/fan units (see page 208 for guidelines in FFU configurations to meet particle standards). This continuous wash of clean air immediately removes personnel-emitted contaminants, as well as particles present even in cleanroom-laundered garments (see Figure 1). Failure to maintain the desired particle standard in the change area will lead to clean garments becoming violated.

Activity	No. of particles (≥ 0.3µm)
Person emits during garmenting process	3,000,000/min.
Cleanest skin (hands)	10,000,000/ft²
Employee street clothes	10,000,000 to 30,000,000/ft²
Floor and bench surfaces	> 10,000,000/ft²
Garments supplied by cleanroom laundry	1,000,000/ ft²

Figure 1: Gowning Area Particle Generators
Source: Encyclopedia of Clean Rooms, Bio-Cleanrooms and Aseptic Areas, Dr. Philip Austin, P.E., 2000

The Change Room illustration depicts an effective floor plan that places the proper gowning stations in appropriate locations. Although many variations on this layout are possible, they should support these key garmenting guidelines:

Don't Touch! Most cleanliness violations occur when a garment is touched by dirty hands, or when it touches a dirty floor. Hands and gloves should therefore be washed and dried frequently. Select washers and dryers with no-touch IR sensors to minimize the chance of violating gloves. Maintain ultraclean, unviolated surfaces where garments can be donned without contamination.

Dress from the Head Down! That way, released particles won't fall on clean garments or booties.

Understand Garment Design! In most instances, gloves and booties are worn over coverall sleeves and cuffs, and hoods are tucked inside collars. Make sure that personnel are trained on how to seal these gaps between clothing, and include a mirror to allow final self-inspection. Hang a photo of a correctly garbed person next to the mirror as a "how-to" guide.

Minimize Motion! As Figure 2 indicates, people wearing cleanroom garments emit thousands of particles per minute even when sitting still! People in street clothes, walking from one change room location to another, release millions of particles. Change room plans should therefore minimize motion, especially during the final stages of dressing, by efficiently organizing the flow of personnel from one station to another.

Minimize Maintenance! Do you have dedicated, trained personnel to peel off adhesive shoe mats, wipe down gowning benches, keep "clean zones" regularly scrubbed, empty waste receptacles, restock garb dispensers, and perform other upkeep with the absolute regularity that your protocol requires? If not, look for ways to minimize reliance on humans—through automation, careful product positioning, choice of materials, and so forth. Initial cost may be higher, but reduced maintenance and greater compliance provide a rich return on your investment!

Train and Reinforce! A good change room design supports proper protocol, but it doesn't teach it. Make sure that personnel complete a formal training program, and stress protocol by hanging reminder posters at every gowning station that reinforce proper procedures.

Particles ≥ 0.3µm emitted per minute in garment indicated

Personnel Activity	Snap Smock	Standard Coverall	2-Piece Coverall	Tyvek® Coverall	Membrane Coverall
No Movement	100,000	10,000	4,000	1,000	10
Light Movement	500,000	50,000	20,000	5,000	50
Heavy Movement	1,000,000	100,000	40,000	10,000	100
Change Position	2,500,000	250,000	100,000	25,000	250
Slow Walk	5,000,000	500,000	200,000	50,000	500
Fast Walk	10,000,000	1,000,000	400,000	100,000	1,000

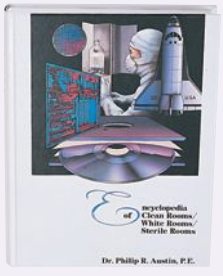
Figure 2: Austin Contamination Index
Source: *Encyclopedia of Clean Rooms, Bio-Cleanrooms and Aseptic Areas,* Dr. Philip Austin, P.E., 2000

Note: Light/heavy movement refer to partial body movements (motioning with arm, tapping toes, etc.). Change of position refers to whole body motion (standing up, sitting down, etc.).

Recommendations courtesy of Dr. Philip R. Austin, leading expert in cleanroom design and operation.

Cleanroom and Change Room References by Dr. Philip R. Austin, P.E.

Contact Dr. Austin for information on his Contamination Control Seminars: (734) 427-8450.



Encyclopedia of Clean Rooms, Bio-Cleanrooms and Aseptic Areas, 3rd Edition
Acorn Industries, 2000, 1,000 pp.

Covers every aspect of contamination control, including Class 100,000 through Class 1 cleanrooms; bio-cleanrooms; sterile rooms; major governmental standards; air, fluid, and gas filtration; vertical and horizontal laminar flow facilities; and personnel and equipment.

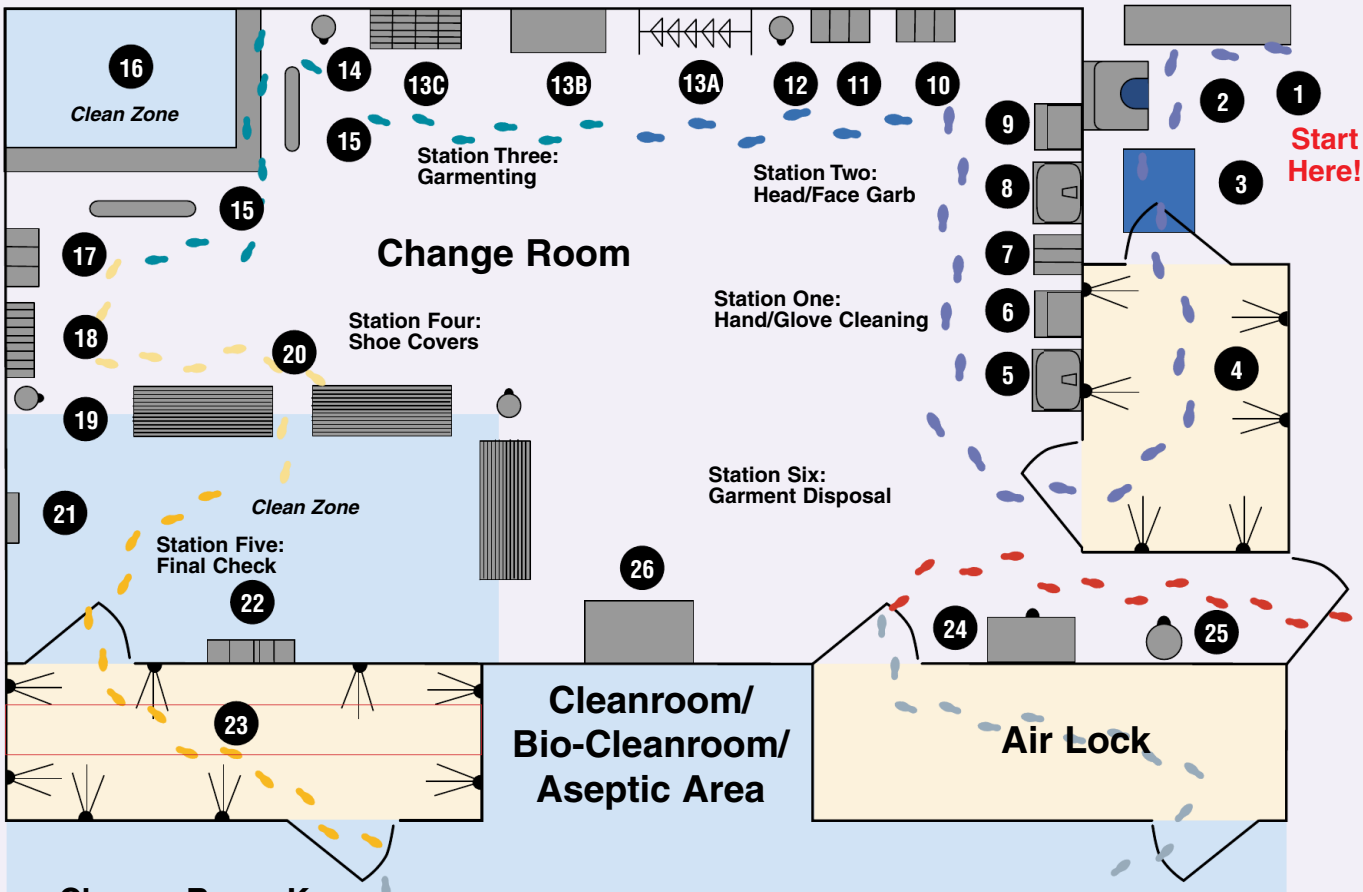
Cat. #
5012-01

Also by Dr. Austin:

Design and Operation of Bio-Cleanrooms for Medical Devices
Acorn Industries, 1994, 440 pp. **5019-38**

Design and Operation of Pharmaceutical Bio-Cleanrooms and Aseptic Areas
Acorn Industries, 1994, 460 pp. **5019-37**

GOWNING ROOM PRODUCTS



Change Room Key

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Sole Cleaner™

Automatic Contamination-Control Mat

- **First-of-its-kind system automatically maintains a sticky surface that removes particles from shoe soles as personnel enter the changing room or cleanroom**
- **PLC controller counts foot passes and replaces sticky surface as it becomes soiled**
- **Self-regenerating design eliminates monitoring and maintenance costs, ensures absolutely reliable sticky surface at all times**
- **Economical cartridges provide nearly 50 surface changes, are fast and easy to replace**
- **Take-up roller draws particle-laden surface inside housing to minimize contamination and simplify disposal**
- **Low-profile, wide-access design allows easy passing of carts and other equipment**
- **Stainless steel external surfaces are durable, easy to clean**
- **Easy to move from one location to another—requires no fixed installation**

CE

Conventional contamination-control mats serve an essential cleanroom function by limiting the number of particles tracked into a contamination-controlled area.

Unfortunately, their need for constant maintenance and replacement makes them costly welcome mats! More importantly, the need for continuous monitoring by a human operator places cleanroom conditions under subjective control. How can you be sure that mats are replaced when they need to be? Worse—what happens when no one is there to oversee their upkeep?

GOWNING ROOM PRODUCTS

Sole Cleaner™: Taking Contamination-Control One Step Further!

Terra Universal's new Sole Cleaner™ minimizes the hassle, expense and uncertainty of cleanroom contamination control.

Like other mats, it features an adhesive surface that seizes particles from the bottoms of shoes and carts as they pass into a changing room or cleanroom.

Unlike other mats, it incorporates a PLC-Controlled transport mechanism that automatically replaces the sticky film surface as it becomes soiled. Instead of individual mats, which must be cleaned or peeled off, the Sole Cleaner uses a continuous sheet of adhesive mat material mounted on a cartridge roll. An infrared beam monitors passing feet, and a counter displays total passes. When the total count exceeds the threshold you select, the transport system automatically unrolls a new sheet of sticky surface and resets the counter.

Lower Costs, Improved Performance

This automatic take-up system both reduces operating expenses and improves contamination control.

By automating mat replacement, it ensures that the mat surface remains as sticky as you need it. Rather than relying on subjective decisions about when a surface is too dirty, you can determine the number of passes acceptable for your application and leave the rest to the Sole Cleaner. In less critical environments (such as changing rooms), this threshold might run in the hundreds; for a Class 10 cleanroom it might be several dozen. In either case, the Sole Cleaner replaces the surface when (and only when!) it needs to.

During mat regeneration, a red warning light glows and audible alarm is activated. The mat will not move, however, as long as the sole cleaner is occupied.

As it replaces a length of soiled mat, the machine draws it onto a take-up roller, where embedded particles are trapped and contained in a closed housing. Rather than accumulating hundreds of crumpled sheets day by day in a cleanroom waste receptacle (which always needs to be emptied!), you replace a single cartridge that is easy to recycle.

Each 150-foot roll typically yields about 45 surface changes. Considering the related handling and maintenance costs associated with other contamination mats, these rolls offer convenience and value. Cartridge replacement is a 30-second operation that requires no tools.

Durable Design Ensures Reliable Operation Under Real-World Conditions

The Sole Cleaner is designed to stand up to high-volume foot traffic without compromising either safety or cleanliness.

Made of stainless steel, it features safety handrails and a low, sloped profile that won't pose a tripping hazard. Its wide passage-way allows 36" of side-to-side clearance (72" in the double-door model) for easy passage of carts and other large equipment. The sticky film rests on a vacuum pad that protects against rips, eliminates slippage, and enhances particle pick-up.

The side housings swing up to permit access to the mat cartridges and the transport mechanism, which uses a minimal number of moving parts to enhance system reliability. The PLC Controls include an LCD readout of the number of passes, the selected count limit and the number of passes since the last roll change. Multiple preset limits can be stored to allow simple system updating if the Sole Cleaner is moved from one location to another. A touch panel allows easy programming. The UL-listed take-up motor includes a safety overload shut-off that halts mat replacement as long as an object (or person) is on the Sole Cleaner.

The Sole Cleaner requires no special installation—simply place it directly on the floor, plug it in, enter the desired number of passes, and it's ready for operation. It can be moved from one location to another, and requires no maintenance other than occasional cartridge replacement.

Order the sticky-mat cartridge separately.

Specifications

Overall Dimensions	
Single-door:	63½"W x 48"D x 91/2"H (housing)/35"H (rails)
Double-door:	99½"W x 48"D x 91/2"H (housing)/35"H (rails)
Sticky Surface:	
Single-door:	36"W x 34"D x ⅜" sloped profile
Double-door:	72"W x 34"D x ⅜" sloped profile
Weight:	230 lbs. (without cartridge)
Motor:	Belt-driven 1/20 HP, runs on 115 or 230VAC, 50/60Hz; includes thermal protection and overload shut-off (will not replace mat occupied by personnel or heavy object); UL listed.
Counter:	PLC Controller with LCD touchpad operator interface; count, preset and function modes
Motion Detector:	Infrared beam positioned 4" from mat surface
Construction:	All stainless steel exterior surfaces (rails and housing)

	110VAC/60Hz Cat. #	220VAC/50Hz Cat. #
Sole Cleaner™		
Single-door (36" mat width)	**2010-50**	**2010-50-220**
Double-door (72" mat width)	**2010-51**	**2010-51-220**

Sticky Mat Cartridges

Each features 150 feet of 34"-wide 8 mil polyethylene film, yielding about 45 changes. Film is not damaged by shoes or casters and does not slip on Sole Cleaner support pad. Quantity discounts available. Weight: 39 lbs.

Adhesion	Cat. #
(6 to 10 oz./sq. in.)	**2010-52**

Custom Designs Available!

Terra Universal will manufacture a Sole Cleaner™ system to meet your requirements—call for a quotation.

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Motorized Shoe Cleaner

- **Internal vacuum system removes contaminating particles**
- **Five internal brushes clean deep into seams, welts**
- **Waist-high handle allows convenient on/off operation**
- **Controls allow adjustable rotational speeds**
- **Model without internal vacuum system available for connection to in-house vacuum facility**

This rugged, easy-to-operate automated shoe cleaner employs a time-proven design that ensures fast, effective shoe cleaning in cleanrooms, changing rooms, and other environmentally controlled areas.

Internal Vacuum System, Multiple Brushes Ensure Fast, Effective Cleaning

It features a direct-drive motor that eliminates the need for belts or chains that require adjustment and replacement. It is available with its own internal vacuum system and disposable paper bags for collection and removal of contaminants; no cumbersome vacuum cleaner or other external accessories are required. Simply plug it into any standard 110V outlet and installation is complete. An internal control allows an industrial engineer or supervisor to easily adjust the rotational speed of the brushes to suit any type of footwear. Operation is controlled by a simple press of the handle.

The Motorized Shoe Cleaner has five internal brushes for thorough cleaning of all shoe surfaces. The flexible nylon upper brush and two pairs of tough fiber rotational side brushes are arranged to reach deep into the seams, welts, and cracks, and to clean every part of the shoe—the sole, upper, behind the heel, and the sole/heel junction.

Clean, Rugged Construction

The housing of the shoe cleaner is made of thermo-formed plastic that resists dents and will not shed particles. The on/off handle is chrome plated. The motor and other particle-generating components are sealed inside the unit to ensure optimal cleanliness.

Specifications

Dimensions:	18"W x 27"D x 10½"H (main unit)/39"H (handle)
Weight:	42 lbs.
Shipping Weight:	50 lbs.
Power Requirement:	110VAC, 60Hz; operates at 12 amps
Electrical Connection:	3-wire power cord with parallel blade and U-ground plug
Vacuum Exhaust:	90 CFM (1.5" I.D. x 1.75" O.D.)
Number of Brushes:	5
Speed Control:	0-1000 RPM
Brush Drive*:	16"
Brushes:	8" dia (for better cleaning action)

* Brush drive motor has been changed to 16". This motor is quieter, more powerful, with larger gears for longer lasting performance.

Cat. #

Motorized Shoe Cleaner*
(Comes with one dust bag installed and three spares; one-year warranty)

110VAC/60Hz	**1784-00**
220VAC/50Hz	**1784-09**
Without internal vacuum system (for use with central in-house vacuum)	**1784-10**

Replacement Parts
(**Note:** brushes require replacement about once every 6 months.)

Stationary Nylon Brush Cleans shoe uppers (one required)	**1784-03**
Upper Rotary Fiber Bush Clean sides of shoes (pair required)	**1784-06**
Lower Rotary Fiber Brush Clean soles of shoes (pair required)	**1784-07**
Vacuum Filter (3µm)	**1784-02**
Dust Bags (one dozen/pack) (weekly replacement recommended)	**1784-01**

Cleanline® Sticky Mats®

- **The fast, convenient, reliable way to clean shoe soles before entering a clean area**
- **Available in two tackiness grades: 12.0 or 15.0 ounces/square inch of adhesion (Pressure-Sensitive Tape Council Test Results)**
- **Peel-off sheets eliminate the need for messy cleaning and make it easy to maintain a clean surface**
- **Numbered corner tabs for easy tracking of remaining sheets**
- **Smooth, effective surface is not damaged by shoes, booties or cart wheels**
- **No sheet delamination or adhesive transfer**
- **Select from among four different colors and eight different sizes**

These sticky mats have proven themselves effective in a wide variety of industries, including microelectronics, aerospace, pharmaceuticals, and food processing.

Peel-Off Sheets Simplify Upkeep

Each sticky mat consists of a stack of tear-off polyethylene film sheets. Persons entering a cleanroom or clean zone walk (and vehicles roll) on the specially treated, pressure-sensitive adhesion on one side of the upper sheet, which removes the last trace of contamination on shoe heels and soles and on wheels. When a sheet becomes loaded with contamination, it is peeled off, exposing a new clean sheet for use. This peel-off design eliminates messy and time-consuming cleaning and washing and makes it easy to keep a clean sticky mat at all times.

Each sticky mat is adhered to the floor or to a frame with either 2-inch wide double-faced adhesive tape, or with a full-bottom sheet of double-faced adhesive film. A clear release sheet protects the top sheet of the sticky mat until it is ready to use. Two levels of tackiness are available for use with a variety of shoes and booties (see ordering information on the next page). Individual sheets are removed by use of either an uncoated edge or a corner tab. The corner tabs are consecutively numbered to show the number of remaining sheets, thereby helping you to keep track of the number of sheets remaining and preventing multiple sheets being removed at once.

The sticky mat is not damaged by footwear or wheels, does not slip, is noncontaminating, and is available in both standard and custom sizes. Company logos can be provided. Standard packs include 120 sheets per package, made up of 4 mats of 30 sheets each. Select the size, color and floor adhesion type from the ordering tables.

Specifications

Adhesion to Shoe Sole:	Medium:	(12 oz./sq. in.)
	High:	(15 oz./sq. in.)

Adhesion tests are conducted according to conditions specified by the Pressure-Sensitive Tape Council (contact Terra for specific test information).

Sticky Mat® shown with Frame (order frame separately, page 293)

GOWNING ROOM PRODUCTS

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Ordering Information

Select a tack (adhesion) level, color, and floor adhesion type (full-bottom double-sided adhesive film, or 2" double-sided adhesive tape strips). White and Grey High-tack mats with a full-bottom adhesive film consist of 30 clear top sheets over a white or grey bottom sheet. White and Grey High-tack mats with a 2" tape strip consist of 30 white or grey sheets with white 2" bottom strip tapes. Blue High-tack mats with either type are made with blue film throughout. All sheets of Medium-tack mats are made of the color indicated. Prices are for 120 sheet packs (4 mats, 30 sheets each). Order frames separately (see next page).

Bootie Type	Suggested Tack Level
Rubber-soled reusable	High or Medium Tack
Vinyl-soled reusable or disposable	Medium Tack
Tyvek sole	Medium Tack
Latex/poly sole	Medium Tack
Polypropylene sole	Medium Tack

	Blue Sticky Mats®				Clear over Grey Sticky Mats®	Clear over White Sticky Mats®
Dimensions (inches)	Medium Tack (Adhesion: 12 oz./sq. in.)		High Tack (Adhesion: 15 oz./sq. in.)		High Tack (Adhesion: 15 oz/sq. in.)	High Tack (Adhesion: 15 oz/sq. in.)
	Full Cat. #	2" Strip Cat. #	Full Cat. #	2" Strip Cat. #	Full Cat. #	Full Cat. #
18 x 36	5601-16	5601-24	5601-32	5601-40	5600-50	5600-57
18 x 45	5601-17	5601-25	5601-33	5601-41	5600-51	5600-58
24 x 36	5601-18	5601-26	5601-34	5601-42	5600-52	5600-59
26 x 45	5601-19	5601-27	5601-35	5601-43	5600-53	5600-60
36 x 36	5601-20	5601-28	5601-36	5601-44	5600-54	5600-61
36 x 45	5601-21	5601-29	5601-37	5601-45	5600-55	5600-62
36 x 60	5601-22	5601-30	5601-38	5601-46	5600-56	5600-63

	Grey Sticky Mats®		White Sticky Mats®		Clear Sticky Mats®	
Dimensions (inches)	Medium Tack (Adhesion: 12 oz./sq. in.)	High Tack (Adhesion: 15 oz./sq. in.)	Medium Tack (Adhesion: 12 oz./sq. in.)	High Tack (Adhesion: 15 oz./sq. in.)	Medium Tack (Adhesion: 12 oz./sq. in.)	High Tack (Adhesion: 15 oz./sq. in.)
	2" Strip Cat. #	2" Strip Cat. #	2" Strip Cat. #	2" Strip Cat. #	2" Strip Cat. #	2" Strip Cat. #
18 x 36	5602-20	5600-64	5602-68	5600-71	5601-72	5601-88
18 x 45	5602-21	5600-65	5602-69	5600-72	5601-73	5601-89
24 x 36	5602-22	5600-66	5602-70	5600-73	5601-74	5601-90
26 x 45	5602-23	5600-67	5602-71	5600-74	5601-75	5601-91
36 x 36	5602-24	5600-68	5602-72	5600-75	5601-76	5601-92
36 x 45	5602-25	5600-69	5602-73	5600-76	5601-77	5601-93
36 x 60	5602-26	5600-70	5602-74	5600-77	5601-78	5601-94

Cleanroom Waste Receptacles

- Contoured tight-fitting lid ensures safe, clean disposal of cleanroom waste
- Electropolished stainless steel finish meets cleanroom requirements
- Easy-open foot-pedal design and self-closing lid keep operator's hands free
- Gasketed seal eliminates particle outflow
- Rigid, durable plastic liner allows easy cleaning

Available in five capacities—see page 226 for ordering information

Cleanline® Sticky Roller

- **Cleans particles from cleanroom walls and other surfaces**
- **Select peel-off adhesive sheets made of polyethylene film (for smooth surfaces) or polyethylene film/foam laminate (for textured surfaces)**
- **Handle extensions allow a "reach" of up to 6 feet**

This sticky roller provides the best possible means of removing even the smallest particles of contamination from flat surfaces such as walls, ceilings, floors, and table tops.

Durable, Noncontaminating Construction

It consists of a reusable roller handle, a roller handle extension, and a disposable roller refill containing the adhesive sheets that capture contaminants. The handle and roller handle extension are made entirely of noncontaminating stainless steel and plastic. Roller handle extensions, which simply screw into the roller handle, extend the roller from 3 to 6 feet.

The disposable roller refills are available in 12-inch and 18-inch widths, with a 3-inch I.D. noncontaminating polyethylene core. This large-diameter core provides a generous cleaning area, resulting in less frequent sheet disposal. Select between two types of single-faced adhesive refills: either 3 mil. clear polyethylene film (for smooth surfaces) or a polyethylene film/foam laminate (for slightly uneven surfaces). Sheets of both types are perforated at circumferential distances; the film-type refill has an uncoated edge. When a sheet becomes contaminated, you simply peel it off to expose a clean one. When the refill is used up, you slide it off the handle and replace it with a new one.

Specifications

Cleaning Surface

Film-Type Roller Refill:	840 linear inches (60 sheets of 14-inch length)
Foam-Type Roller Refill:	320 linear inches (20 sheets of 16-inch length)

Sticky Rollers: Handles and Extensions

Description	Construction	Shipping Weight	Cat. #
Handle	Stainless Steel/Plastic	4	**5603-34**
Extension: 3' to 6'	Aluminum/Plastic	4	**5603-35**

Sticky Rollers: Roller Refills (4 Refills/Case)

Material	Width	Length	Cat. #
Foam	18"	20 sheets	**5603-37**
Foam	12"	20 sheets	**5603-38**
Poly Film	18"	60 sheets	**5603-39**
Poly Film	12"	60 sheets	**5603-40**

Cleanline® Sticky Mat Frames

- **Highly recommended as a uniform base for adhering Sticky Mats**
- **Function equally well with all Sticky Mat bottom adhesives**
- **Require no maintenance**
- **Pre-assembled, ready to use**

These frames provide a uniform, effective base for adhering sticky mats securely, while permitting easy removal of the last sheet and eliminating the problems created by floors of widely varying materials. They also enhance the appearance of mats. Frames are held in place by a non-skid base.

The frames consist of a sloping 4-inch anodized aluminum edge, into which a plastic base is permanently secured. They are available for all sizes of sticky mats; the width and length are each six inches greater than those of the corresponding sticky mat. Overall height is 5⁄16". They are supplied fully assembled, ready for use.

Note: Some larger frame sizes take 2, 3, or 4 mats to fill (for example, a 45" x 54" frame holds two each 26" x 45" mats or three each 18" x 45" mats).

Sticky Mat Frames

Size	Shipping Weight (lbs.)	Includes Non-Skid Base Cat. #
24 x 30	6	**5602-92**
24 x 42	8	**5602-93**
24 x 51	10	**5602-94**
24 x 78	15*	**5602-95**
24 x 96	18*	**5602-96**
30 x 42	15	**5602-97**
30 x 51	18	**5602-98**
32 x 51	18	**5602-99**
30 x 78	24*	**5603-00**
30 x 96	30*	**5603-01**
32 x 96	30*	**5603-02**
42 x 42	15	**5603-03**
42 x 51	18*	**5603-04**
42 x 66	24*	**5603-05**
42 x 78	26*	**5603-06**
42 x 96	34*	**5603-07**
46 x 54	24*	**5603-08**
51 x 58	30*	**5603-09**
51 x 60	30*	**5603-10**
51 x 66	34*	**5603-11**
51 x 78	38*	**5603-12**

Too large for UPS shipment

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Contamination Control Mats and Floor Coverings

- **Removes contaminating particles from shoes and wheels to help you maintain cleanroom standards**
- **Cleans easily with a detergent solution and squeegee**
- **Tolerates heavy loads, and is non-toxic and resistant to most chemicals**
- **Goes on working for years if cleaned regularly**
- **Available as mats, runners, or for wall-to-wall installation**
- **All sizes also available with static-dissipative properties**

These mats and floor coverings are designed to remove even the finest particles of foot-borne contamination simply and effectively, without any tacky carry-over or damage to shoe covers.

Clean, Durable Particle Traps Wherever You Need Them!

Their unique dust-gathering properties result from the exceptional coefficient of friction (3.5µ, using "Tortus" floor friction tester) in their polyester-compound material. They also contain a bactericide that effectively prohibits growth of common bacteria (see specifications below).

Static-dissipative models are available for Low-Profile Protectamat, Clean-Zone, and Clean-Zone Mat to help eliminate static charges and the particles they attract.

Given regular cleaning with a detergent solution and squeegee, they will all go on working cost-effectively for years. Available in a wide variety of sizes and thicknesses, and in several different colors, all of these products are non-toxic, unaffected by X-rays and gamma rays, and resistant to most chemicals (details available upon request). They exhibit negligible outgassing (ASTM E595) and negligible effects of U.V. exposure.

Specifications

Note: Unless otherwise indicated, specifications apply to all Clean-Zone, Protectamat, and Low-Profile Protectamat models specified below.

Bacterial Penetration:	Prevents growth of common bacteria (tested on cultures of pseudonomas aeruginosa and staphylococcus aureus).
Coefficient of Friction:	3.5µ, using "Tortus" floor friction tester.
Static Dissipation: (select models)	Resistance to earth of 10^{10} ohms/square and 10^{8} ohms/square for static dissipative (tested to ASTM F150, DIN 51953, BS 2050); static decay of less than 0.05 seconds (5000v to zero).
Heat Resistance:	32°F to 122°F (0°C to 50°C)
Load Resistance:	40kg/sq. cm (570 lbs./sq in.) using a 4000 kg track on 4 wheels, each contact area being 25 sq. cm
Skin Reaction:	No evidence of erythema, edema or other skin reaction after 48 hour period of constant contact
Toxicity:	Non-toxic

Clean-Zone Floor Covering

Clean-Zone is supplied in standard rolls, to be professionally installed as a wall-to-wall floor covering, creating a permanent and unavoidable trap for dirt. A 6'-6"-foot width is available, in blue, grey, red, or green, in lengths of 10, 20, 30, or 40 feet. In a static-dissipative form, a 6'-6"-foot width is available, in either blue or grey, also in lengths of 10, 20, 30, or 40 feet. Weight: 0.55 lbs./sq. ft. The Clean-Zone Floor covering is 3⁄32" (2.3µm) thick.

Note: Flooring adhesive and a seam sealer kit must be purchased separately (see page 295).

Clean-Zone: Standard (Nondissipative)

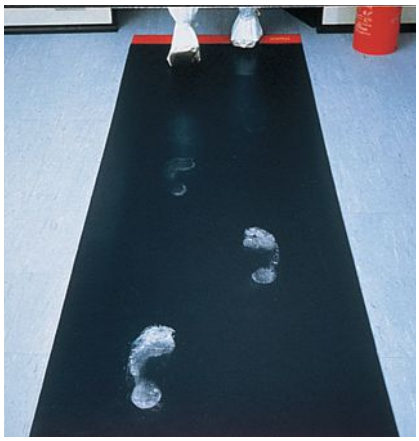
Size	Color			
	Blue Cat.#	Grey Cat.#	Red Cat.#	Green Cat.#
10' x 6'6"	3801-00	3801-01	3801-02	3801-03
20' x 6'6"	3801-04	3801-05	3801-06	3801-07
30' x 6'6"	3801-08	3801-09	3801-10	3801-11
40' x 6'6"	3801-12	3801-13	3801-14	3801-15

Clean-Zone: Static Dissipative

Size	Color	
	Blue Cat.#	Grey Cat.#
10' x 6'6"	3801-16	3801-17
20' x 6'6"	3801-18	3801-19
30' x 6'6"	3801-20	3801-21
40' x 6'6"	3801-22	3801-23

UPDATE: Roll widths are now 6' 6"!

Protectamat



Protectamat is a loose-laid polyester mat, 4-feet wide, and available in lengths of 2', 3'3", 6'6", 10', and 13'. All of these mats are dark blue, and except for the smallest version, they feature attractive red leader strips at both ends. The 2' x 4' mat has a thickness of 7/32" (5 mm), and the other four 9/32" (7 mm). Weight: 1.52 lbs./sq. ft.

Dimensions		Weight		
Feet	mm	lbs.	Kg	Cat. #
2' x 4'	.6 x 1.2	14	6.35	**3801-24**
3'3" x 4'*	1 x 1.2	30	13.6	**3801-25**
6'6" x 4'*	2 x 1.2	60	27.2	**3801-26**
10" x 4'*	3 x 1.2	70	31.8	**3801-27**
13' x 4'*	4 x 1.2	98	44.5	**3801-28**

Includes red leaders

Low-Profile Protectamat

The Low-Profile Protectamat, which has a thickness of only 3/32" (2.3 mm), is made of a composite material consisting of a bottom layer of high specific-gravity polymer, a middle layer of nonwoven polyester matrix, and a top layer of Dycem particle-collecting polyester compound. Available either as a standard loose-laid mat or with a semi-permanent, self-adhesive backing for secure floor placement. Each Low-Profile Protectamat measures 39" x 53" and is available in a choice of two colors (blue or grey), in both a regular and a static-dissipative version, which is supplied with a grounding stud and strap. Weight: 0.60 lbs./sq. ft.

	Blue	Grey
	Cat #	Cat #
Standard Mats Loose Laid	**3801-31**	**3801-32**
Static-Dissipative Mats Self Adhesive	**3801-33**	**3801-34**

Cleaning Roller

The Cleaning Roller is a permanent, high-tack, washable cleaning instrument, ideal for removing even the finest contamination from walls, floors, work surfaces, equipment, and finished products. The roller is made from a patented polymer compound with remarkable high-tack qualities, and is blue in color, 9" wide by 3½" in diameter by 12¾" long (22.5 x 9 x 32.4 cm), and weighs approximately 1.6 lbs. (0.73 kg) without extension. Accumulated contamination can be removed from the roller surface simply by wiping with an alcohol-treated cleanroom wipe. Telescoping handle extensions, useful for cleaning ceilings, walls, and floors, are available as options, as are replacement roller heads and packages of wipes (30 treated wipes are included with each roller ordered).

	Cat.#
Cleaning Roller with Handle	**3801-35**
Handle Extension 2' to 4' (0.6 to 1.2 m)	**3801-36**
Handle Extension 4' to 8' (1.2 to 2.4 m)	**3801-37**
Replacement Roller	**3801-38**
9" x 12" Alcohol-Treated Pro-Sat Wipes Case includes 50 resealable bags of 30 wipes	**3801-39**

Optional Accessories

Dysol Cleanroom Cleaning Solution
Specially manufactured for the cleanroom environment, a ready-to-use solution of nonionic surfactant and deionized water, filtered to 0.2 µm. Ideal for most cleanroom surfaces, this solution can also be used in cleaning machines.

	Cat. #
1 Gallon Bottle	**3801-43**

Dygiene Bactericide
For regular use as a bactericide, this concentrated, water-soluble disinfecting cleaning fluid destroys both gram positive and gram negative bacteria. Can be used in cleaning machines.

	Cat. #
1 Gallon Bottle	**3801-44**

Dyclean General Purpose Cleaning Solution
For regular cleaning outside the cleanroom environment, this concentrated, water-soluble solvent is especially effective for removing black scuff marks left by shoes or wheels. Can be used in cleaning machines.

	Cat. #
1 Gallon Bottle	**3801-45**

Flooring Adhesive (5 liters)
For chemical welding. Includes applicator.

Cat. # **3801-46**

Seam Sealer Kit

Cat. # **3801-47**

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Hand and Glove Washing/Drying Station

- **Incorporates washing and ULPA-filtered drying modules in one cleanroom-compatible station**
- **IR beam activation for hands-free, noncontaminating operation**
- **Fabricated of stainless steel with chrome-plated faucets (electropolished models also available)**
- **Optional liquid soap dispenser is ideal for aseptic operations**
- **Dryer module incorporates noise-absorbing insulation and isolated motor for quiet operation**

This integrated washing/drying station is specifically designed for use in critical cleanroom and gowning room environments.

Fabricated of 304 stainless steel, it is available with electropolished surfaces for optimal cleanliness. Infrared sensors are mounted immediately behind the chrome-plated faucets to allow hands-free washer activation, ensuring that personnel do not touch surfaces and potentially contaminate hands or gloves.

The optional soap dispenser is ideal for pharmaceutical or medical applications that require washing with a germicidal agent. Like the faucet, this feature is IR-beam operated—passing hands in front of the dispensing nozzle activates an electrical pump, which delivers an adjustable amount of soap.

Industry-Leading Quiet Operation

The integral drying module incorporates blower, energy-efficient heater with insulated air flow tubing, and an ULPA (ultra-low penetration air) filter rated 99.999% efficient @ 0.12µm particles. The use of a clean-operation, brushless upstream motor contributes to clean operation. Because the motor is isolated and encased in noise-absorbing insulation, the dryer operates at a fraction of the noise level associated with automatic dryers. The dryer housing swings open for easy access to filter and electronics. See facing page for complete dryer specifications.

Hand/Glove Cleaning Station

Dimensions (W x D x H) Includes levelers	No. of Sinks	Stainless Steel 110VAC/60Hz Cat. #	Stainless Steel 220VAC/50Hz Cat. #	Electropolished Stainless Steel 110VAC/60Hz Cat. #	Electropolished Stainless Steel 220VAC/50Hz Cat. #	Soap Dispensing Module* Cat. #
24" x 22" x 61"	1	**9600-60**	**9600-60-220**	**9600-05**	**9600-05-220**	**9600-64**
48" x 22" x 61"	2	**9600-61**	**9600-61-220**	**9600-06**	**9600-06-220**	**9600-64**
96" x 22" x 61"	4	**9600-62**	**9600-62-220**	**9600-07**	**9600-07-220**	**9600-64**
144" x 22" x 61"	6	**9600-63**	**9600-63-220**	**9600-08**	**9600-08-220**	**9600-64**

**** Order one per sink.***

The only cleanroom-compatible, integrated washing/drying station!

PureDry™ Cleanroom Hand/Glove Dryer

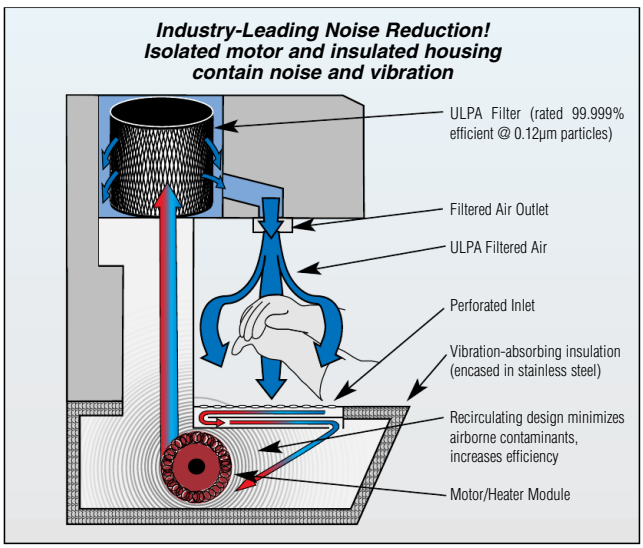
- **Provides warm, contamination-free air for drying hands and gloves in a cleanroom and bio-cleanroom**
- **Also ideal for drying tools, bottles, microelectronic components and other small, particle-sensitive materials**
- **Eliminates the need for towels that shed particles and harbor germs**
- **ULPA (Ultra Low Penetration Air) filter captures microcontaminants**
- **Insulation and motor isolation reduce noise and vibration levels**
- **Recirculating air design minimizes turbulence for enhanced cleanliness, increased heating and filter efficiency**
- **Wide exposure area allows complete drying of elbow-length gloves**
- **Photo-electric cell and adjustable timer allow no-touch operation**
- **Can be mounted on wall or benchtop**
- **Stainless steel design reduces contaminants**

This first-of-its-kind recirculating hand/glove dryer offers contamination control features for the most critical cleanroom applications, at a price that's right almost anywhere.

Fast, Safe Drying Where Tiny Particles Create Big Problems

In a particle-sensitive environment, PureDry™ helps to eliminate contamination problems by reducing the number of airborne particles and germs that can settle on PC boards, chemical solutions, biological cultures, and other sensitive materials.

Unlike conventional drying towels, it ensures fast, thorough drying without contact with foreign media that can shed particles and harbor germs. Its upstream heater warms the air stream before it passes through an ULPA filter and on to the drying area. This noncontaminating operation is especially crucial in cleanrooms and bio-cleanrooms that call for strict environmental controls. The PureDry also eliminates waste disposal and/or laundering costs associated with towel drying.



And unlike other electric hand dryers, this unit employs a recirculating air design, thereby minimizing turbulence that can adversely affect cleanroom air circulation and containing particles that may fall from hands or gloves. As the heated, filtered air stream passes downward, it is captured in a collection area (along with moisture and contaminants) and routed back through the heater/filter/blower module. The PureDry thus has almost no impact on the cleanliness, moisture level, or air flow of the surrounding area. And outside air—a potential source of contaminants—is not drawn into the PureDry's filtered airstream.

A photo cell allows hands-free operation, and the extended exposure area of the PureDry provides ample space to dry elbow-length gloves. The all-stainless steel housing is compatible with cleanroom requirements. Its space-efficient design and low cost make it ideal for many applications, from pharmaceutical laboratories to semiconductor manufacturing plants to hospitals. It comes with a one-year warranty.

Specifications

Dimensions:	15"W x 21⅛"H x 11"D
Shipping Weight:	32 lbs.
Filter:	ULPA filter rated 99.999% effective @ 0.12µm particles
Heater:	700W
Power:	115VAC/60Hz or 220VAC/50Hz.

	Cat. #
PureDry™ Hand/Glove Dryer	
120VAC/60Hz	**3333-33**
220VAC/50Hz	**3333-34**
Replacement ULPA Filter	**3333-35**
99.999% effective @ 0.12 micron	

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Hand/Glove Cleansing Station

- **Cleanses hands of particles, micro-organisms, and sodium from fingertips to wrist**
- **Standardizes cleansing process through microprocessor control of cycle, duration, and amount of cleansing agent injected**
- **Saves time—requiring only 10-15 seconds for thorough cleansing**
- **Increases rate of compliance with hand/glove washing requirements**
- **Dries gloves in 10-20 seconds and hands in 20-30 seconds with air curtain option**
- **Conserves water using only one-half gallon per cycle with a high-velocity, low-volume spray**

This Hand/Glove Cleansing Station is based on a unique, patented method for delivering cleansing solution and/or water to the hands.

Microprocessor-Controlled Standardization

The hands are placed inside two rotating cylinders, where a gentle but stimulating high-velocity spray thoroughly washes from fingertips to wrist. The pleasant sensations provided by this process help motivate employees to use the station frequently, and the system's microprocessor controls the duration of cleansing and the amount of cleansing agent applied to ensure thorough, standardized cleansing.

Washing is initiated automatically by means of an optical proximity scanner, and the duration of the washing cycle may be set to last from 6 seconds to 20 seconds (preset at 12 seconds). The system has an automatic 20-second self-cleaning cycle, which can be preset to occur at intervals of either 8 or 24 hours, or after either 64, 128, or 256 wash cycles.

Note: Wall-mount models do not include self-clean cycle but do feature a cycle counter and solutions monitor gauge.

Floor mount models using tap water generally require a disinfectant self-clean solution, especially in high-volume applications (300 or more cycles per day); order separately. Floor-mount models using DI water inject DI water during self-cleaning (they do not aspirate solutions).

Specifications

Electrical –	Power:	90-240 V, 48-62 Hz, 2 A
	Leakage Current:	max. 100 µA
Plumbing –	Tap Capacity:	4 gal./min., 50-120 psi
	Drain Capacity:	4 gal./min.
Water Temperature –	Hot:	110°F-190°F
	Cold:	40°F-100°F
Water Consumption:	¾ gal./12 second cycle	
Dimensions –	Floor Mount:	18½"W x 21½"D x 48½"H
	Wall Mount:	21¼"W x 20"D x 33"H
Weight:		110 lbs.

Hand Cleansing Solution

Case of 4 one-gal. containers, each good for approx. 800 washes @ 5 ml aspiration.

	Cat. #
Chlorhexidine Gluconate 2%	**2121-06**
Chlorhexidine Gluconate 4%	**2121-07**

Self-Clean Solution

(for floor models using tap water)
Case of 4 one-gal. containers, each good for approx. 5,000 - 6,000 cleaning cycles. **2121-08**

Mixed cases also available; call Terra.

Air Curtain Option

Aids in hand and glove drying (floor models only) **2121-09**

Hand/Glove Cleansing Station		
Water Source	Stainless Steel Floor Model Cat. #	ABS Wall-Mount Model Cat. #
Tap Water	2121-02	2121-04
DI Water	2121-03	—

Garb and Parts Dispensers—*Space-Saving Convenience!*

Terra's lightweight plastic shelves, racks, organizers and dispensers end workplace clutter.

These practical, economical, cleanroom-compatible products help you save time and make full use of valuable cleanroom space. They are ideal for a broad range of cleanroom and bio-cleanroom applications.

Static-Dissipative PVC for Cleanliness, Chemical Resistance *and* Static Safety

Most of these products are available in your choice of acrylic or static-dissipative PVC, a transparent plastic with a surface resistivity of about 10^7 ohms/square. Like standard PVC, this material resists common laboratory chemicals, and—because it eliminates static attraction—it keeps surfaces free of particles inside and out. See page 596 for full specifications. **Note:** To avoid scratches and other surface damage, clean only with water (do not use alcohol).

Pigeon-Hole Organizer

- **Ideal for tools and small parts**
- **Acrylic or Static-Dissipative PVC construction makes cleaning easy, ensures full visibility**
- **Can be stacked as storage needs grow**

Features nine 5" x 5" pigeon holes that accommodate most wafer boats commonly in use, as well as other small parts for general laboratory and cleanroom applications. A 3/4" labeling edge on each compartment allows easy identification of stored parts.

Overall dimensions: 16"H x 16"W x 7½"D; other sizes and configurations available.

Wafer Boat Organizer	Cat. #
Acrylic	**4005-22**
Static-Dissipative PVC	**4005-20**

Swab Dispenser

- **Holds swabs of varying sizes**
- **Eliminates benchtop clutter**
- **Select Static-Dissipative PVC for use with solvents and other corrosive materials**

	Benchtop Models	Wall-Mount Models
Swab Dispenser (6"W x 6"H x 4"D)	Cat. #	Cat. #
Acrylic	**4950-87**	**5151-62**
Static-Dissipative PVC	**4950-88**	**5151-63**

Sneeze Guard™

- **Fits onto most microscope eyepieces**
- **Shields work stage against operator-generated contaminants**
- **Eliminates bothersome face masks**

The Sneeze Guard™ is used in all microelectronics operations that involve microscopes. It functions effectively as a face mask without the inconvenience and expense, and is available in both acrylic and static-dissipative PVC. In addition to our standard models, Terra can create Sneeze Guards in custom sizes and configurations.

Sneeze Guard™

Overall	Cutout	Static-Dissipative PVC	Acrylic
W x H	W x H	Cat. #	Cat. #
7⅛" x 7¾"	4¾" x 1¾"	**1601-51**	**1601-50**
11" x 11"	4¾" x 1⅝"	**1602-75**	**1600-25**

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Dispensing Bins

- **Ideal for dust-free, spill-safe storage and easy dispensing of small lab items—vials, pipet tips, swabs, etc.**
- **Hinged lid allows simple one-hand dispensing**
- **See-through front panels, removable top ensure easy monitoring and refilling**

Holds approximately 250 pipet tips. Bins suitable for direct benchtop placement or wall mounting to save space.

	Benchtop Models	Wall-Mount Models
Standard (8¼"H x 5"W x 6¼"D)	Cat. #	Cat. #
Acrylic (white with clear panels)	**4950-12**	**5151-68**
Static-Dissipative PVC (clear)	**4950-13**	**5151-69**

Cleanroom Benchtop Caddy

- **Noncontaminating, cleanroom-compatible caddy organizes tools, probes, wrist straps—just about anything**
- **Can be customized to suit your storage needs—call Terra**

Overall dimensions: 6½"H x 10"W x 9¾"D; made of ⅛"-thick material. Standard compartment configuration indicated below; other sizes and configurations available. Lid fits snugly to seal out contamination.

	Cat. #
Acrylic	**4005-28**

Number of Compartments	Compartment Height		Compartment	
	Nominal	To Lid	Width	Length
1	4"	6"	5"	6"
2	4"	6"	2½"	2½"
4	4"	6"	2"	4"

Micro-Desiccator Storage Cabinets

- **Ideal for storing material sensitive to moisture or particles**
- **Made of clear, durable acrylic with airtight sealed door**

Small desiccator cabinet comes with two or three compartments for safe storage of small, sensitive parts. Use desiccant to ensure a low-humidity environment (see page 136).

	Cat. #
Small (7¼"H x 8"W x 10"D)	
Clear Acrylic	**4950-06**
Static-Dissipative PVC	**4950-08**
Large (9½"H x 10"W x 16"D)	
Clear Acrylic	**4950-09**
Static-Dissipative PVC	**4950-11**

GOWNING ROOM PRODUCTS

Safety Glasses Holder

- **See-through holder is ideal for bench or wall mounting**
- **Sloped compartments keep glasses in place when wall-mounted**
- **Open bottom simplifies cleaning**

Capacity	(Dimensions)	Static-Dissipative PVC Cat. #	Acrylic Cat. #
8	(6¾ x 5¾ x 17")	**4950-46**	**4950-45**
98	(23¾ x 5¾ x 46")	—	**4951-05**

Glove Box Holders

- **Holders anchor lightweight glove boxes, keep them from sliding on benchtop, make dispensing easier**
- **Ideal for benchtop—but two holes make wall mounting simple**
- **Three sizes to choose from—hold one, two, or three glove boxes**

Two-box and three-box holders can hold different sized boxes simultaneously; foam insert assures proper fit.

	Cat. #
One-Box (5 1/8"H x 11 1/2"W x 4 3/8"D)	
Acrylic	**4950-81**
Static-Dissipative PVC	**4950-82**
Two-Box (10 1/8"H x 12"W x 4 3/4"D)	
Acrylic	**4950-83**
Static-Dissipative PVC	**4950-84**
Three-Box (15 1/2"H x 12"W x 4 3/4"D)	
Acrylic	**4950-85**
Static-Dissipative PVC	**4950-86**

Tissue Box Holders

- **Anchor lightweight tissue boxes to keep them from sliding on benchtop and make dispensing easier**
- **Ideal for benchtop or for wall mounting**
- **Three sizes to choose from**

	Cat. #
Small (5 1/2"H x 5 3/4"W x 3 1/8"D)	
Acrylic	**4950-41**
Static-Dissipative PVC	**4950-42**
Medium (5"H x 5 1/8"W x 4 1/8"D)	
Acrylic	**4005-53**
Static-Dissipative PVC	**4005-54**
Large (5 1/2"H x 15"W x 4 1/4"D)	
Acrylic	**4950-43**
Static-Dissipative PVC	**4950-44**

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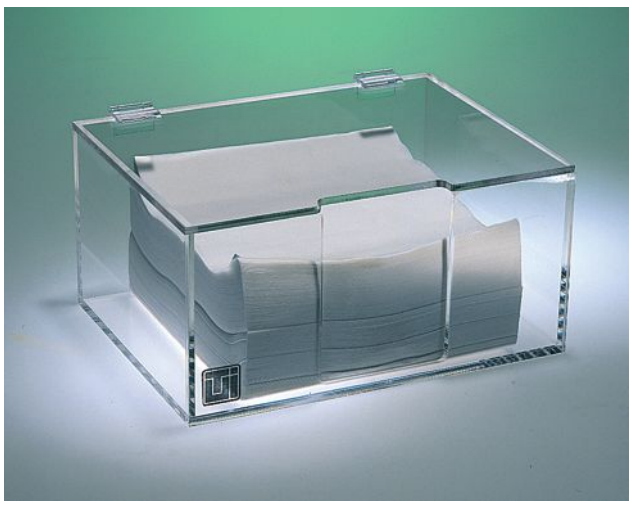
Cleanroom Wiper Dispenser

- **Designed for single-sheet dispensing of wipers**
- **Angled design facilitates easy wiper removal, even by gloved hand**
- **Available in two sizes and materials (other sizes available)**

	Cat. #
Wiper Dispenser, small	
(10 1/2"W x 14 1/2"D x 4"H)	
Acrylic	**4950-93**
Static-Dissipative PVC	**4950-94**
Wiper Dispenser, large	
(12 1/2"W x 15"D x 3 3/4"H)	
Acrylic	**4950-95**
Static-Dissipative PVC	**4005-55**

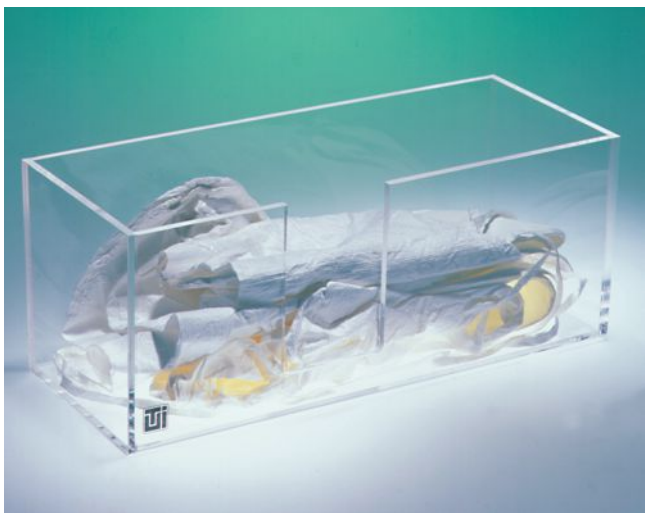


Enclosed Wiper Dispenser

- **Hinged top opens for easy loading; closes to minimize exposure to dust and other contaminants**
- **Side cut-out permits easy single-sheet removal**
- **Select Static-Dissipative PVC for optimal cleanliness**

Standard size: 12"W x 9"D x 6"H; other sizes and configurations available.

	Cat. #
Enclosed Wiper Dispenser	
Acrylic	**4951-01**
Static-Dissipative PVC	**4951-02**

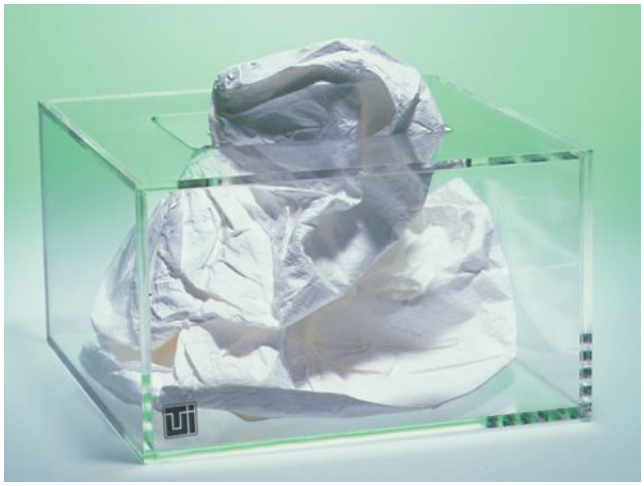


Cleanroom Bootie Dispenser

- **Large capacity holds several booties of any common size**
- **Side slots allow easy bootie removal**
- **Static-Dissipative PVC models control static charges, eliminate particle attraction**

	Cat. #
Bootie Dispenser	
(15"W x 6"D x 6"H)	
Acrylic	**4950-97**
Static-Dissipative PVC	**4950-98**

GOWNING ROOM PRODUCTS



Cleanroom Hat Dispenser

- **6" x 4" top opening allows easy removal of hats and other cleanroom garb**
- **Select Static-Dissipative PVC for optimal particle control**

Standard size: 12"W x 6"D x 6"H; other sizes and configurations available.

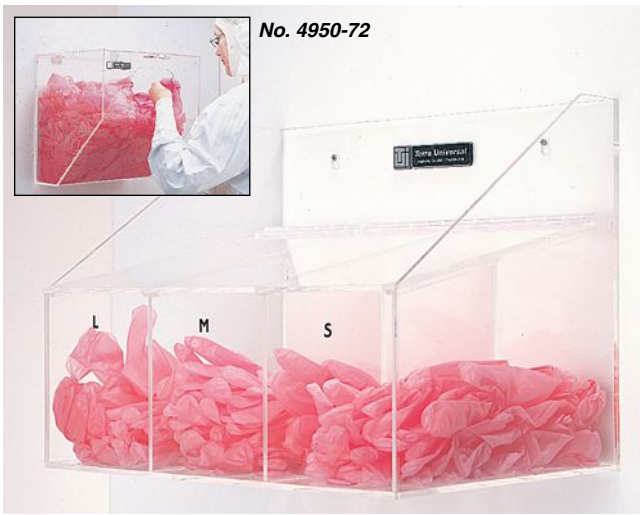
Hat Dispenser	Cat. #
Acrylic	**4950-99**
Static-Dissipative PVC	**4951-00**

Benchtop Glove Dispenser

- **Single-chamber design is ideal for benchtop dispensing**
- **8" x 3" top opening allows ample room for reaching gloves**
- **Select Static-Dissipative PVC for optimal cleanliness**

Standard size: 12"W x 6"D x 6"H; other sizes and configurations available.

Benchtop Glove Dispenser	Cat. #
Acrylic	**4951-03**
Static-Dissipative PVC	**4951-04**



No. 4950-72

No. 4005-56

Wall-Mount Glove Dispenser

- **Available in two designs and materials**
- **Three-chamber model organizes varying glove sizes and types**
- **All models feature swing-open lids for easy loading**
- **Static-Dissipative PVC models prevent dust build-ups**

Single-chamber size: 17"H x 16½"W x 12½"D with 8" x 5" elliptical opening. Three-chamber size: 12"H x 16"W x 11½"D. Other sizes and configurations available.

Single-Chamber	Cat. #
Acrylic	**4950-72**
Static-Dissipative PVC	**4950-74**
Three-Chamber	
Acrylic	**4005-56**
Static-Dissipative PVC	**4005-57**

Balance Shields

- **Ideal for use with today's sensitive electronic balances—transparent barrier protects against drafts, bumps, spills, and splashes**
- **Removable lid provides easy access for adding liquids or dry chemicals from top**
- **Two shields to choose from, each with notches for power cord if needed**

	Cat. #
Small (12¼"H x 13"W x 12"D)	
Acrylic	**4950-55**
Static-Dissipative PVC	**4950-56**
Large (22"H x 16¼"W x 16¼"D)	
Acrylic	**4950-57**
Static-Dissipative PVC	**4950-58**

Apparel Dispenser

- **Multi-bin storage/dispenser organizes apparel sizes and styles**
- **Stainless steel door frames, heavy-duty locking latches ensure durability**
- **Let Terra configure a system to your space requirements!**

No. of Bins	Dimensions	Acrylic Cat. #	Static-Dissipative PVC Cat. #
4	48½"W x 24½"D x 36"H	**4951-06**	**4951-07**
3	36½"W x 24½"D x 36"H	**4951-08**	**4951-09**
2	24½"W x 24½"D x 36"H	**4951-10**	**4951-11**

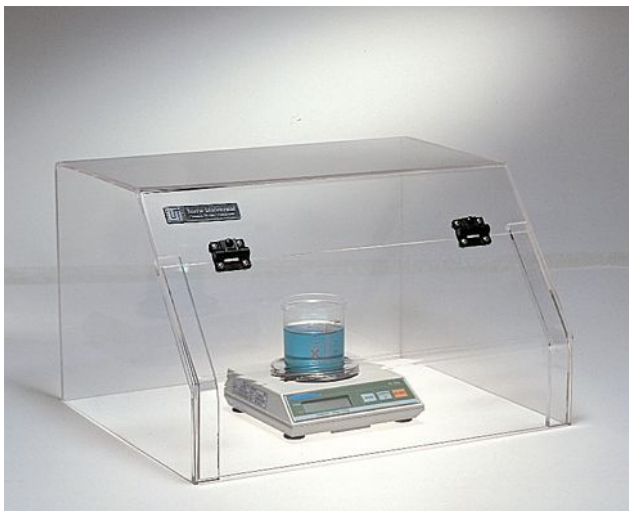
Small Parts Dispenser

- **Four partitioned bins allow organized storage of finger cots and other small cleanroom items**
- **Hinged top and bottom access panels simplify stocking, dispensing**
- **Select plexiglass or Static-Dissipative PVC**

These versatile dispensers make it easy to get your fingers on the finger cots! Four storage bins let you stock and organize finger cots, fasteners, or virtually any other small parts you may need during processing operations. The front panel swings open to expose each chamber's 5" x 4⅛" access area, and the top panel opens to allow easy stocking through 4" x 4⅛" openings. Overall Dimensions: 15¾"W x 8"D x 13"H.

	Cat. #
Finger Cot Dispenser	
Acrylic	**4005-51**
Static-Dissipative PVC	**4005-50**

GOWNING ROOM PRODUCTS

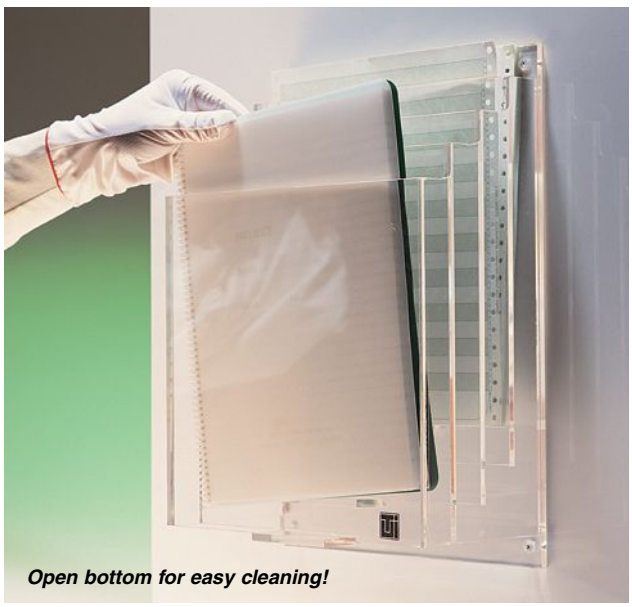


Mini-Hood

- **Easily placed over small process equipment, beakers, flasks and other materials to protect against spills and fumes**
- **Prevents drafts from affecting delicate measurements with electronic balances**
- **Hinged access shield swings open for additional clearance**

This Mini-Hood is ideal for many laboratory and cleanroom applications. It can easily be modified to allow exhaust fume venting. Standard size: 20"W x 12"H x 16"D (see page 394 for Terra's larger Universal Hood).

Mini-Hood	Cat. #
Clear Acrylic	**4950-89**
Static-Dissipative PVC	**4950-90**
Nondissipative PVC	**4950-92**



Cleanroom File Holders

- **Organize paper work in and out of the cleanroom**
- **Four-slot models feature open bottom with folder stops to eliminate "dust traps," simplify cleaning**
- **Single slot models provide convenient spot for tracking documentation at each work station**

These convenient file holders are easy to clean and completely cleanroom compatible. Large units feature four 10" x 10" x 1" slots with folder supports on the bottom side to keep paper work in place and simplify cleaning. The slots are staggered for easy access and labeling. Small units provide a 13" x 7" slot that tapers from 3" at the opening to 1/2" at the base. All file holders are pre-drilled to allow easy wall mounting.

4-Slot (15"H x 10 1/2"W x 5"D)	Cat. #
Acrylic	**4005-25**
Static-Dissipative PVC	**4005-23**
Single-Slot (8 3/4"H x 13"W x 3"D)	
Acrylic	**4005-32**
Static-Dissipative PVC	**4005-30**

Notebook Holder

- **Shields notebook (and logged information) from laboratory spills**
- **Props open notebook at stable, easy-to-read 60° angle**
- **See-through shield allows quick, easy reference to notes**

Notebook Holder (10 1/4"H x 15 3/4"W x 6"D)	Cat. #
Acrylic	**4950-47**
Static-Dissipative PVC	**4950-48**

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Custom Gowning Room Solutions

Put Terra's design and fabrication experience to work in your gowning area!
See Terra's complete line of apparel storage and dispensing units beginning on page 299.

Dispensing Bins
Custom dispensing bins are ideal for hoods, shoe covers, gloves, cots, and other small apparel. Electropolished stainless steel cabinets include lower storage compartments.

	Cat. #
With Five Bins	**9600-11**
With One Bin	**9600-09**

Apparel Dispenser (Open Slot Dispensing)
Lower slots allow convenient dispensing of packaged cleanroom garments, as well as gloves, masks, shoe covers, and other apparel. Top hinged doors allow easy stocking. Includes storage cabinets. Made of electropolished stainless steel with choice of acrylic or static-dissipative PVC stocking hamper.

	Cat. #
Acrylic Hamper	**4951-12**
Static-Dissipative PVC Hamper	**4951-13**

Apparel Dispenser (Swing-Down Door Dispensing)
Multi-bin storage/dispenser organizes apparel sizes and styles. Features stainless steel door frames and heavy-duty locking latches for durability. Select acrylic or dissipative PVC designs. Model shown: 4 bins (other sizes available).

	Cat. #
Acrylic	**4951-06**
Static-Dissipative PVC	**4951-07**

Safety Glasses Holder
Custom configurations available for up to 98 glasses. Sloped compartments with open bottom position glasses securely while eliminating particle traps.

	Cat. #
Model Shown (Acrylic)	**4951-05**

Cleanroom Storage Cabinet

- **Roomy cabinets include chrome-plated posts and adjustable wire shelves to store materials of many sizes**
- **Select additional chrome-plated wire shelving and versatile storage fixtures to organize cleanroom garments, booties, gloves and other supplies**
- **Models available with HEPA filter/blower unit that maintains a continuous wash of particle-free air**
- **Double doors with self-closing hinges are available in plexiglass or transparent Static-Dissipative PVC**

These cleanroom storage units allow you to design a cabinet that's just right for your application.

Model No. 4205-00

Laminar Flow Module Provides Effective Particle Control

Choose between models with or without the HEPA filter/blower module. This module, positioned above the storage area, includes a quiet, direct-drive, variable-speed blower mounted above a HEPA filter rated 99.99% efficient at removing particles 0.3µm and larger.

This blower/filter module delivers up to 120 linear feet/minute of air, a continuous downstream that blocks the inrush of contaminants into the storage area and helps to keep cleanroom supplies particle-free. An air outlet located at the bottom of the storage area discharges air along with any contaminants that may have entered the cabinet. All blower/filter components are easily accessible through a swing-up front panel.

Versatile Shelf/Post Design Accommodates Variety of Storage Modules

Two chrome-plated wire shelves, mounted on four chrome-plated vertical posts, are furnished standard with each cabinet. Shelves allow an uninterrupted vertical flow of air, and their patented split-sleeve design lets you install additional shelves on the support posts and adjust shelf height to suit your requirements. In addition to wire shelves, we offer several other storage modules that are ideal for clean, organized storage of cleanroom supplies (see photo and ordering information below).

Cabinets are made of 3/4" fiber core board with an easy-to-clean, nonshedding laminate sealed on all edges to meet Class 100 cleanroom requirements. The top surface slopes forward to allow easy cleaning and prevent particle build-up. The transparent, overlapping access doors feature self-closing hinges to keep doors securely closed, even under the positive internal pressure generated by the laminar flow option. Doors can be ordered in clear acrylic or static-dissipative PVC. Static-Dissipative PVC combines excellent chemical resistance with a surface resistivity between 10^6 and 10^8 ohms/square to help control static and particles (see page 596 for complete specifications).

Cabinets can also be ordered in custom configurations. Posts and shelving available in stainless steel on a custom basis.

Specifications			Cleanroom Storage Cabinets*	
Type	Outside Dimensions (W" x D" x H")	Inside Dimensions (W" x D" x H")	Formica Laminate with Acrylic Doors Cat. #	Formica Laminate with Dissipative PVC Doors Cat. #
With Blower	37 3/4 x 26 1/2 x 86	36 x 25 x 63 1/2	**4205-00**	**4205-02**
Without Blower	37 3/4 x 26 1/2 x 86	36 x 25 x 63 1/2**	**4205-01**	**4205-03**

Includes four posts and two shelves (positioned near the top and bottom). ** Plus upper storage.

System Options

Stand (with leveling feet)
Epoxy-finished welded steel tubing; raises cabinet 7" above the floor.
Cat. # **4205-10**

Tray Slides
Hang from wire shelf to allow suspension of trays or tote boxes.
Cat. # **1304-90**

Shelf Dividers
These 8-inch dividers snap in place anywhere along the shelf width.
Cat. # **1303-28**

Replacement HEPA Filter
99.99% efficient @ 0.3µm particles.
Cat. # **1681-02**

Adjustable Undershelf Slide
Attaches to wire shelves to allow mounting of lockable drawers and tote boxes.
Cat. # **1302-59**

Storage Baskets
Hang from the shelf edge.
Cat. # **1318-01**

Super Erecta Shelf (36" x 24")
The unique Corner Release System makes changing shelf levels fast and easy, without tools! Two shelves are furnished with each cabinet; others can be added. They can be positioned along the posts at 1-inch increments.
Cat. # **1701-82**

Lockable Drawer (17 1/2" x 22 3/8" x 6")
Fits into adjustable undershelf slide.
Cat. # **1318-00**

Tote Boxes
Cat. # **6000-39**
See complete description beginning on page 519.

Snap-On Drop-In Baskets
Hang beneath the shelf; open front and rear allow easy access to storage area.
Cat. # **1318-02**

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Wall-Mounted Garment Rack

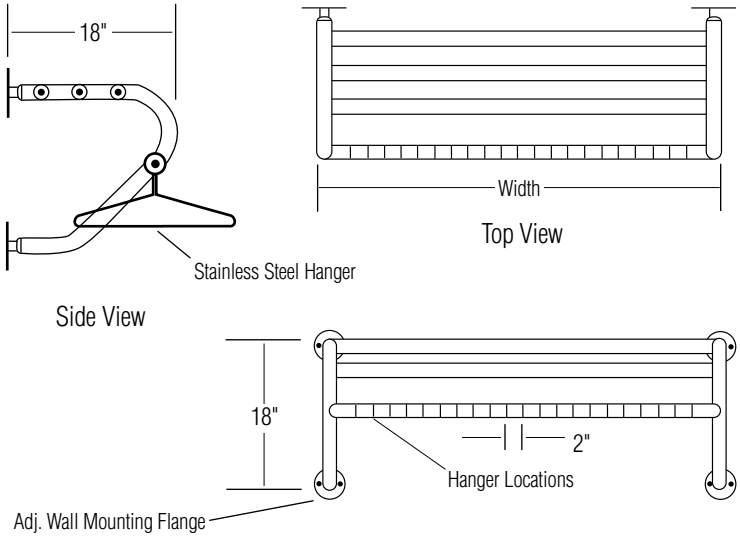
- **Fabricated of tubular stainless steel for durability and easy cleaning**
- **Wall-mount design conserves precious cleanroom floor space**
- **Includes 12 electropolished stainless steel hangers**

These are the perfect racks wherever cleanliness and space are critical concerns.

Fabricated of 16-gauge 304 stainless steel tubing, their cylindrical surfaces wipe down easily, optimize laminar airflow, and won't collect particles. By mounting these racks to the wall, you free up valuable floor space for benches and other change room furnishings.

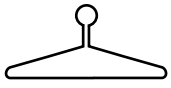
All tubular parts are die-formed on specified radii, and all welded areas are blended to match adjacent surfaces to a #4 finish. Cross-bracing provides stability. The tubular overshelf provides an additional storage area. Hanger locators are scored on 2" increments to provide maximum storage capacity for cleanroom apparel.

Their knockdown design reduces shipping costs (assembly required). Each unit comes with twelve electropolished close-looped hangers, which slide onto the hanger bar during assembly.



Wall-Mounted Garment Rack*			
Width	**Weight**	**Stainless Steel** Cat. #	**Electropolished Stainless Steel** Cat. #
4'	35 lbs.	**5656-01**	**5656-05**
5'	38 lbs.	**5656-02**	**5656-06**
6'	46 lbs.	**5656-03**	**5656-07**
8'	61 lbs.	**5656-04**	**5656-08**

Includes 12 electropolished hangers.



Closed Loop Hangers
Electropolished Stainless Steel
Cat#/dozen **5656-09**

Free-Standing Garment Rack

- **Tubular stainless steel hanger rod is scored at 2" increments for hanger placement**
- **Knocks down for economical shipping**
- **Select electropolished stainless steel for optimal cleanliness**
- **Includes 12 hangers standard**

Like the models above, these Free-Standing Garment Racks are fabricated of 16-gauge 304 stainless steel cylindrical tubes that wipe down easily and won't collect dust or other particles. Cross bracing with elbow brackets provides stability. Comes with twelve electropolished closed-loop hangers that slide onto the hanger bar during assembly.

Free-Standing Garment Rack*			
Width	**Weight**	**Stainless Steel** Cat. #	**Electropolished Stainless Steel** Cat. #
4'	39 lbs.	**5656-34**	**5656-38**
5'	48 lbs.	**5656-35**	**5656-39**
6'	58 lbs.	**5656-36**	**5656-40**
8'	77 lbs.	**5656-37**	**5656-41**

Includes 12 electropolished hangers.

Stainless Steel Flange Feet
For Free-Standing models above. Order four per rack.

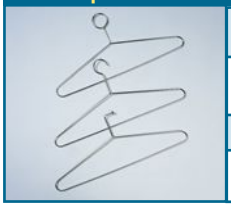
Cat. #
5656-42

Garment Storage Racks

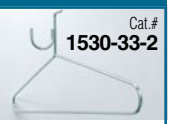
- **Ultra-clean electropolished stainless steel surfaces won't shed particles or snag garments**
- **Collapsible square-tube racks can be disassembled for convenient, economical shipping or for addition of closed-loop hangers (type B and C below)**
- **Cylindrical-tube racks feature all rounded frame members for easier wipe-down**
- **Fixed-position hanger style reduces metal-on-metal contact and keeps garments optimally spaced**
- **Select among dozens of standard sizes, or call with your custom requirements!**

These Garment Storage Racks provide a clean, convenient way to keep your cleanroom garments clean and organized. Their electropolished stainless steel construction ensures ultra-smooth, noncontaminating surfaces that won't snag garments or wipers.

Electropolished Cleanroom Hangers



Style	Compatible Rack	Cat. #
Closed Loop	Type B	1530-30-2
Detachable	Type A or B	1530-31-2
Fixed Position	Type C	1530-32-2



Cat.# **1530-33-2**

Hook Hanger
(For Type C Rack)
Hook is ideal for hoods, masks and other apparel.

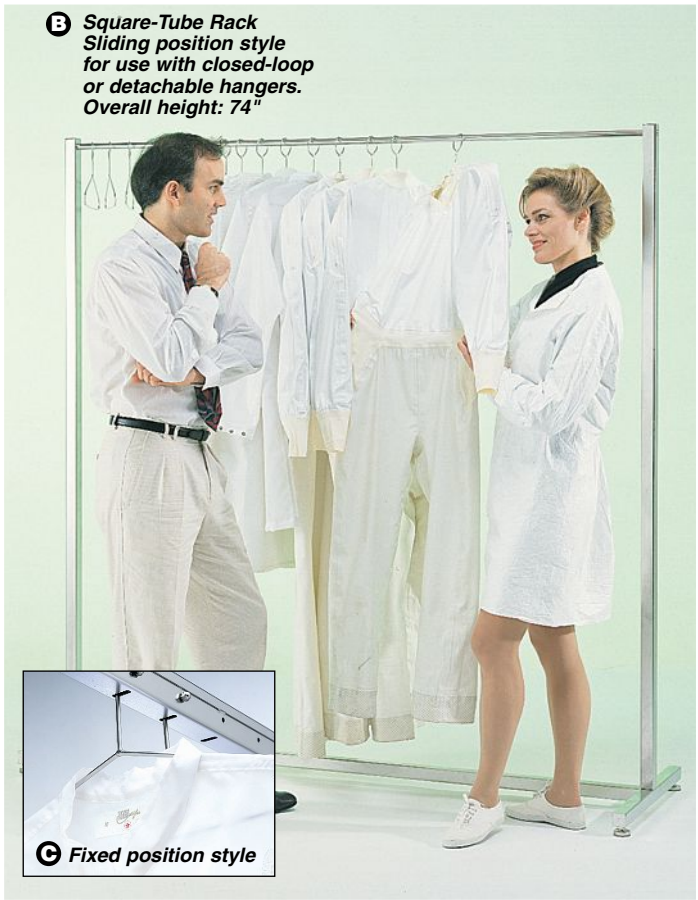
Electropolished Stainless Steel Garment Storage Racks (Order hangers separately)

Type See photos below. See chart for compatible hangers.	Dimensions See below for heights	Hanger Capacity		A. Cylinder Tube Frame		B/C. Square Tube Frame	
		Single Rack	Dual Rack	Single-Rack Cat. #	Dual-Rack Cat. #	Single-Rack Cat. #	Dual-Rack Cat. #
Type B:	48"W x 24"D	15	30	-	-	**9230-00-2**	**9230-04-2**
Sliding Position	60"W x 24"D	19	38	-	-	**9230-01-2**	**9230-05-2**
	72"W x 24"D	23	46	-	-	**9230-02-2**	**9230-06-2**
	84"W x 24"D	27	54	-	-	**9230-03-2**	**9230-07-2**
Types A & C:	48"W x 24"D	15	30	**9602-67**	**9602-75**	**9230-08-2**	**9230-12-2**
Fixed Position	60"W x 24"D	19	38	**9602-68**	**9602-76**	**9230-09-2**	**9230-13-2**
	72"W x 24"D	23	46	**9602-69**	**9602-77**	**9230-10-2**	**9230-14-2**
	84"W x 24"D	27	54	**9602-70**	**9602-78**	**9230-11-2**	**9230-15-2**

Note: Collapsible designs (Styles B and C) are shipped disassembled for more economical shipping. Upon customer request, and for an extra charge, units will be factory assembled and crated, but higher freight charges can be expected.

A ***Cylinder Frame Rack***
(1½"-diameter tubes)
Overall height: 76"
For use with detachable hangers.

B ***Square-Tube Rack***
Sliding position style
for use with closed-loop
or detachable hangers.
Overall height: 74"



C ***Fixed position style***

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Cleanroom Garment and Supplies Storage Cabinets

- **Versatile storage cabinets provide optimal storage space for cleanroom garments, tools, wipes, process equipment, and other materials**
- **Choose the configuration for your requirements:**
  - **✓ Garment rack (holds up to 30 garments)**
  - **✓ Adjustable shelves**
  - **✓ Combination garment rack/shelves**
- **Models available with HEPA filter/blower unit that removes 99.99% of all contaminants 0.3 microns and larger**
- **Chrome-plated hardware, nonshedding materials ensure cleanroom compatibility**
- **Double doors with self-closing hinges allow easy access with minimal clearance requirement**
- **Available with Static-Dissipative PVC front panels for optimal cleanliness and static safety**

These rugged, economical cabinets provide a clean storage area for cleanroom garments, boots, wipes, and other materials.

They are available in several storage configurations and sizes. A chrome-plated garment rod accommodates up to 30 garments. Models with adjustable shelves are ideal for other cleanroom tools and materials, and come in several sizes.

Laminar Flow Cabinets

Laminar flow cabinets feature a quiet, direct drive, variable-speed blower mounted above a HEPA filter rated 99.99% efficient at removing particles 0.3µm and larger. This blower/filter module delivers up to 120 linear feet/minute of Class 10 air, a continuous downstream that blocks the inrush of contaminants into the storage area and helps to keep garments and other materials particle-free. An air outlet located at the bottom of the storage area discharges air along with any contaminants that may have entered the cabinet. All blower/filter components (including fiberglass pre-filters) are easily accessible through a swing-up front panel.

Cabinets and shelves are made of a variety of materials to suit particular application requirements. The cabinets are made of ¾" fiber core board with an easy-to-clean, nonshedding laminate sealed on all edges to meet Class 100 cleanroom requirements. The top surface slopes forward to allow easy cleaning and prevent particle build-up.

The transparent, overlapping access doors feature self-closing hinges to keep doors securely closed, even under the positive internal pressure generated by the laminar flow option. Doors can be ordered in clear acrylic or static-dissipative PVC. Static-dissipative PVC combines excellent chemical resistance with a surface resistivity between 10^6 and 10^8 ohms/square; its dissipative properties help control contamination by eliminating charges that attract particles. Shelves may be ordered of either nonconductive laminate or polypropylene.

Cabinets can also be ordered in custom sizes and configurations—just call Terra with your specifications!

Top component houses easy-access filter/blower

TYPE B Cabinet:
Garment Storage/Shelves
Cat. No. 4101-04

GOWNING ROOM PRODUCTS

TYPE A Cabinet:
Garment storage only
Cat. No. 4101-00

TYPE C Cabinet:
Adjustable Shelves
Cat. No. 4101-09

To Order:

1. Select the chamber type for your application. Types B and C shelves rest on adjustable bookshelf-type supports mounted to the inside of the cabinet. In Type B models, the chamber is divided into garment and shelf storage areas.
2. Select a model with or without a HEPA filter/blower module (laminar flow option not available for Type C cabinets).
3. Select the desired chamber depth.
4. Select shelving.
5. Select stand, if desired. Stands feature a white epoxy finish and raise cabinets 6" off the floor. Leveling feet are included.

Cleanroom Hangers

Electropolished stainless steel construction helps maintain cleanroom conditions.

	Cat. #
Closed Loop	**1530-30-2**
Detachable	**1530-31-2**

Fixed position hanger configurations are available. Call Terra for more information.

Replacement HEPA Filter — 1681-02

For models with filter/blower unit.
Rated 99.99% efficient @ 0.3µm particles.

Specifications			Garment Storage Cabinets		Corresponding Shelves		Stands
Type		Outside Dimensions (W" x D" x H")	Formica Laminate w/Acrylic Doors Cat.#	Formica Laminate w/Dissip. PVC Doors Cat.#	Polypropylene Shelves Cat.#	Nonconductive Laminate Shelves Cat.#	Raise cabinet 6" off floor Cat.#
A	Filter/Blower	36 x 20 x 94	**4101-00A**	**4101-14A**	—	—	**4101-45**
	Cabinet Only	36 x 20 x 78	**4101-01A**	**4101-15A**	—	—	**4101-45**
	Filter/Blower	36 x 24 x 83	**4101-02A**	**4101-16A**	—	—	**4101-46**
	Cabinet Only	36 x 24 x 67	**4101-03A**	**4101-17A**	—	—	**4101-46**
B	Filter/Blower	48 x 20 x 94	**4101-04A**	**4101-18A**	**4101-30**	**4101-40**	**4101-47**
	Cabinet Only	48 x 20 x 78	**4101-05A**	**4101-19A**	**4101-30**	**4101-40**	**4101-47**
	Filter/Blower	48 x 24 x 83	**4101-06A**	**4101-20A**	**4101-31**	**4101-41**	**4101-48**
	Cabinet Only	48 x 24 x 67	**4101-07A**	**4101-21A**	**4101-31**	**4101-41**	**4101-48**
C	Cabinet Only	30 x 14 x 78	**4101-09A**	**4101-23A**	**4101-32**	**4101-42**	**4101-50**
	Cabinet Only	30 x 18 x 78	**4101-11A**	**4101-25A**	**4101-33**	**4101-43**	**4101-51**
	Cabinet Only	36 x 20 x 78	**4101-13A**	**4101-27A**	**4101-28**	**4101-44**	**4101-45**

Turn the page for more garment storage products!

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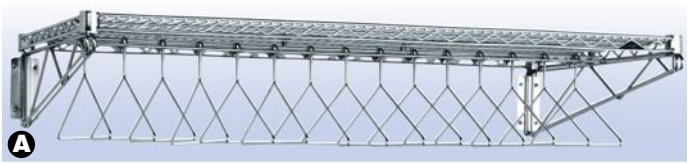

From InterMetro Industries

Gowning Room Furnishings

- **Made of electropolished 304 stainless steel for optimal cleanliness**
- **Select conductive sleeves to make any system shown ESD-safe**

These versatile systems accommodate a host of gowning room storage and dispensing requirements. All units with shelves feature InterMetro's site-select mounting posts for easy height adjustment.

Conductive Sleeves (Package of four)
Replaces standard plastic sleeves to make any unit on these two pages ESD-safe.

Cat. #
1571-01

A/B. Wall-Mount and Upright Garment Racks

Electropolished stainless steel construction and open wire design promotes ultra-clean conditions. Features unique hanger capture mechanism to ensure proper positioning at 3" intervals and to deter theft. Both models include electropolished stainless steel hangers; upright models include leveling feet. All units are 24"D; upright models are 74"H.

Width	No. of Hangers	A. Wall-Mount Cat. #	B. Upright Cat. #
36"	11	**2650-20**	**2650-16**
48"	15	**2650-21**	**2650-17**
60"	19	**2650-22**	**2650-18**
72"	23	**2650-23**	**2650-19**

C. Gowning Bench

Made of 14-gauge, 304 stainless steel, with stainless steel leveling footplates.

Dimensions	Cat. #
16" x 36"	**2650-24**
16" x 48"	**2650-25**
16" x 60"	**2650-26**
16" x 72"	**2650-27**

D. Economy Garment Rack

Made of chrome-plated wire racks, this configuration of Metro Super Erecta shelving creates a versatile garment storage rack.

Required Quantity	Item	Cat. #
4	74.625" H Corner Post	**1300-89**
2	24" x 48" Chrome Wire Shelf	**1300-53**
4	Footplate	**1301-78**
1	Chrome Support Frame	**2650-28**
1	Chrome Hanger Tube	**1302-19**
15	Closed Top Loop Chrome Hanger	**2650-29**

E. Garment Storage Rack

Specify quantities below to create this convenient 20-bin mobile storage rack.

Required Quantity	Item	Cat. #
4	62.563"H SS Corner Post	**2650-30**
5	24" x 48" SS Wire Shelf	**1300-82**
15	8"H SS Shelf Divider	**1303-32**
5	4"H SS Rear Ledge	**1302-99**
10	4"H SS Side Ledge	**1302-95**
2	5" Stem Caster	**2080-55**
2	5" Stem Caster with Brakes	**2080-56**

F. Bootie/Shoe Rack

Items listed below create a bootie/shoe rack. All components are stainless steel.

Required Quantity	Item	Cat. #
4	62.563"H SS Corner Post	**1300-94**
5	24" x 48" SS Wire Shelf	**1300-82**
12	52" SS Rods/Tabs	**2650-31**

More Storage Solutions from InterMetro Industries

Complete ordering information begins on page 184.

Super Adjustable Chrome Wire Shelving™

The unique Corner Release System and SiteSelect™ Posts make changing shelf levels fast and easy, without tools!

	Cat. #
Replacement Sleeves/Wedges (for adjustable shelves) Package of 4	**1571-00**
Conductive Sleeves, Package of 4	**1571-01**
Chrome-Plated Posts	
54 9/16"	**1300-87**
62 9/16"	**1300-88**

Super Adjustable Wire Shelves

Dimensions W x L (inches)	Chrome Plated Cat. #
18 x 36	**1701-76**
18 x 48	**1701-77**
18 x 60	**1701-78**
21 x 36	**1701-79**
21 x 48	**1701-80**
24 x 24	**1701-81**
24 x 36	**1701-82**
24 x 48	**1701-83**

Work-In-Process (WIP) Shelving
— see page 187

Stainless Steel Security Trucks
— see page 191

Wall-Mount Shelving
— see page 192

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Class 1 Stainless Steel Gowning Benches

- **UltraClean™ fully passivated electropolished stainless steel finish meets the most stringent cleanliness requirements—certified Class 1 compatible!**
- **Optional bootie racks provide convenient storage slots**
- **Variety of frame and top configurations to suit every preference:**

  Cylinder Tube Benches feature easy-clean rounded tubes

  Free-Standing Square-Tube Benches come with solid or rod tops

  Floor-Mounted Benches prevent floor scratching and help you maintain gowning areas at specified change room locations

Today's ultra-stringent cleanroom requirements don't leave any room for contamination. Neither do these UltraClean™ Stainless Steel Gowning Benches.

They are built according to Terra's rigorous UltraClean™ manufacturing process. All welding is carefully monitored to ensure continuous seams that are completely free of voids or crevices. After extensive mechanical buffing, benches are electropolished to remove the top layer of subsurface contaminates that can lead to shedding, even on polished stainless steel surfaces. The chromium-rich layer that remains guards against scratching, corrosion and rust, thereby increasing the life of the metal and minimizing the chance of surface breakdown and particle shedding. The result: a bench independently certified as Class 1-compatible.

Bench Designs for Every Cleanroom Requirement!

Select among several standard designs. Solid top floor-mounted models feature two posts with 7 3/8"-diameter mounting plates and four 1/4"-diameter holes on 6" centers. These models prevent personnel from shifting bench locations and scratching cleanroom floors—a potential source of contamination. Fixed-installation benches are also ideal for change rooms with determined gowning locations that support a specific gowning protocol.

Free-standing benches feature leveling glides and come with solid or rod tops (which accommodate the laminar airflow inside a cleanroom or change room). Terra's new cylinder tube benches are fabricated of 1 1/2"-diameter tube frames and legs; tops are 3/8"-diameter rods on 1" centers. Their CleanTip™ design minimizes

Free-Standing Rod Top

Fixed-Mount Solid Top

Free-Standing Solid Top

Rod Top Benches with Easy-Clean Cylinder Frames

GOWNING ROOM PRODUCTS

welding and makes it easy to wipe down the entire perimeter of the bench frame.

Optional Bootie Racks are available for selected models. Fabricated of 1/4"-diameter rods on 2" centers, these racks provide convenient storage bins beneath the bench surface.

Custom Sizes Available!
Call Terra with your requirements for special sizes or configurations!

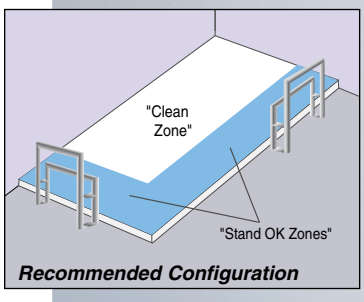
Bootie Racks (available on free-standing benches with square-tube frames)

Floor Mounted		Free Standing Design (Solid tops now with rounded edges)				Bootie Rack**	
L"x W"x H"	Solid Top Cylinder Base Cat. #	L"x W"x H"	Solid Top Square Tube Frame Cat. #	Rod Top Square Tube Frame Cat. #	Rod Top Cylinder Frame Cat.#	No. of Slots	Installed Cat.#
36 x 9 x 18	**1530-15-2**	36 x 16 x 18	**1530-25-2**	**1530-10-2**	**9602-96**	12	**1560-15-2**
48 x 9 x 18	**1530-16-2**	48 x 16 x 18	**1530-26-2**	**1530-11-2**	**9602-97**	15	**1560-16-2**
60 x 9 x 18	**1530-17-2**	60 x 16 x 18	**1530-27-2**	**1530-12-2**	**9602-98**	18	**1560-17-2**
72 x 9 x 18*	**1530-18-2**	72 x 16 x 18	**1530-28-2**	**1530-13-2**	**9602-99**	21	**1560-18-2**
84 x 9 x 18*	**1530-19-2**	84 x 16 x 18	**1530-29-2**	**1530-14-2**	**9600-02**	24	**1560-19-2**

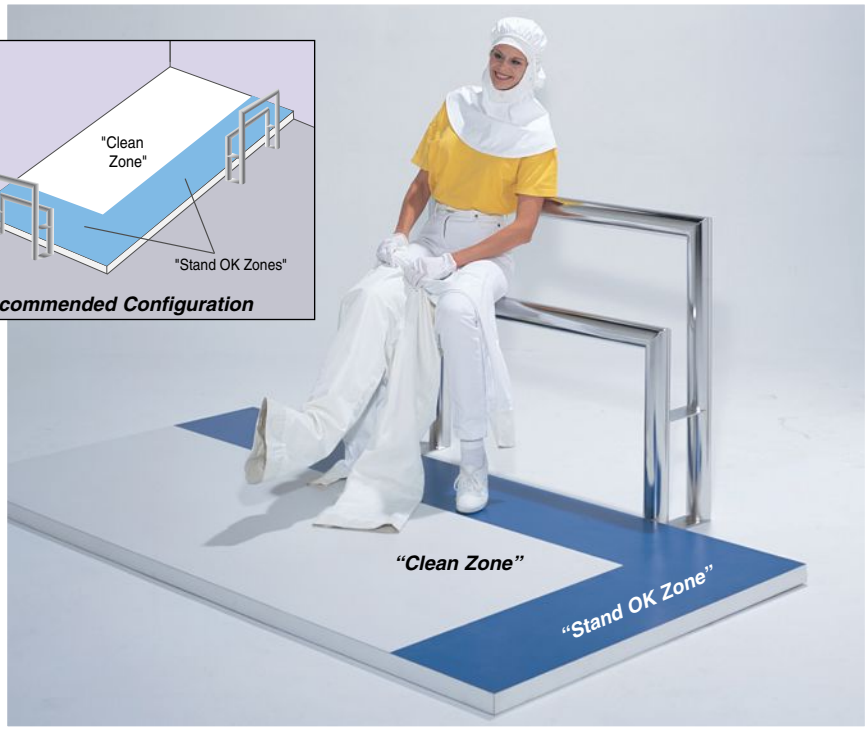
Includes center leg mount. ** Fits on free-standing benches only (order bench separately).

Gowning Platform

- **Crucial protection against the violation of cleanroom garments!**
- **Raised platform demarcates a controlled gowning zone, alerting personnel to proper gowning protocol**
- **Clearly marked "Clean Zone" ensures that garments remain particle-free as they are being donned**
- **Durable, easy-to-clean surfaces won't particulate**



Recommended Configuration



A sad fact of cleanroom life: far too often, garments are violated before garbed personnel even enter the cleanroom.

Sure, you may specify and store garments to the highest level of cleanliness, but what happens when people actually put them on? Although you may keep your change room furnishings contaminant-free, your floors are probably covered with particulates. You may train personnel on gowning procedures that keep garments off the floor, but how can you ensure compliance?

Safeguard Your Investment in Cleanliness!
This platform offers a simple, effective way to keep garments clean. By presenting a 2" raised platform for the garmenting procedure, it alerts personnel that they are entering a "clean zone" with special requirements. Personnel are permitted to walk or stand only along the 14"-wide blue zone along two sides of the platform. The white "clean zone" is strictly off limits and can be frequently cleaned to ensure a surface as clean as any in your facility.

When preparing to don their coveralls, personnel enter the blue zone, hold the coverall by the waist while facing the clean white zone, and position the garment above protected white zone while putting it on. If the garment does touch the ground, it remains clean.

The gowning platform is made of composite fiber with a high-grade laminate top and side edges. Dimensions: 48" x 96" x 2" high. For optimal safety and comfort, select a Lean Rail for each blue zone (see illustration).

CleanLean™ Lean Rail

- **Dual lean rails provide ergonomically correct supports as personnel don and remove garments**
- **Electropolished stainless steel surfaces won't shed or collect particles**
- **The ideal complement to Terra's Gowning Platform**

Terra's CleanLean™ offers dual supports to ensure safe, comfortable garmenting. Electropolished stainless steel cylinders are positioned at 24" and 36" above the floor level and are easy to wipe down. Mounting holes are located on 3" centers.

	Cat. #
Gowning Platform	**9605-49**
CleanLean™	**9605-50**

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Gowning Room Bootie Cabinets

- **Provides a clean organized racking area for booties and shoes**
- **Electropolished stainless steel construction meets today's ultra-pure requirements**
- **Select perforated shelf rack or enclosed cabinet**

Terra's bootie cabinets offer an effective system of racking booties and shoes. Choose between two configurations:

The **Perforated-Shelf Cabinet** features ten shelves with 3/4"-diameter perforations that hold up to 60 pairs of booties. The shelf perforations are designed to accommodate a vertical laminar flow of air inside the change room, helping to minimize turbulence and optimize particle control.

The **Enclosed Cabinet** features 42 pairs of storage slots (one for shoes, one for booties) arranged on seven levels. This design allows for labeling of shoe and bootie slots reserved for specific personnel.

All units are fabricated of electropolished stainless steel, meeting today's ultra-pure requirements.

Custom sizes and configurations are available–just send us your specification.

Enclosed Shelf Cabinet

Perforated Shelf Cabinet

Gowning Room Bootie/Shoe Cabinets			
Description	**No. of Slots**	**Dimensions** (inches)	Cat. #
Perforated Shelf Cabinet	60	48W x 14D x 68H	**9600-03**
Enclosed Shelf Cabinet	42	63W x 18D x 74H	**9600-04**

Related Products—

See page 288

Sole Cleaner™ Automatic Contamination-Control Mat

See page 290

Motorized Shoe Cleaner

See page 291

Cleanline® Sticky Mats®

See page 315

Gowning Bench Bootie Racks

Cleanroom Mirror

- **Provides a visual self-check to ensure proper gowning before personnel enter the cleanroom**
- **All electropolished stainless steel frame is easy to wipe down clean**
- **Helps ensure proper gowning protocol!**

Terra's specially designed Cleanroom Mirror gives personnel the opportunity to inspect their garb before they enter the cleanroom (see page 286 for recommended gowning protocol).

Fabricated of industrial-grade plate glass, this mirror is mounted in a special low-profile, heavy-gauge steel frame to ensure sturdy support. It mounts flush with the wall to prevent particle accumulation. Electropolishing yields smooth surfaces that wipe down clean (see page 320 for a description of electropolishing procedures).

Dimensions: 36"W x 72"H

	Cat. #
Cleanroom Mirror	**5252-52**

Cleanroom Garment Hamper

- **Polypropylene construction combines cleanliness and chemical resistance**
- **Recessed foot pedal enables hands-free operation**
- **Custom sizes available—call Terra with your requirements**

Terra's Cleanroom Garment Hamper allows clean, easy disposal of soiled cleanroom garments.

Its self-closing lid is easily raised with a press of the recessed stainless steel foot pedal, and polypropylene construction safely contains garments or protective garb splashed with acids or caustic chemicals. The standard hamper features over seven cubic feet of capacity; Terra will also custom fabricate storage hampers of other sizes and materials to suit your requirements

Outside Dimensions: 31"W x 14.5"D x 42"H
Inside Dimensions: 29.5"W x 11.5"D x 35"H

	Cat. #
Cleanroom Garment Hamper	**5151-51**

Related Products—

See Terra's complete line of reusable and disposable cleanroom frocks, overalls, boots and gloves beginning on page 248.

Eyes-Only Cleanroom Hoods

IsoClean® Cleanroom Frock

IsoClean® Cleanroom Overalls

Cleanroom Work Stations

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See "Hoods" (beginning on page 376) for Terra's complete line of laminar flow and exhaust fume work stations.

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UltraClean™ Electropolished Finish

Optimal Contamination Control for Optimal Product Yields

The submicron geometries of semiconductor components demand increasingly stringent cleanroom conditions. Today's miniaturized devices can easily be destroyed by particles so small that they were virtually ignored by cleanroom standards of a decade ago.

As a result, semiconductor processing facilities built to these standards are frequently unable to operate competitively now—simply because they cannot maintain a high enough rate of component yields. Manufacturers who could once minimize failure rates in a Class 100 environment now face the need to meet Class 10 or even Class 1 standards. Because contamination control has become such an important factor in optimizing these yields—and in maximizing profits—it is more important than ever to eliminate sources of yield-busting contamination.

Stainless steel, for years the cleanroom surface of choice, has proven to be one such contamination source. Even conventionally buffed or polished stainless steel surfaces contain subsurface particles and impurities (including iron, carbon, silicon, and other reactive materials) that can in time oxidize or shed; these effects are intensified by the uneven surface of stainless steel.

To minimize the generation of these airborne particles, Terra Universal now offers products with an UltraClean stainless steel finish, a completely passivated, electropolished surface that helps you meet the most critical contamination-control requirements in effect today.

Mechanical Polishing vs. Electropolishing

Electropolishing is preferable to mechanical polishing because it leaves a streamlined surface that features no fine directional lines, offers less friction and surface drag, and results in less galling of the threads of the stainless steel surface. These characteristics in turn greatly diminish the possibility of particle shedding while preserving the fatigue strength of the stainless steel and maximizing its resistance to corrosion.

Electropolished stainless steel is also much easier to clean than other finished stainless steel surfaces. Because the smooth surface features no molecular impurities or other anomalies, it will not shed particles during cleaning and also offers less adhesion (which can lead to shedding of particles from cleaning wipers). Electropolished surfaces are also easier to sterilize, making them ideal for applications in food processing and biological/medical industries.

New Mirror-Finish Electropolishing!

For the cleanest, most brilliant stainless steel finish available, specify Mirror-Finish Electropolishing. The process entails extensive hand-buffing of all stainless steel surfaces prior to electropolishing and yields a finished surface that is guaranteed free of all blemishes. (For mirror finishing, add 40% to the price of standard electropolishing.)

Three Steps to a Contamination-Free Surface

1. Material Preparation

UltraClean products are fabricated of 304 or 316 stainless steel that is specially prepared to eliminate any pockets or gaps where contaminants or chemicals could collect during the passivation and electropolishing processes.

Continuous fusion welding along all seams in benches, hoods and other equipment leaves a smooth, uniform finish for optimal processing results.

2. Chemical Passivation

Next, all parts are chemically passivated in an acid solution to remove iron, carbon, and other surface impurities.

Chemical passivation is important because of the uniformity of results: each exposed surface is evenly stripped of contaminants, regardless of its shape or position. This process continues for an extended period—up to several hours, depending on the size and condition of the part.

3. Electropolishing

Finally, materials are electropolished, a procedure in which parts are fitted to electrodes, which ensure even electrolysis of all sides, and then immersed in an acid bath. The current energizes the acid molecules in the bath solution, which remove molecular impurities (typically, a layer up to 0.001" thick).

This controlled process selectively removes surface imperfections ion by ion, according to the fundamental principles of electrolysis. It removes microscopic "peaks" much faster than it does the corresponding "valleys," resulting in a microscopically smooth, featureless surface. Mechanical polishing, on the other hand, always leaves behind directionally oriented ridges and smears that contribute to friction, shedding, and metal fatigue.

Results Speak for Themselves

Compared to conventionally buffed or polished stainless steel, UltraClean finish stainless steel provides a striking improvement in cleanliness, resulting in a reduction of particles and failure rates!

Cleanroom Preparation and Packaging Available!

On demand, final assembly, cleaning and packaging can be performed in Terra's on-site Class 10 cleanroom.

Terra has been independently certified as a Cleanroom Manufacturing Specialist, and employs approved cleanroom protocol for manufacturing and cleaning operations.

Call for further information.

Seal of Cleanroom Approval!

Products bearing this seal have been independently certified by Ultraclean Products Approval Laboratory, Livonia, Michigan.

CLEANROOM WORK STATIONS

Class 1 Gowning Benches
See page 314

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UltraClean™ Stainless Steel Work Stations

Square Tube Bases

Terra Universal manufactures the most advanced lines of electropolished stainless steel work benches available for high-technology cleanrooms.

Power Cord Pass-Through
Standard on all rod tops.

QuietTop™ Rod Top Benches
Rods "float" in a non-outgassing elastomer that dampens noise and vibrations.

ULTRACLEAN PRODUCTS APPROVAL LABORATORY
CERTIFIED
FOR CLASS 1
CLEANROOM USE
Dr. Philip R. Austin, P.E.
Dr. Philip J. Austin, Ph.D.
LIVONIA, MICHIGAN USA

Class 1 Compatible

Cylinder Tube Benches—The Shape of Clean
See page 326

Compare!

Terra's advanced technology benches incorporate contamination-control designs and materials you just won't find elsewhere.

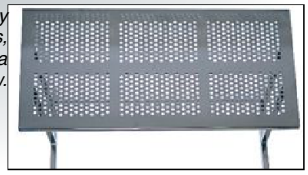
Compare!

OpenTop™ Perforated Top

Hidden reinforcements minimize dead spots, add strength, and eliminate deflection bounce-back ("oil-can effect") without dead spaces.

Competitor's Design

Conventional perforated tops rely on "blank out" support panels, which create turbulence in a cleanroom laminar flow.



Compare!

Elastomer "potting" eliminates welds around rods, dampens vibration and eliminates particle traps!

Competitor's Design

Conventional welds trap particles and amplify noise and vibrations.

Compare!

Full Bullnose Front Edge

Standard on all QuietTop™ models, Terra's one-piece bullnose enhances worker comfort while optimizing vertical laminar airflow—without welds or cracks.

Competitor's Designs

Crimped edges leave cracks where particles collect.

Welded bullnose harbors contaminants; sharp bottom angle creates turbulence.

OpenTop™ Perforated Top Benches

Preserves maximum open space to facilitate laminar airflow without sacrificing strength or rigidity.

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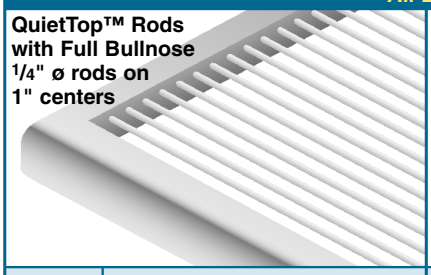
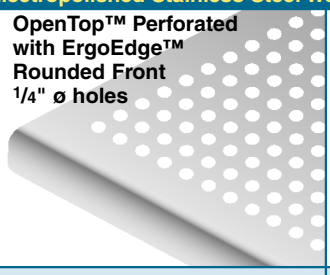
HEAVY-DUTY

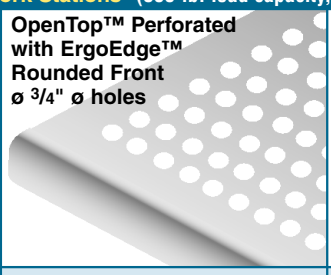
All-Electropolished Stainless Steel Work Stations* (800-lb. load capacity, A & C bases are 1½" square tubes)



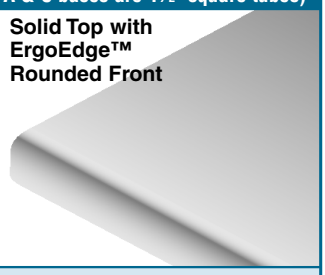
QuietTop™ Rods with Full Bullnose 1/4" ø rods on 1" centers



OpenTop™ Perforated with ErgoEdge™ Rounded Front 1/4" ø holes



OpenTop™ Perforated with ErgoEdge™ Rounded Front ø 3/4" ø holes



Solid Top with ErgoEdge™ Rounded Front

Bench Size* (W" x D")	"A" Base Cat. #	"C" Base Cat. #	"A" Base Cat. #	"C" Base Cat. #	"A" Base Cat. #	"C" Base Cat. #	"A" Base Cat. #	"C" Base Cat. #
24 x 24	9601-01	9601-02	9604-51	9604-72	9601-43	9601-44	9601-85	9601-86
36 x 24	9601-03	9601-04	9604-52	9604-73	9601-45	9601-46	9601-87	9601-88
48 x 24	9601-05	9601-06	9604-53	9604-74	9601-47	9601-48	9601-89	9601-90
60 x 24	9601-07	9601-08	9604-54	9604-75	9601-49	9601-50	9601-91	9601-92
72 x 24	9601-09	9601-10	9604-55	9604-76	9601-51	9601-52	9601-93	9601-94
84 x 24	9601-11	9601-12	9604-56	9604-77	9601-53	9601-54	9601-95	9601-96
96 x 24	9601-13	9601-14	9604-57	9604-78	9601-55	9601-56	9601-97	9601-98
24 x 30	9601-15	9601-16	9604-58	9604-79	9601-57	9601-58	9601-99	9603-00
36 x 30	9601-17	9601-18	9604-59	9604-80	9601-59	9601-60	9603-01	9603-02
48 x 30	9601-19	9601-20	9604-60	9604-81	9601-61	9601-62	9603-03	9603-04
60 x 30	9601-21	9601-22	9604-61	9604-82	9601-63	9601-64	9603-05	9603-06
72 x 30	9601-23	9601-24	9604-62	9604-83	9601-65	9601-66	9603-07	9603-08
84 x 30	9601-25	9601-26	9604-63	9604-84	9601-67	9601-68	9603-09	9603-10
96 x 30	9601-27	9601-28	9604-64	9604-85	9601-69	9601-70	9603-11	9603-12
24 x 36	9601-29	9601-30	9604-65	9604-86	9601-71	9601-72	9603-13	9603-14
36 x 36	9601-31	9601-32	9604-66	9604-87	9601-73	9601-74	9603-15	9603-16
48 x 36	9601-33	9601-34	9604-67	9604-88	9601-75	9601-76	9603-17	9603-18
60 x 36	9601-35	9601-36	9604-68	9604-89	9601-77	9601-78	9603-19	9603-20
72 x 36	9601-37	9601-38	9604-69	9604-90	9601-79	9601-80	9603-21	9603-22
84 x 36	9601-39	9601-40	9604-70	9604-91	9601-81	9601-82	9603-23	9603-24
96 x 36	9601-41	9601-42	9604-71	9604-92	9601-83	9601-84	9603-25	9603-26

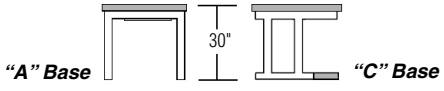
** Standard height is 30" (floor to top). Heights of 32" and 36" and widths of 34" are available at no extra charge. Specify when ordering.*

To Order—

1. **Select Heavy or Light Duty Base:** Heavy-duty bases support loads up to 800 lbs. (364kg) without bowing. Light-duty bases support loads up to 200 lbs. (91kg) without bowing.

2. **Select a Top Style:** Either solid, rod (QuietTop™), or perforated (OpenTop™).

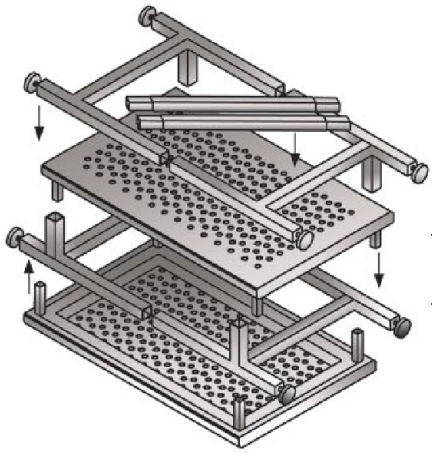
3. **Select "A" Base or "C" Base:** For heavy-duty designs, bases are 1½" x 1½" square tubes. For light-duty designs, both base types are 1" square tubes.

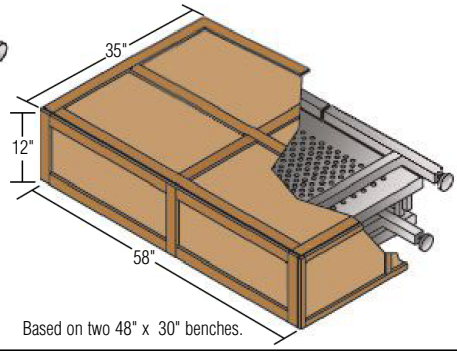


4. **Select Optional Accessories:** See following page for over-top and under-top shelves. See page 329 for other options, including keyboard tray, mounting feet, cleanroom drawers, equipment mounts, and electrical power strips.

Knock-Down (Collapsible) Frames Available!

Available for models with square-tube bases, Terra's knock-down benches allow easy removal of legs for economical shipping and space-efficient storage. Assembled in minutes, these benches provide all of the strength of our standard "A" and "C" bases. To order, add "-KD" to the affected part number.

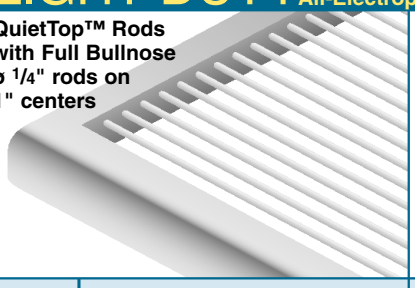




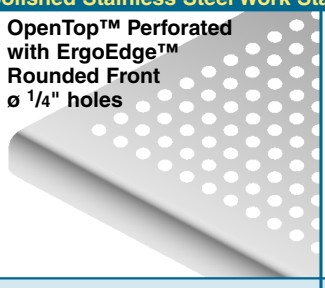
Based on two 48" x 30" benches.

CLEANROOM WORK STATIONS

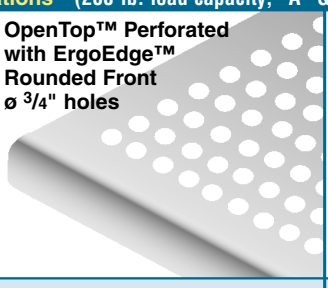
LIGHT-DUTY All-Electropolished Stainless Steel Work Stations* (200-lb. load capacity; "A" & "C" bases are 1" square tubes)



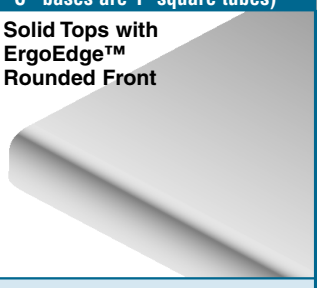
QuietTop™ Rods with Full Bullnose ø 1/4" rods on 1" centers



OpenTop™ Perforated with ErgoEdge™ Rounded Front ø 1/4" holes



OpenTop™ Perforated with ErgoEdge™ Rounded Front ø 3/4" holes



Solid Tops with ErgoEdge™ Rounded Front

Bench Size* (W" x D")	"A" Base Cat. #	"C" Base Cat. #	"A" Base Cat. #	"C" Base Cat. #	"A" Base Cat. #	"C" Base Cat. #	"A" Base Cat. #	"C" Base Cat. #
24 x 24	9603-90	9603-91	9604-93	9605-02	9604-08	9604-09	9604-26	9604-27
36 x 24	9603-92	9603-93	9604-94	9605-03	9604-10	9604-11	9604-28	9604-29
48 x 24	9603-94	9603-95	9604-95	9605-04	9604-12	9604-13	9604-30	9604-31
24 x 30	9603-96	9603-97	9604-96	9605-05	9604-14	9604-15	9604-32	9604-33
36 x 30	9603-98	9603-99	9604-97	9605-06	9604-16	9604-17	9604-34	9604-35
48 x 30	9604-00	9604-01	9604-98	9605-07	9604-18	9604-19	9604-36	9604-37
24 x 36	9604-02	9604-03	9604-99	9605-08	9604-20	9604-21	9604-38	9604-39
36 x 36	9604-04	9604-05	9605-00	9605-09	9604-22	9604-23	9604-40	9604-41
48 x 36	9604-06	9604-07	9605-01	9605-10	9604-24	9604-25	9604-42	9604-43

** Standard height is 30" (floor to top). Heights of 32" and 36" and widths of 34" are available at no extra charge. Specify when ordering.*

Available in other depths, as well as solid and perforated tops. Call for information.

Over-Top Shelf

Support uprights can be added to any standard Terra work station to accommodate an overtop shelf made of 1/4"-diameter rods on 2" centers. Standard height of a 12"D shelf is 12" above the bench surface (custom shelf depths and heights are available).

For "C" Bases	Corresponding Shelves Electropolished (1/4" rods on 2" centers)			
	For Bench Width	Above-Bench Shelves* 12"D, mounted 12" above bench Cat. #	Under-Bench Shelves 12"D, mounted 21.5" above floor Cat. #	Under-Bench Shelves 18"D, mounted 21.5"above floor Cat. #
	24"	1530-69-2	1530-68-2	1530-67-2
	36"	1530-86-2	1530-87-2	1530-88-2
	48"	1532-20-2	1525-61-2	1525-62-2
	60"	1532-21-2	1525-80-2	1525-84-2
	72"	1532-22-2	1525-81-2	1525-85-2
	84"	1532-23-2	1525-82-2	1525-86-2
	96"	1532-24-2	1525-83-2	1525-87-2

** Price includes mounting at standard height. Specify other desired height.*

Under-Top Shelf

Standard mounting is 21½" above the floor. Select 12"D or 18"D (custom shelf depths and heights are available). Made of 1/4"-diameter rods on 2" centers.

For "A" Bases	Corresponding Shelves Electropolished (1/4" rods on 2" centers)			
	For Bench Width	Above-Bench Shelves 12"D, mounted 12" above bench Cat. #	Under-Bench Shelves 12"D, mounted 21.5" above floor Cat. #	Under-Bench Shelves 18"D, mounted 21.5"above floor Cat. #
	24"	1527-65-2	1527-72-2	1527-79-2
	36"	1527-66-2	1527-73-2	1527-80-2
	48"	1527-67-2	1527-74-2	1527-81-2
	60"	1527-68-2	1527-75-2	1527-82-2
	72"	1527-69-2	1527-76-2	1527-83-2
	84"	1527-70-2	1527-77-2	1527-84-2
	96"	1527-71-2	1527-78-2	1527-85-2

Note: Shelves must be ordered with the corresponding bench (they cannot be retrofitted).

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800 S. Raymond Ave., Fullerton, CA 92831 CA

UltraClean™ Stainless Steel Work Stations

Cylinder Tube Bases

Bases are made of 1 1/2"-diameter cylinder tubes for easy cleaning and optimal airflow. Select solid, rod or perforated top.

Power Cord Pass-Through
Standard on all rod tops.

CleanTip™ Design
Open-sided construction is easier to clean.

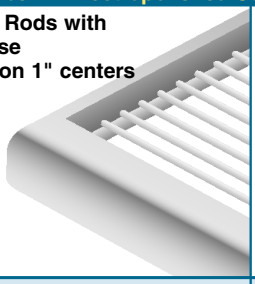
Full Bullnose Front Edge
One-piece bullnose enhances worker comfort while optimizing vertical laminar airflow.

UltraClean™ Benches with Square Tubes— See page 322

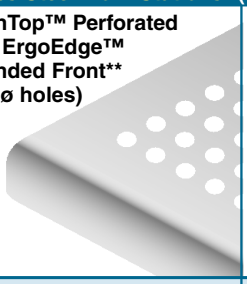
CLEANROOM WORK STATIONS

Cylinder Tube All-Electropolished Stainless Steel Work Stations* (800-lb. load capacity)

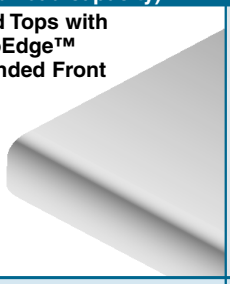
CleanTip™ Rods with Full Bullnose
1/4" ø rods on 1" centers



OpenTop™ Perforated with ErgoEdge™ Rounded Front**
(3/4" ø holes)



Solid Tops with ErgoEdge™ Rounded Front



Corresponding Wire Shelves (18"D)

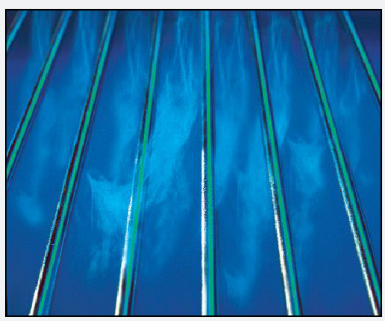
Bench Size (W" x D")	Cat. # *	Cat. # *	Cat. # *	Shelves can be removed or adjusted up/down and forward/backward on the mounting tube. Cat. # *
24 x 24	9603-27	9603-48	9603-69	9604-44
36 x 24	9603-28	9603-49	9603-70	9604-45
48 x 24	9603-29	9603-50	9603-71	9604-46
60 x 24	9603-30	9603-51	9603-72	9604-47
72 x 24	9603-31	9603-52	9603-73	9604-48
84 x 24	9603-32	9603-53	9603-74	9604-49
96 x 24	9603-33	9603-54	9603-75	9604-50
24 x 30	9603-34	9603-55	9603-76	9604-44
36 x 30	9603-35	9603-56	9603-77	9604-45
48 x 30	9603-36	9603-57	9603-78	9604-46
60 x 30	9603-37	9603-58	9603-79	9604-47
72 x 30	9603-38	9603-59	9603-80	9604-48
84 x 30	9603-39	9603-60	9603-81	9604-49
96 x 30	9603-40	9603-61	9603-82	9604-50
24 x 36	9603-41	9603-62	9603-83	9604-44
36 x 36	9603-42	9603-63	9603-84	9604-45
48 x 36	9603-43	9603-64	9603-85	9604-46
60 x 36	9603-44	9603-65	9603-86	9604-47
72 x 36	9603-45	9603-66	9603-87	9604-48
84 x 36	9603-46	9603-67	9603-88	9604-49
96 x 36	9603-47	9603-68	9603-89	9604-50

Standard height is 30". Heights of 32" and 36" available at no extra charge. Specify when ordering. Frames are 1½-diameter cylindrical tubes.
****Standard 3/4" diameter perforations create 40% open space.***

Rods or Perforations?

Both rod and perforated tops are designed to optimize the vertical laminar flow of particle-free air inside a cleanroom. From that point of view, both are superior to solid tops, which block air flow and create significant turbulence both above and below the work surface.

Perforations provide more surface area for supporting parts, but they do generate some turbulence in the gaps between the cut-outs. Terra's standard OpenTop™ perforations have a 3/4" diameter and open up 40% of the total benchtop for the air flow. Other hole patterns and sizes are available.



Rods create virtually no turbulence, but their open structure leaves little space to support small tools and parts. To solve this problem, Terra offers clip-on equipment mounts (see page 329). Terra's standard QuietTop™ design uses 1/4"-diameter rods on 1" centers. Call for other rod sizes and configurations.

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UltraClean™ Stainless Steel Work Station
Accessories

CLEANROOM WORK STATIONS

A. Keyboard Tray

This retractable tray, fabricated of 1/4"-diameter rods, is mounted on nylon rollers for clean operation. Standard width: 24" O.D. (21.5" I.D). Standard mounting is center of bench width.

Cat. #
1540-01-2

B. Holster

Select the most convenient location on your work station for this 1/4"-diameter rod "holster," which accommodates bar code scanners, nitrogen guns, and other equipment.

Cat. #
1540-03-2

C. Mounting Feet

Electropolished stainless steel feet feature cut-outs to allow the bench to be bolted to the floor.

	Cat. #
2 1/2" diameter	**1540-04-2**
3 1/2" diameter	**1540-05-2**

D. Vacuum Line Fittings

These chrome-plated fittings accommodate vacuum service lines to operate wafer handling tools and other vacuum-driven process equipment.

Cat. #
1540-07-2

E. UltraClean™ Stainless Steel Cleanroom Drawers

These easy-to-install drawers come in a variety of sizes.

Cleanroom Drawer Unit (Dimensions are inside planar)		
No. of Drawers	**Min. Drawer Height**	**Electropolished Stainless Steel** 15 1/4"W x 18 3/4"D Cat. #
1	6"	**1741-26**
1	12"	**1741-27**
2	6", 6"	**1741-28**
2	6", 12"	**1741-29**
3	6", 6", 6"	**1741-30**

F. Electropolished Stainless Steel Foot Rest

Terra Universal's Electropolished Stainless Steel Foot Rest was designed for cleanliness, as well as for operator comfort.

Cat. #
2803-90

G. Equipment Mounts

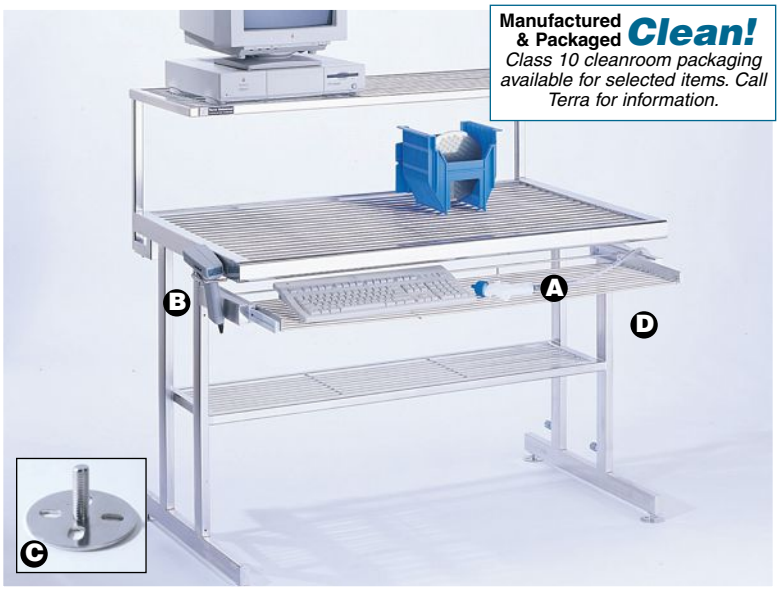
These electropolished stainless steel plates clip onto Terra's standard rod top benches to provide a convenient staging platform for process equipment and small parts.

	Cat. #
4" x 4"	**9602-50**
6" x 6"	**9602-51**
8" x 8"	**9602-52**
12" x 12"	**9602-53**
16" x 16"	**9602-54**

H. Power Cord Runner

Eliminate unsightly, hard-to-clean tangles of wires and tubing! This electropolished stainless steel tube houses power cords and service lines running to the bench top. Standard mounting is on the right rear bench leg (specify other desired position).

	Cat. #
For 1" x 2" square tube bases	**9602-55**
For 1" x 1" square tube bases	**9602-88**
For cylinder tube bases	**9602-56**



I. Electrical Power Strip *comes with a clip-on cord tray*

Finally—a power strip that doesn't compromise cleanliness or performance! This electropolished stainless steel unit features smooth surfaces for easy wipe-down and minimal particle retention. A rear cord tray houses excess power cord. Includes vacuum/nitrogen service Quick Connects at each end, GFCI duplex outlets, and a 6-foot power cord.

Width	Receptacles	110VAC/60Hz Cat. #	220VAC/50Hz Cat. #
48"	3 Duplexes	**9602-57**	**9602-82**
60"	3 Duplexes	**9602-58**	**9602-83**
72"	4 Duplexes	**9602-80**	**9602-84**
84"	5 Duplexes	**9602-81**	**9602-85**
96"	6 Duplexes	**9602-87**	**9602-86**

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Rod-Top and Perf-Top Cleanroom Tables

- **Made of electropolished 304 stainless steel for optimal cleanliness**
- **Super Erecta construction makes it easy to adjust table height**
- **Select conductive sleeves to make any system shown ESD-safe**

Fabricated of 304 stainless steel, these cleanroom tables feature InterMetro's Super Erecta construction to allow versatile benchtop height adjustment.

All units are knocked-down to minimize shipping and handling charges. They can be assembled in minutes, without tools: the split-sleeve design allows adjustment of the benchtop from 33" to 40" above the floor, in 1" increments. All tables with overheads have 74"-high rear posts. Cantilever shelves are sold separately; see next page.

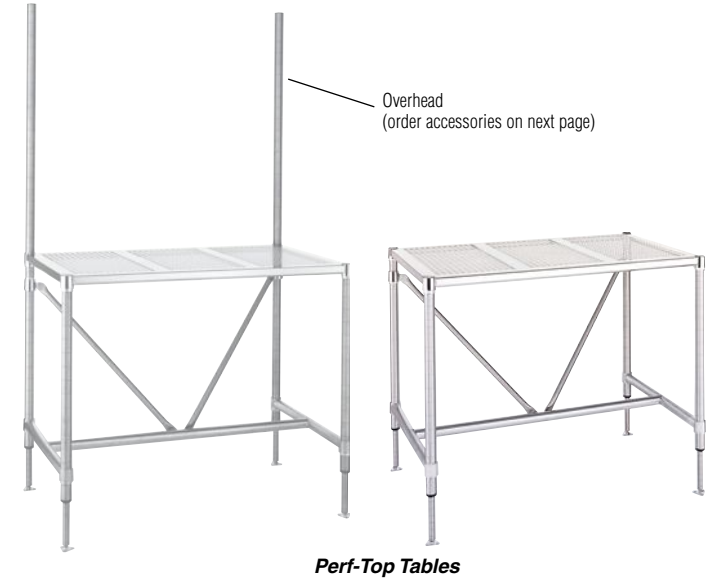
ESD Safety Note: Because standard units ship with plastic split sleeves, they are not rated conductive. For optimal ESD safety, order conductive aluminum split sleeves (see options on following page).

Rod-Top Tables

Rod-Top Tables

Top is manufactured from ¼"-diameter, type 304 stainless steel rods on 1" centers, which provide approximately 75% open area. Support members feature a satin finish. Order shelves and other accessories for overhead supports on next page.

Rod-Top Cleanroom Tables				Rod-Top w/Overhead	
Dimensions (W x D) Inches	(mm)	Shipping Weight lbs. (kg)	Cat. #	Shipping Weight lbs. (kg)	Cat. #
30 x 36	(762 x 915)	32 (14.5)	**2650-68**	40 (18.1)	**2650-72**
30 x 48	(762 x 1220)	40 (18.1)	**2650-69**	48 (21.8)	**2650-73**
30 x 60	(762 x 1525)	48.5 (22)	**2650-70**	55.5(25.2)	**2650-74**
30 x 72	(762 x 1825)	58 (26.3)	**2650-71**	65.5(29.7)	**2650-75**



Perf-Top Tables

Perf-Top Tables

Top is manufactured from ¼"-diameter, type 304 stainless steel with .75"-diameter holes on 1" centers. Table provides approximately 35% open area. Support members feature a satin finish. Order shelves and other accessories for overhead supports on next page.

Perf-Top Cleanroom Tables				Perf-Top w/Overhead	
Dimensions (W x D) Inches	(mm)	Shipping Weight lbs. (kg)	Cat. #	Shipping Weight lbs. (kg)	Cat. #
30 x 36	(762 x 915)	32 (15.9)	**2650-76**	42.5 (19.3)	**2650-80**
30 x 48	(762 x 1220)	46 (20.9)	**2650-77**	53.5 (24.3)	**2650-81**
30 x 60	(762 x 1525)	58 (26.3)	**2650-78**	65.5 (29.7)	**2650-82**
30 x 72	(762 x 1825)	69 (31.3)	**2650-79**	76.5 (34.7)	**2650-83**

Optional Accessories

The versatile design of these cleanroom tables allows you to add grid panels for convenient attachment of shelves, keyboard holders, and other accessories. All are manufactured of clean electropolished Type 304 stainless steel.

Grid Panels* (includes attachment hardware)

Dimensions Inches	(W x D) (mm)	Shipping Weight lbs. (kg)	Cat. #
33 x 36	(838 x 915)	13.8 (6.3)	**2650-88**
33 x 48	(838 x 1220)	18.4 (8.3)	**2650-89**
33 x 60	(838 x 1525)	23 (10.4)	**2650-90**
33 x 72	(838 x 1829)	27.5 (12.5)	**2650-91**

**** Grid panels and accessories cannot be used with overhead cantilever shelves.***

Cleanroom Table Accessories

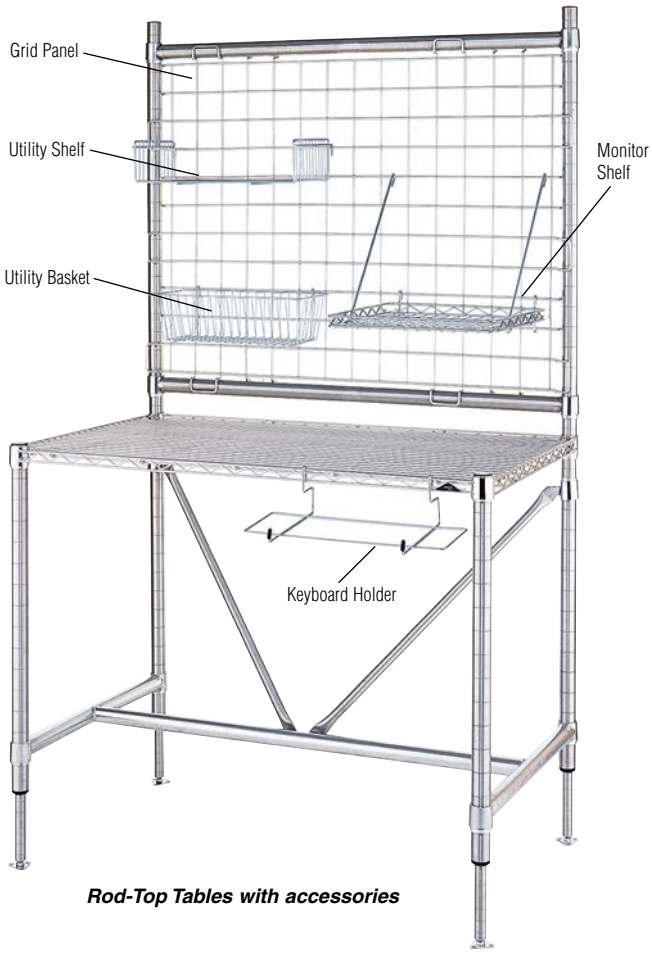
Description	Dimensions Inches	(W x L) (mm)	Shipping Weight lbs. (kg)	Cat. #
Monitor Shelf	16.75 x 16.75	(425 x 425)	32 (15.9)	**2650-92**
Keyboard Holder*	9.5 x 16	(241 x 406)	40 (20.9)	**2650-93**
Utility Shelf	9 x 18.5	(228 x 470)	48.5 (26.3)	**2650-94**
Utility Basket	5 x 13.4 x 7	(127 x 345 x 180)	58 (31.3)	**2650-95**

**** Keyboard holder cannot be used on perf tables.***

Cantilever Shelves for Overhead (not pictured)

Fits Table Width Inches	(mm)	Shipping Weight lbs .(kg)	Cat. #
36	(915)	6.5 (2.9)	**2650-84**
48	(1220)	10.5 (4.8)	**2650-85**
60	(1525)	13 (6)	**2650-86**
72	(1829)	15.5 (7)	**2650-87**

**** Grid panels and accessories cannot be used with overhead cantilever shelves.***



Rod-Top Tables with accessories

Conductive Sleeves (Package of four) — Cat. # **1571-01**

Replaces standard plastic sleeves to make any unit on these two pages ESD-safe.

MicroVac™ Portable Cleanroom Vacuum

Ideal for removing microcontaminants from hard-to-reach places! The MicroVac™ incorporates a four-stage filtering system to trap particles as small as 0.12 microns. Made of stainless steel, it includes a mini-tool kit for use in drawers, computer keyboards, and other hard-to-clean surfaces.

	Cat. #
110VAC/60Hz	**5100-00**
220VAC/50Hz	**5100-00-220**

See page 281

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Cleanroom Work Stations— Stainless Steel Tops

- Stainless steel work surface meets Class 100 particle requirements
- Choice of adjustable "A" base or nonadjustable "C" base available in either finished steel or stainless steel
- Ground terminals and wrist-strap pin connectors allow easy grounding of ionizing guns, wrist straps, and other static protection equipment
- Modular overhead fixture houses three-position fluorescent light

C-Base Design, shown with white-finished frame (No. 1521-55) and optional drawer unit

Also available in all-electropolished stainless steel—see page 322

Many other models available: see following pages for other applications, including vibration-isolation systems, ErgoHeight™ and UltraClean™ work stations!

Stainless Steel Cleanroom Workstation (Heavy-Duty 800 lb. Load Capacity)

Benchtop Dimens. (W" x D")	Stainless Steel Top w/ Finished Steel Base*				Stainless Steel Support Uprights (pair)		Epoxy-Finished Support Uprights (pair)		Fluorescent Light Fixture (finished steel)	Stainless Steel Shelf (12" X 11/4") (Fits on either upright)
	Solid Top		Perforated Top (.75" ID Hole)**							
	"A" Frame Design Cat. #	"C" Frame Design Cat. #	"A" Frame Design Cat. #	"C" Frame Design Cat. #	For Light/ Shelf (36") Cat. # / Pair	For Shelf Only (18") Cat. # / Pair	For Light/ Shelf (36") Cat. # / Pair	For Shelf Only (18") Cat. # / Pair	Cat. #	Cat. #
48 x 30	1521-45	1521-54	1522-56	1522-66	1525-68	1525-69	1524-50	1524-51	1524-78	1525-26
60 x 30	1751-00	1521-55	1522-57	1522-67	1525-68	1525-69	1524-50	1524-51	1700-76	1525-27
72 x 30	1752-00	1521-56	1522-58	1522-68	1525-68	1525-69	1524-50	1524-51	1700-78	1525-28
84 x 30	1521-46	1521-57	1522-59	1522-69	1525-68	1525-69	1524-50	1524-51	1527-00	1525-29
96 x 30	1753-00	1521-58	1522-60	1522-70	1525-68	1525-69	1524-50	1524-51	1700-80	1525-30
48 x 34	1521-49	1521-61	1522-61	1522-71	1525-68	1525-69	1524-50	1524-51	1524-78	1525-26
60 x 34	1700-65	1521-62	1522-62	1522-72	1525-68	1525-69	1524-50	1524-51	1700-76	1525-27
72 x 34	1700-66	1521-63	1522-63	1522-73	1525-68	1525-69	1524-50	1524-51	1700-78	1525-28
84 x 34	1521-50	1521-64	1522-64	1522-74	1525-68	1525-69	1524-50	1524-51	1527-00	1525-29
96 x 34	1521-51	1521-65	1522-65	1522-75	1525-68	1525-69	1524-50	1524-51	1700-80	1525-30

** Stainless Steel Scuff Guards included on finished C-Base benches; order separately for A-Bases. Nonadjustable (one piece) legs also available with "A" Base design at no additional cost (specify when ordering). Finish is white epoxy or powder coat.*
*** For .25" diameter perforations, add $32/ft. of width to the standard pricing.*

Clean, Versatile—and Static Safe

This stainless steel work station combines durability, chemical-resistance, cleanliness, and conductivity.

The stainless steel top is mounted onto an epoxy-finished or powder-coated steel frame made of all-welded square tubing. The heavy-wall tubing used in the construction allows the bench top to support much heavier loads than conventional benches without sagging. Select either the "A" base (adjustable from 25" to 34" floor-to-top) or rigid "C" base design (32" floor-to-top)—see page 335 for a full description. Finished "C" bases come with stainless steel scuff guards on the forward leg member to guard against scratching, and finished "A" base benches are available with a stainless steel lower leg member to provide this additional scuff protection. All base designs include leveling feet. Grounding terminals allow easy connection to your in-house ground, and ground pin connectors located on both the right and left sides of the front frame panel accommodate wrist straps and other static control equipment.

For optimal cleanliness, select the UltraClean™ stainless steel work station, which features an electropolished finish that removes the top layer of stainless steel and leaves behind an ultra-smooth layer of chromium and nickel (see page 322 for ordering information).

New Lock-In Frame Adjusts to Your Requirements

Terra's lock-in frame design allows you to add either a shelf support or a combination light/shelf support, along with all the accessories you need. These supports can be ordered in either stainless or finished steel to meet your cleanliness requirements.

The versatile overhead fixture accommodates a dual-intensity fluorescent illuminator and utility shelves mounted above the work surface.

The fluorescent light assembly includes two fixtures mounted inside the overhead fixture. Each one contains two 40-watt tubes, providing you with either 80 or 160 watts of fluorescent lighting. This variable light control allows you to emphasize one portion of the work area or to provide complete, shadow-free lighting. A light diffuser panel ensures even illumination.

Standard perforations on all Terra benches are ¾" in diameter, allowing 40% open space on the benchtop. Tops also available with ¼"-diameter perforations. See page 322

Computer Rack
A convenient space-efficient CPU rack, 12"W x 20"D x 14"H.
Cat. #
1741-19

A-Base Design with optional drawers (No. 1751-00)

Versatile Shelf Storage

The support uprights allow you to mount one or several 12"-wide stainless steel shelves. Each shelf runs the length of the bench and can be easily moved up and down by adjusting the lock-in frame support. One or several shelves can be added, simply by removing the light assembly and sliding the shelf sleeve over the support arms (see illustration, page 335 for dimensions).

Stainless Steel Leg Member
Replaces lower leg of A-Base benches to guard against scuffs.
Cat. #
1741-25

Cleanroom Drawers (See page 349 for other models)

No. of Drawers	Min. Drawer Height	ABS Plastic Cat.#	Stainless Steel Cat.#
1	3"	**1740-23**	—
1	6"	**1740-02**	**1741-20**
1	12"	**1740-98**	**1741-21**
2	3", 6"	**1740-14**	—
2	6", 6"	**1740-15**	**1741-22**
2	6", 12"	**1740-06**	**1741-23**
3	3", 6", 12"	**1740-07**	—
3	6", 6", 6"	**1740-09**	**1741-24**
4	3", 3", 6", 6"	**1740-08**	—

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DownDraft™ Work Station

- **Enhances operator safety during soldering, chemical processing, adhesive coating, and other operations involving noxious fumes**
- **Sub-surface blower/filter module draws fumes through perforated stainless steel work platform**
- **Activated charcoal filter safely removes a wide range of organic fumes for safe indoor exhaust release**

This work station is ideal for soldering or chemical processing that requires the removal of potentially hazardous fumes.

Its powerful 1200 CFM blower draws exhaust fumes downward, away from the operator, for safe removal and purification. The activated charcoal filter removes 98% of most organic chemical vapors, allowing safe release (see page 424 for information on this and other chemical vapor filters). An 8"-diameter exhaust flange also allows fumes to be ducted away from the bench for external release.

Benchtops are made of cleanroom-grade white laminate, sealed on all sides to prevent particle release. Legs, made of 1½" square steel tubing, raise the work surface 32" off the floor and feature a white epoxy finish and leveling feet. Exhaust fumes enter the filter through three perforated stainless steel platforms positioned at the center of the work surface. Specify other desired platform sizes or locations.

Benchtop Dimensions

(32"H, including leveling feet)	110VAC/60Hz Cat. #	220VAC/50Hz Cat. #
48"W x 30"D	**1728-01**	**1728-01-220**
60"W x 30"D	**1728-02**	**1728-02-220**
72"W x 30"D	**1728-03**	**1728-03-220**
48"W x 34"D	**1728-06**	**1728-06-220**
60"W x 34"D	**1728-07**	**1728-07-220**
72"W x 34"D	**1728-08**	**1728-08-220**

CE

	Cat. #
Activated Charcoal Filter Pre/Post-Filter Two recommended to contain gross particulates.	**1716-00** **1681-04A**
HEPA Final Filter Allows cleanroom exhaust release.	**1681-02**

Polypropylene Work Station

- **All polypropylene construction for superb chemical resistance**
- **Ideal for use near wet processing operations**

This all-polypropylene work bench resists chemical spills, making it the perfect staging area for wet cleaning and processing operations. Reinforced design holds loads up to 200 pounds. Four sliding drawers hold handling tools, wipers, and other small items. Dimensions: 60"W x 30"D x 30"H (floor to top).

Cat. #
7018-41

Customized to Your Requirements!

Put Terra's extensive design and fabrication experience to work on your cleanroom application.

Whether you need a dimensional modification or whole new design, Terra engineers will work with yours to develop an effective, economical solution!

Custom Electropolished Stainless Steel Work Bench
Features multiple duplex outlets, staging shelf and four utility drawers.

Cat. #
9600-65

Modular Cleanroom Work Stations:

Performance, Versatility, and Economy

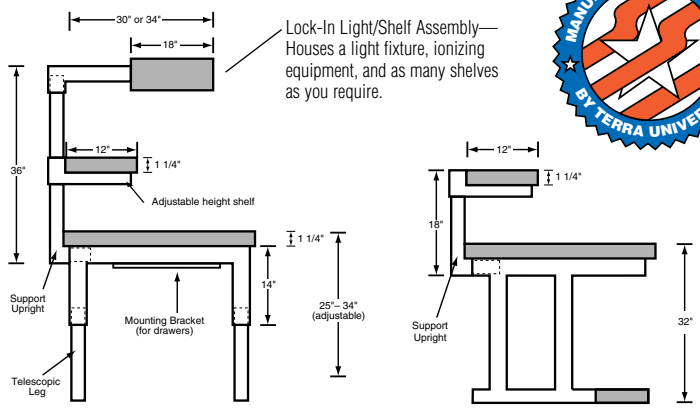
The modular construction of Terra work stations lets you order the work surface and accessories you need, straight from stock. Their lock-in frame lets you adjust height or expand their capabilities as your requirements change. Frame and leg members are fabricated of heavy-duty, all-welded 1½" or 2" square tubing to support the heaviest loads without sagging. All materials are selected and fabricated to meet or exceed Class 100 cleanroom standards.

The adjustable "A"-base models feature telescopic legs that let you adjust the work surface to suit your application (from 25" to 34" floor-to-top). This feature is important if you must maintain a standard work surface height in automated processes. Its retractable design also makes shipping and storage more economical. These benches include nonmarking levelers.

The "C"-base design combines strength with comfort. The sturdy 14-gauge steel tubing and welded construction eliminate the need for forward legs under the work surface that bang knees and chairs, thereby helping to isolate the work surface from accidental bumps and jars. The forward ends of the bottom runners are protected by stainless steel scuff guards. All steel members feature an epoxy or powder coat finish (except tables made entirely of stainless steel or electropolished stainless steel). Stainless steel feet are adjustable for proper leveling. "C"-frame tables are 32" high (floor-to-top).

Benchtops are available in stainless steel, nonconductive or dissipative laminate, and polypropylene.

Model Shown: No. 1000-00 bench, with No. 1524-50 uprights, 1700-76 light and 1000-65 shelf. See page 364.



"A"-Base Design (shown with 36" uprights, light and shelf)

"C"-Base Design (shown with 18" uprights and shelf)

MANUFACTURED IN THE USA BY TERRA UNIVERSAL

Laminate Benchtops

Static-Dissipative Plastic Laminate combines the chemical- and heat-resistive properties of plastic laminate with a controlled path to ground for dissipation of static charge without voltage suppression ambiguity. This laminate has a micro-thin layer of aluminum oxide (moho hardness of 9; diamond - 10) integrated directly into its surface, creating an extremely hard protective layer, which provides long-term resistance to surface abrasion. This material has also been specifically tested for particle trapping (see test results below.) Each sheet used in fabrication is individually certified to meet the values set forth below:

Specifications

General

Thickness:	.040 Nominal
Chemical Resistance:	Resistive to common solvents such as Acetone, Trichloroethylene, Solder Flux, Isopropyl Alcohol, and Naptha
Thermal Resistance:	350°F with no charge per NEMA LD 3.06 and NEMA LKD 3.08; molten solder will not mar surface
Abrasion Resistivity:	Typical NEMA Value—1550 cycles; Wear Rate of .006 gm/100 cycles
Cleaning:	Clean with water only, or with a mild, nonabrasive, ammoniated detergent and rinse; DO NOT use wax or other coatings

Electrical	*Typical*	*Certified*
Surface Resistivity per ASTM D-257:	10^{7} Ω/sq	$10^{6\text{-}9}$ Ω/sq.
Resistance to Ground Ohms—NFPA 99:	10^{7}	$10^{6\text{-}9}$
Decay Rate per Fed Test 101C, Method 4046: (5,000 to 0 Volts)	.01 sec.	.5 sec.

Particle Trapping Test

	Particles/cu. ft. Air in 16 Sq. In. Area (Microns)	
Sample:	10	5
Cleanroom Air:	0	1
Water Washed Sample:	9	9
Ethyl Alcohol Washed Sample:	10	15
Acetone Washed Sample:	7	10
Freon TF Washed Sample:	17	12
Silica Gel & Iron Oxide-Contaminated Surface Washed with Ethyl Alcohol:	5	20

These counts are very low. Under the same test conditions, a material which does shed particles would give off thousands of particles in the 10- and 5-micron range. This material is thus certified as cleanroom safe.

Non-Conductive Laminate shares many characteristics with static-dissipative laminate, except surface resistivity. In surface resistivity tests, this laminate material measured between 4.1 x 10^{11} and 7.4 x 10^{12} Ω/sq. It is generally resistive to most solvents as well as hot solder; however, mineral acids (such as hydrochloric, sulphuric, or nitric acid) should not be allowed to contact to laminate. This material is suitable for cleanroom use and will not outgas.

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Cleanroom Work Stations— Nonconductive Laminate Tops

- **Sealed laminate top design meets Class 100 particle requirements**
- **Select adjustable "A" base or recessed "C" base to suit your application requirements**
- **Modular overhead fluorescent light fixture provides shadow-free viewing anywhere on benchtop surface**
- **Optional ionizing fan provides safe, reliable, static neutralization**

Terra's Standard Nonconductive Cleanroom Work Station is designed to let you order exactly the work surface you need, straight from stock. Its modular design accommodates a wide range of accessories that can make the critical difference in operator productivity and quality assurance.

Tough, Versatile, Clean

The laminate tops are bonded to a 1¼" high-density, epoxy-bonded fiber core; edges are covered with plastic edging, and backing is provided on the bottom of the work surface to meet cleanroom standards. Standard color is non-glare white.

The heavy-duty work bench frame is made of all-welded square tubing. The heavy-wall tubing used in the construction allows the benchtop to support much heavier loads than conventional benches without sagging. Select either the "A" base (adjustable from 25" to 34" floor-to-top) or rigid "C" base design (32" floor-to-top)—see page 335 for a full description. Both base designs feature a white epoxy enamel or powder coat finish. "C" bases come with stainless steel scuff guards on the forward leg member to guard against scratching, and "A" base benches are available with a stainless steel lower leg member to provide this additional scuff protection. All base designs include leveling feet.

Lock-In Frame Adjusts to Your Requirements

Terra's lock-in frame design allows you to add either a shelf support or a combination light/shelf support, along with all the accessories you need.

The versatile overhead fixture houses a dual-intensity fluorescent illuminator, which includes two fixtures mounted inside the overhead fixture. Each one contains two 40-watt tubes, providing you with either 80 or 160 watts of fluorescent lighting. The three-position rocker switch on the left side of the fixture controls operation: in the UP position, both fixtures are ON; in the bottom position only one fixture is ON, and in the middle position both fixtures are OFF. This variable light control allows you to emphasize one portion of the work area or to provide complete, shadow-free lighting. A light diffuser panel ensures even illumination.

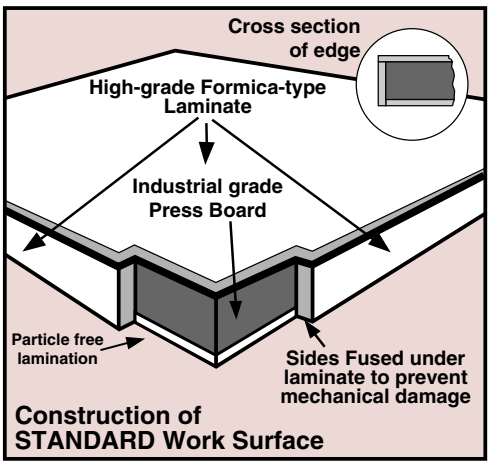
C-Base Design (No. 1000-00) with No. 1524-50 uprights, 1700-76 light and 1000-65 shelf

Many other models available: see page 319 for an overview of other applications, including static-dissipative and acid-resistant work surfaces, vibration-isolation systems, ErgoHeight™ and UltraClean™ work stations!

Standard Cleanroom Workstation* (800-lb. load capacity)			Corresponding Accessories			
Nonconductive Tops			Finished CR Steel Support Uprights (pair)		Fluorescent Light Fixture	Nonconductive Shelf (fits on either upright)
Benchtop Dimensions (W" x D")	"A" Base Design (telescoping legs) Cat. #	"C" Base Design (recessed legs) Cat. #	For Light/Shelf (36") Cat. # / Pair	For Shelf Only (18") Cat. # / Pair	Cat. #	Cat. #
48 x 30	1722-00	1521-09	1524-50	1524-51	1524-78	1527-07
60 x 30	1724-00	1000-00	1524-50	1524-51	1700-76	1000-65
72 x 30	1726-00	1000-01	1524-50	1524-51	1700-78	1000-66
84 x 30	1521-01	1000-02	1524-50	1524-51	1527-00	1000-67
96 x 30	2402-00	1000-03	1524-50	1524-51	1700-80	1000-68
48 x 34	1723-00	1521-16	1524-50	1524-51	1524-78	1527-07
60 x 34	1725-00	1521-17	1524-50	1524-51	1700-76	1000-65
72 x 34	1727-00	1521-18	1524-50	1524-51	1700-78	1000-66
84 x 34	1521-05	1521-19	1524-50	1524-51	1527-00	1000-67
96 x 34	1521-06	1521-20	1524-50	1524-51	1700-80	1000-68

** Frame and legs feature an epoxy or powder-coat finish. C-Base includes stainless steel scuff-guards to protect against scratching (order separately for A-Base).*

CLEANROOM WORK STATIONS



Construction of STANDARD Work Surface

Versatile Shelf Storage

The support uprights allow you to mount one or several 12"-deep shelves. Each shelf runs the width of the bench and can be easily moved up and down by adjusting the lock-in frame collar. One or several shelves can be added, simply by removing the light assembly and sliding the shelf sleeve over the support arms (see illustration, page 335, for dimensions).

Other system options include easy-clean Modular Cleanroom Drawers and power strips, which provide convenient outlets along the length of the benchtop to operate power process equipment. **Note:** Each shelf includes a support and mounting collar.

A-Base Design (No. 1724-00), shown with optional drawers.

Other Bench Options

Computer Rack

A convenient space-efficient CPU rack, 12"W x 20"D x 14"H.

Cat. #
1741-19

Elastomeric Compression Mounts

Dampen vibrations to help maintain a steady work surface. Six are recommended per work station; price includes installation. For optimal vibration control, see page 346

Cat. #
9700-00

Power Strip

Includes master on/off switch, 15-A breaker and 4 receptacles (installed)

Cat. #
1681-80

Cleanroom Drawers Unit (See page 349 for other models)

No. of Drawers	Min. Drawer Height	ABS Plastic Cat.#	Stainless Steel Cat.#
1	3"	**1740-23**	—
1	6"	**1740-02**	**1741-20**
1	12"	**1740-98**	**1741-21**
2	3", 6"	**1740-14**	—
2	6", 6"	**1740-15**	**1741-22**
2	6", 12"	**1740-06**	**1741-23**
3	3", 6", 12"	**1740-07**	—
3	6", 6", 6"	**1740-09**	**1741-24**
4	3", 3", 6", 6"	**1740-08**	—

Stainless Steel Leg Member

Replaces lower leg of A-Base benches to guard against scuffs.

Cat. #
1741-25

Full-Coverage Ionizing Blower

Designed for overhead shelf mounting or benchtop placement, this unit projects a balanced stream of positive ions for neutralization of static charges throughout a restricted area, without taking up valuable work space. Its steady-state DC ion emission enables fast discharge with low airflow, minimizing disruption of processing operations.

The patented IsoStat technology guarantees intrinsically balanced ionization and eliminates complicated feedback circuits, making this the most reliable ionizer available. Emitter points are electrostatically shielded to eliminate field-induced charge. For full specifications, see page 600.

Recommended installation: If fixed installation is desired, Terra recommends selection of a shelf with desired uprights (18" or 36"). The ionizer's bracket features .25"-diameter screw holes for mounting to the underside of the shelf.

Full-Coverage Ionizing Blower

Cat. #
2005-11

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Cleanroom Work Stations— Static-Dissipative Tops

- **Static-dissipative laminate (10^6 to 10^8 ohms/sq.) safely dissipates charges to reduce possibility of electrostatic discharge (meets MIL-B-81705-B specifications)**
- **Cleanroom-compatible materials, all-bonded surfaces exceed Class 100 cleanroom standard**
- **Ground terminals and wrist-strap connectors allow easy grounding of ionizing guns, wrist straps, and other static protection equipment**
- **Modular overhead fixture and shelf house three-position fluorescent light**
- **Optional ionizing fan provides safe, effective static neutralization**

Clean, Versatile— and Static Safe

This work station is ideal for static-sensitive materials that can be degraded or destroyed by the charges generated by conventional benchtops.

It features a dissipative laminate top bonded to a 1¼" high-density, epoxy-bonded fiber core. Edges are covered with plastic edging, and backing is provided on the bottom of the work surface to meet Class 100 cleanroom standards.

C-Base Bench No. 1521-32, with No. 1524-50 uprights, 1700-76 light, 1700-90 shelf and 1740-07 drawer.

Many other models available: see page 319 for an overview of other applications, including acid-resistant work surfaces, vibration-isolation systems, ErgoHeight™ and UltraClean™ work stations!

Static-Dissipative Work Station* (800-lb. load capacity)			Corresponding Accessories			
Static Dissipative Top			Finished CR Steel Support Uprights (pair)		Fluorescent Light Fixture	Static-Dissipative Shelf (fits on either upright)
Benchtop Dimensions (W" x D")	"A" Base Design (telescoping legs) Cat. #	"C" Base Design (recessed legs) Cat. #	For Light/Shelf (36") Cat. # / Pair	For Shelf Only (18") Cat. # / Pair	Cat. #	Cat. #
48 x 30	1728-00	1521-31	1524-50	1524-51	1524-78	1524-80
60 x 30	1730-00	1521-32	1524-50	1524-51	1700-76	1700-90
72 x 30	1732-00	1521-33	1524-50	1524-51	1700-78	1700-92
84 x 30	1521-23	1521-34	1524-50	1524-51	1527-00	1527-35
96 x 30	2400-00	1521-35	1524-50	1524-51	1700-80	1700-94
48 x 34	1700-29	1521-38	1524-50	1524-51	1524-78	1524-80
60 x 34	1731-00	1521-39	1524-50	1524-51	1700-76	1700-90
72 x 34	1733-00	1521-40	1524-50	1524-51	1700-78	1700-92
84 x 34	1521-27	1521-41	1524-50	1524-51	1527-00	1527-35
96 x 34	1521-28	1521-42	1524-50	1524-51	1700-80	1700-94

** Frame and legs feature an epoxy or powder-coat finish. C-Base includes stainless steel scuff–guards to protect against scratching (order separately for A-Base).*

CLEANROOM WORK STATIONS

The dissipative laminate tops safely dissipate electrostatic charges to allow operations on static-sensitive devices—these benches meet MIL-B-81705-B specifications. They also resist a wide range of chemicals—see page 335 for full specifications on Terra's bench top laminates and materials. Standard color is non-glare white.

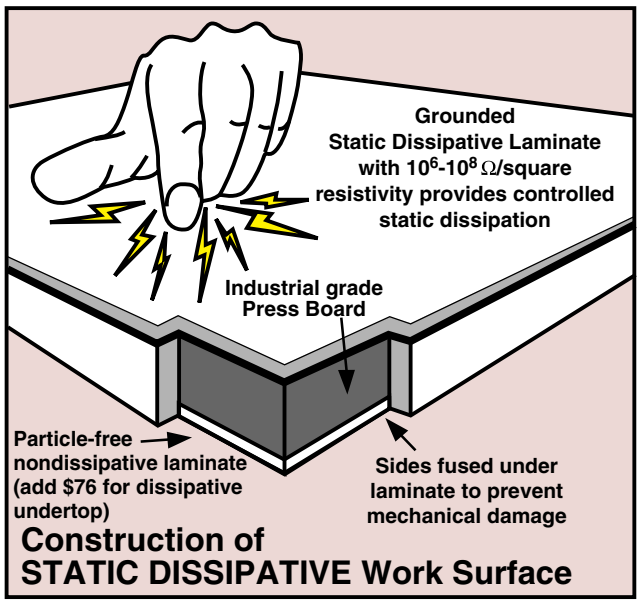
Grounding terminals allow easy connection to your in-house ground, and connectors located on both the right and left sides of the front frame panel accommodate wrist straps and other static control equipment.

Like our standard work stations, this station also features a heavy-duty bench frame made of all-welded square tubing. The heavy-wall tubing used in the construction allows the benchtop to support much heavier loads than conventional benches without sagging. Select either the "A" base (adjustable from 25" to 34" floor-to-top) or rigid "C" base design (32" floor-to-top)—see page 335 for a full description. Both base designs feature a white epoxy enamel or powder-coat finish. "C" bases come with stainless steel scuff guards on the forward leg member to guard against scratching, and "A" bases are available with a stainless steel lower leg member to provide this additional scuff protection. All base styles include leveling feet.

Lock-In Frame Adjusts to Your Requirements

Terra's lock-in frame design allows you to add either a shelf support or a combination light/shelf support, along with all the accessories you need.

The versatile overhead fixture house a dual-intensity fluorescent illuminator, which includes two fixtures mounted inside the overhead fixture. Each one contains two 40-watt tubes, providing you with either 80 or 160 watts of fluorescent lighting. The three-position rocker switch on the left side of the fixture controls operation: in the UP position, both fixtures are ON; in the bottom position only one fixture is ON, and in the middle position both fixtures are OFF. This variable light control allows you to emphasize one portion of the work area or to provide complete, shadow-free lighting. A light diffuser panel ensures even illumination.



Construction of
STATIC DISSIPATIVE Work Surface

Versatile Shelf Storage

The support uprights allow you to mount one or several 12"-deep shelves. Each shelf runs the width of the bench and can be easily moved up and down by adjusting the lock-in frame support. One or several shelves can be added, simply by removing the light assembly and sliding the shelf sleeve over the support arms (see illustration, page 335, for dimensions).

Other system options include easy-clean Modular Cleanroom Drawers and power strips, which provide convenient outlets along the length of the bench top to operate power process equipment.

Other Options:

Power Strip — Cat. # **1681-80**
Includes master on/off switch, 15-A breaker and 4 receptacles (installed)

Stainless Steel Leg Member — Cat. # **1741-25**
Replaces lower leg of A-Base benches to guard against scuffs

Elastomeric Compression Mounts — Cat. # **9700-00**
Dampen vibrations to help maintain a steady work surface. Six are recommended per work station; price includes installation. For optimal vibration control, see page 346.

Cleanroom Drawers (See page 349 for other models)

No. of Drawers	Min. Drawer Height	ABS Plastic Cat.#	Stainless Steel Cat.#
1	3"	**1740-23**	—
1	6"	**1740-02**	**1741-20**
1	12"	**1740-98**	**1741-21**
2	3", 6"	**1740-14**	—
2	6", 6"	**1740-15**	**1741-22**
2	6", 12"	**1740-06**	**1741-23**
3	3", 6", 12"	**1740-07**	—
3	6", 6", 6"	**1740-09**	**1741-24**
4	3", 3", 6", 6"	**1740-08**	—

Full-Coverage Ionizing Blower

Designed for overhead shelf mounting or benchtop placement, this unit projects a balanced stream of positive ions for neutralization of static charges throughout a restricted area, without taking up valuable work space. Its steady-state DC ion emission enables fast discharge with low airflow, minimizing disruption of processing operations.

The patented IsoStat technology guarantees intrinsically balanced ionization and eliminates complicated feedback circuits, making this the most reliable ionizer available. Emitter points are electrostatically shielded to eliminate field-induced charge. For full specifications, see page 600.

Recommended installation: If fixed installation is desired, Terra recommends selection of a shelf with desired uprights (18" or 36"). The ionizer's bracket features .25"-diameter screw holes for mounting to the underside of the shelf.

Full-Coverage Ionizing Blower — Cat. # **2005-11**

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Cleanroom Work Stations— Chemical-Resistant Tops

- **Lightweight polypropylene work surface provides optimal protection against acids and other caustic chemicals**
- **Cleanroom-compatible design meets Class 100 particle requirements**
- **Raised "ship's edges" available to contain dangerous spills**
- **Select solid top or perforated top with plenum chamber for venting fumes during wet processing operations**
- **Modular overhead fixture houses three-position fluorescent light**

This modular work station combines all of the advantages of our standard units with the light-weight durability of polypropylene, which resists the corrosive effects of a wide range of acids and other caustic materials.

The polypropylene top is bonded to a steel frame for support along the entire work surface. The bench frame is made of all-welded square tubing; the heavy-wall tubing used in the construction allows the benchtop to support much heavier loads than conventional benches without sagging. The "A" base table support is adjustable from 25" to 34" floor-to-top and features a white finish. Optional stainless steel lower leg members help guard against scratching. All base designs include leveling feet.

Select either the solid benchtop or a perforated top that features a sub-surface plenum chamber. This perforated top/plenum model is ideal for operations under a vertical laminar flow station; the perforations safely vent fumes that might arise during wet processing applications into the plenum chamber, from which they can be exhausted through a 5" x 40" discharge (custom discharge sizes are available to suit your in-house exhaust system).

A-Base Bench No. 1522-01, shown with optional drawers

Many other models available: see page 319 for an overview of other applications, including static-dissipative work surfaces, vibration-isolation systems, ErgoHeight™ and UltraClean™ work stations! Custom cut-outs are available to accommodate sinks, rinsers and other process equipment.

Polypropylene Cleanroom Workstation*					Corresponding Accessories				
Benchtop Dimens. (W" x D")	Polypropylene Solid Top		Polypropylene Perforated Top With Plenum**	Stainless Steel Perforated Top w/Polypropylene Plenum**	CR Steel Finished Support Uprights		Fluorescent Light Fixture	Polypropylene Shelf	Polypropylene Shelf
	"A" Base Design (telescoping legs)	"C" Base Design (recessed legs)			For Light/ Shelf (36")	For Shelf Only (18")	Painted Steel	(12" x 1¼") Fits on either upright.	(12" x 1¼") With raised edges
	Cat. #	Cat. #	Cat. #	Cat. #	Cat. # / Pair	Cat. # / Pair	Cat. #	Cat. #	Cat. #
48 x 30	**1522-00**	**1522-14**	**1522-42**	**1526-50**	**1524-50**	**1524-51**	**1524-78**	**1525-54**	**1525-56**
60 x 30	**1522-01**	**1522-15**	**1522-43**	**1526-51**	**1524-50**	**1524-51**	**1700-76**	**1521-73**	**1525-57**
72 x 30	**1522-02**	**1522-16**	**1522-44**	**1526-52**	**1524-50**	**1524-51**	**1700-78**	**1521-74**	**1525-58**
84 x 30	**1522-03**	**1522-17**	**1522-45**	**1526-53**	**1524-50**	**1524-51**	**1527-00**	**1521-02**	**1525-59**
96 x 30	**1522-04**	**1522-18**	**1522-46**	**1526-54**	**1524-50**	**1524-51**	**1700-80**	**1521-03**	**1525-60**
48 x 34	**1522-07**	**1522-21**	**1522-47**	**1526-55**	**1524-50**	**1524-51**	**1524-78**	**1525-54**	**1525-63**
60 x 34	**1522-08**	**1522-22**	**1522-48**	**1526-56**	**1524-50**	**1524-51**	**1700-76**	**1521-73**	**1525-64**
72 x 34	**1522-09**	**1522-23**	**1522-49**	**1526-57**	**1524-50**	**1524-51**	**1700-78**	**1521-74**	**1525-65**
84 x 34	**1522-10**	**1522-24**	**1522-50**	**1526-58**	**1524-50**	**1524-51**	**1527-00**	**1521-02**	**1525-66**
96 x 34	**1522-11**	**1522-25**	**1522-51**	**1526-59**	**1524-50**	**1524-51**	**1700-80**	**1521-03**	**1525-67**

** Frame and legs feature an epoxy or powder-coat finish. Select stainless steel scuff–guards to protect against scratching (See ordering information on next page).*

*** A-Base is standard*

CLEANROOM WORK STATIONS

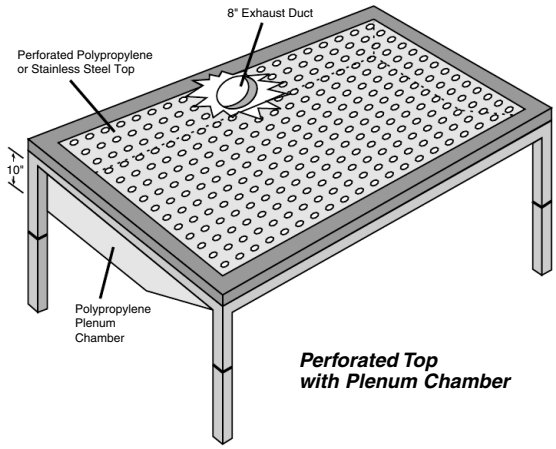
Lock-In Frame Adjusts to Your Requirements

Terra's lock-in frame design allows you to add either a shelf support or a combination light/shelf support, along with all the accessories you need.

The versatile overhead fixture accommodates a dual-intensity fluorescent illuminator and utility shelves mounted above the work surface. The fluorescent light assembly includes two fixtures mounted inside the overhead fixture. Each one contains two 40-watt tubes, providing you with either 80 or 160 watts of fluorescent lighting. The three-position rocker switch on the left side of the fixture controls operation: in the UP position, both fixtures are ON; in the bottom position only one fixture is ON, and in the middle position both fixtures are OFF. This variable light control allows you to emphasize one portion of the work area or to provide complete, shadow-free lighting. A light diffuser panel ensures even illumination.

Versatile Shelf Storage

The support uprights allow you to mount one or several 12"-deep shelves. Each shelf runs the width of the bench and can be easily moved up and down by adjusting the lock-in frame support. One or several shelves can be added, simply by removing the light assembly and sliding the shelf sleeve over the support arms (see illustration, page 335, for dimensions).



Perforated Top with Plenum Chamber

Other Options:

Power Strip

Includes master on/off switch, 15-A breaker and 4 receptacles (installed).

Cat. # **1681-80**

Stainless Steel Leg Member

Replaces lower leg of A-Base benches to guard against scuffs.

Cat. # **1741-25**

Cleanroom Drawers

No. of Drawers	Min. Drawer Height	ABS Plastic Cat. #	Stainless Steel Cat. #
1	6"	**1740-02**	**1741-20**
1	12"	**1740-98**	**1741-21**
2	6", 6"	**1740-15**	**1741-22**
2	6", 12"	**1740-06**	**1741-23**
3	6", 6", 6"	**1740-09**	**1741-24**

C-Base Design with optional drawer unit (No. 1522-15)

Full-Coverage Ionizing Blower

Designed for overhead shelf mounting or benchtop placement, this unit projects a balanced stream of positive ions for neutralization of static charges throughout a restricted area, without taking up valuable work space. Its steady-state DC ion emission enables fast discharge with low airflow, minimizing disruption of processing operations.

The patented IsoStat technology guarantees intrinsically balanced ionization and eliminates complicated feedback circuits, making this the most reliable ionizer available. Emitter points are electrostatically shielded to eliminate field-induced charge.

For full specifications, see page 600.

Recommended installation: If fixed installation is desired, Terra recommends selection of a shelf with desired uprights (18" or 36"). The ionizer's bracket features .25"-diameter screw holes for mounting to the underside of the shelf. For broad coverage, ionizers should be positioned every 24" along the bench.

	Cat. #
Full-Coverage Ionizing Blower	**2005-11**

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Boosting Yields through Vibration Control

In an age of rapidly shrinking component geometries, your investment in vibration control today will be even more important tomorrow

As manufacturers involved in lithography, surface profilometry, metrology, biotechnology, and other critical operations have found, vibrations are a potentially disastrous threat to precision and throughput.

Vibrations are generated by traffic, footfall, air handling equipment, and other conditions that exist in the vicinity of virtually every manufacturing facility.

Even though a production or metrology tool may include a vibration isolation system, the fab floor may not meet the equipment's floor specification. Or vibrations experienced at the fab floor may push an existing tool beyond its original resolution specification. Or disturbance levels deemed acceptable at one time may escalate suddenly and unexpectedly—causing serious problems.

Disturbing Consequences!

In the most severe cases of environmental disturbance, high-precision operations become impossible. Without the ability to zero in on precise locations on a sample surface, an operator cannot complete critical functionality tests, obtain required resolution, or perform microinjections and other delicate procedures.

In other cases, momentary disturbances can compromise operations without the operator's knowledge. For example, a brief set of vibrations caused by unusually heavy street traffic can have disastrous consequences on an automated step-and-repeat lithographic exposure, involving hundreds of discrete parts that will have to be reworked or scrapped. To make matters worse, this damage may not be detected until after further processing operations have been completed—compounding an investment in degraded components.

Another consequence of environmental disturbances is felt on a more visceral level: they literally may be making your operators sick! Persistent viewing of blurred, shaking objects at high magnifications causes nausea, headaches, and fatigue, which take a heavy toll on performance and throughput.

Passive and Active Vibration Control

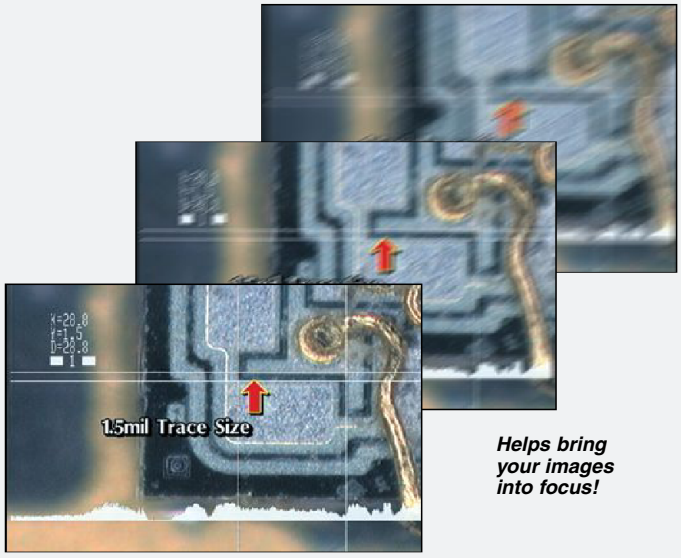
Vibration Control is essential for precision test and measurement of production processes and the research of phenomena with dimensions in the nanometer (and even Angstrom) size range. Successfully meeting this level of stability requires extremely precise alignment of system components, which is best accomplished by combining three strategies:

A rigid system structure: Keeping a high stiffness-to-mass ratio of the instrument and the support structure results in better resistance to both on-board and environmental vibration.

A stable floor: Floor vibration is by far the most important environmental factor in determining system performance. Especially in older buildings built to less stringent stability specifications, vibration from a wide variety of sources may be a significant problem. In such cases, the floor may need to be reinforced.

Enhanced Performance Through Vibration Isolation

- ***High Resolution Microscopes***
- ***Scanning Electron Microscopes***
- ***Scanning Probe Microscopes—such as AFM's and STM's***
- ***Transmission Electron Microscopes***
- ***Commercial Interferometers***
- ***Surface Profilometers***
- ***Photolithography Exposure Illuminators***
- ***Metrology Inspection Systems***
- ***Ion Implanters***
- ***Probe Stations***



Helps bring your images into focus!

Supplemental passive or active vibration isolation where needed: If the floor exceeds adequate stability for the desired level of performance, a supplemental vibration isolation system may be required.

Passive Vibration Isolation

The most common type of vibration isolator is the pneumatic isolator, which contains a sealed and pressurized air volume and movable piston. A rolling diaphragm membrane provides an airtight seal between the isolator and the piston. Compressed air pushes against the piston to support the system static load. Damping is provided by forcing air to move between chambers through one or more small orifices and/or a pendulum rod within a viscous damper.

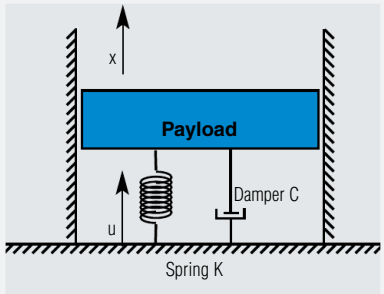
Simply stated, the key to isolating vibration is to develop vibration isolators that attain the lowest possible natural frequency with the best isolation possible. The lower the natural frequency, the greater the ability of the isolation table to resist a disturbing frequency (resulting from loud noises, traffic, falling objects, etc.).

Natural frequency is the rate of movement (in cycles per second) at which a mass-spring system will vibrate if it is disturbed. The damping mechanism in the system will eventually damp out these oscillations.

As long as the disturbing frequency is higher than the natural frequency, the surface will isolate the vibration. When disturbing frequencies approach and then fall below the natural frequency, however, the isolators in the vibration table will amplify the disturbing frequency, increasing the vibration of the work surface.

Vibration isolation effectiveness is demonstrated graphically by a transmissibility curve which plots the ratio of system motions to ground motion as a function of frequency. In the transmissibility curve shown, the crossover frequency is the frequency at which the motion of the isolated system is the same as the floor motion (transmissibility = 1).

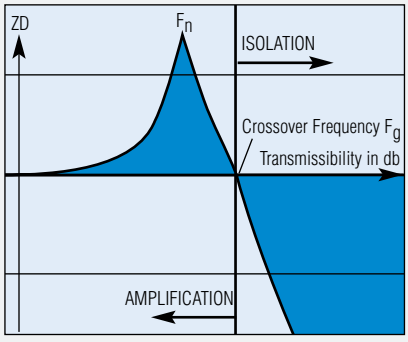
Any disturbing force with a higher frequency will be isolated; the pneumatic isolator will transmit only a small fraction of the floor vibration to the isolated system. This isolation efficiency approaches 99.9%, depending on the load and the disturbing frequency.



Passive Isolation System
x - Frequency of vibration at work surface
u - Frequency of vibration at floor
T (Transmissibility) = x/u

Any disturbing force with a lower frequency will be amplified, although this amplification can be minimized through proper engineering of the damping mechanism. This low frequency amplification can be eliminated, and additional vibration isolation achieved, with an active vibration control system (see below).

For optimal results, then, the desirable characteristics of a pneumatic isolator are a low natural frequency, a low amplification at resonance, and a fast roll-off of vibration transmission at higher frequencies. These are precisely the characteristics engineered into our line of passive vibration isolation tables and platforms.



Transmissibility Curve
fn - Natural Frequency
fg - Crossover Frequency

Active Vibration Control

The passive vibration-isolation system described above is generally effective at isolating floor vibrations at higher frequencies, but it does nothing to isolate payload-generated vibrations. Automatic XY stages, for example, create vibrations that compromise readings. Likewise, fans, motors, and valves that are directly mounted to the payload create vibrations that cannot be isolated by a passive system.

Active isolation addresses these shortcomings while providing maximum isolation for low frequency vibration (0.7 - 30 Hz). A typical active vibration control system consists of motion sensors and force or displacement actuators, which produce counteracting forces designed to cancel payload vibration. By permanently mounting the motion sensor to the payload, the controller receives all the residual vibration signals from any source, regardless of their origin: floor vibration, sound pressure waves, etc. This innovative active-control system is known as a real-time feedback controller, with optional stage and ground feedforward control.

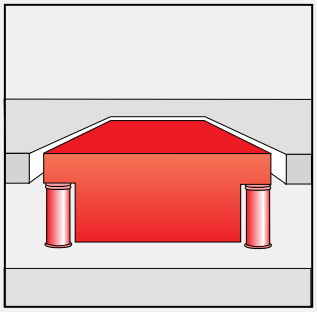
Applying feedforward control to XY stages requires an interface between the stage controller and the active system controller, producing outstanding performance and decreasing settling times by a factor of 200 (typically). This design virtually eliminates the long settling time after stage movement, which is characteristic of passive vibration systems, greatly improving throughput.

Refer to page 345 for Terra's A-TLC Series Workstations, which provide active vibration isolation.

Full Range of Vibration Solutions!

In addition to standard Vibration-Isolation Workstations, Terra offers stand-alone isolators, platforms, and pedestals designed specifically for common semiconductor processing and inspection equipment operating in a cleanroom environment.

Call for information on a solution to environmental disturbances in your facility!



BP Modular Block Platform Designed specifically for integration into raised cleanroom floor.

Design Rules and Line Widths: Past, Present, and Future

The trend toward smaller geometries suggests that an investment in vibration isolation now will continue to pay huge dividends in the future.

Period	*Photo Line*	*Registration*	*Inspection*
1975 - 1980	7 to 10 microns	0.7 to 1 micron	0.1 micron
1980 - 1985	2 to 7 microns	0.2 to 0.7 micron	0.07 micron
1985 - 1990	0.7 to 2 microns	0.07 to 0.2 micron	0.02 micron
1990 - 1995	0.3 to 0.7 micron	0.03 to 0.07 micron	0.007 micron
Current - Future	0.1 to 0.3 micron	0.01 to 0.03 micron	0.0001 micron (10Å)

How Does Your Facility Shake Down?

Maximum permissible amplitudes in the following vibration categories (VC):

- VC-A Adequate in most instances for optical microscopes to 400X
- VC-B An appropriate standard for optical microscopes to 1000X, inspection and lithography equipment to 3 micron line widths
- VC-C A good standard for most lithography and inspection equipment to 1 micron line widths.
- VC-D Suitable for electron microscopes (SEMs, TEMs) and E-Beam systems, operating to the limit of their capacity.
- VC-E Assumed to be adequate for the most demanding of sensitive systems.

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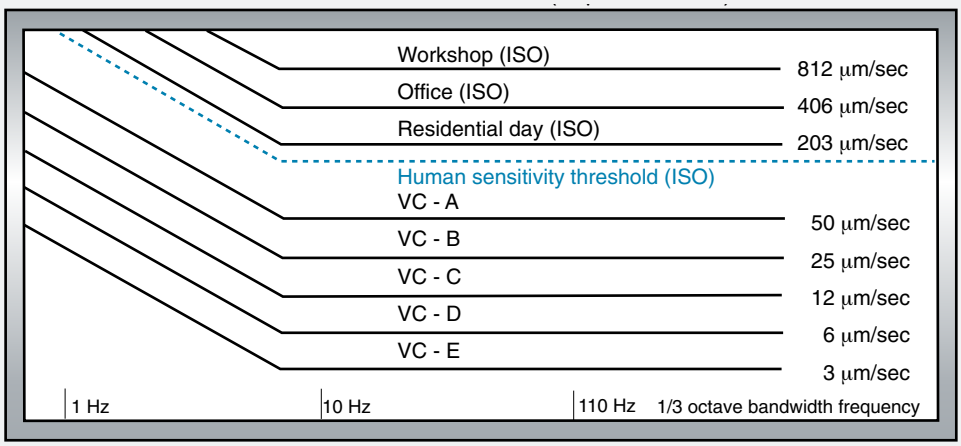

Allowable vibration in semiconductor facilities (in µm/sec rms)

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800 S. Raymond Ave., Fullerton, CA 92831 CA

TLC Series Vibration-Free Workstations

- **Increases accuracy and throughput of high-resolution inspection**
- **Ergonomic design enhances functionality and comfort**
- **Rigid all-welded frame produces lower natural frequency for more effective vibration damping**
- **Industry-leading pneumatic damping mounts with mechano-pneumatic proportional valves optimize throughput by minimizing settling time**
- **Automatic height-leveling with varying load conditions**
- **Load-carrying capacity of up to 450 lbs. (205 kg)**

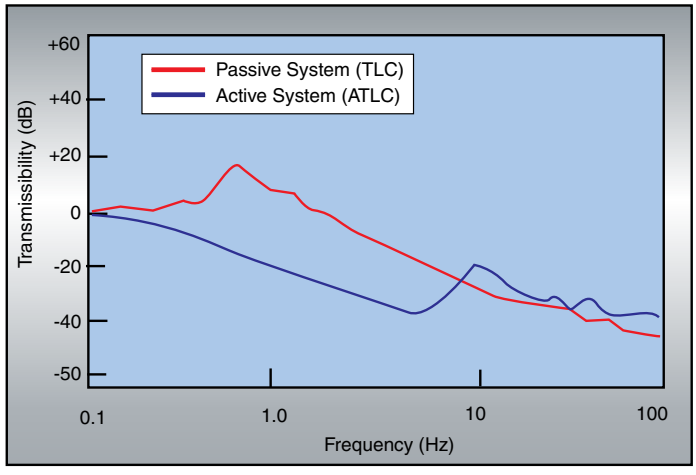
TLC Series vibration-free workstations provide exceptional quality and performance at economical prices.

Industry-Leading Vibration-Damping Design

A high-stiffness chassis is the foundation of the TLC Series Workstation. Its all-welded construction, including steel crossbeams, results in high stability and a load-carrying capacity of up to 450 lbs. (205 kg) on standard models, with custom tops capable of handling up to 1,320 lbs. (600 kg). The large work surface is a laminated stainless steel with maximum inherent damping. Mechano-pneumatic proportional valves minimize settling time and provide auto-leveling to within ± 5 mm to compensate for varying loads. Rugged leveling feet ensure solid, wobble-free contact with sloping or irregular floors.

The large work surface is isolated from vibration by low-frequency pneumatic isolators with a horizontal and vertical natural frequency of about 2 Hz. These isolators effectively dampen typical building vibrations above 3 Hz.

A full line of accessories includes arm rests, shelves, monitor arms, and casters.



Specifications

Natural frequency:	2.1 Hz (vertical): 1.9 Hz (horizontal)
Amplification at resonance:	4 (approx.)
Isolation efficiency @ 5 Hz	vertical 70 - 96%
	horizontal 42 - 84%
Isolation efficiency @ 10 Hz	vertical 83 - 98%
	horizontal 62 - 96%
Vertical Travel:	± 5 mm (0.2 in.)
Minimum natural frequency of support plate:	> 80 Hz
Net load capacity:	450 lbs.
Required pressure:	80 psi
Compressed air usage:	0.2 l/min. (approx.)
Compressed air hose size:	¼" OD
Chassis color:	Shell white

TLC Workstation

Dimensions inches (mm)	Weight	Cat. #
30W x 30D x 30H (762 x 762 x 762mm)	415lbs. (190kg)	**3434-00**
36W x 30D x 30H (914 x 762 x 762mm)	470lbs. (215kg)	**3434-01**
48W x 30D x 30H (1220 x 762 x 762mm)	600lbs. (275kg)	**3434-02**
60W x 30D x 30H (1524 x 762 x 762mm)	720lbs. (330kg)	**3434-03**
36W x 36D x 30H (914 x 914 x 762mm)	555lbs. (250kg)	**3434-04**
48W x 36D x 30H (1220 x 914 x 762mm)	705lbs. (320kg)	**3434-05**
60W x 36D x 30H (1524 x 914 x 762mm)	855lbs. (390kg)	**3434-06**

Optional Features for TLC and Active TLC Workstations

Monitor and Keyboard Arm

Rigidly attaches to the TLC or ATLC frame; adjustable in three directions.

Cat. # **3434-14**

Casters

Set of four retractable casters.

Cat. # **3434-15**

Arm rests

Enhance operator comfort and stability during delicate manipulations without disturbing the isolated work surface.

	Cat. #
30"W	**3434-16**
36"W	**3434-17**
48"W	**3434-18**
60"W	**3434-19**

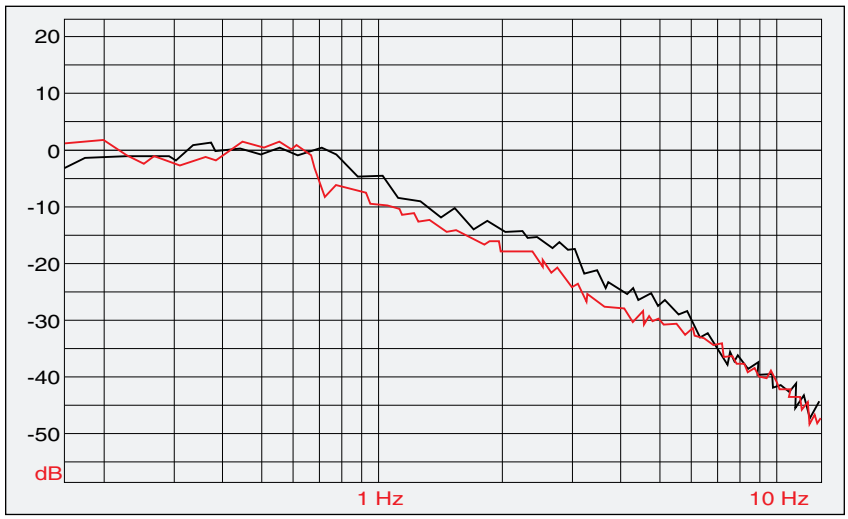
Sliding Shelf

Requires (2) arm rests each for front and back shelf support.

Dimensions	Cat. #
6" x 30"	**3434-20**
10" x 30"	**3434-21**
12" x 30"	**3434-22**
14" x 30"	**3434-23**
21" x 30"	**3434-24**
6" x 36"	**3434-25**
10" x 36"	**3434-26**
12" x 36"	**3434-27**
14" x 36"	**3434-28**
21" x 36"	**3434-29**

Active TLC Series Vibration-Free Workstations

- **Ideal for low-frequency vibrations (from 0.1 Hz) that are potentially amplified by passive vibration isolation systems**
- **Optimizes throughput by minimizing settling time after transient disruptions**
- **Active, electronic vibration control in six degrees of freedom**
- **Feedforward feature cancels vibrations generated by payloads (X-Y stage motion, fans, valves, etc.)**
- **Digital control based on DSP-CPU uses adaptive, self-tuning control algorithm**



In many critical test and inspection procedures, especially in the 0.1 - 120 Hz frequency range, passive vibration isolation systems simply can't achieve the damping necessary for high precision and throughput. These Active TLC workstations can.

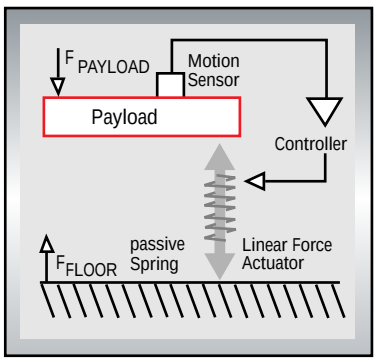
Active Vibration Control—The Key to Productivity

The Active TLC Series Vibration-Free Workstations are ideal for wafer inspection and lithography equipment, as well as electron beam microscopes susceptible to minute vibrational disturbances.

These work stations suppress "on board" disturbances and eliminate the long settling times required with passive isolators in conjunction with moving XY stages. The A-TLC stations offer control over these inertial forces by means of a feedback reactive mode. Rather than simply damping vibrations, these work stations actively cancel them. This results in higher resolution and improved settling time.

During normal operation, floor and payload vibration are monitored simultaneously. The knowledge of the total system transfer function and all levels of vibration enable the controller to compute correctional forces in amplitude and phase which never amplify at any given frequency and guarantee optimal servo stability. If the characteristics of the payload change, reinitializing updates the stored transfer function automatically.

Each workstation incorporates a set of isolator modules, a DSP (digital signal processor) controller, linear actuators, and a triaxial sensor unit for measurement and control of floor vibrations.



Basic Active Vibration Isolation System

Specifications

Transmissibility:	see curves
Transient settling time:	< 50 msec
Degrees of freedom (D.O.F.):	6
System noise floor:	100 nm/√Hz at 0.1 Hz 10 nm/√Hz at 10 Hz < 1 nm/√Hz for f > 10 Hz
Maximum deflection:	± 1 mm (0.03 in.)
Vertical leveling accuracy:	± 300 µm (MV-3 valves)
EMI emission:	< 5 mG/√Hz (P-P)
Air supply (min/max):	5/8 bar (75/120 psi)
Air consumption:	< 100 Nltr./min; > 1 scfm
Power consumption:	0.85 kW (max.); 0.4 kW (typ.)
Chassis color:	Shell white

A-TLC Workstation (see previous page for optional accessories)

Dimensions inches (mm)	Weight	Cat. #
30W x 30D x 30H (762 x 762 x 762mm)	435lbs. (200kg)	**3434-07**
36W x 30D x 30H (914 x 762 x 762mm)	490lbs. (225kg)	**3434-08**
48W x 30D x 30H (1220 x 762 x 762mm)	620lbs. (285kg)	**3434-09**
60W x 30D x 30H (1524 x 762 x 762mm)	740lbs. (340kg)	**3434-10**
36W x 36D x 30H (914 x 914 x 762mm)	575lbs. (260kg)	**3434-11**
48W x 36D x 30H (1220 x 914 x 762mm)	725lbs. (330kg)	**3434-12**
60W x 36D x 30H (1524 x 914 x 762mm)	875lbs. (400kg)	**3434-13**

Sneeze Guard™

- **Fits onto most microscopic eyepieces**
- **Shields work stage against operator generated contaminants**
- **Eliminates bothersome face masks**

The Sneeze Guard is used in all microelectronics operations that involve microscopes. It functions effectively as a face mask without the inconvenience and expense, and is available in both plexiglass and Static-Dissipative PVC. In addition to our five standard models, Terra can create Sneeze Guards in custom sizes and configurations. For complete data and ordering information, see page 228.

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Vibration-Free Work Station

- Pneumatic vibration-free mounts isolate up to 90% of building vibration, eliminate operator fatigue and nausea during microscope operations
- Low-profile, ergonomic design combines stability with convenience
- Built-in pneumatic controller simplifies leveling, allows continuous in-line operation
- Meets Class 100 particle requirements
- Optional bumper guards against accidental bumping
- Select work surface material for your application: nonconductive and dissipative laminates, stainless steel, and UltraClean™ electropolished stainless steel
- Available in UltraClean™ Finished Stainless Steel for the most critical contamination requirements
- ErgoHeight™ design provides automatic height adjustment (see separate ordering table, page 351)

No. 1570-53

Vibration–Free Work Stations			Nonconductive Top	Static Dissipative Top	Stainless Steel Top		UltraClean™ Stainless Steel Top, Frame & Legs
Work Surface Dimensions (W" x D")	Number of Isolators	Maximum Load * (lbs.)	"A" Base Design** Cat. #	"A" Base Design** Cat. #	w/ Finished CR Steel Frame, Legs "A" Base Design** Cat. #	All Stainless Steel Construction "A" Base Design** Cat. #	"A" Base Design** Cat. #
48 x 30	4	360	1570-00	1570-26	1570-52	1570-80	1570-80-2
60 x 30	4	350	1570-01	1570-27	1570-53	1570-81	1570-81-2
72 x 30	6	550	1570-02	1570-28	1570-54	1570-82	1570-82-2
84 x 30	6	540	1570-03	1570-29	1570-55	1570-83	1570-83-2
96 x 30	6	530	1570-04	1570-30	1570-56	1570-84	1570-84-2
48 x 34	4	360	1570-07	1570-33	1570-59	1570-87	1570-87-2
60 x 34	4	350	1570-08	1570-34	1570-60	1570-88	1570-88-2
72 x 34	6	550	1570-09	1570-35	1570-61	1570-89	1570-89-2
84 x 34	6	540	1570-10	1570-36	1570-62	1570-90	1570-90-2
96 x 34	6	530	1570-11	1570-37	1570-63	1570-91	1570-91-2

** Maximum loads with plate weights removed.*
*** Nonadjustable (one piece) legs also available with "A" base design at no extra cost (specify when ordering). Select stainless steel scuff guards to protect finished steel legs.*

CLEANROOM WORK STATIONS

Manufacturers who routinely engage in high-magnification operations know there's more than one cause of motion sickness. Shaky work surfaces not only compromise precision and accuracy—they also literally make you sick!

As geometries get smaller and assembly and test procedures become more dependent on high magnifications, it becomes more important than ever before to ensure the optimal work surface for every application. That can mean not only effective vibration isolation, but also Class 1 cleanliness, static-dissipation, automated conveyance systems, and a host of other critical operating conditions. Failure to meet any one of these requirements can lead to microscopic errors—and big problems.

A Modular Vibration-Free Surface For Every Requirement

Terra Universal's Vibration-Free Work Station provides the optimal solution to these problems. It incorporates an advanced vibration-control design to provide the ideal work station for high-precision microelectronic manufacturing and testing operations—such as substrate aligning and measuring, surface profiling, probing, and wire bonding. Because the work station isolates 90% of typical building vibration, it eliminates worker fatigue, headaches, and nausea that result from microscopic operations on a shaky surface.

Each work station consists of five basic components: the frame (with several leg options), benchtop, undertop, shock bumper, and the pneumatic vibration-absorbing mounts and regulation system.

Frame and Bench Top

The frame is fabricated of all-welded 2" square steel tubing with 12-gauge thickness. The sturdy welded construction eliminates the need for leg bracing below the top frame, and the heavy-wall tubing allows the bench top to support much heavier loads than conventional benches without sagging.

The legs are fabricated of heavy-gauge 2" and 1¾" square tubing. The telescopic "A" base models can be adjusted to suit your application (from 26-35" floor-to-top). This feature is important if you must maintain a standard work surface height in automatic processes, and it allows the bench to accommodate operators and chairs of varying sizes (higher ranges are available). Its retractable design also makes shipping and storage more economical. These benches include plastic, nonmarking glides and are available with the ErgoHeight™ option for motorized height adjustment.

All steel tubing used in the frame and leg construction features a white epoxy or powder-coat finish (stainless steel frames and legs are also available with stainless steel tops). Legs can be ordered with stainless steel scuff guards to prevent scratching and chipping.

Benchtops are available in several materials. Nonconductive and static-dissipative benchtops are constructed of high-grade thermosetting plastic laminate bonded to a ¾" high-density epoxy fiber substrate. A frame of ¾" high-density epoxy fiber is also bonded under the periphery of the top to provide additional reinforcement. A backing sheet is laminated to the underside to meet cleanroom requirements. For complete static protection, the dissipative models are equipped with a grounding connector and two snap-type plug receptacles for standard wrist straps. The laminate meets MIL-B-81705-B specifications. Standard color of the top is non-glare (texture-finish) ivory.

The stainless steel benchtop combines chemical resistance and complete static conductivity. Each of these stations can accommodate virtually any load without sagging, and their ergonomic, low-profile design affords all of the comfort and convenience of standard benches.

A thick-gauge steel plate provides optimum reinforcement and prevents sagging under heavy loads. This undertop is encased in the recessed underside of the benchtop and fastened to it, forming a two-piece floating work station. It is securely set on four to six vibration-free mounts, isolating the work surface from any possible shocks or vibrations. The undertop also comes with fasteners that allow one or two 40-lb. weight plates to be added to the bench.

No. 1570-01

Pneumatic Vibration-Absorbing Mounts

These mounts are designed for applications that require exceptionally high vibration isolation, with a natural frequency down to 2-4 Hz. The vibration absorbing system offers high deflection and a horizontal-to-vertical stillness ratio of one-to-one. This ensures excellent stability without lateral restraints; the system isolates up to 90% of most building vibrations.

By varying the air input supplied to the pneumatic mounts while a load is applied, the floating work surface can be adjusted in height for leveling within ± ¼". Since pneumatic mounts operate at zero deflection under load, this work station requires 30% to 60% less free height than conventional benchtops. For most applications, the air pressure in the center body provides a significant portion of the isolation capabilities of the mounts.

In-house air, bottled air, or nitrogen can be used for pressurization of the mounts. The station includes a safety master regulator and an individual pressure regulator and gauge for each vibration isolator to allow easy inflation and balancing of the benchtop. This inflation system also allows you to operate the table while it is continuously connected to the gas supply; this in-line operation is recommended to ensure a steady, balanced work surface.

Each isolator is rated for a 25-100 pound load, so you can safely operate a standard station with up to 350 pounds of net load (with weight plates removed). For very light loads (under 25 pounds) it is recommended that the table be operated with one or more plate weights. Varying weights produce varying vibration-isolation results, depending on the frequency of vibrations in your facility; for best results, experiment with varying plate weight configurations. Weights are included with each station.

Shock Bumper*

For Table Width	Stainless Steel Cat. #	UltraClean™ Stainless Steel Cat. #
48"	**1570-14**	**1570-19**
60"	**1570-15**	**1570-20**
72"	**1570-16**	**1570-21**
84"	**1570-17**	**1570-22**
96"	**1570-18**	**1570-23**

**** Protects the front of the isolated top board against an operator accidentally bumping the board (also serves as an arm rest).***

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Vibration-Free Platform

- **Portable low-profile design allows for multiple vibration-free work stations on a single bench**
- **Pneumatic vibration-isolation mounts dampen up to 90% of building vibration, eliminate operator fatigue and nausea during microscope operations**
- **Also isolates vibration-producing equipment from the work surface**
- **Available in several sizes and materials, including UltraClean™ electropolished stainless steel**
- **Easy to set up and relocate**

Manufacturers who routinely engage in high-magnification operations know there's more than one cause of motion sickness. Shaky work surfaces not only compromise precision and accuracy—they also literally make you sick!

A Low-Profile, Steady Work Surface Wherever You Need It

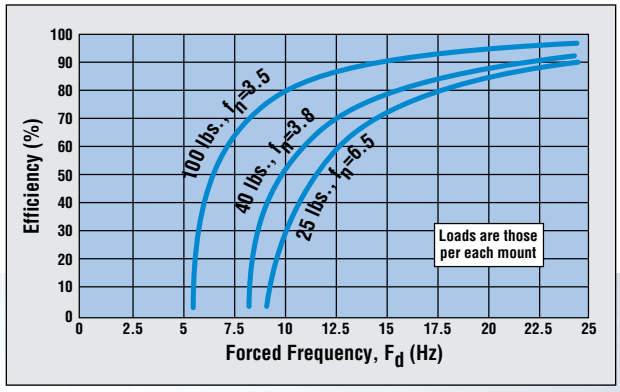
Terra's portable, economical Vibration-Free Platform cures the shakes by providing benchtop vibration isolation in both the vertical and horizontal direction.

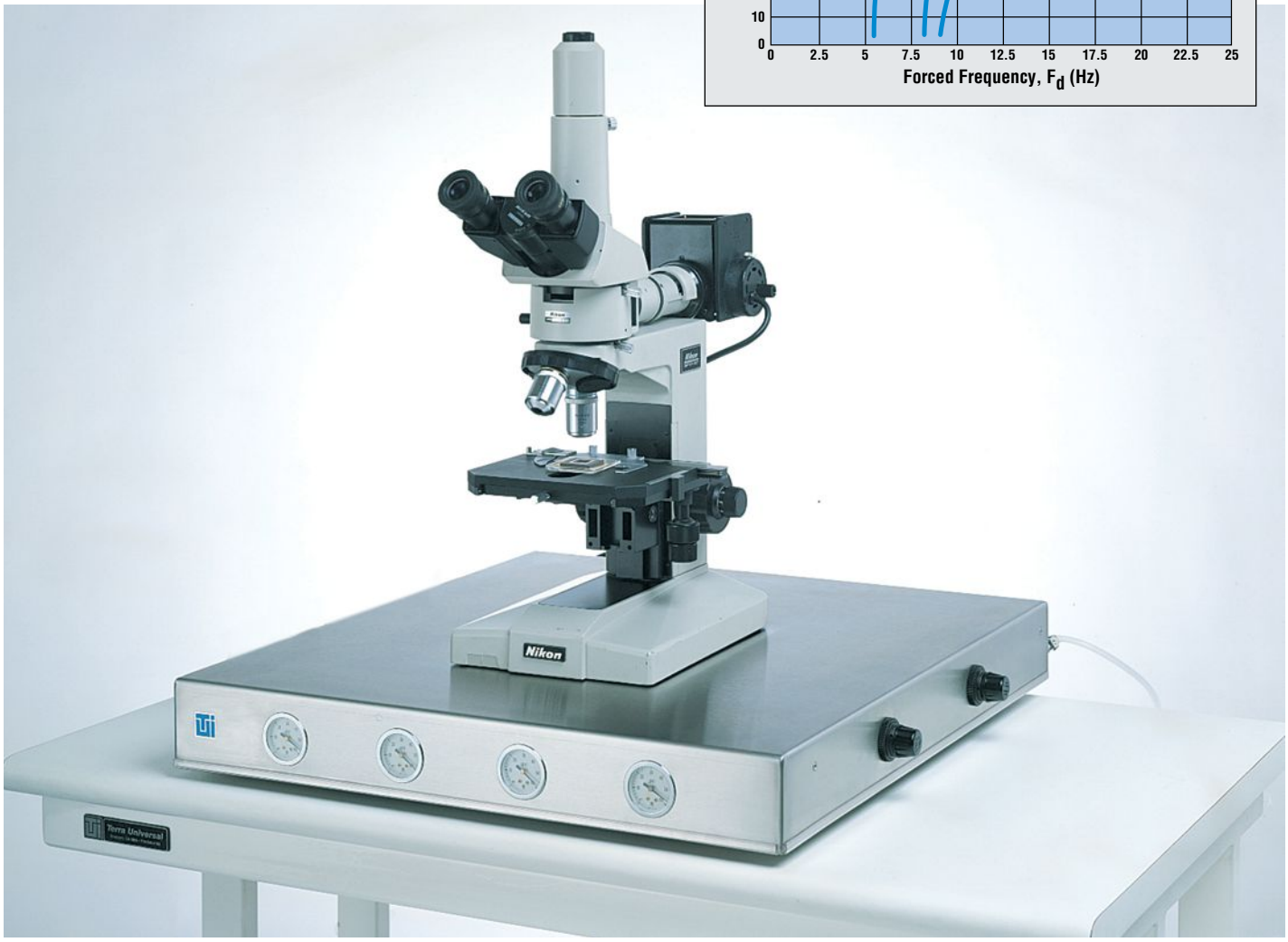
Four pneumatic all-axis isolators act as highly stable air springs that isolate up to 90% of typical building vibrations (see efficiency curves, below). With the help of built-in pressure regulators, this platform maintains a fixed, controlled pressure with maximum loads up to 213 lbs.

Removable incremental plate weights attached beneath the platform surface allow you to adjust the net load to provide optimal dampening for the process equipment you are working with. This versatility, and the low-profile design, makes this platform ideal for applications that involve a wide range of close-tolerance equipment.

Compact Design Saves Space—and Money!

Its compact, portable size offers additional benefits. It lets you bring a steady surface to close-tolerance operations wherever they crop up, eliminating the need either to relocate heavy vibration-free tables or simply to forego a dampened surface (and risk the consequences!).



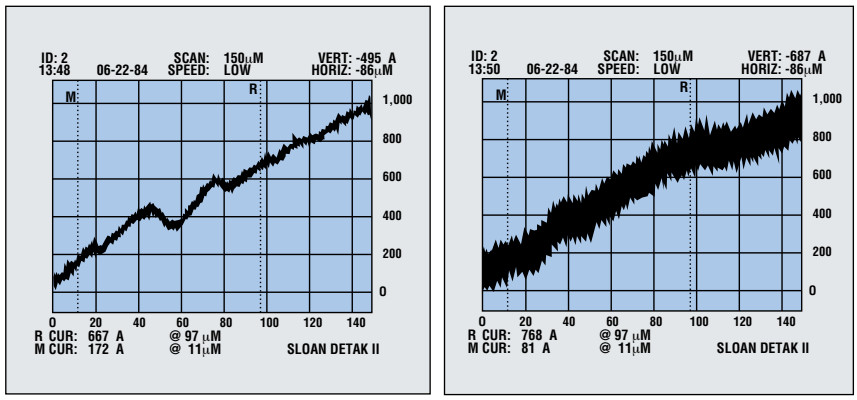


Further, because vibration-free tables can accommodate only one work station, large-scale productions often require the purchase of several such units. This low-cost platform offers an alternative to this expensive arrangement. You can place several of these units on a single bench, thereby establishing multiple vibration-free work stations while using very little space.

For optimal particle control, select a platform with an UltraClean™ finish stainless steel construction. The Vibration-Free Platform is easy to operate and requires little or no attention after the initial set-up. No special tools or mounting hardware is necessary. The platform comes completely assembled and ready for operation.

Just a Few Applications . . .

- High-Magnification Microscope/ Video Inspection
- Wire Bonding and Wire Bond Testing
- Scanning Electron Microscope (SEM) Inspection
- Tunneling Electron Microscope (TEM) Inspection
- Laser Surgery and Laser Processing
- High-Precision Electronic Balance Measurement
- Wafer Inspection and Probing
- FTIR Spectroscopy
- Thin Film Deposition
- Surface Profiling
- Doppler Velocimetry
- Biological Sample Manipulation
- Confocal Microscopy



Test results by a Sloan Dektak II Surface Profile Measuring System with and without Terra's Vibration-Free Platform

See page 346 for Terra's larger Vibration-Free Work Stations

Specifications			Vibration-Free Platform
Work Surface (W" x D" x H")	Maximum Load* (lbs.)	Shipping Weight (lbs.)	UltraClean™ Finish Stainless Steel Top Cat. #
21 3/4 x 18 1/4 x 3	213	163	**1580-02**
23 x 24 x 3	213	203	**1580-03**

**** Internal plate weight should be removed before operation with net loads over 100 lbs.***

Modular Cleanroom Drawer Units

These modular drawer units let you select a combination of stainless steel or nonconductive plastic drawers in many different depths. They mount easily under work surfaces, shelves—even on cleanroom carts. Their stackable, modular design allows you to mount them just about anywhere you like.

White plastic drawers feature rounded corners inside and out for easy cleaning. All drawers feature smooth, quiet glides and flush pulls to help ensure noncontaminating storage and handling.

Cleanroom Drawer Locks

For added security of drawer contents. Price includes installation of locks on any drawers listed below. Specify size and number of drawers to have locks.

Cat.#
1700-97

Cleanroom Drawer Unit (Dimensions are inside planar)				
No. of Drawers	Min. Drawer Height	ABS Plastic 14 1/8"W x 15 1/4"D Cat.#	Stainless Steel 14 1/2"W x 18"D Cat.#	Electropolished Stainless Steel 15 1/4"W x 18 3/4"D Cat.#
1	3"	**1740-23**	—	—
1	6"	**1740-02**	**1741-20**	**1741-26**
1	12"	**1740-98**	**1741-21**	**1741-27**
2	3", 6"	**1740-14**	—	—
2	6", 6"	**1740-15**	**1741-22**	**1741-28**
2	6", 12"	**1740-06**	**1741-23**	**1741-29**
3	3", 6", 12"	**1740-07**	—	—
3	6", 6", 6"	**1740-09**	**1741-24**	**1741-30**
4	3", 3", 6", 6"	**1740-08**	—	

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ErgoHeight™ Auto-Adjusting Cleanroom Work Stations

- **Motorized lifters automatically raise, lower and level the work surface for optimal operator comfort and convenience**
- **Ergonomic benchtop positioning eliminates back stress—and costly lawsuits!**
- **Front panel-mounted controls ensure easy operation**
- **Sealed design isolates motor to guard against contamination and meet Class 100 particle standards**
- **Available with several top materials and powder-coat or stainless steel base**
- **Ideal for operations with high-profile processing equipment**

Sure, Your Bench is Adjustable—But Do You Adjust It?

Adjustability means nothing if it's inconvenient or unfeasible.

True, many benches (including Terra's "A"-base work stations) feature telescopic legs that let you position the work surface at the optimal height. But how likely is an operator to perform that adjustment if it means temporarily relocating heavy, expensive process equipment? How many helping hands are required? Where are the necessary tools when you need them? How long will it disrupt critical process operations? And how long will it be before someone else wants the bench just the way it was?

Adjustable cleanroom chairs help solve these problems, but in many cleanroom applications, a chair just isn't enough. Many test and assembly procedures require adjustment outside the range of most adjustable chairs, forcing an operator to hunch to meet the occasion. Other processes require that an operator stand or move from one position to another, so that chairs of any kind aren't much help. When frequent adjustment entails moving heavy equipment worth many thousands of dollars, the temptation is to let someone suffer—and risk a back injury, lost productivity, even lawsuits!

Note: Because the ErgoHeight™ Work Bench requires a steady benchtop for safe operation, it is not recommended for use with an overhead light fixture.

ErgoHeight™ Auto-Adjustable Cleanroom Work Stations

Benchtop Dimensions (W" x D")	Powder-Coated Steel Bases				Stainless Steel Bases	
	Nonconductive Top (see pg. 336) Cat. #	Static-Dissipative Top (see pg. 338) Cat. #	Polypropylene Top (see pg. 340) Cat. #	Stainless Steel Top Cat. #	Stainless Steel Top (see pg. 332) Cat. #	Electropolished Top and Base Cat. #
36 x 30	**3504-16**	**3504-24**	**3504-32**	**3504-04**	**3504-40**	**3504-00**
48 x 30	**3504-17**	**3504-25**	**3504-33**	**3504-05**	**3504-41**	**3504-01**
60 x 30	**3504-18**	**3504-26**	**3504-34**	**3504-06**	**3504-42**	**3504-02**
72 x 30	**3504-19**	**3504-27**	**3504-35**	**3504-07**	**3504-43**	**3504-03**
36 x 34	**3504-20**	**3504-28**	**3504-36**	**3504-08**	**3504-44**	**3504-12**
48 x 34	**3504-21**	**3504-29**	**3504-37**	**3504-09**	**3504-45**	**3504-13**
60 x 34	**3504-22**	**3504-30**	**3504-38**	**3504-10**	**3504-46**	**3504-14**
72 x 34	**3504-23**	**3504-31**	**3504-39**	**3504-11**	**3504-47**	**3504-15**

**** These models feature epoxy-finished steel frames, with stainless steel lower leg members to prevent scuffing.***

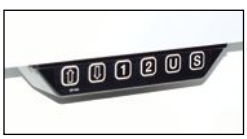
CLEANROOM WORK STATIONS

Model shown:
Vented ErgoHeight™ No. 3504-90

ErgoHeight™ Work Surfaces: An Automated Boost to Benchtop Operations

The ErgoHeight™ incorporates a high-torque, low RPM motor inside two lifters located on the right and left sides of the table. Each lifter can safely handle 210 pounds of net load, for a total net load of 420 pounds.

A control panel mounted on the front of the benchtop frame contains all necessary switches for up/down table motion and to level the work surface. This option is ideal for use with process equipment that requires height adjustment to suit individual operators, as well as for leveling the system or interfacing it with adjacent operations. Standard height range is 28" to 48" floor-to-top.



Convenient up/down controls with up to four height positions stored in memory.

Clean, Smooth Operation

All parts are designed for use in a cleanroom environment. The thermally protected lifters are completely sealed inside the legs to ensure particle retention and cleanroom compatibility.

And because an ErgoHeight™ Work Station provides smooth, controlled height adjustment under virtually any load, it allows automatic height adjustment of vibration-sensitive equipment. Typically you can bring delicate test equipment, even liquids, to the optimal level without lengthy disruption, thereby making the most of expensive cleanroom time. For enhanced vibration isolation in microscope operations, select Terra's Vibration-Free ErgoHeight™ Station.

The ErgoHeight™ Cleanroom Work Station is available with a variety of bench tops to suit your particular application requirement, with either powder-coated or electropolished stainless steel bases.

Vibration-Free ErgoHeight™ Auto-Adjustable Cleanroom Work Stations (see page 346 for vibration data)						Vented ErgoHeight™
Benchtop Dimensions (W" X D")	Powder-Coated Steel Bases			Stainless Steel Bases		
	Nonconductive Top Cat. #	Static-Dissipative Top Cat. #	Stainless Steel Top Cat. #	Stainless Steel Top Cat. #	Electropolished Top and Base Cat. #	Perforated SS Top and Base* Cat. #
36 x 30	3504-48	3504-56	3504-64	3504-72	3504-80	3504-88
48 x 30	3504-49	3504-57	3504-65	3504-73	3504-81	3504-89
60 x 30	3504-50	3504-58	3504-66	3504-74	3504-82	3504-90
72 x 30	3504-51	3504-59	3504-67	3504-75	3504-83	3504-91
36 x 34	3504-52	3504-60	3504-68	3504-76	3504-84	3504-92
48 x 34	3504-53	3504-61	3504-69	3504-77	3504-85	3504-93
60 x 34	3504-54	3504-62	3504-70	3504-78	3504-86	3504-94
72 x 34	3504-55	3504-63	3504-71	3504-79	3504-87	3504-95

** Includes a polypropylene plenum chamber below a perforated stainless steel top, with 8"-diameter flanged outlet port for connection to in-house exhaust system.*

Cleanroom and Laboratory Chairs

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BioFit Seating

- **A chair for every application—**
  - ✓ **Ergonomic Upholstered Chairs**
  - ✓ **Ergonomic Static-Control Chairs**
  - ✓ **Ergonomic Static-Control Cleanroom Chairs**
  - ✓ **Class1, Class10 and Class100 CleanroomChairs**
  - ✓ **Duragrain Styrene Cleanroom Chairs**
  - ✓ **Adjustable Stools**
- **Modular components let you customize your seating to fit your needs**
- **Ergonomic features ensure worker comfort, minimize fatigue and chance of injury**
- **Industrial-grade materials and construction guarantee durability**
- **Models available for desk and bench height**
- **Select among wide range of colors and fabric types**
- **Backed by a 15-year warranty**

Few elements of the workplace are as essential but as misunderstood as chairs.

Despite the importance of ergonomic designs, Federal Standard 209E cleanroom specifications, and static control, few chair manufacturers address these issues clearly and reliably in products with guaranteed performance.

Seating that Works Hard—In Nearly Any Environment

Terra's BioFit line of chairs meets these and other workplace requirements with rugged, industrial-strength designs and a number of innovative features, including a wide range of nonshedding and static-control fabrics, hermetically sealed particle traps and truly ergonomic adjustment controls. Best of all, these chairs are offered in economical configurations that let you select the features you need for your particular application, whether a Class 10 cleanroom, a research laboratory or a stocking room.

Durability—the First Requirement in All Applications

A broken chair threatens worker productivity as well as safety, and so all of these chairs are designed and built, from top to bottom, with the roughest conditions in mind.

Upholstered seats are made with a furniture-grade hardwood pan, assembled with screws and metal T-nuts for added durability. Each features an internal bumper guard, giving it excellent appearance and protecting the fabric and vinyl from abrasions that occur when the chair is bumped into desks and benches. Backs feature a protective plastic panel that wraps around the edges of the backrest to protect the upholstery from damage. The larger ergonomic backrests feature additional internal bumper guards that protect the fabric and vinyl from splitting.

Chairs with tubular bases have a heavy-duty inverted "U" shape that relieves stress from the weld and places it in the bend of the tubing for added strength, especially compared to "butt weld"-type constructions. Leg tubing itself is shaped to accept the caster directly, resulting in a much more durable design and eliminating the need for stem inserts that often wear out before the caster itself. Cast aluminum bases are also extremely strong. Their all-metal design eliminates plastic bases found in inferior chairs. All bases feature five legs on a standard basis.

Pneumatic cylinders are taper-fitted at the top and bottom to eliminate bolts, screws, rivets or other metal fasteners that can come loose and pose a safety threat. This design also makes it easy to assemble and disassemble chairs and, in many cases, even to change the seat height in the field simply by changing an adapter tube. The "Soft Touch" seat height adjustment control takes the aggravation out of seat control—no standing or stooping is necessary.

These features enable us to extend a 15-year warranty—among the best in the industry!—on all components except upholstery and casters, which are covered for five years.

Ergonomics: It's More Than a Good Idea

Growing concern over worker safety and productivity has forced manufacturers to consider the many industrial implications of "ergonomics": the study of how laws of nature influence human performance in day-to-day work environments.

Better understanding of such repetitive stress disorders as carpal tunnel syndrome has led to more effective applications of ergonomics in the design of products like chairs that can significantly reduce the incidence of worker fatigue and injury. Increasingly stiff workers' compensation premiums and OSHA fines make this investment in worker health an economic imperative!

These BioFit chairs are backed by years of research into ergonomic seating. Their field-proven designs maximize worker comfort in several ways. First, each chair features a "Soft Touch" pneumatic control that allows fast, easy height adjustment without stooping or twisting motions that can lead to injury. This top-quality mechanism carries a lifetime warranty.

Second, this line of seating offers modular features that allow you to select seating that's exactly right for your applications. All chairs incorporate a full 3" of cushioning in both the seat and backrest, and make use of a protective plastic panel and body-conforming hinge assembly for enhanced comfort and durability. Designated "ergonomic" chairs use larger seats and backrests for additional support.

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Grade 2 Vinyl

Black

Oatmeal

Blue

Grey

Grade 4 Breathable Nylon

Black

Indigo

Grey

ESD Materials

Conductive Black Vinyl

Micron Black Static Dissipative Vinyl

Grey Static Dissipative Viscose/Wool

Blue Static Dissipative Viscose/Wool

Micron Blue Static Dissipative Vinyl

Fabrics For Every Requirement

Chairs are available in the colors and fabrics listed above (for further information, refer to performance test data listed in descriptions of individual chairs on the following pages). Each material offers specific advantages.

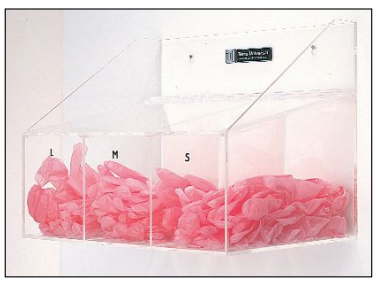
Grade 2 Vinyl is the standard material for Class 100 chairs.

Grade 4 Breathable Nylon looks, feels and upholsters like leather, but is 100% nylon made from fibers laid in a 3-dimensional matrix. This material breathes through billions of micro-pores that function as particle traps. It is suitable for Class 10 applications.

Conductive Black Vinyl is our most conductive material (not recommended for cleanroom use).

Microcon Static-Dissipative Blue/Black Vinyl is a heavy-duty vinyl for use in ESD cleanroom applications.

Static-Dissipative Viscose/Wool, a high-quality ESD wool blend, is available in two colors and combines a high aesthetic appeal with static protection.



Garb and Parts Dispensers—Space-Saving Convenience!

These handy dispensers save space and organize your change room gloves, safety glasses, wipers, hats, and other garb. Also perfect benchtop storage bins for small parts used in cleanroom processing. Select clear acrylic or static-dissipative PVC, which eliminates static charges and the particles they attract.

See pages 299-306 for complete information.

Fabric Specifications: General			
Material	**Standard Weight**	**Abrasion Resistance**	**Flammability Tests***
Grade 2: 50-gauge vinyl**	36 oz/ linear yd.	400,000 cycles, VW seatbelt test	Fed spec. CCC-A680A; Class 2 treatments (A1-B-C); Boston Fire Code; N.Y Port Authority; NFPA Code 701 Life Safety Code; FMVSS 302 FAA (FAR 25.853, Para. B); Calif. Flammability Regulations (117-75, Sec. E)
Grade 4: Nytek™ Nylon Fiber Matrix	6.7 oz/ sq. yd.	100,000 + double rubs Wyzenbeck/wire screen (ASTM D-1175)	Calif. Bulletin 117; UFAC Class 1 ASTM E-84 Class A rated
Static-Dissipative weave: 60% viscose, 40% wool	19/20 oz/ linear yd.	30,000+ double rubs, Wyzenbeck	Calif. CS-191-53, Class I; Technical Bulletin 117; MVSS 302

Results reported pursuant to above standards do not necessarily define hazards presented under actual fire conditions.
****Prefixx protective finish for stain resistance and easy cleaning.***

Particle Data During 30 Minutes of Seat Compression Class 100 Chairs with Grade 2 Vinyl (Counts/Ft³ during compression)			
	>0.1 Micron	**>0.3 Micron**	**>0.5 Micron**
Sample 1	4	3	2
Sample 2	29	21	18
Sample 3	3	1	1

Particle Data During 30 Minutes of Seat Compression Class 10 Chairs with Grade 2 Vinyl (Counts/Ft³ during compression)			
	>0.1 Micron	**>0.3 Micron**	**>0.5 Micron**
Sample 1	9	7	6
Sample 2	4	3	2
Sample 3	6	2	1

Additional Grade 4 Breathable Nylon Specifications

Chemical Resistance

Tests, designed to simulate regular use of the following disinfectants over long periods of time, showed no detrimental effects to the upholstery:

- Sodium Hypocholorite 5.25 pbw, inert ingredients 94.75 pbw
- Multicide; Biotrol, Inc.
- Biocide, Biotrol, Inc.
- Glutarex; 3M
- Banicide; Pascal
- Sporicidin Solution; Sporicidin International
- Sporicidin Spray; Sporicidin International
- Cidex-7; Johnson and Johnson
- Cetylcide; Cetylite Industries

Particle Data During 30 Minutes of Seat Compression Class 10 Chairs with Grade 4 Breathable Nylon (Counts/Ft³ during compression)			
	>0.1 Micron	**>0.3 Micron**	**>0.5 Micron**
Sample 1	90	0	0

Static Performance Test Data for Static Control Seating				
	Conductive Black Vinyl	**Static Dissipative Vinyl**	**Static Dissipative Wool/Viscose**	**Conductive Nylon**
Decay (from 5000 volts to technical zero):	0.63 sec.	0.01 sec.	0.1 sec.	0.01 sec.
Top Surface or Volume Resistivity:	2.6×10^2 Ohms/ sq. surface	5.3×10^6 Ohms/ sq. surface	2.7×10^8 Ohms-cm volume	5.0×10^5 Ohms/ sq. surface
Average Component Resistance (to ground):	1.5×10^3 Ohms	4.7×10^7 Ohms	3.0×10^6 Ohms	1.6×10^4 Ohms

Results taken from an independent testing laboratory (available upon request).

Stainless Steel Clipboard

- **Stainless steel construction gives you a clipboard that's up to cleanroom standards**
- **12" x 9½" surface firmly holds writing paper in place**

What is there to say about a clipboard?

They're easy to overlook when you're setting up your cleanroom, yet they're an essential item when it comes time to update information.

This one is completely clean-room compatible. Stainless steel construction ensures a nonshedding, durable, conductive surface for cleanroom paper. Large 12" x 9½" surface and spring-loaded clip securely hold standard sized sheets.

		Cat. #
NEW	**Stainless Steel**	**1350-00**
NEW	**Polypropylene**	**1350-01**

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Ergonomic Upholstered Chairs

- **Industrial-grade chairs feature rugged frames and durable upholstery for a long service life**
- **Ergonomic design increases worker comfort and productivity**
- **Three adjustable designs offer a variety of features to suit individual applications**
- **All models feature "Soft Touch" pneumatic seat-height adjustment**
- **Select among three different fabric types and four different colors**
- **Refer to page 357 for full specifications**

These chairs combine worker comfort and industrial-strength durability.

Constructed with rugged five-legged bases, each chair includes a contoured seat and a variety of upholstery options as part of its ergonomic seating package. Seats and backrests include an internal bumper guard that provides an excellent appearance and protects the fabric and vinyl from abrasions that occur when the chair is bumped into desks and benches.

These durable and highly functional chairs are also equipped with a sophisticated "Soft Touch" pneumatic seat-height adjustment mechanism—a best-of-its-kind control that allows an operator to raise or lower the seat without interrupting work or contorting the body. Rubber casters are standard on each model.

See page 357 full specifications on fabric types.

Type A Chairs:
Ergonomic seat with standard concave backrest, seat control, and chrome-plated metal parts, including 23" base with casters. Footrings on selected models.

Type B Chairs:
Ergonomic seat with standard concave backrest and chrome-plated metal parts, including 23" base (no footring) with casters.

Type C Chairs:
Ergonomic seat with 15.5" wide x 14.5" high ergonomic backrest and chrome-plated metal parts, including 23" base (no footring) with casters.

Ergonomic Upholstered Chairs

Seat Height (in. nominal)	Weight (lbs.)	Color	Grade 2 Vinyl Cat. #	Grade 4 Breathable Nylon Cat. #
Desk	34	Black	**2801-01**	**2801-25***
High	34	Blue	**2801-02**	**2801-26***
17-22*	34	Oatmeal	**2801-03**	**2801-27***
	34	Grey	**2801-04**	**2801-28***
Bench	40	Black	**2801-05**	**2801-29**
High	40	Blue	**2801-06**	**2801-30**
24-29	40	Oatmeal	**2801-07**	**2801-31**
	40	Grey	**2801-08**	**2801-32**
Desk	24	Black	**2801-33**	**2801-57**
High	24	Blue	**2801-34**	**2801-58**
16-22	24	Oatmeal	**2801-35**	**2801-59**
	24	Grey	**2801-36**	**2801-60**
Bench	26	Black	**2801-37**	**2801-61**
High	26	Blue	**2801-38**	**2801-62**
23-29	26	Oatmeal	**2801-39**	**2801-63**
	26	Grey	**2801-40**	**2801-64**
Desk	26	Black	**2801-65**	**2801-89**
High	26	Blue	**2801-66**	**2801-90**
17-22	26	Oatmeal	**2801-67**	**2801-91**
	26	Grey	**2801-68**	**2801-92**
Bench	28	Black	**2801-69**	**2801-93**
High	28	Blue	**2801-70**	**2801-94**
24-29	28	Oatmeal	**2801-71**	**2801-95**
	28	Grey	**2801-72**	**2801-96**

***These models have a fixed footring**

Ergonomic Upholstered Chairs

Type C
(No. 2801-96)

Type B
(No. 2801-35)

Type A
(No. 2801-02)

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Ergonomic Static-Control Chairs

- **Select the conductive or static-dissipative fabric that meets your static-control requirements**
- **All models include "Soft Touch" pneumatic control for easy height adjustment**
- **Static-control casters allow easy mobility**
- **Refer to page 357 for full specifications**

Computer rooms, microelectronics assembly areas, and other ESD-sensitive environments require a chair that can control static. These chairs offer a choice of four different static-safe fabrics that do just that.

Each material has slightly different static decay, surface resistivity and resistance-to-ground characteristics, important considerations in critical areas (see figure below for performance test data of each). This selection gives you several options to guarantee a static-control chair that meets your requirements. All static-control chairs include black static-control casters.

They also provide all of the performance features of our standard Ergonomic Upholstered Chairs, including "Soft Touch" height adjustment, ergonomic seat and backrest design, and industrial-strength construction techniques that guarantee a long, trouble-free service life. All come with a 15-year qualified guarantee.

See page 357 for full specifications on fabric types.

Type E
(No. 2802-17)

Type G
(No. 2802-54)

Type F
(No. 2802-39)

Type D
(No. 2801-99)

Static Performance Test Data for Static Control Seating

	Conductive Black Vinyl	Static Dissipative Vinyl	Static Dissipative Wool/Viscose	Conductive Nylon
Decay (from 5000 volts to technical zero):	0.63 sec.	0.01 sec.	0.1 sec.	0.01 sec.
Top Surface or Volume Resistivity:	2.6×10^{2} Ohms/ sq. surface	5.3×10^{6} Ohms/ sq. surface	2.7×10^{8} Ohms-cm volume	5.0×10^{5} Ohms/ sq. surface
Average Component Resistance (to ground):	1.5×10^{3} Ohms	4.7×10^{7} Ohms	3.0×10^{6} Ohms	1.6×10^{4} Ohms

Results taken from an independent testing laboratory (available upon request).

Type D Chairs:
Ergonomic seat with standard concave backrest, fixed footring, and tubular base with casters.

Ergonomic Static-Control Type D Chairs

Seat Height (in. nominal)	Weight (lbs.)	Color	Conductive Black Vinyl Cat. #	Static-Dissipative Vinyl Cat. #	Static-Dissipative Wool Cat. #
Desk	30	Black	**2801-97**	**2801-99**	—
High	30	Blue	—	**2802-00**	**2802-05**
17-22	30	Grey	—	—	**2802-06**
Bench	33	Black	**2801-98**	**2802-01**	—
High	33	Blue	—	**2802-02**	**2802-07**
26-31	33	Grey	—	—	**2802-08**

Type E Chairs:
Ergonomic seat with standard concave backrest and cast aluminum 23" base (no footring) with casters.

Ergonomic Static-Control Type E Chairs

Seat Height (in., nominal)	Weight (lbs.)	Color	Conductive Black Vinyl Cat. #	Static-Dissipative Vinyl Cat. #	Static-Dissipative Wool Cat. #
Desk	24	Black	**2802-13**	**2802-15**	—
High	24	Blue	—	**2802-16**	**2802-21**
17-22	24	Grey	—	—	**2802-22**
Bench	26	Black	**2802-14**	**2802-17**	—
High	26	Blue	—	**2802-18**	**2802-23**
23-29	26	Grey	—	—	**2802-24**

Type F Chairs:
Ergonomic seat with 15.5" wide x 14.5" high ergonomic backrest, fixed footring, and tubular base with casters.

Ergonomic Static-Control Type F Chairs

Seat Height (in., nominal)	Weight (lbs.)	Color	Conductive Black Vinyl Cat. #	Static-Dissipative Vinyl Cat. #	Static-Dissipative Wool Cat. #
Desk	35	Black	**2802-29**	**2802-31**	—
High	35	Blue	—	**2802-32**	**2802-37**
17-22	35	Grey	—	—	**2802-38**
Bench	33	Black	**2802-30**	**2802-33**	—
High	33	Blue	—	**2802-34**	**2802-39**
24-30	33	Grey	—	—	**2802-40**

Type G Chairs:
Ergonomic seat with 15.5" wide x 14.5" high ergonomic backrest and extra-wide 26" leg-spread polished cast-aluminum base with casters.

Ergonomic Static-Control Type G Chairs

Seat Height (in., nominal)	Weight (lbs.)	Color	Conductive Black Vinyl Cat. #	Static-Dissipative Vinyl Cat. #	Static-Dissipative Wool Cat. #
Desk	32	Black	**2802-45**	**2802-47**	—
High	32	Blue	—	**2802-48**	**2802-53**
17-22	32	Grey	—	—	**2802-54**
Bench	32	Black	**2802-46**	**2802-49**	—
High	32	Blue	—	**2802-50**	**2802-55**
22-27	32	Grey	—	—	**2802-56**

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Class 100 Ergonomic Static-Control Chairs

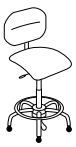
- **Certified by an independent laboratory to meet requirements of Fed. Std. 209E for Class 100 environment**
- **Clean static-dissipative vinyl upholstery features a surface resistivity of 5.3 x 10^6 ohms/square**
- **Ergonomic design includes "Soft Touch" pneumatic height adjustment**
- **Chrome plated base and footrings ensure nonshedding surface**
- **All models include conductive casters for static-safe rolling on hard surfaces**

These chairs combine superb cleanliness with static-control features. All metal frame and components are carefully designed for complete static drainage and nonshedding, cleanroom-compatible performance. They feature conductive casters to ensure charge dissipation. All exposed metal surfaces are chrome plated. The static-dissipative vinyl used in their construction is layered with colored vinyl outside and carbon underneath to ensure excellent static-dissipative characteristics (see specifications below for performance test data).

This design minimizes the possibility of particle generation during everyday use. Other construction features ensure a long, trouble-free service life. Seats and backrests include internal bumper guards to enhance appearance and protect the vinyl from abrasions that occur when the chair is bumped into desks and benches. Standard backrests help eliminate fatigue and back stress; the larger ergonomic backrests feature additional internal support that enhances comfort and protects against fabric splitting. The "Soft Touch" pneumatic lift takes the contortions out of height adjustment—a simple press of a lever raises or lowers the seat to a comfortable height.

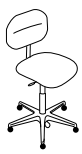
See page 357 for full specifications on fabric types.

Model No. 2802-76



Type H Chairs:
Ergonomic seat with standard concave backrest, fixed footring, and chrome-plated metal parts, including tubular base with casters

Seat Height (in., nominal)	Weight (lbs.)	Color	Static-Dissipative Vinyl Cat. #
Desk High 17-22	33	Black	**2802-61**
	33	Blue	**2802-62**
Bench High 26-31	33	Black	**2802-64**
	33	Blue	**2802-65**



Type I Chairs:
Ergonomic seat with standard concave backrest and chrome-plated metal parts, including 23" base (no footring) with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	Static-Dissipative Vinyl Cat. #
Desk High 17-22	24	Black	**2802-67**
	24	Blue	**2802-68**
Bench High 24-29	26	Black	**2802-70**
	26	Blue	**2802-71**

Type J Chairs:
Ergonomic seat with 15.5" wide x 14.5" high ergonomic backrest, fixed footring, and chrome-plated metal parts, including tubular base, casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	Static-Dissipative Vinyl Cat. #
Desk High 17-22	35	Black	**2802-73**
	35	Blue	**2802-74**
Bench High 26-34	35	Black	**2802-76**
	35	Blue	**2802-77**

Type K Chairs:
Ergonomic seat with 15.5" wide x 14.5" high ergonomic backrest and chrome-plated metal parts/polished aluminum base with 26" leg-spread.

Seat Height (in., nominal)	Weight (lbs.)	Color	Static-Dissipative Vinyl Cat. #
Desk High 17-22	32	Black	**2802-79**
	32	Blue	**2802-80**
Bench High 23-29	34	Black	**2802-82**
	34	Blue	**2802-83**

Particle Data During 30 Minutes of Seat Compression
Class 100 Chairs with Grade 2 Vinyl (Counts/Ft^3 during compression)

	>0.1 Micron	>0.3 Micron	>0.5 Micron
Sample 1	4	3	2
Sample 2	29	21	18
Sample 3	3	1	1

Static Performance Test Data for Static Control Seating

	Static Dissipative Vinyl
Decay (from 5000 volts to technical zero):	0.01 sec.
Top Surface or Volume Resistivity:	5.3 x 10^6 Ohms/ sq. surface
Average Component Resistance (to ground):	4.7 x 10^7 Ohms

Results taken from an independent testing laboratory (available upon request).

Class 100 Ergonomic Static-Control Chairs

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Class 100 Ergonomic Cleanroom Chairs

- **Certified by an independent laboratory to meet Class 100 specifications of Federal Standard 209E**
- **Ergonomic seat guarantees worker comfort, reduces fatigue and back injuries**
- **Vinyl upholstery with internal bumper guard is designed for many years of cleanroom use**
- **Filter traps particles 0.1 microns and larger for contamination-free comfort**
- **Polyurethane casters with chrome-plated hoods are durable and nonshedding**
- **All models feature chrome-plated metal parts for completely noncontaminating operation**
- **Refer to page 357 for full specifications**

These chairs are designed and built to the most exacting standards of this classification.

BIOFIT's manufacturing experience result in industrial-strength construction combined with Class-100 cleanroom compatibility. The durable vinyl fabric is specially manufactured to resist shedding under constant wear. All metal parts are chrome plated or polished aluminum to ensure a nonscratching, nonshedding surface, and all models feature polyurethane hooded casters for particle-free rolling.

In addition, each chair contains an exclusive filter that traps particles 0.1 microns and larger while allowing the seat to conform to body shape. This acrylic copolymer microporous membrane includes a nylon fabric support to prevent rupturing under that heaviest, day-in, day-out use. This state-of-the-art particulate performance guarantees both comfort and non-contaminating performance; these chairs are certified by an independent testing laboratory to meet the specifications of Federal Standard 209E (see table below for typical performance test data).

Like our other BioFit chairs, they feature an ergonomic design that includes "Soft Touch" pneumatic height adjustment, 3" of cushioning on backs and seats.

Model No. 2802-94

See page 357 for full specifications on fabric types.

Particle Data During 30 Minutes of Seat Compression
Class 100 Chairs with Grade 2 Vinyl (Counts/Ft³ during compression)

	>0.1 Micron	>0.3 Micron	>0.5 Micron
Sample 1	4	3	2
Sample 2	29	21	18
Sample 3	3	1	1

Type L Chairs:
Ergonomic seat with standard concave backrest, fixed footring, and chrome-plated metal parts, including tubular base with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	Grade 2 Vinyl Cat. #
Desk High 17-22	33	Black	**2802-85**
	33	Blue	**2802-86**
	33	Oatmeal	**2802-87**
	33	Grey	**2802-88**
Bench High 25-30	33	Black	**2802-89**
	33	Blue	**2802-90**
	33	Oatmeal	**2802-91**
	33	Grey	**2802-92**

Type N Chairs:
Ergonomic seat with 15.5" wide x 14.5" high ergonomic backrest, fixed footring, and chrome-plated metal parts, including tubular base with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	Grade 2 Vinyl Cat. #
Desk High 17-22	35	Black	**2803-01**
	35	Blue	**2803-02**
	35	Oatmeal	**2803-03**
	35	Grey	**2803-04**
Bench High 24-30	35	Black	**2803-05**
	35	Blue	**2803-06**
	35	Oatmeal	**2803-07**
	35	Grey	**2803-08**

Type M Chairs:
Ergonomic seat with standard concave backrest and chrome-plated metal parts, including 23" base (no footring) with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	Grade 2 Vinyl Cat. #
Desk High 17-22	24	Black	**2802-93**
	24	Blue	**2802-94**
	24	Oatmeal	**2802-95**
	24	Grey	**2802-96**
Bench High 23-29	26	Black	**2802-97**
	26	Blue	**2802-98**
	26	Oatmeal	**2802-99**
	26	Grey	**2803-00**

Type O Chairs:
Ergonomic seat with 15.5" wide x 14.5" high ergonomic backrest and chrome-plated metal parts, including extra-wide 26" leg-spread base with casters.

Seat Height (in. nominal)	Weight (lbs.)	Color	Grade 2 Vinyl Cat. #
Desk High 17-22	32	Black	**2803-09**
	32	Blue	**2803-10**
	32	Oatmeal	**2803-11**
	32	Grey	**2803-12**
Bench High 23-29	34	Black	**2803-13**
	34	Blue	**2803-14**
	34	Oatmeal	**2803-15**
	34	Grey	**2803-16**

Class 100 Ergonomic Cleanroom Chairs

Type N
(No. 2803-05)

Type L
(No. 2802-87)

Type O
(No. 2803-16)

Type M
(No. 2802-94)

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Standard Class 10 and Static-Control Class 10 Cleanroom Chairs

- **Integral, sealed breather lung isolates potential sources of contaminates while preserving seating comfort for optimal cleanliness**
- **Certified by an independent laboratory to meet requirements of Federal Standard 209E**
- **Available in static-dissipative vinyl fabric for protection against electrostatic discharge**
- **Vinyl upholstery and chrome-plated parts ensure cleanroom compatibility**
- **"Soft Touch" pneumatic height control brings seat to comfortable level at the press of a lever**
- **Includes hooded polyurethane casters (conductive casters on static-control models)**

When cleanroom operations demand an extremely low level of particulates, this Class 10 Ergonomic Chair can make the grade.

It is built to the same rigid standards, offers the same comfort and ease of use, and provides the same benefits as the Class 100 chair above, but it incorporates a unique particle retention system that guarantees Class 10 compatibility. Instead of a filtering system, it features a breather lung: a flexible, expandable and collapsible vessel hermetically sealed from the cleanroom environment but open to the air trapped inside the seat. This vessel "breathes" to allow comfortable compression and expansion of the seat—while minimizing the risk of particle escape. The durable, nonshedding vinyl upholstery is completely sealed to the lung (or to the back cushion) to ensure that no particles are emitted from the edges of the chair. (See typical performance data below).

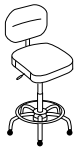
These chairs are available in standard and static-dissipative vinyl to meet your requirements. All are noncontaminating; dissipative Microcon vinyl fabric features a surface resistivity of 5.3 x 10^6 ohms/square for protection against ESD damage in sensitive environments (see static specifications below).

See page 357 for full specifications on fabric types.

Model No. 2803-41

Particle Data During 30 Minutes of Seat Compression
Class 10 Chairs with Grade 2 Vinyl (Counts/Ft³ during compression)

	>0.1 Micron	>0.3 Micron	>0.5 Micron
Sample 1	9	7	6
Sample 2	4	3	2
Sample 3	6	2	1



Type P Chairs:
"Breather-Lung" seat with standard concave backrest, fixed footring, and chrome-plated metal parts, including tubular base with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	Grade 2 Vinyl Standard Seat Cat. #	Grade 2 Vinyl Ergonomic Seat Cat. #
Desk High 17-22	32	Black	**2803-17**	**2805-17**
	32	Blue	**2803-18**	**2805-18**
	32	Oatmeal	**2803-19**	**2805-19**
	32	Grey	**2803-20**	**2805-20**
Bench High 24-29	32	Black	**2803-21**	**2805-21**
	32	Blue	**2803-22**	**2805-22**
	32	Oatmeal	**2803-23**	**2805-23**
	32	Grey	**2803-24**	**2805-24**

Type Q Chairs:
"Breather-Lung" seat with standard concave backrest and chrome-plated metal parts, including 23" base (no footring) with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	Grade 2 Vinyl Standard Seat Cat. #	Grade 2 Vinyl Ergonomic Seat Cat. #
Desk High 17-22	24	Black	**2803-25**	**2805-25**
	24	Blue	**2803-26**	**2805-26**
	24	Oatmeal	**2803-27**	**2805-27**
	24	Grey	**2803-28**	**2805-28**
Bench High 22-27	25	Black	**2803-29**	**2805-29**
	25	Blue	**2803-30**	**2805-30**
	25	Oatmeal	**2803-31**	**2805-31**
	25	Grey	**2803-32**	**2805-32**

Type R Chairs:
Black or Blue static-dissipative vinyl, "Breather-Lung" seat with standard concave backrest, fixed footring, and chrome-plated metal parts, including tubular base with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	ESD Material Standard Seat Cat. #	ESD Material Ergonomic Seat Cat. #
Desk High 17-22	32	Black	**2803-33**	**2805-33**
	32	Blue	**2803-34**	**2805-34**
Bench High 24-29	32	Black	**2803-37**	**2805-37**
	32	Blue	**2803-38**	**2805-38**

Type S Chairs:
Black or Blue static dissipative vinyl, "Breather-Lung" seat with standard concave backrest and chrome-plated metal parts, including 23" base (no footring) with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	ESD Material Standard Seat Cat. #	ESD Material Ergonomic Seat Cat. #
Desk High 17-22	24	Black	**2803-41**	**2805-41**
	24	Blue	**2803-42**	**2805-42**
Bench High 22-27	25	Black	**2803-45**	**2805-45**
	25	Blue	**2803-46**	**2805-46**

Standard Class 10 and Static-Control Class 10 Cleanroom Chairs

All models available with ergonomic waterfall seat

Type Q
(No. 2803-27)

Type P
(No. 2803-22)

Type R
(No. 2803-38)

Type S
(No. 2803-41)

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800 S. Raymond Ave., Fullerton, CA 92831 CA

Ergonomic Class 10 Cleanroom Chair

- **Revolutionary nylon fiber matrix allows chair to breathe through billions of tiny micropores, without emitting particles**
- **Looks and feels like soft glove leather, but offers outstanding durability, chemical resistance, and Class-10 cleanliness**
- **Ergonomic seat design helps minimize fatigue and injury**
- **"Soft Touch" pneumatic control simplifies seat height adjustment**
- **Chrome plating and fully hooded neoprene casters ensure noncontaminating performance**
- **Available in conductive material (with conductive casters) for static-sensitive environments**
- **Refer to page 357 for full specifications**

Model No. 2803-54

These Class 10 chairs take advantage of significant advancements in materials technology to combine Class 10-compatible cleanliness with ergonomic seat and back designs.

They use a porous nylon fiber matrix, laminated with a super-efficient filter media ("Grade 4 Breathable Nylon" on comparison chart, p. 357). This combination of materials for covering seats and backs gives Class 10 performance without the need for built-in filters or other devices. The new base material has the supple appearance and feel of soft glove leather, yet maintains superior durability and stain resistance. Its nylon fibers are laid down in a three-directional axis similar to the natural structure of collagen that is found in leather.

This porous structure allows the chair to breathe by transmitting moisture vapor through billions of tiny micropores, ensuring optimal comfort while minimizing the risk of particulate contamination. The material looks and acts like vinyl, making it easy to clean with soap and water. Because it is really nylon, however, it is resistant to common disinfectants and bleach, and it won't outgas or shed particles. Most importantly for those who use it, it's remarkably comfortable to sit on, and even compensates for temperature extremes. When the room temperature is warm, excess heat is dissipated; when a room is cold, heat is retained.

The synthetic filter media laminated to the base material is made of permanent electrets in the form of a fibrous mat. An electret is a nonconductive material with imbedded electrical charges that have an infinite life span. By incorporating electrostatic charges into the media, the filtration efficiency is enhanced over that normally expected from fibers of this size.

All of these chairs come with chrome-plating on all exposed metal parts except the polished aluminum bases, and hooded polyurethane casters for smooth, nonshedding rolling on hard surfaces. (Static-control models feature conductive casters.)

See page 357 for full specifications on fabric types.

Type T Chairs:
Micropore Nylon seat with standard concave backrest, fixed footring, and tubular base with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	Breathable Nylon Cat. #
Desk High 17-22	33	Black	**2803-49**
	33	Blue	**2803-50**
	33	Oatmeal	**2803-51**
	33	Grey	**2803-52**
Bench High 26-31	33	Black	**2803-53**
	33	Blue	**2803-54**
	33	Oatmeal	**2803-55**
	33	Grey	**2803-56**

Type V Chairs:
Micropore Nylon seat with 15.5" wide x 14.5" high ergonomic backrest, fixed footring, and tubular base with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	Breathable Nylon Cat. #
Desk High 17-22	35	Black	**2803-65**
	35	Blue	**2803-66**
	35	Oatmeal	**2803-67**
	35	Grey	**2803-68**
Bench High 26-31	35	Black	**2803-69**
	35	Blue	**2803-70**
	35	Oatmeal	**2803-71**
	35	Grey	**2803-72**

Type U Chairs:
Micropore Nylon seat with standard concave backrest and 23" base (no footring) with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	Breathable Nylon Cat. #
Desk High 16-22	24	Black	**2803-57**
	24	Blue	**2803-58**
	24	Oatmeal	**2803-59**
	24	Grey	**2803-60**
Bench High 23-29	26	Black	**2803-61**
	26	Blue	**2803-62**
	26	Oatmeal	**2803-63**
	26	Grey	**2803-64**

Type W Chairs:
Micropore Nylon seat with 15.5" wide x 14.5" high ergonomic backrest and extra-wide 26" leg-spread base (no footring) with casters.

Seat Height (in., nominal)	Weight (lbs.)	Color	Breathable Nylon Cat. #
Desk High 17-22	32	Black	**2803-73**
	32	Blue	**2803-74**
	32	Oatmeal	**2803-75**
	32	Grey	**2803-76**
Bench High 23-29	34	Black	**2803-77**
	34	Blue	**2803-78**
	34	Oatmeal	**2803-79**
	34	Grey	**2803-80**

Ergonomic Class 10 Cleanroom Chairs

Type V
(No. 2803-68)

Type T
(No. 2803-49)

Type W
(No. 2803-73)

Type U
(No. 2803-57)

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Class 1 Ergonomic Cleanroom Chair

- **Cleanroom built, cleaned and packaged—ready to pass directly into your own cleanroom**
- **Certified to meet Class 1 specifications of Federal Standard 209E**
- **"Soft Touch" pneumatic height control brings seat to comfortable level quickly and easily**
- **Ergonomic seat design, with waterfall seat, helps minimize fatigue and injury**
- **Static-safe model features dissipative Micron nylon**

What's the best way to prep a cleanroom chair for your facility? Make sure it's particle-free when it arrives!

No Hassle, No Particle Seating!

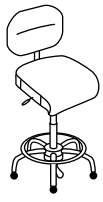
That's the assurance you receive with these Class 1 Ergonomic Chairs. Each one is manufactured, cleaned, and double-packaged in the manufacturer's own cleanroom. When it arrives at your facility, you simply open the box and then pass the chair components into your gowning area. Each is double-wrapped in 6 mil cleanroom bags that are independently verified for air leaks. Once inside your cleanroom, the chairs are fast and easy to assemble—without tools—by garbed and gloved personnel.

This start-to-finish emphasis on cleanliness eliminates the risk of hidden particles, the residue of dirty manufacturing methods, migrating into your sensitive operations. It also eliminates the cost of tedious wipe-down and verification procedures.

Once inside your cleanroom, these chairs help maintain Class 1 conditions. An exclusive air exchange system in the seat prevents air from escaping into the cleanroom surroundings when personnel are seated. The ergonomic seat and six-way articulating seat control help boost productivity by ensuring operator comfort. The seat control is covered with a hard plastic pan and sealed with flexible neoprene rubber and double-sided high contact non-outgassing tape, covering all areas where particles could be generated.

Thanks to this design and to ultraclean materials, these chairs have been certified Class 1 Clean by independent testing.

No. 2805-05



"Breather lung" waterfall seat with standard contoured backrest, articulating seat control, adjustable footring, 5-leg cast aluminum base with 23" spread, and hooded casters.

Particle Test Data

Size Range	> 0.1 Micron	> 0.3 Micron	> 0.5 Micron
Sample 1	2	1	1
Sample 2	5	2	1

	Cat. #
Class 1 Chair (blue)	**2805-05**
Class 1 ESD Chair (blue)	**2805-06**

Cleanroom Duragrain Styrene Chairs

- **Rugged duragrain seat and back ensure cleanroom compatibility, chemical spill resistance, and long service life**
- **"Soft Touch" pneumatic mechanism takes the heavy work out of seat-height adjustment**
- **Chrome-plated base and footrings minimize particles**
- **Hooded polyurethane casters available for smooth, contamination-free rolling**

These lightweight adjustable chairs are ideal for laboratory settings that require clean conditions, durable performance, and resistance to chemical spills.

Seat Height (in., nominal)	Weight (lbs.)	Type	Duragrain Seat & Back Chairs Cat. #
15-20	28	With Footring	**2804-73**
15-20	31		**2804-74***
18-23	28		**2804-75**
22-27	29		**2804-76**
26-31	30		**2804-77**
14-19	23	Without Footring	**2804-78***
14-19	21		**2804-79**
18-23	21		**2804-80**
20-25	22		**2804-81**
23-28	23		**2804-82**

Includes hooded polyurethane casters.

No. 2804-74

No. 2804-79

The duragrain styrene seat and back guarantee optimal durability yet offer surprising comfort. Select models with or without footrings and casters; all feature chrome plating on all exposed metal parts and easy "Soft Touch" adjustability.

Adjustable Static-Control Stool

- **"Soft Touch" control allows easy seat adjustment**
- **Chrome-plated metal frames and polished aluminum bases ensure cleanroom compatibility (with dissipative vinyl)**
- **Includes footrings**
- **Upholstered seat comes in several conductive and nonconductive materials**
- **Chrome-plated steel models ensure optimal cleanliness and chemical resistance**

These adjustable stools come with user-friendly pneumatic controls for easy height adjustment (up to 29" in bench-height models; refer to ordering tables below).

Models are available in several colors and fabric types. Conductive and dissipative seats provide static-control properties; see test data for typical static performance. Chrome-plated steel stools have a smooth surface—ideal for use around caustic chemicals that might corrode fabric tops. Castered stools feature hooded ¾"-wide neoprene casters for smooth, contamination-free rolling.

See page 357 for full specifications on fabric types.

Seat Height* (in., nominal)	Weight* (lbs.)	Color	Material	Static-Control Stool with Casters Cat. #	Static Control Stool without Casters Cat. #
	30	Black	Conductive Vinyl	**2804-15**	**2804-31**
Desk	30	Black	Dissipative Vinyl	**2804-16**	**2804-32**
High	30	Blue	Dissipative Vinyl	**2804-17**	**2804-33**
16-21	30	Blue	Dissipative Wool	**2804-19**	**2804-35**
	30	Grey	Dissipative Wool	**2804-20**	**2804-36**
	28	Black	Conductive Vinyl	**2804-23**	**2804-39**
Bench	28	Black	Dissipative Vinyl	**2804-24**	**2804-40**
High	28	Blue	Dissipative Vinyl	**2804-25**	**2804-41**
24-29	28	Blue	Dissipative Wool	**2804-27**	**2804-43**
	28	Grey	Dissipative Wool	**2804-28**	**2804-44**

**** With casters add 2" to seat height and 2lbs to shipping weight.***

Chrome Plated Steel Adjustable Stools

Fixed-Height Stool

Chrome Plated:	Cat. #
18"	**2804-85**
24"	**2804-86**
30"	**2804-87**

Adjustable Foot Rest

	Cat. #
Painted:	**2804-83**
Chrome Plated:	**2804-84**

Chrome Plated Steel Adjustable Stools:
with footrings

Seat Height (in., nominal)	Weight (lbs.)	Chrome-Plated Stool Cat. #
13-18	23	**2804-63**
13-18	26	**2804-64***
17-22	23	**2804-65**
20-25	24	**2804-66**
24-30	25	**2804-67**

****Includes hooded casters.***

Chrome Plated Steel Adjustable Stools:
without footrings

Seat Height (in., nominal)	Weight (lbs.)	Chrome-Plated Stool Cat. #
13-18	20	**2804-68***
13-18	18	**2804-69**
16-21	18	**2804-70**
18-23	19	**2804-71**
21-26	20	**2804-72**

****Includes hooded casters.***

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ESD Chair

- **Static-dissipative fabric makes these chairs safe for use around sensitive components and equipment**
- **Ergonomic design features four adjustable functions to ensure comfort, safety**
- **Patented Fluid-Motion pneumatic mechanism lets chair move with you**
- **Built to stand up to long, rugged use**

Even simple movements such as reaching for a telephone can generate enough voltage to damage or degrade sensitive microelectronic components.

The ESD Chair is designed specifically to eliminate these problems by combining conductive materials, hooded static-free casters, and static-free fabric in a chair that's as comfortable as it is attractive.

Four Continuous-Comfort Ergonomic Functions

Both the contoured seat and back are covered with 2½" of urethane foam to ensure comfortable seating (meets California Code 117). In addition, these chairs feature four adjustable ergonomic functions.

The 5-leg base is 26" diameter and is made of molded black plastic, with steel collar reinforcement. The 2" diameter dual-wheel, anti-static casters are particularly well suited for hard floors. Their design allows easy movement but slows down backward rolling when you stand up—an important safety feature.

Static-Dissipative Fabric Protects Sensitive Products

The 99% polyacryl/1% metal filament ESD fabric features a surface resistivity no greater than 1.5 x 10^6 ohms/square cm (when tested in accordance with DIN 54345). Tests have shown that the casters maintained their static-dissipative characteristics after the equivalent of five years of continuous heavy use.*

By placing these chairs on any grounded floor mat, you can rest assured that static charges generated by an operator will be safely dissipated before they can do any damage.

Available in five fabric colors: mushroom, onyx, pearl gray, indigo, and terracotta.

No. 1013-02

Patented Fluid Motion: As you shift position, your chair back and seat move in synchronized unison, pneumatically. You can also lock the back and seat in any position that's comfortable. Chairs without Fluid Motion have mechanical backrest angle adjustment.

Chair Height Adjustment: Gives you fingertip control of the chair height.

Backrest Height: Lets you raise and lower the backrest while you are seated. Features built-in lumbar support.

Automatic Backrest Flexibility: Your backrest flexes as you move.

Fabric Chart

Dimensions:

Seat:	19" x 17½"
Back:	15½" x 13½"
Seat Height:	see chart
Overall Width:	19"
Overall Depth:	25"
Weight:	27-34 lbs.

**** These are typical test results, not guaranteed values.***

ESD Chair	With Fluid Motion Controls			With Mechanical Controls**		
Fabric Color	**Seat Height** 16"– 21" No Footring Cat. #	**Seat Height** 19"– 26" With Footring Cat. #	**Seat Height** 23"– 32" With Footring Cat. #	**Seat Height** 16"– 21" (No Footring) Cat. #	**Seat Height** 19"– 26" (With Adjust. Chrome Footring) Cat. #	**Seat Height** 23"– 32" (With Adjust. Chrome Footring) Cat. #
Mushroom	**1012-00**	**1013-40**	**1013-45**	**1012-13**	**1012-18**	**1012-23**
Onyx	**1013-00**	**1013-41**	**1013-46**	**1012-14**	**1012-19**	**1012-24**
Pearl Gray	**1013-01**	**1013-42**	**1013-47**	**1012-15**	**1012-20**	**1012-25**
Indigo	**1013-02**	**1013-43**	**1013-48**	**1012-16**	**1012-21**	**1012-26**
Terracotta	**1013-03**	**1013-44**	**1013-49**	**1012-17**	**1012-22**	**1012-27**

*****The Low-Cost Alternative ESD Chair comes with a mechanical backrest angle adjustment***

Cleanroom ESD Chair

- **Vinyl material and ultra-clean construction make this chair suitable for use in a Class 100 environment**
- **Static-safe fabric helps protect sensitive components and equipment**
- **Ergonomic design features four adjustable functions to ensure comfort, safety**
- **Patented Fluid-Motion pneumatic mechanism lets chair move with you**
- **Built to stand up to long, rugged use**

These chairs offer the static protection of the ESD chair, but add particle-control features for use in a cleanroom environment.

Proven Cleanroom Performance

Both the bottom and back shell are completely enclosed to inhibit particle generation, and the carbon-impregnated vinyl fabric combines cleanliness with static-protection.

In fact, tests conducted by an independent laboratory in accordance with Federal Standard 209 demonstrated that particles generated by the chair remained under the Class 100 limit (100 particles 0.5 µm or larger per cubic foot) even when heavy work was simulated.*

Four Continuous-Comfort Ergonomic Functions

Both the contoured seat and back are covered with 2½" of urethane foam to ensure comfortable seating (meets California Code 117). In addition, these chairs feature four adjustable ergonomic functions:

No. 1013-52

The 5-leg base is 26" diameter and is made of cast aluminum with a polished top. The 2" diameter dual-wheel, anti-static casters are particularly well suited for hard floors. Their design allows easy movement but slows down backward rolling when you stand up—an important safety feature.

Tests have shown that the casters maintained their static-dissipative characteristics after the equivalent of five years of continuous heavy use.* By placing these chairs on any grounded floor mat, you can rest assured that static charges generated by an operator will be safely dissipated before they can do any damage.

Standard vinyl color is black.

Dimensions:

Seat:	19" x 17½"
Back:	15½" x 13½"
Seat Height:	See below
Overall Width:	19"
Overall Depth:	25"
Weight:	27 - 34 lbs.

These are typical test results, not guaranteed values.

Patented Fluid Motion: As you shift position, your chair back and seat move in synchronized unison, pneumatically. You can also lock the back and seat in any position that's comfortable. Chairs without Fluid Motion have mechanical backrest angle adjustment.

Chair Height Adjustment: Gives you fingertip control of the chair height.

Backrest Height: Lets you raise and lower the backrest while you are seated. Features built-in lumbar support.

Automatic Backrest Flexibility: Your backrest flexes as you move.

Cleanroom ESD Chair	With Fluid Motion Controls	With Mechanical Controls
	Cat. #	Cat. #
16"-21" (no footring)	**1013-50**	**1012-10**
19"-26" (with adjust. footring)	**1013-51**	**1012-11**
23"-32" (with adjust. footring)	**1013-52**	**1012-12**

Optional Class 1 Upgrade Package **1013-90**

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Cleanroom Chair

- **Vinyl material and ultra-clean construction makes this chair suitable for use in a Class 100 environment**
- **Ergonomic design features four adjustable functions to ensure comfort, safety**
- **Patented Fluid-Motion pneumatic mechanism lets chair move with you**
- **Features adjustable chrome footring**
- **Built to stand up to long, rugged use**

Proven Cleanroom Performance

These chairs make use of a non-porous vinyl fabric to allow their use in a cleanroom environment. In addition, both the bottom and back shell of the Cleanroom Chair are completely enclosed to inhibit particle generation.

Tests conducted by an independent laboratory in accordance with Federal Standard 209 demonstrated that particles generated by the chair remained under the Class 100 limit (100 particles 0.5 µm or larger per cubic foot) even when heavy work was simulated.*

Patented Fluid Motion: As you shift position, your chair back and seat move in synchronized unison, pneumatically. You can also lock the back and seat in any position that's comfortable. Chairs without Fluid Motion have mechanical backrest angle adjustment.

Chair Height Adjustment: Gives you fingertip control of the chair height.

Backrest Height: Lets you raise and lower the backrest while you are seated. Features built-in lumbar support.

Automatic Backrest Flexibility: Your backrest flexes as you move.

No. 1013-08

Four Continuous-Comfort Ergonomic Functions

Both the contoured seat and back are covered with 1½" of urethane foam to ensure comfortable seating (meets California Code 117). In addition, these chairs feature four adjustable ergonomic functions.

The 5-leg base is 26" diameter and is made of molded black plastic. The 2" diameter dual-wheel, safety casters are particularly well suited for hard floors. Their design allows easy movement but slows down backward rolling when you stand up—an important safety feature.

Available in black, Copenhagen, medium green, jade, and teal.

Dimensions:

Seat:	19" x 17½"
Back:	15½" x 13½"
Seat Height:	See chart
Overall Width:	19"
Overall Depth:	25"
Weight:	27 - 34 lbs.

These are typical test results, not guaranteed values.

Vinyl Color Chart

Cleanroom Chair	With Fluid Motion Control			With Mechanical Backrest Angle Control		
Vinyl Color	**Seat Height** 16"-21" (No Footring)	**Seat Height** 19"-26" (with Footring)	**Seat Height** 23"-32" (with Footring)	**Seat Height** 16"-21" (No Footring)	**Seat Height** 19"-26" (With Adjust. Chrome Footring)	**Seat Height** 23"-32" (With Adjust. Chrome Footring)
Cat. #	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #	
Black	**1012-04**	**1012-05**	**1012-06**	**1012-31**	**1012-36**	**1012-41**
Copenhagen	**1013-04**	**1013-08**	**1013-12**	**1012-32**	**1012-37**	**1012-42**
Medium Green	**1013-05**	**1013-09**	**1013-13**	**1012-33**	**1012-38**	**1012-43**
Jade	**1013-06**	**1013-10**	**1013-14**	**1012-34**	**1012-39**	**1012-44**
Teal	**1013-07**	**1013-11**	**1013-15**	**1012-35**	**1012-40**	**1012-45**

Optional Class 1 Upgrade Package **1013-90**

Class 10 Cleanroom Seating

- **Versatile chairs come in a variety of seat-height options**
- **Polyurethane coatings ¾-inch thick meet California Code 117**
- **Adjustable seats, backs, and chrome-finished footrings (on taller models)**

These chairs and stools are built to meet Class 10 cleanroom standards. They virtually eliminate the particulate contamination commonly associated with upholstery, cushioning and finishes.

All the seats and backs of the chairs are made with contoured ⅜-inch thick, seven-layer molded plywood, coated with polyurethane ¾-inch thick to meet California Code 117.

Task Chairs with Backrests in Three Height Adjustments

The multipurpose task chair with backrest is available in three different seat-height ranges (see chart below), with the taller two featuring a chrome-finished footring that adjusts 6" vertically for use with extended heights. Each model provides a backrest that adjusts 4", a seat-height that adjusts up to 10", and an adjustable backrest angle that can be fixed at any point in its range. Both the shell and the five-leg base of all models are charblack, with 2-inch diameter dual-wheel safety hard floor casters.

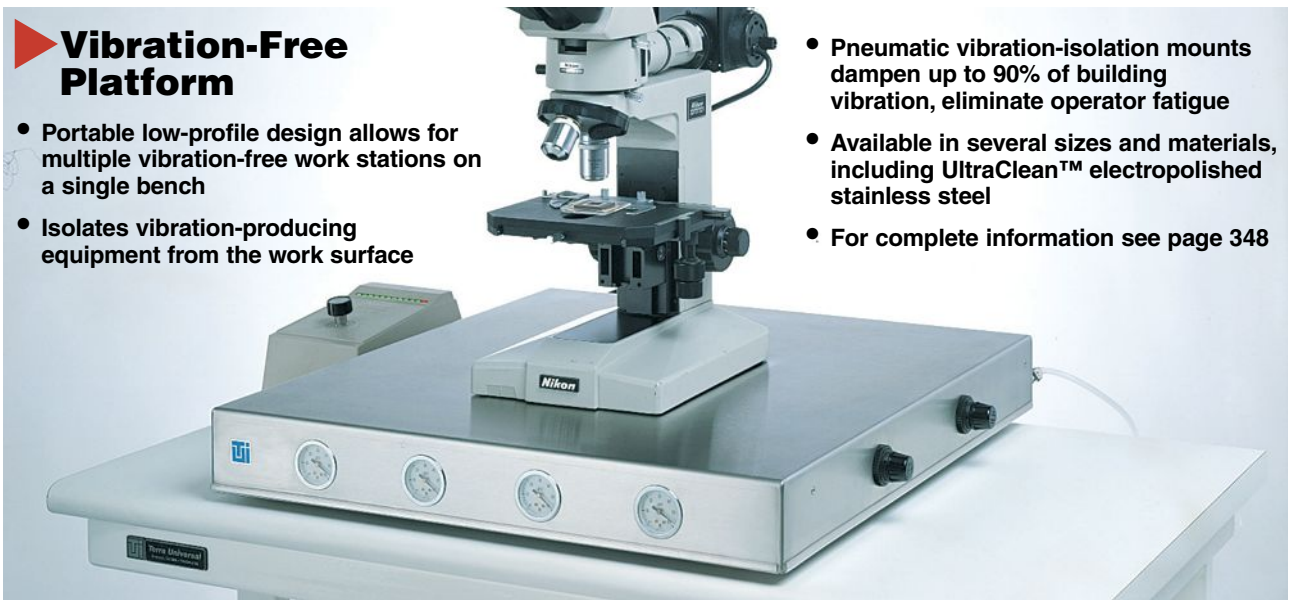
Task Chair

Class 10 Chairs and Stools

Description	Seat Height (in.)	Overall Dimensions (H x W x D—in.)	Base Dia. (in.)	Seat Size (in.)	Back Size (in.)	Footring	Weight (lbs.)	Cat. #
Task Chair	16-23	28-38 x 17.5 x 23.5	26	17.5 x 19	15.5 x 13.5	No	27	**1013-16**
Task Chair	19-26	30-42 x 17.5 x 23.5	26	17.5 x 19	15.5 x 13.5	Yes	29	**1013-17**
Task Chair	23-32	33-47 x 17.5 x 23.5	26	17.5 x 19	15.5 x 13.5	Yes	30	**1013-18**

Vibration-Free Platform

- **Portable low-profile design allows for multiple vibration-free work stations on a single bench**
- **Isolates vibration-producing equipment from the work surface**
- **Pneumatic vibration-isolation mounts dampen up to 90% of building vibration, eliminate operator fatigue**
- **Available in several sizes and materials, including UltraClean™ electropolished stainless steel**
- **For complete information see page 348**



Hoods

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Environmental Control Modules

Benchtop Laminar Flow and Ductless Exhaust Hoods

- **Modular HEPA filter/blower units and hoods of varying sizes and materials form versatile controlled-environment enclosures**
- **Innovative, economical design lets you configure a system for any of three basic applications:**
  - ✓ **Horizontal or Vertical Laminar Flow Hood** with filters to meet particle standards as clean as Class 1
  - ✓ **Horizontal or Vertical Ductless Fume Hood** purifies wide range of noxious fumes for safe indoor release
  - ✓ **Exhaust Fume Hood** directs fumes to an in-house exhaust system
- **Filter/blower module also functions as a stand-alone air purifier (mounted to wall or ceiling) or as a clean-air feed system (for a remote enclosure)**
- **Powerful 1200 CFM blowers with unique plenum chamber ensure uniform air velocity throughout the entire work area**
- **Modular design minimizes turbulence and noise associated with large, centralized filter/blower systems**
- **Optional ionizing equipment ensures static safety in laminar flow applications**
- **Custom modifications provide economical solutions to unique requirements**
- **Stainless steel hood frame supports your choice of five different panel materials**

CE

3-Module Vertical Laminar Flow Hood (page 384) with optional light, AirGard®, and cleanroom bench

3-Module Horizontal Ductless Exhaust Purifier (page 386)

Filter/Blower Module

Vertical Ductless Exhaust Purifier (page 388)

Horizontal Laminar Flow Hood with Access Shield down

These Environmental Control Modules address a central cleanroom dilemma: high-technology equipment requires smaller geometries (and more stringent environmental standards), while the necessary cleanrooms become increasingly expensive to construct and maintain.

The Cleanroom Dilemma

In fact, research suggests that particles in the sub 0.1 micron range, which can degrade today's most sensitive components, are largely unaffected by cleanroom laminar flow airstreams. The disturbing consequence of these findings is that many submicron particles—once they are introduced into a cleanroom—may be nearly impossible to remove, even with sophisticated HEPA filtering systems. At the heart of this problem are humans themselves—by far the greatest source of contamination in a cleanroom.

Isolated controlled-air environments provide a cost-effective solution to this problem. Once an operator is removed from the processing or storage area, maintaining superclean conditions becomes much easier—and much more affordable!

A Controlled Environment To Fit Your Needs

Terra's Environmental Control Modules provide a versatile, economical approach to this mini-environment concept.

Their design flexibility allows you to construct a laminar flow or exhaust purification/removal system for virtually any sized enclosure. Hoods are available for use with two, three, or four filter/blower modules, and several hoods of any size can be positioned together to form as large a work station as you need. Blower/filter modules attach securely to hoods by means of a few screws, and gaskets ensure an air-tight seal.

Further, blower/filter modules can be wall mounted to provide continuous filtering/recirculating, or operated as free-standing systems to deliver a continuous supply of Class 10 air (or purified exhaust) to a remote benchtop or enclosure.

The low-profile filter/blower module incorporates 1200 CFM impeller blowers designed for quiet, continuous duty. A flexible mounting system enables it to function as a positive-pressure blower in one set of applications, drawing air through intake baffles and directing filtered air through an exhaust grid. In the other mounting position, it functions as a negative-pressure ventilator, drawing exhaust fumes through a charcoal purification filter and then releasing them through 8"-diameter exhaust flanges.

The polypropylene housing accommodates a variety of filters. HEPA (High-Efficiency Particulate Air) and ULPA (Ultra-Low Penetration Air) filters provide Class 10 (and cleaner) air flows—refer to performance graph for flow rate and particle counts. Exhaust purification filters remove from the air stream the fumes produced during soldering, screen printing, chemical titrations, and other processing operations (see page 392 for characteristics of exhaust purification filters). Filters can also be used together in the same housing to ensure a clean, purified exhaust flow.

Modular Hoods to Fit Any Requirement

Hoods are designed to fit on a standard table when interfaced with the filter/blower module. Hoods for vertical flow applications are designed for tables 30" deep or deeper. Hoods for horizontal flow applications require a 34"- 44" deep table to accommodate both the hood and filter/blower (Terra's cleanroom table listed on page 391 accommodates all configurations). Both hood designs are available in three widths. All hoods feature a segmented access shield that allows ample operator access to the working area and also closes completely to minimize contaminants. Stainless steel hood frames support your choice of five different hood materials.

Uniform Laminar Flows— No Matter How Large the System

This range of sizes gives you complete flexibility to design a system that meets your requirements.

Double-width hoods provide ample working space for one operator. Larger hoods maintain effective laminar/exhaust flow rates for larger working areas and several operators.

In fact, their economical, modular design lets you configure a bank of controlled-air enclosures as wide as you want. Because each incorporates its own filter/blower module, the system maintains a uniform laminar flow across the entire work area—no matter how large it is—with minimal noise and turbulence. Compare this working environment with the noisy, wind-blown processing areas in systems that rely on a single, centralized filter/blower!

Hoods are available in five materials. Terra's light-weight, transparent static-dissipative PVC, which features a surface resistivity between 10^6 and 10^8 ohms/square, safely eliminates static build-ups and the particles they attract, making surfaces clean inside and out. Nondissipative PVC and polypropylene enclosures are ideal for use with a wide range of caustic fumes. All hoods feature a stainless steel reinforcement frame for optimal strength and stability.

Hoods can also be equipped with a conduit flange to allow remote applications. Simply specify desired location of input/exhaust when ordering.

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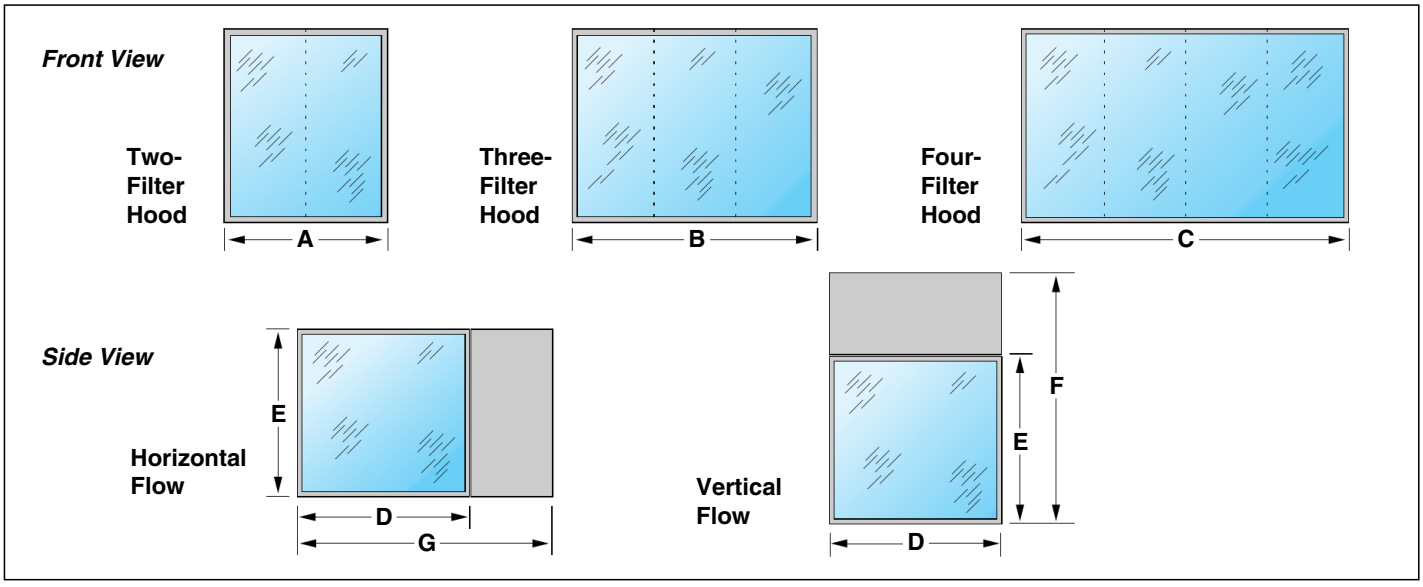


System Options

(See ordering information on the following pages.)

Ionizing Equipment guarantees static safety in laminar flow applications by emitting a balanced stream of positive and negative ions to the work surface, neutralizing charge imbalances and eliminating electrostatic discharge (ESD) that can destroy sensitive components. Includes ionizing bar (mounted inside the hood) and self-balancing power supply (see page 421 for complete information).

Fluorescent Lighting is recommended for use with stainless steel and polypropylene hoods. An externally mounted fixture is designed not to interfere with conditions under the hood. UV tubes are ideal for promoting sterile conditions in microelectronics and biological processes.

Cleanroom Table features a sealed laminate nonconductive surface to minimize particle accumulation and ensure easy cleaning. Standard table features an epoxy-finished steel frame with stainless steel sleeves on the lower support member to prevent scuffing. See complete information on page 391.

AirGard™ Air Velocity Monitor
Monitors air velocity (70 - 250 ft/sec; 0.35 - 1.25 m/sec) to ensure laminar flow or ventilation efficiency. LCD display shows constant digital reading of face velocity; and LED and audible High/Low alarms indicate when air speed falls below user selectable level. Part number includes flush-mount installation on specified Terra Universal hood (laminar flow or exhaust fume). Refer to page 586 for full specifications.

	Cat. #
110VAC, 50/60Hz	**6704-65**
220VAC, 50Hz	**6704-65-220**

Hood Type:						
Two Filter	Three Filter	Four Filter	All			
A	B	C	D	E	F	G
28"	42"	56"	30"	28"	41 1/2"	43 1/2"

Power Strips include 4 grounded electrical receptacles, a master on/off switch, and a 15-amp circuit breaker. Standard mounting is on the interior right side of the hood.

Specifications

Blower: 1200 CFM (rated at 0" static pressure) 1675 RPM variable-speed impeller; 115VAC/60Hz; consumes 115W; 1.0 running amps (230VAC/50Hz models also available); housed in white polypropylene housing with plenum chamber to optimize uniform air flow. Note: 1200CFM blowers used in ductless exhaust applications do not include speed controls.

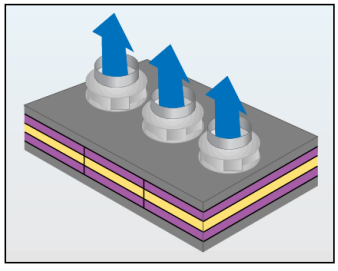
Filters: HEPA: 99.99% efficient @ 0.3µm particles
ULPA: 99.999% efficient @ 0.12µm particles

Exhaust Purification: Activated charcoal filter rated effective with wide range of organic fumes (see complete ordering information on this and other purification filters beginning on page 424).

Dimensions
Hood: See dimensional illustrations
Blower Housing: 13 1/2"D x 32 1/4"H x 28", 42", or 56"W

Blower Performance—Testing performed on 42"W models

Exhaust Purification

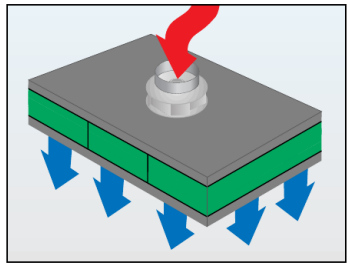


Air Flow
As Shown:
600 CFM exhaust flow
(200 CFM per filter pack)

With HEPA final filters #1621-02:
525 CM exhaust flow
(175 CFM per filter pack

3 1200 CFM Impellers
3 Charcoal Filters #1716-00
6 Pre/Post Filters #1681-04A

Laminar Flow



Air Speed
Max.>150 ft./minute
(adjustable to 90 ft./minute)

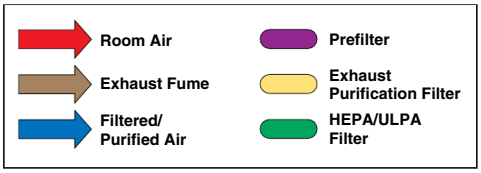
Air Flow
800 CFM

1 1200 CFM Impeller
3 HEPA Filters #1681-02

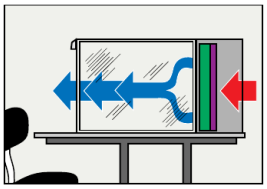
Application Guide for Environmental Control Modules

The following pages provide complete ordering information for Environmental Control Modules configured for several common application requirements (positive and negative-pressure stations, vertical and horizontal air flows, with and without hoods).

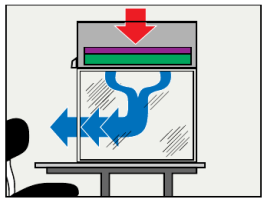
Use the checklist below to locate the configuration that's right for your requirements. Whichever modules you select, Terra will deliver a complete turnkey system that's ready for operation!



Clean Air Laminar Flow Applications

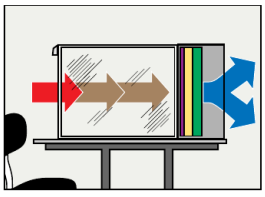


Horizontal Laminar Flow Hood
(See page 382)
Directs a uniform stream of filtered air forward from the rear of the work area. Includes:
- Hood (any size)
- Filter/Blower Modules (to match hood)
- Filter(s): ULPA or HEPA to meet particle requirements
- Other Options: Table, ionizing bar, light, power strip

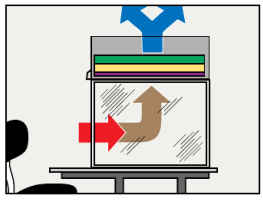


Vertical Laminar Flow Hood
(See page 384)
Directs a uniform stream of filtered air downward to the work area. Includes:
- Hood (any size)
- Filter/Blower Modules (to match hood)
- Filter(s): ULPA or HEPA to meet particle requirements
- Other Options: Table, ionizing bar, light, power strip

Ductless Exhaust Hoods

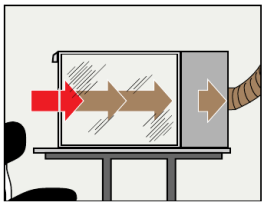


Horizontal Ductless Exhaust Purifier *(See page 386)*
Draws exhaust fumes toward the rear of the work area and into an exhaust purification filter to allow safe indoor release. Includes:
- Hood (any size)
- Filter/Blower Modules (to match hood)
- Filter(s): Exhaust Purification (many types available) plus prefilter/postfilter to meet particle requirements
- Other Options: Table, Exhaust Fume Detector Kit, light, power strip

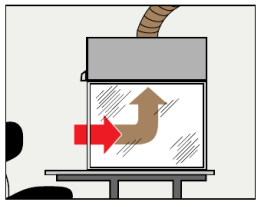


Vertical Ductless Exhaust Purifier
(See page 388)
Draws exhaust fumes upwards from the work area through an exhaust purification filter to allow safe indoor release. Includes:
- Hood (any size)
- Filter/Blower Modules (to match hood)
- Filter(s): Exhaust Purification (many types available) plus prefilter/postfilter to meet particle requirements
- Other Options: Table, Exhaust Fume Detector Kit, light, power strip

Exhaust Fume Hoods

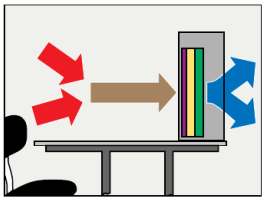


Horizontal Exhaust Fume Hood
(See page 390)
Draws exhaust fumes toward the rear of the work area to an exhaust duct for delivery to an in-house ventilation system. Includes:
- Hood (any size)
- Blower Modules (to match hood)
- Adapter Panel (with flange for exhaust conduit)
- Other Options: Table, exhaust conduit, light, power strip

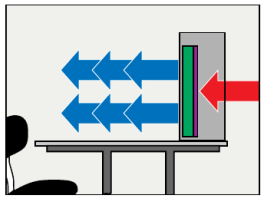


Vertical Exhaust Fume Hood
(See page 390)
Draws exhaust fumes upwards from the work area to an exhaust duct for delivery to an in-house ventilation system. Includes:
- Hood (any size)
- Blower Modules (to match hood)
- Adapter Panel (with flange for exhaust conduit)
- Other Options: Table, exhaust conduit, light, power strip

Free-Standing Ventilator Modules

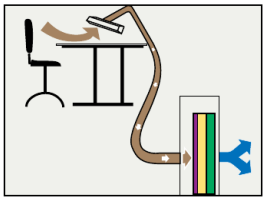


Free-Standing Ductless Exhaust Purifier *(See page 390)*
Draws exhaust fumes from a work bench or other work area into a purification filter for safe release/recirculation. Includes:
- Filter/Blower Module
- Filter(s): Exhaust Purification (many types available) plus prefilter/postfilter to meet particle requirements
- Exhaust Fume Detector Kit

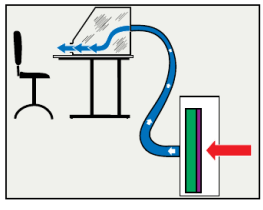


Free-Standing Clean Air Blower
(See page 390)
Can be placed on any work surface to provide a high-volume horizontal flow of particle-free air. Includes:
- Filter/Blower Module
- Filter(s): ULPA or HEPA to meet particle requirements

Remote Air Control Modules



Remote Exhaust Purifier *(See page 391)*
Draws exhaust fumes from a remote area for purification and safe indoor release. Includes:
- Filter/Blower Module
- Filter(s): Exhaust Purification (many types available) plus prefilter/postfilter to meet particle requirements
- Adapter Panel with flange (for connecting incoming exhaust line)
- Other Options: Conduit, Exhaust Fume Detector Kit



Remote Clean Air Blower *(See page 391)*
Provides a continuous stream of HEPA-filtered or ULPA-filtered air to a remote enclosure. Includes:
- Filter/Blower Module
- Filter(s): ULPA or HEPA to meet particle requirements
- Adapter Panel with flange (for clean air feed conduit)
- Conduit

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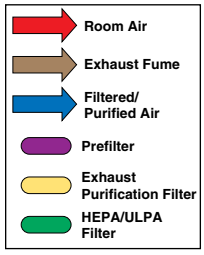
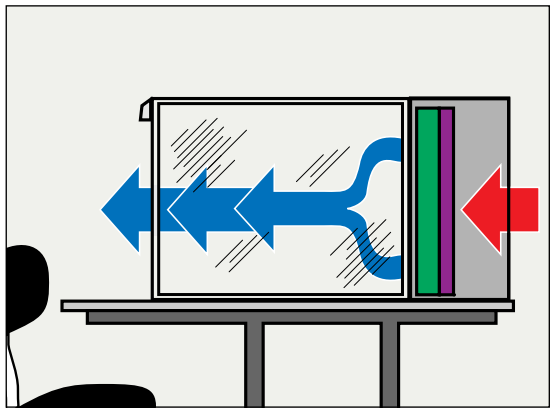
Environmental Control Modules: Horizontal Laminar Flow Modules

These modules direct a continuous wash of filtered air horizontally across the work area. They require a work surface that provides at least 44" of depth (see page 391). Select the hood material and filter(s) for your application below. All components are delivered as a complete turnkey system, ready for operation.





To Order —

1. The chart below indicates the ***system widths*** available, for two, three or four filters (HEPA or ULPA; order separately). A 12" x 12" prefilter is installed externally. Refer to page 380 for overall system dimensions.
2. Select the desired voltage for the ***blower/filter module***. Each polypropylene housing incorporates a 1200 CFM impeller blower (see performance graph on page 380). The unique plenum design provides uniform air velocity across the entire filter face, ensuring a laminar airflow throughout the enclosure.
3. Select the ***hood material*** for your application.
4. Order the correct number of ***filters*** for your hood size.
5. A ***fluorescent light*** is recommended for optimal visibility, especially with a polypropylene or stainless steel hood. ***Ionizing equipment*** is available to protect the work area against surface charges that can create electro-static discharge. The optional ***AirGard® Air Velocity Meter*** ensures adequate air flow to remove particles effectively.
6. Horizontal laminar flow hoods require a ***work surface*** with 44" of depth. Refer to page 391 for benches designed specifically for these systems.

See page 380 for full specifications

Dimensions		Blower/Filter Module***		Hoods (Includes access shield of material indicated in parentheses)				
No. of Filters*	Working Area** (W" x D" x H")	115VAC/60Hz Cat. #	230VAC/50Hz Cat. #	Dissipative PVC Cat. #	Nondissipative PVC Cat. #	Acrylic Cat. #	Polypropylene Cat. #	Stainless Steel Cat. #
2	28 x 30 x 28	**1650-10**	**1650-10-220**	**1682-28A**	**1682-31A**	**1682-34A**	**1682-37A**	**1682-40A**
3	42 x 30 x 28	**1650-11**	**1650-11-220**	**1682-29A**	**1682-32A**	**1682-35A**	**1682-38A**	**1682-41A**
4	56 x 30 x 28	**1650-12**	**1650-12-220**	**1682-30A**	**1682-33A**	**1682-36A**	**1682-39A**	**1682-42A**

** Indicates number of filters that are housed in the corresponding blower/filter module. Order HEPA or ULPA filters separately.*
*** Inside hood dimensions. See page 380 for overall dimensions, including filter/blower housing.*
**** Includes one 1200 CFM impeller blower (rated at 0" static pressure; see performance data on page 380).*

System Options	Ionizing Equipment (see page 421)		Lighting Fixture†		
For Hood Size	110VAC, 50/60 Hz Cat. #	220VAC 50 Hz Cat. #	110VAC, 50/60 Hz Cat. #	220VAC, 50 Hz Cat. #	Replacement Tube Cat. #
28"W (two filters)	**1526-39**	**1526-39-220**	**1682-23**	**1682-23-220**	**1682-26**
42"W (three filters)	**1526-40**	**1526-40-220**	**1682-24**	**1682-24-220**	**1682-26**
56"W (four filters)	**1526-41**	**1526-41-220**	**1682-25**	**1682-25-220**	**1682-26**

† Highly recommended for optimal visibility, especially in polypropylene and stainless steel hoods. Externally mounted.

Filters

HEPA (High Efficiency Particulate Air) — Cat. #
Rated 99.99% efficient @ 0.3µm particles. **1681-02**

ULPA (Ultra Low Penetration Air)
Rated 99.999% efficient @ 0.12µm particles **1681-10**

Replacement Pre/Post-Filter
Mounted externally. One included standard. **9202-50**

Power Strip

Cat. #

Includes 4 outlets, master on/off switch, and 15 amp circuit breaker. Installed on right side of hood.
110VAC, 50/60 Hz **1681-80**

AirGard™ Air Velocity Monitor

Monitors air velocity (70 - 250 ft/sec; 0.35 - 1.25 m/sec) to ensure laminar flow or ventilation efficiency. Includes installation. Refer to page 586 for full specifications.
110VAC, 50/60Hz **6704-65**
220VAC, 50Hz **6704-65-220**

Shown with optional light and cleanroom bench - see page 391 Refer to page 380 for full specifications.

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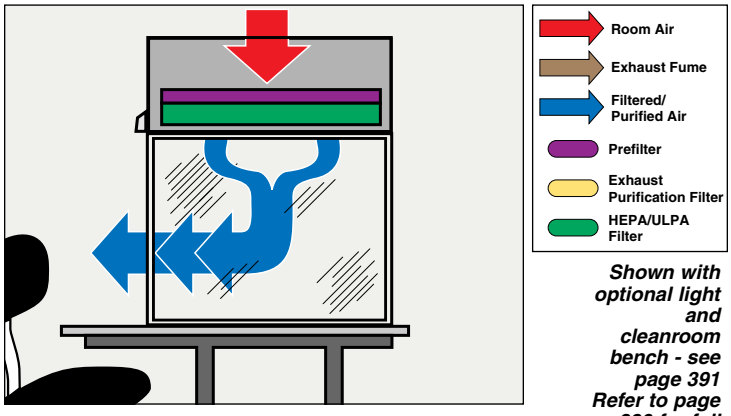
Environmental Control Modules:
Vertical Laminar Flow Modules

These modules direct a continuous wash of filtered air downward from the filter/blower module mounted above the hood. They require a work surface that provides at least 32" of depth (see page 391). Select the hood material and filter(s) for your application below. All components are delivered as a complete turnkey system, ready for operation.



Shown with optional light and cleanroom bench - see page 391 Refer to page 380 for full specifications.

To Order —

1. The chart below indicates the ***system widths*** available, for two, three or four filters (HEPA or ULPA; order separately). A 12" x 12" prefilter is installed externally. Refer to page 380 for overall system dimensions.
2. Select the desired voltage for the ***blower/filter module***. Each polypropylene housing incorporates a 1200 CFM impeller blower (see performance graph on page 380). The unique plenum design provides uniform air velocity across the entire filter face, ensuring a laminar airflow throughout the enclosure.
3. Select the ***hood material*** for your application.
4. Order the correct number of ***filters*** for your hood size.
5. A ***fluorescent light*** is recommended for optimal visibility, especially with a polypropylene or stainless steel hood. ***Ionizing equipment*** is available to protect the work area against surface charges that can create electro-static discharge. The optional ***AirGard® Air Velocity Meter*** ensures adequate air flow to remove particles effectively.
6. Horizontal laminar flow hoods require a ***work surface*** with 32" of depth. Refer to page 391 for benches designed specifically for these systems.

Dimensions		Blower/Filter Module***		Hoods (Includes access shield of material indicated in parentheses)				
No. of Filters*	Working Area** (W" x D" x H")	115VAC/60Hz Cat. #	230VAC/50Hz Cat. #	Dissipative PVC Cat. #	Nondissipative PVC Cat. #	Acrylic Cat. #	Polypropylene Cat. #	Stainless Steel Cat. #
2	28 x 30 x 28	**1650-20**	**1650-20-220**	**1682-44A**	**1682-47A**	**1682-50A**	**1682-53A**	**1682-56A**
3	42 x 30 x 28	**1650-21**	**1650-21-220**	**1682-45A**	**1682-48A**	**1682-51A**	**1682-54A**	**1682-57A**
4	56 x 30 x 28	**1650-22**	**1650-22-220**	**1682-46A**	**1682-49A**	**1682-52A**	**1682-55A**	**1682-58A**

** Indicates number of filters that are housed in the corresponding blower/filter module. Order HEPA or ULPA filters separately.*
*** Inside hood dimensions. See page 380 for overall dimensions, including filter/blower housing.*
**** Includes one 1200 CFM impeller blower (rated at 0" static pressure; see performance data on page 380).*

System Options	Ionizing Equipment (see page 421)		Lighting Fixture†		
For Hood Size	110VAC, 50/60 Hz Cat. #	220VAC 50 Hz Cat. #	110VAC, 50/60 Hz Cat. #	220VAC, 50 Hz Cat. #	Replacement Tube Cat. #
28"W (two filters)	**1526-39**	**1526-39-220**	**1682-23**	**1682-23-220**	**1682-26**
42"W (three filters)	**1526-40**	**1526-40-220**	**1682-24**	**1682-24-220**	**1682-26**
56"W (four filters)	**1526-41**	**1526-41-220**	**1682-25**	**1682-25-220**	**1682-26**

† Highly recommended for optimal visibility, especially in polypropylene and stainless steel hoods. Externally mounted.

Filters

HEPA (High Efficiency Particulate Air) Cat. #
Rated 99.99% efficient @ 0.3µm particles. **1681-02**

ULPA (Ultra Low Penetration Air)
Rated 99.999% efficient @ 0.12µm particles **1681-10**

Replacement Pre/Post-Filter
Mounted externally. One included standard. **9202-50**

Power Strip
Cat. #
Includes 4 outlets, master on/off switch, and 15 amp circuit breaker. Installed on right side of hood.
110VAC, 50/60 Hz **1681-80**

AirGard™ Air Velocity Monitor
Monitors air velocity (70 - 250 ft/sec; 0.35 - 1.25 m/sec) to ensure laminar flow or ventilation efficiency. Refer to page 586 for full specifications.
110VAC, 50/60Hz **6704-65**
220VAC, 50Hz **6704-65-220**

Shown with optional light, AirGard® and cleanroom bench

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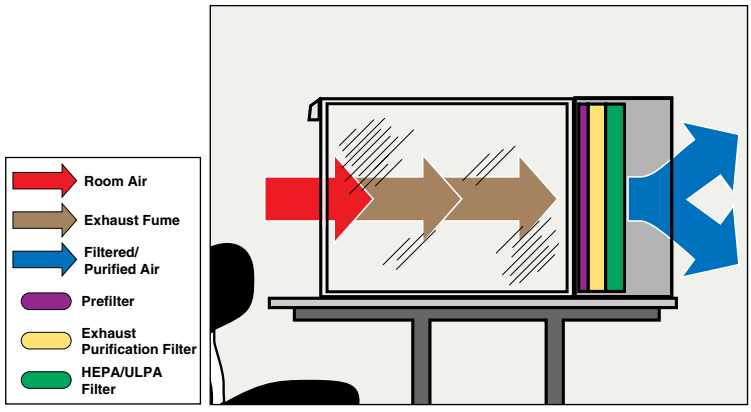
Environmental Control Modules: Horizontal Ductless Exhaust Purifier

This negative-pressure system is designed to ventilate and purify hazardous fumes generated under the hood, allowing safe indoor release of exhaust. It is ideal for such operations as soldering, screen printing, and chemical mixing.

Select the hood material and filter(s) for your application below. They require a work surface that provides at least 44" of depth (see page 391). All components are delivered as a complete turnkey system, ready for operation.



To Order —

1. The chart below indicates the ***system widths*** available, for two, three or four filter packs. Each filter pack includes a primary filter (generally, an activated charcoal filter), and pre- and post-filter, and a final HEPA filter, if exhaust must meet critical cleanliness requirements. Refer to page 380 for overall system dimensions.
2. Select the desired voltage for the ***blower/filter module***. Each polypropylene housing incorporates a 1200 CFM impeller blower for each filter pack, ensuring adequate exhaust flow (see performance graph on page 380).
3. Select the ***hood material*** for your application.
4. Order the correct number of ***filters*** for your hood size. The activated charcoal filter listed below is 98% effective at removing a wide range of organic fumes. Terra also offers other purification filters designed for specific chemicals, such as sulfur compounds, amines, mercury compounds and formaldehyde; see page 424. Pre- and post-filters trap carbon particles that can escape the purification filter.
5. A ***fluorescent light*** is recommended for optimal visibility, especially with a polypropylene or stainless steel hood. ***Ionizing equipment*** is available to protect the work area against surface charges that can create electro-static discharge. The optional ***AirGard® Air Velocity Monitor*** ensures adequate airflow to remove exhaust fumes effectively.
6. Horizontal laminar flow hoods require a ***work surface*** with 44" of depth. Refer to page 391 for benches designed specifically for these systems.

Dimensions		Blower/Filter Module***		Hoods (Includes access shield of material indicated in parentheses)				
No. of Filters*	Working Area** (W" x D" x H")	115VAC, 60Hz Cat. #	230VAC, 50Hz Cat. #	Dissipative PVC (Dissipative PVC Shield) Cat. #	Nondissipative PVC (Nondissipative PVC Shield) Cat. #	Acrylic (Acrylic Shield) Cat. #	Polypropylene (Nondissipative PVC Shield) Cat. #	Stainless Steel (Dissipative PVC Shield) Cat. #
2	28 x 30 x 28	**1650-30**	**1650-30-220**	**1682-60A**	**1682-83A**	**1682-86A**	**1682-89A**	**1682-92A**
3	42 x 30 x 28	**1650-31**	**1650-31-220**	**1682-61A**	**1682-84A**	**1682-87A**	**1682-90A**	**1682-93A**
4	56 x 30 x 28	**1650-32**	**1650-32-220**	**1682-62A**	**1682-85A**	**1682-88A**	**1682-91A**	**1682-94A**

**** Indicates number of filter packs that are housed in the corresponding blower/filter module. Each filter pack includes a primary filter (activated charcoal or HEPA/ULPA) and pre/post filters. Order filters separately.***
***** Inside hood dimensions. See page 380 for overall dimensions, including filter/blower housing.***
****** Includes one 1200 CFM impeller blower for each filter pack (rated at 0" static pressure; see performance data on page 380).***

System Options	Lighting Fixture†		
For Hood Size	110VAC, 50/60 Hz Cat. #	220VAC, 50 Hz Cat. #	Replacement Tube Cat. #
28"W (two filters)	**1682-23**	**1682-23-220**	**1682-26**
42"W (three filters)	**1682-24**	**1682-24-220**	**1682-26**
56"W (four filters)	**1682-25**	**1682-25-220**	**1682-26**

† Highly recommended for optimal visibility, especially in polypropylene and stainless steel hoods. Externally mounted.

Filters

Note: Up to four filters (a prefilter, charcoal filter, postfilter, and HEPA/ULPA final filter) can be installed in each filter pack.

Purification Filter (Activated charcoal) Cat. # **1716-00**
See page 424 for chemical rating; others available

Pre/Post-Filter Cat. # **1681-04A**
Recommended for installation on each side of the charcoal filter.

HEPA (High Efficiency Particulate Air) Cat. # **1681-02**
Rated 99.99% efficient @ 0.3µm particles.

ULPA (Ultra Low Penetration Air) **1681-10**
Rated 99.999% efficient @ 0.12µm particles

Power Strip

Includes 4 outlets, master on/off switch, and 15 amp circuit breaker. Installed on right side of hood. Cat. #
110VAC, 50/60 Hz **1681-80**

AirGard™ Air Velocity Monitor

Monitors air velocity (70 - 250 ft/sec; 0.35 - 1.25 m/sec) to ensure laminar flow or ventilation efficiency. Refer to page 586 for full specifications.
110VAC, 50/60Hz **6704-65**
220VAC, 50Hz **6704-65-220**

Shown with optional light and cleanroom bench

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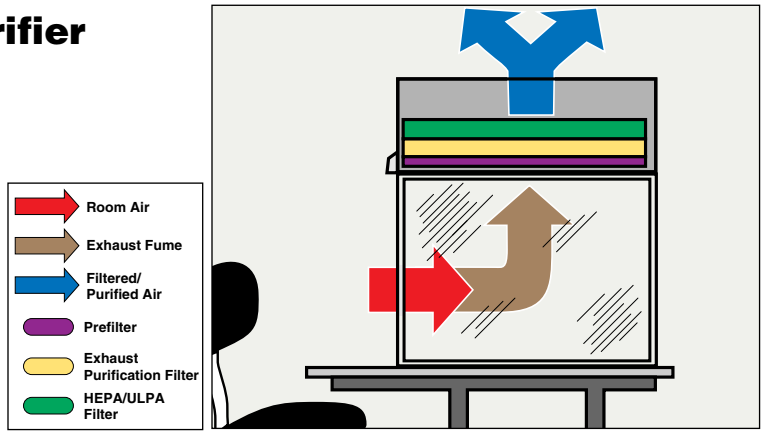
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Environmental Control Modules:
Vertical Ductless Exhaust Purifier

This negative-pressure system draws exhaust fumes upwards from the work area through an exhaust purification filter to allow safe indoor release. It is ideal for such operations as soldering, screen printing, and chemical mixing.

Select the hood material and filter(s) for your application below. They require a work surface that provides at least 32" of depth (see page 391). All components are delivered as a complete turnkey system, ready for operation.



To Order —

1. The chart below indicates the ***system widths*** available, for two, three or four filter packs. Each filter pack includes a primary filter (generally, an activated charcoal filter), and pre- and post-filter, and a final HEPA filter, if exhaust must meet critical cleanliness requirements. Refer to page 380 for overall system dimensions.
2. Select the desired voltage for the ***blower/filter module***. Each polypropylene housing incorporates a 1200 CFM impeller blower for each filter pack, ensuring adequate exhaust flow (see performance data on page 380).
3. Select the ***hood material*** for your application.
4. Order the correct number of ***filters*** for your hood size. The activated charcoal filter listed below is 98% effective at removing a wide range of organic fumes. Terra also offers other purification filters designed for specific chemicals, such as sulfur compounds, amines, mercury compounds and formaldehyde; see page 424. Pre- and post-filters trap carbon particles that can escape the purification filter.
5. A ***fluorescent light*** is recommended for optimal visibility, especially with a polypropylene or stainless steel hood. ***Ionizing equipment*** is available to protect the work area against surface charges that can create electro-static discharge. The optional ***AirGard® Air Velocity Meter*** ensures adequate air flow to remove exhaust fumes effectively.
6. Horizontal laminar flow hoods require a ***work surface*** with 32" of depth. Refer to page 391 for benches designed specifically for these systems.

Dimensions		Blower/Filter Module***		Hoods (Includes access shield of material indicated in parentheses)				
No. of Filters*	Working Area** (W" x D" x H")	115VAC, 60Hz Cat. #	230VAC, 50Hz Cat. #	Dissipative PVC (Dissipative PVC Shield) Cat. #	Nondissipative PVC (Nondissipative PVC Shield) Cat. #	Acrylic (Acrylic Shield) Cat. #	Polypropylene (Nondissipative PVC Shield) Cat. #	Stainless Steel (Dissipative PVC Shield) Cat. #
2	28 x 30 x 28	**1650-40**	**1650-40-220**	**1683-22A**	**1683-25A**	**1683-28A**	**1683-31A**	**1683-34A**
3	42 x 30 x 28	**1650-41**	**1650-41-220**	**1683-23A**	**1683-26A**	**1683-29A**	**1683-32A**	**1683-35A**
4	56 x 30 x 28	**1650-42**	**1650-42-220**	**1683-24A**	**1683-27A**	**1683-30A**	**1683-33A**	**1683-36A**

**** Indicates number of filter packs that are housed in the corresponding blower/filter module. Each filter pack includes a primary filter (activated charcoal or HEPA/ULPA) and pre/post filters. Order filters separately.***
***** Inside hood dimensions. See page 380 for overall dimensions, including filter/blower housing.***
****** Includes one 1200 CFM impeller blower for each filter pack (rated at 0" static pressure; see performance data on page 380).***

System Options	Lighting Fixture†		
For Hood Size	110VAC, 50/60 Hz Cat. #	220VAC, 50 Hz Cat. #	Replacement Tube Cat. #
28"W (two filters)	**1682-23**	**1682-23-220**	**1682-26**
42"W (three filters)	**1682-24**	**1682-24-220**	**1682-26**
56"W (four filters)	**1682-25**	**1682-25-220**	**1682-26**

† Highly recommended for optimal visibility, especially in polypropylene and stainless steel hoods. Externally mounted.

Filters
Note: Up to four filters (a prefilter, charcoal filter, postfilter, and HEPA/ULPA final filter) can be installed in each filter pack.

Purification Filter (Activated charcoal) Cat. # **1716-00**
See page 424 for chemical rating; others available

Pre/Post-Filter Cat. # **1681-04A**
Recommended for installation on each side of the charcoal filter.

HEPA (High Efficiency Particulate Air) Cat. # **1681-02**
Rated 99.99% efficient @ 0.3µm particles.

ULPA (Ultra Low Penetration Air) **1681-10**
Rated 99.999% efficient @ 0.12µm particles

Power Strip
Includes 4 outlets, master on/off switch, and 15 amp circuit breaker. Installed on right side of hood. Cat. #
110VAC, 50/60 Hz **1681-80**

AirGard™ Air Velocity Monitor
Monitors air velocity (70 - 250 ft/sec; 0.35 - 1.25 m/sec) to ensure laminar flow or ventilation efficiency. Refer to page 586 for full specifications.
110VAC, 50/60Hz **6704-65**
220VAC, 50Hz **6704-65-220**

Shown with optional light, AirGard® and cleanroom bench

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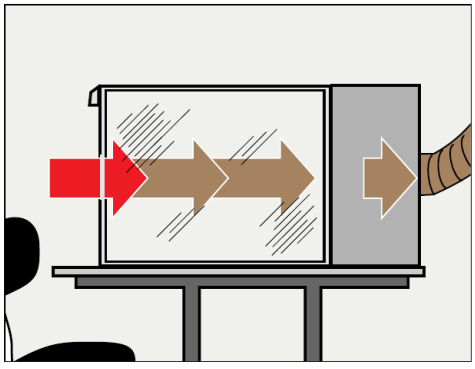
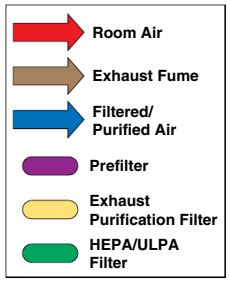
800 S. Raymond Ave., Fullerton, CA 92831 CA

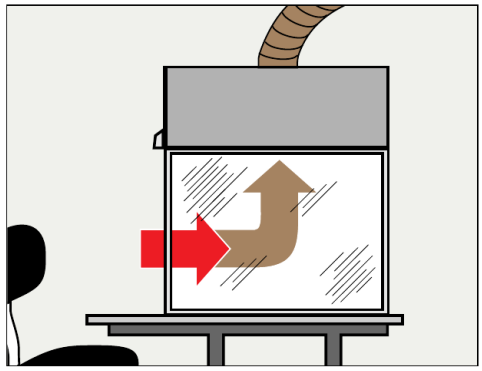
Environmental Control Modules:
Exhaust Fume Hoods

Draws exhaust fume hoods into an exhaust duct for delivery to an in-house filtration system. Each blower module includes multiple 1200-CFM impeller blowers to provide adequate ventilation. An 8"-diameter flange for each blower allows connection to exhaust conduit.





Horizontal Exhaust Fume Hood



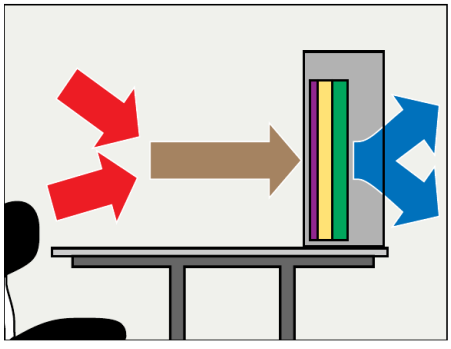
Vertical Exhaust Fume Hood

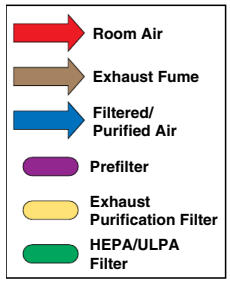
Dimensions		Blower/Filter Module**		Hoods (Includes access shield of material indicated in parentheses)				
No. of Blowers*	Working Area** (W" x D" x H")	115VAC, 60Hz Cat. #	230VAC, 50Hz Cat. #	Dissipative PVC (Dissipative PVC Shield) Cat. #	Nondissipative PVC (Nondissipative PVC Shield) Cat. #	Acrylic (Acrylic Shield) Cat. #	Polypropylene (Nondissipative PVC Shield) Cat. #	Stainless Steel (Dissipative PVC Shield) Cat. #
Horizontal Flow								
2	28 x 30 x 28	**1650-50**	**1650-50-220**	**1683-41A**	**1683-47A**	**1683-53A**	**1683-59A**	**1683-65A**
3	42 x 30 x 28	**1650-51**	**1650-51-220**	**1683-42A**	**1683-48A**	**1683-54A**	**1683-60A**	**1683-66A**
4	56 x 30 x 28	**1650-52**	**1650-52-220**	**1683-43A**	**1683-49A**	**1683-55A**	**1683-61A**	**1683-67A**
Vertical Flow								
2	28 x 30 x 28	**1650-60**	**1650-60-220**	**1683-44A**	**1683-50A**	**1683-56A**	**1683-62A**	**1683-68A**
3	42 x 30 x 28	**1650-61**	**1650-61-220**	**1683-45A**	**1683-51A**	**1683-57A**	**1683-63A**	**1683-69A**
4	56 x 30 x 28	**1650-62**	**1650-62-220**	**1683-46A**	**1683-52A**	**1683-58A**	**1683-64A**	**1683-70A**

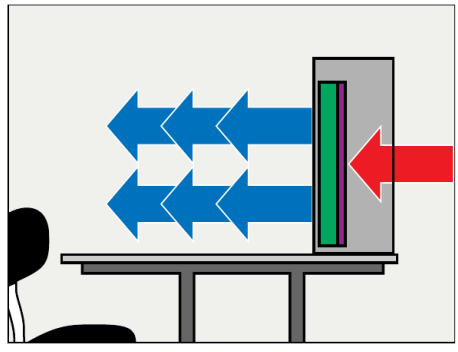
** Inside hood dimensions. See page 380 for overall dimensions, including filter/blower housing.*
*** Includes number of 1200 CFM impeller blowers indicated (blower rated 1200 CFM @ 0" static pressure; see performance data on page 380)*

Ventilator Modules

Versatile stainless steel modules incorporate 1200 CFM blower for clean air or exhaust fume applications







Free-Standing Ductless Exhaust Purifier

Draws exhaust fumes from a work area into a purification filter to allow safe indoor release. It is ideal for continuous operation in an area where exhaust fumes could accumulate over time and pose a health hazard. Includes 8"-diameter exhaust flange.

	Cat. #
Blower Module (for free-standing exhaust purification)	**1683-72A**
Activated Charcoal Filter (see page 424)	**1716-00**
Activated Charcoal Pre/Postfilter (order two)	**1681-04A**

Free-Standing Clean Air Blower

This module can be placed on any work surface to provide a high-volume horizontal flow of particle-free air.

	Cat. #
Blower Module (for free-standing clean air blower)	**1683-73A**
HEPA Filter (99.99% efficient @ 0.3 µm particles)	**1681-02**
ULPA Filter (99.999% efficient @ 0.12µm particles)	**1681-10**

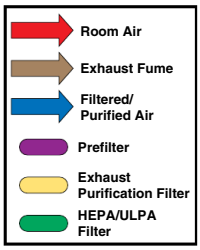
Cleanroom Benches
for Environmental Control Modules

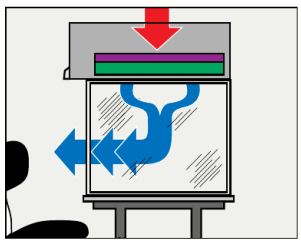
- **Allow permanent installation of Universal Environmental Control Modules as complete turnkey systems**
- **Available in several materials and designs to meet a variety of cleanroom requirements**
- **Precise sizing eliminates exposed edges that collect particles**

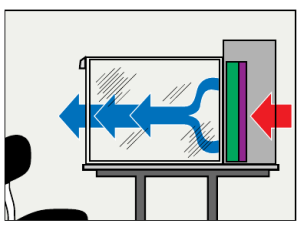
These cleanroom benches are designed specifically for use with Terra's Universal Environmental Control Modules (ECMs) listed on the preceding pages.

Designed to permit fixed (permanent) hood installation, they turn your ECM into a secure, turnkey system with minimal exposed edges that can collect particles. They are available in several materials to match a variety of requirements. Dissipative and nondissipative tables feature laminated surfaces sealed at the top and bottom to eliminate particle shedding. Laminate, polypropylene and stainless steel models include epoxy-finished steel frames with stainless steel scuff guards to prevent chipping of the bottom leg member.

Benches are sized to fit the ECM hood precisely; select the model that matches your system.







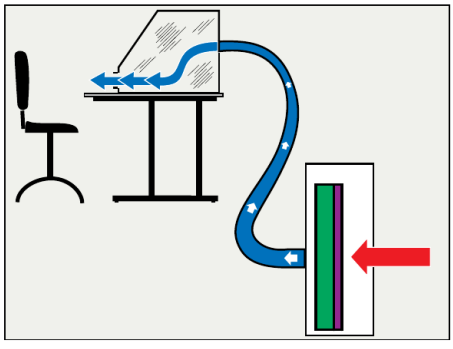
For Vertical Flow Applications (Benches are 32"H x 33"D)

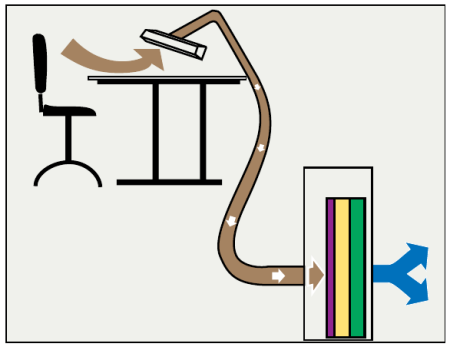
For Hood Size (No. of Blowers)	Nondissipative Laminate Painted Base Cat. #	Dissipative Laminate Painted Base Cat. #	Polypropylene Painted Base Cat. #	Stainless Steel Top Painted Base Solid Top Cat. #	Stainless Steel Top Painted Base Perforated Top Cat. #
28"W (2 modules)	**1684-14**	**1684-17**	**1684-20**	**1684-23**	**1684-26**
42"W (3 modules)	**1684-15**	**1684-18**	**1684-21**	**1684-24**	**1684-27**
56"W (4 modules)	**1684-16**	**1684-19**	**1684-22**	**1684-25**	**1684-28**

For Horizontal Flow Applications (Benches are 32"H x 44"D)

For Hood Size (No. of Blowers)	Nondissipative Laminate Cat. #	Dissipative Laminate Cat. #	Polypropylene Cat. #	Stainless Steel Top with Painted Frame Solid Top Cat. #	Stainless Steel Top with Painted Frame Perforated Top Cat. #
28"W (2 modules)	**1684-35**	**1684-38**	**1684-41**	**1684-44**	**1684-47**
42"W (3 modules)	**1684-36**	**1684-39**	**1684-42**	**1684-45**	**1684-48**
56"W (4 modules)	**1684-37**	**1684-40**	**1684-43**	**1684-46**	**1684-49**

Ventilator Modules (continued)





For remote ventilation of a glove box, see page 453

Remote Clean Air Blower

In this application, filtered air is directed through a length of conduit to a remote enclosure. The blower module listed below includes an 4"-diameter OD flange for easy connection of conduit hosing.

	Cat. #
Blower Module (for remote clean air blower)	**1683-75A**
HEPA Filter (99.99% efficient @ 0.3 µm particles)	**1681-02**
ULPA Filter (99.999% efficient @ 0.12µm particles)	**1681-10**

Remote Exhaust Purifier

Exhaust fumes are drawn from a remote enclosure or pick-up device through a conduit to a purification filter. See page 419 for ordering information.

Note: Always test the purified exhaust stream for the presence of dangerous fumes.

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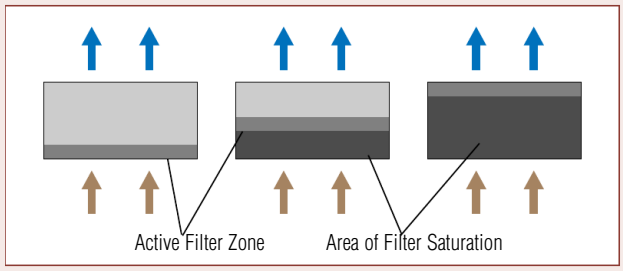
Exhaust Fume Filtration

See ordering information on page 424

Activated carbon, the most common purification filtration medium, adsorbs chemicals with a molecular weight above 30 and a boiling point above 60°C. It is also effective with many other chemicals because of their particular molecular structure (see the chemical adsorption chart, page 425).

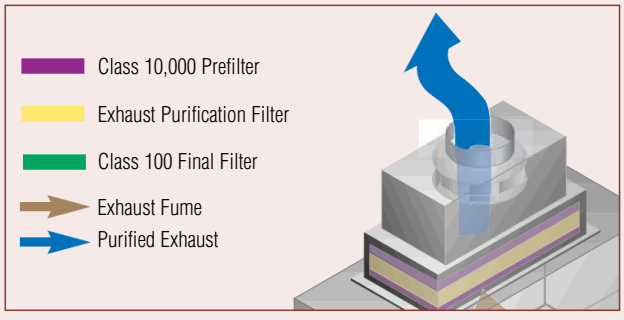
Adsorption takes place in the active filter zone, the small cross-section of the filter bed in which the material to be removed comes in contact with the filtering medium (see illustration). This active filter zone moves upward as the filter becomes saturated. When it reaches the filter's top surface, there is an initial breakthrough by the contaminant gas; thereafter the percentage of contaminant gas that escapes filtration increases until total saturation of the filter is reached.



Enhancing Filter Performance

To optimize filtration efficiency, any ductless exhaust fume system must ensure that the exhaust stream is exposed to the purification medium for an adequate time. Terra exhaust purification systems satisfy this condition in several ways.

First, our specially selected impeller ventilators are designed to ensure the optimal linear velocity of the airstream—sufficient to maintain a negative pressure in the work area that prevents backflow, but low enough to allow adequate adsorption of fumes by the filtering medium. Our prefilters also extend exposure time by reducing the airflow through the filter.



Monitoring Filter Effectiveness

A ductless exhaust fume system needs to be monitored in two areas. The user must detect the period between initial contaminant breakthrough and the point at which the contaminant gas reaches the Threshold Limit Value (TLV) for that substance. The velocity of the airstream must also be monitored to ensure an adequate negative pressure and to detect ventilator failure.

Through periodic testing of the exhaust airstream, you can determine the useful filter life in your particular application and gauge filter effectiveness with an elapsed time meter.

An electronic airflow velocity monitor also helps to ensure safe, effective operation by providing a continuous velocity indication and providing an alarm when velocity falls below a user-defined threshold.

Put Safety First!

Use the chemical chart on page 425 to help you select the proper filter for your application. To ensure safety, make sure that filter performance is properly monitored, as explained above. Avoid filter use in applications involving very toxic substances, very high volumes of contaminants, and unknown or highly volatile chemical reactions. Always make sure that filters are promptly changed when the Threshold Limit Value (TLV) has been reached for any contaminant gases present.

Flange Adapter Panels

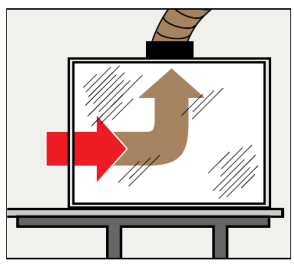
These panels can be mounted to filter/blower modules to allow easy connection of exhaust conduit. Part number includes installation on specified modules. Each flange is 3" x the specified diameter.

Important Application Notes:

1. A flange restricts the flow of air passing through the filter. ***In exhaust fume applications, the minimum allowable flange diameter is 8"!***

   An 8"-diameter flange is provided standard on systems configured for exhaust fume applications. Smaller diameters can impede ventilation, reduce the effectiveness of exhaust purification, and possible expose operators to hazardous fumes.

Flange on blower



2. Be sure to specify the correct quantity for your application. In positive pressure applications, one flange per blower module is required. In negative pressure (exhaust) applications, multiple flanges are included in each blower housing.
3. Make sure to select a flange material that is compatible with chemical vapors that might be present in the air flow.

Adapter Panels	For Blower Module		For Hoods (select compatible material)				
Flange Size	Polypropylene Cat. #	Stainless Steel Cat. #	Acrylic Cat. #	Polypropylene PVC Cat. #	Static-Dissipative PVC Cat. #	Nondissipative Cat. #	Stainless Steel
4" O.D.	1650-70	1650-74	1683-80A	1683-84A	1686-90A	1683-91A	1683-95A
6" O.D.	1650-71	1650-75	1683-81A	1683-85A	1683-88A	1683-92A	1683-96A
8" O.D.	1650-72	1650-76	1683-82A	1683-86A	1683-89A	1683-93A	1683-97A
10" O.D.	1650-73	1650-77	1683-83A	1683-87A	1683-90A	1683-94A	1683-98A

Heated Processing Chamber

- **Ideal for work with biological samples, microelectronics-based surgical tools, medical implants, and other critical components requiring above-ambient calibration or testing**
- **Recirculation system ensures uniform heating of the internal environment up to 140°F**
- **Transparent polycarbonate front and sides allow full visibility of chamber**
- **Hinged access door with PVC parting curtain allows introduction of large materials when opened, provides convenient access with minimal heat loss when closed**
- **Dual air diffusers and plenum-chamber ensure uniform circulation of heated air**

Custom work is no problem– simply call Terra with your specifications

This processing chamber responds to a growing trend in the medical and biotechnology industries: more and more temperature-sensitive microelectronic devices are being introduced into the human body, where reliable operation at above-ambient temperatures is a matter of life or death.

By providing a precisely regulated, uniform, traceable processing temperature from ambient to 140°F, this chamber simulates the working environment of microcircuits or biological samples during processing and testing operations.

Clean, Convenient and Efficient

Its low-profile, EMI-shielded impeller blower circulates air through the heat exchanger. A time proportional controller with RTD probe allows adjustment of the set-point up to 140°F (60°C); its LED readout displays set-point and process temperatures in either Fahrenheit or Celsius, and an RS-232C interface allows remote monitoring and control by means of a PC.

The polycarbonate chamber combines complete visibility with protection against thermal stress. The hinged front door includes strips that allow insertion of an operator's hands with minimal heat loss. Top and bottom stainless steel diffusing shields feature perforations of differing sizes that ensure uniform circulation of air throughout the chamber; a micro-screen positioned above the lower diffuser prevents small parts from falling into the plenum area. A 3-inch stainless steel utility shelf is mounted on the rear wall of the chamber, and a sliding door on the left side accommodates any electrical service lines that may be required by processing equipment used inside the chamber.

Specifications

Dimensions:	19"W x 24"D x 15"H
Weight:	25 lbs.
Materials:	Polycarbonate (front and side of processing chamber); 304 stainless steel (blower/heater housing and diffusers)
Blower:	230 CFM motorized impeller with automatic thermal protection (adjustable 40-70°C)
Heater:	Dual strip heaters mounted to aluminum fin heat exchanger.
Temperature Control:	Sensor is RTD element mounted beneath front edge of process chamber.

	110VAC/60Hz	220VAC/50Hz
	Cat. #	Cat. #
Heated Processing Chamber	**1530-40A**	**1530-40A-220**

Cleanroom Clean or Picture Perfect?

Terra appreciates the many comments we have received from cleanroom professionals regarding our catalog photos.

True, our cleanroom "workers" take liberties in their dress that yours cannot. Whether to demonstrate a product feature or simply to produce a more attractive image, our models occasionally forego their masks or hoods.

Rest assured: we wouldn't think of letting them in a cleanroom until they followed proper gowning protocol!

See page 286 for recommended gowning procedures

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800 S. Raymond Ave., Fullerton, CA 92831 CA

Universal Hood

- **Completely modular design lets you configure an economical hood and filter/blower configuration to your specs!**
- **As a Mini-Laminar Flow Hood, it provides a continuous wash of HEPA- or ULPA-filtered particle-free air to the work surface**
- **As a Ductless Exhaust Fume Hood, it ventilates and purifies hazardous exhaust fumes for safe indoor release**
- **As an Exhaust Fume Hood, it draws fumes from the work area to your in-house exhaust system**
- **Wide range of purification filters available to meet OSHA and other requirements**
- **Select single or twin hoods (for one or two operators), in many materials to suit specific applications**
- **Optional hood frame isolates hood and blower for a vibration-free work surface**
- **Other system options include fluorescent or UV lighting, ionizing equipment, and power strips**
- **Custom modifications include hand ports and special dimensions to enclose processing equipment**

Terra's Universal Hood functions either as a particle-free mini-cleanroom work environment or an exhaust venting/purification station. Its practical, fully modular design allows you to construct an economical system that's just right for your requirements.

Custom Versatility—On a Standard Basis

The backbone of the system is a versatile filter/blower system that mounts on top of a portable hood. Because the rugged variable-speed impeller can be mounted in its housing as either a blower or a ventilator, the system can be configured as a laminar flow (positive-pressure) station or an exhaust fume (negative-pressure) station.

A filter housing (mounted beneath the blower housing) allows easy installation of up to four separate filters: particulate filters rated up to 99.999% efficient at removing particles 0.12 microns in diameter; or exhaust purification filters designed to safely remove a variety of organic and inorganic chemical vapors.

Reliable, Uniform Performance

Terra's experience in air-flow engineering shows in our filter/blower performance. Regardless of the filter configuration you select, the system delivers uniform face velocity. Specially designed plenum chambers ensure that the blower output is distributed evenly across the surface of the filter, thereby minimizing turbulence and eliminating negative pressure zones that can actually draw contaminants into the work area. (See graphs on the following pages for detailed information on blower/filter performance.)

Hoods are available in several sizes and materials:

Acrylic Hoods are fabricated of clear 1/4" acrylic to permit complete 360° visibility. All edges are fused and polished to ensure maximum clarity and durability. These hoods feature an acrylic swing-up access shield that restricts the air flow into or out of the work area, thereby optimizing the efficiency of the filter/blower system.

Static-Dissipative PVC Hoods feature the full visibility of acrylic but add static-dissipative surfaces to minimize the risk of ESD (electrostatic discharge) under the hood. Static-dissipative PVC also serves the important function of controlling particles by eliminating the attractive forces that develop on other plastic surfaces. It also resists a wide range of chemicals (see page 596 for complete information on this material). These hoods include a swing-up access shield (also of static-dissipative PVC).

Nondissipative PVC Hoods are lightweight, transparent, and resist many acids and alkalis commonly used in processing operations. Their standard access shield is made of nondissipative PVC.

Polypropylene Hoods combine the light weight of a plastic hood with superb chemical resistance. They are ideal for chemical processing and for such operations as soldering, which generates corrosive fumes that could damage other plastics. A transparent nondissipative PVC access shield allows full viewing of the work area.

Stainless Steel Hoods offer superb chemical and heat resistance, cleanliness, and static conductivity. The large static-dissipative PVC access shield ensures full visibility and restricts air flow into or out of the work area.

Tempered Glass Hoods provide a safe environment for corrosive fumes without sacrificing visibility. Stainless steel frames lend strength and stability to these hoods. Access shields for these models are made of static-dissipative PVC.

All hoods feature a bottomless design that permits easy placement over large instruments and assemblies, and all are available in single or twin designs (to accommodate one or two operators). Because they are completely portable, you can move them freely throughout your facility as the job requires. Custom cut-outs can also be specified for arm ports or process equipment.

Versatile Stands and Work Surfaces

Stands come in two designs. Vibration-isolated stands feature a two-part bench and frame to isolate the work area from blower vibration. On non-isolated units, the hood rests directly on the bench.

Either design can be selected in several benchtop materials: nonconductive laminate, conductive laminate, stainless steel (solid or perforated) and polypropylene. All bench frames (whether isolated or not) are made of rigid square tubing with a white epoxy finish, and include stainless steel scuff sleeves to prevent scuffing along the bottom leg support.

Subsurface polypropylene plenum chambers are available for perforated benchtops on a custom basis. These plenums (designed according to your specific requirements) serve two important functions: during chemical processing, they collect hazardous spills; and during laminar flow operations, they eliminate air-flow deflection towards the operator (an important concern when hazardous fumes may be present).

Other system options include a lighting fixture (with either fluorescent or UV illuminator); ionizing equipment (for safe neutralization of static charges); and a power strip (mounted along the rear surface of the work surface).

Static-Dissipative PVC Eliminates Contamination Magnets

- **Surface resistivity between 10^6 and 10^8 ohms/square**
- **Resists a wide range of acids and corrosive chemicals**
- **Eliminates particle attraction and build-up**
- **Renders nonconductive plastics obsolete in many applications**
- **See page 596 for full specifications and ordering information**

Special Requests Are No Problem!

Put our extensive manufacturing experience to work for you. Whether you require a different size, a different material, or a whole new design, our engineers will work with yours to develop a complete turnkey system.

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Ordering Information for Universal Hoods

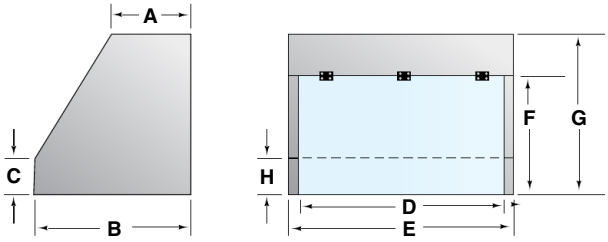
Design Your Own System!
The following pages provide ordering information for each system module: the hood, the bench/frame, the filter/blower module, and other system accessories.

Once you select the components for your application, Terra will deliver a turnkey system ready for operation.

Special request? No problem!
We'll be happy to quote you on modifications to any system module.

Select a Hood

Begin by selecting the hood size (large or small, available for single or twin stations); then choose the material that's right for your application (see descriptions on the previous page). Notice that each hood comes with a swing-up access shield of a compatible material, indicated on the ordering table. Access shields can be selected in other materials or with custom cut-outs; let us know your requirements.



Universal Hood Nominal Dimensions (in inches)

Type	A	B	C	D	E	F	G	H
Small Single	16	24	4	33	36	17	23	5
Large Single	19	28	8½	42½	45	21	27	8½
Small Twin	16	24	4	66	72	17	23	5
Large Twin	19	28	8½	85	90	21	27	8½

Hoods Available with Permanent Bottoms
To order, add "-1" to the catalog no. and 30% to the price of the hood you select. Includes a ½" front lip.

Polypropylene Hood (shown without bottom)

Stainless Steel Hood (shown without bottom)

Tempered Glass Hood, shown with optional Adapter Panel for exhaust conduit (see page 401)

Type	Universal Hoods (includes access shield of materials indicated in parentheses)					
See Dimensions above	Polypropylene (Nondissipative PVC shield) Cat. #	Static Dissipative PVC (Dissipative PVC ⊗ shield) Cat. #	Nondissipative PVC (Nondissipative PVC shield) Cat. #	Stainless Steel (Dissipative PVC shield) ⊗ Cat. #	Acrylic (Acrylic shield) Cat. #	Tempered Glass (Dissipative PVC shield) ⊗ Cat. #
Small Single	7900-12	2241-03	7900-14	2900-16	1715-09	2900-14
Large Single	7900-13	2241-04	7900-15	2900-17	1715-10	2900-15
Small Twin	7900-06	2242-00	7900-08	2900-06	1715-06	2900-12
Large Twin	7900-07	2242-01	7900-09	2900-07	1715-08	2900-13

Ordering Information for Universal Hoods (cont'd.)

Select a Stand

The Universal Hood's bottomless design allows it to be placed on virtually any work surface. For optimal performance, however, Terra recommends one of these hood stands, available in two designs (see descriptions below).

Both designs feature raised lips to hold the hood securely in place. All frames (whether isolated or not) are made of rigid square tubing with a white epoxy finish, and include stainless steel scuff sleeves to prevent scuffing along the bottom leg support. The work surface stands 32" above the floor. Be sure to select the size (large or small, single or twin) to match your hood.

Choose the work surface to suit your application (see ordering table). Subsurface polypropylene plenum chambers are available for perforated benchtops on a custom basis. These plenums (designed according to your specific requirements) serve two important functions: during chemical processing, they collect hazardous spills; and during laminar flow operations, they eliminate air-flow deflection towards the operator (an important concern when hazardous fumes may be present).

Vibration-isolated stand with free-standing hood frame isolates vibrations caused by the hood blower

Non-isolated (one-piece) stand

Vibration-Isolated Stands feature a two-part work surface and hood frame to isolate the work area from blower vibration, which can interfere with microscope operation.

Vibration-Isolated Stands (Select Hood Frame and desired work surface. All stands and tables include leveling feet.)

For Hood Type	Bench Top Dimensions (W" x D")	Hood Frame (Epoxy-finished Steel) Cat. #	Vibration-Isolated Work Surface				
			Nonconductive Laminate Cat. #	Conductive Laminate Cat. #	Polypropylene Cat. #	Stainless Steel–Solid Cat. #	Stainless Steel–Perforated Cat. #
Small Single	34 1/4 x 23	**1682-01**	**1682-02**	**1682-03**	**1715-17**	**1715-21**	**1715-25**
Large Single	44 1/4 x 27	**1715-02**	**1715-03**	**1715-07**	**1715-18**	**1715-22**	**1715-26**
Small Twin	58 1/4 x 23	**1715-11**	**1715-13**	**1715-15**	**1715-19**	**1715-23**	**1715-27**
Large Twin	88 1/4 x 27	**1715-12**	**1715-14**	**1715-16**	**1715-20**	**1715-24**	**1715-28**

Non-Isolated Stands combine the work surface and hood frame in a single unit.

Non-Isolated Stands (One piece Hood Frame and work surface. All stands include leveling feet.)

For Hood Type	Bench Top Dimensions (W" x D")	Nonconductive Laminate Cat. #	Conductive Laminate Cat. #	Polypropylene Cat. #	Stainless Steel–Solid Cat. #	Stainless Steel–Perforated Cat. #
Small Single	35 1/4 x 23 1/4	**1682-16**	**1682-12**	**1715-29**	**1715-33**	**1715-37**
Large Single	44 1/4 x 27 1/4	**1682-17**	**1682-13**	**1715-30**	**1715-34**	**1715-38**
Small Twin	71 1/4 x 23 1/4	**1682-18**	**1682-14**	**1715-31**	**1715-35**	**1715-39**
Large Twin	89 1/4 x 27 1/4	**1682-19**	**1682-15**	**1715-32**	**1715-36**	**1715-40**

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Ordering Information for Universal Hoods (cont'd.)

Select a Filter/Blower System

Terra's filter/blower modules are designed to accommodate three basic configurations. Decide which is right for you; then select the modules to provide the performance you require.

Laminar Flow Station

This positive-pressure configuration allows filtration of particles to ensure a uniform, contamination-free flow of air to the work surface. It thus provides a mini-cleanroom environment for particle-sensitive operations in microelectronics, biotech, and many other industries.

To construct your system, select a stainless steel blower module and filter housing. Note that two of each housing are required for twin (72"W or 90"W) stations.

Select the appropriate blower for your application: a 740 CFM or a 1200 CFM variable speed impeller. The higher-output blower is recommended for applications with multiple filters or that require a high-level air flow. Finally, pick the filter(s) that provide the cleanliness rating you require (refer to the efficiency ratings below). The performance illustration provides specific information on the air flow each filter provides when used with the Terra blower module. Unless otherwise specified, blower/filter modules come installed as indicated in the illustration, with the higher-rated filter positioned downstream in the filter housing.

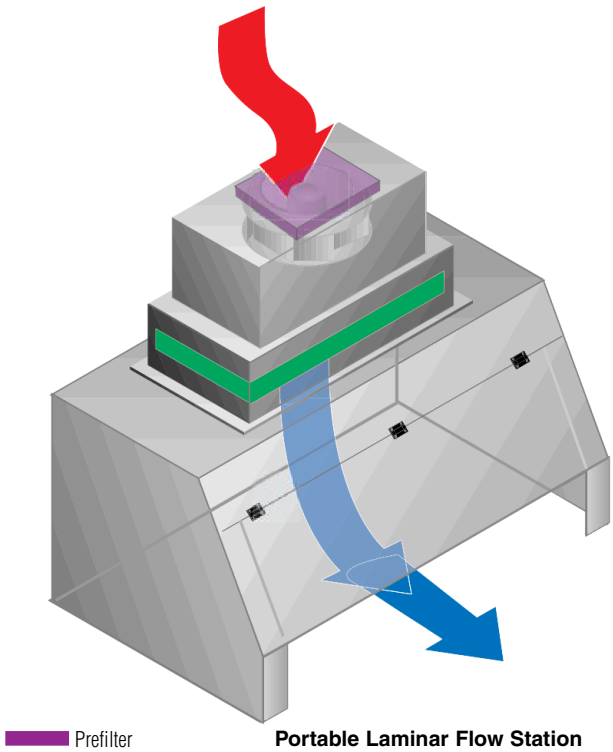
Specifications

Blowers: 1) 740 CFM, 1560 RPM variable speed impeller
2) 1200 CFM, 1675 RPM variable speed impeller
Note: Both blowers rated at no static pressure. See performance charts below for performance under filter load.

Filter Housing: 28.75"W x 13.75"D x 7.50"H

Blower Housing: 21.62"W x 13.50"D x 7.25"H. Includes power switch, speed control and power cord receptacle (cord not included)

Prefilter: 12" x 12" fiberglass prefilter (included)



Prefilter

Class 100 HEPA Filter

Portable Laminar Flow Station

- Room Air
- HEPA Filtered Air

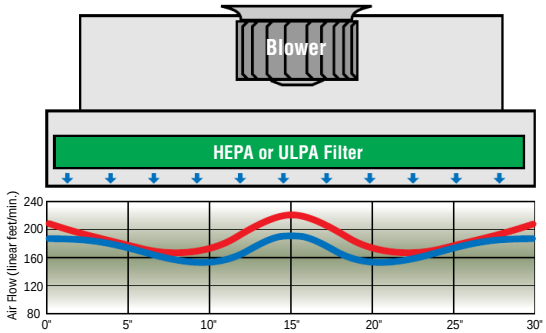
Select **HEPA** or **ULPA Filter,** along with **Blower** and **Filter Housing** of desired material

Blower Module*			Filter Housing*	Filters**		
Blower Type (@ 0" static pressure)	**Electrical** Cat. #	**Stainless Steel** Cat. #	**Stainless Steel** Cat. #	**HEPA** Cat. #	**ULPA** Cat. #	**Prefilter**
740 CFM	115VAC/60Hz 230VAC/50Hz	**1715-50** **1715-50-220**	**1715-52**	**1681-02**	**1681-10**	**9202-50**
1200 CFM	115VAC/60Hz 230VAC/50Hz	**1715-51** **1715-51-220**				

**** Dimensions: 22.75W x 13.50"D x 7.25"H (Blower Module), 30"W x 13.75" x 7.75"H (Filter Housing).***

***** HEPA (High-Efficiency Particulate Air) Filters rated 99.99% efficient @ 0.3 µm particles; ULPA (Ultra-Low Penetration Air) Filters rated 99.999% efficient @ 0.12 µm particles.***

Note: Twin stations require two blower modules, two filter housings, and two filter sets



Average Flow: 800 CFM
Data above reflect performance with 1200 CFM blower.

HEPA Filter (99.99% efficient @ 0.3 µm particles)

ULPA Filter (99.999% efficient @ 0.12 µm particles)

AirGard™ Air Velocity Monitor

Monitors air velocity (70 - 250 ft/sec; 0.35 - 1.25 m/sec) to ensure laminar flow or ventilation efficiency. LCD display shows constant digital reading of face velocity and LED and audible High/Low alarms indicate when air speed falls below user selectable level. Part number includes flush-mount installation on specified Terra Universal hood (laminar flow or exhaust fume). Refer to page 586 for full specifications.

Ordering Information for Universal Hoods (cont'd.)

Ductless Exhaust Fume Hood

This negative-pressure system ventilates and purifies hazardous fumes generated under the hood, allowing safe indoor release of exhaust. It is ideal for such operations as soldering, screen printing, and chemical mixing. Its portability enables you to put a cover on operations that might otherwise create a toxic work environment!

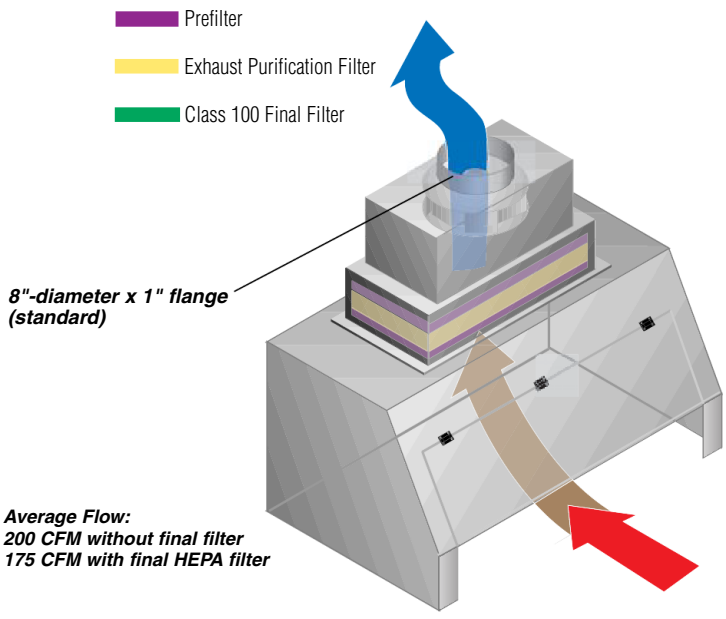
The 1200 CFM impeller blower provides ample airflow to ensure safe ventilation of hazardous fumes under the hood. The blower includes an 8"-diameter x 1" flange to allow connection of the exhaust flow to a conduit hose, if desired. Select filter and blower housing material to suit your application: either stainless steel or polypropylene.

Finally, pick the filter(s) that meet your requirements. The activated charcoal purification filter listed below is 98% effective at removing a wide range of organic fumes. Terra Universal also offers several other purification filters designed for specific toxins, such as ether, sulfur compounds, mercury compounds and formaldehyde; refer to the ordering information beginning on page 424.

A prefilter and postfilter are highly recommended for all applications involving a charcoal filter. Even if you specify a downstream final HEPA filter, the charcoal postfilter will extend the service life of the HEPA filter by removing large carbon particles that escape from the activated charcoal filter.

Note: Terra recommends thorough testing of filter performance in each application prior to exhaust release, and assumes no responsibility for damage or injury that may result as a consequence of improper filter selection or use.

Unless otherwise specified, blower/filter modules come installed as indicated in the illustration, with the higher-rated filter positioned downstream of the purification filter in the filter housing.



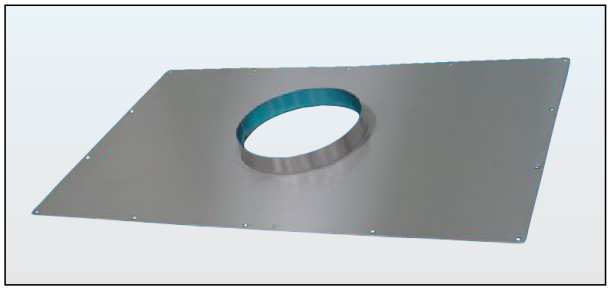
Select **Exhaust Purification Filter, Pre- and Final Filters** (for particle retention), along with **Blower** and **Filter Housing** of desired material.

Blower Module*				Filter Housing*		Filters**			
Blower Type (@ 0" static pressure)	Electrical	Stainless Steel Cat. #	Polypropylene Cat. #	Stainless Steel Cat. #	Polypropylene Cat. #	Charcoal Cat. #	Pre/Post Filter*** Cat. #	HEPA Final Cat. #	ULPA Final Cat. #
1200 CFM	115VAC/60Hz	**1715-53**	**1684-98**	**1715-54**	**1687-10**	**1716-00**	**1681-04A**	**1681-02**	**1681-10**
	230VAC/50Hz	**1715-53-220**	**1684-98-220**						

Dimensions: 22.75W x 13.50"D x 7.25"H (Blower Module), 30"W x 13.75" x 7.75"H (Filter Housing).
****Activated charcoal filter removes more organic vapors; see page 424 for specifications. HEPA (High-Efficiency Particulate Air) Filters rated 99.99% efficient @ 0.3 µm particles; ULPA (Ultra-Low Penetration Air) Filters rated 99.999% efficient @ 0.12 µm particles.***
*****A pre/postfilter is recommended on both sides of the activated charcoal filter to contain large carbon particles.***

Note: Twin stations require two blower modules, two filter housings, and two filter sets.

Shown with polypropylene hood and filter/blower housings, optional AirGard® and stand.



Flange Adapter Panels

These panels provide a 3" high flange for connection of an exhaust duct to either the filter housing or the blower housing. They are available in several diameters and materials, for installation on hoods or filter/blower housings. See page 401

AirGard™—*See info on previous page.*

Toxic Gas Detector Kit

Ensures purity of exhaust stream. See page 536

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Ordering Information for Universal Hoods (cont'd.)

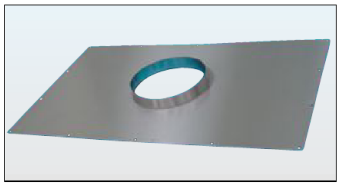
Portable Exhaust Fume Hood

This negative-pressure system is designed to ventilate fumes to your in-house exhaust system, usually by means of an exhaust duct.

If your facility includes a negative pressure exhaust system, you can order a flange adapter panel for any of the Universal Hoods, in a variety of materials and sizes (see below). This panel provides a flange for connection of an exhaust duct directly from the hood to your exhaust system.

Or, if no exhaust fan is present, order a blower module out of either of the materials offered below. The blower housing contains a 1200 CFM variable-speed impeller mounted for negative-pressure applications. The blower housing comes with a 8"-diameter x 1" high flange (made of the same material as the housing you specify) for exhaust ducting; other sizes may also be ordered. For twin stations (72"W or 90"W), two blower housings are generally required for adequate exhaust venting.

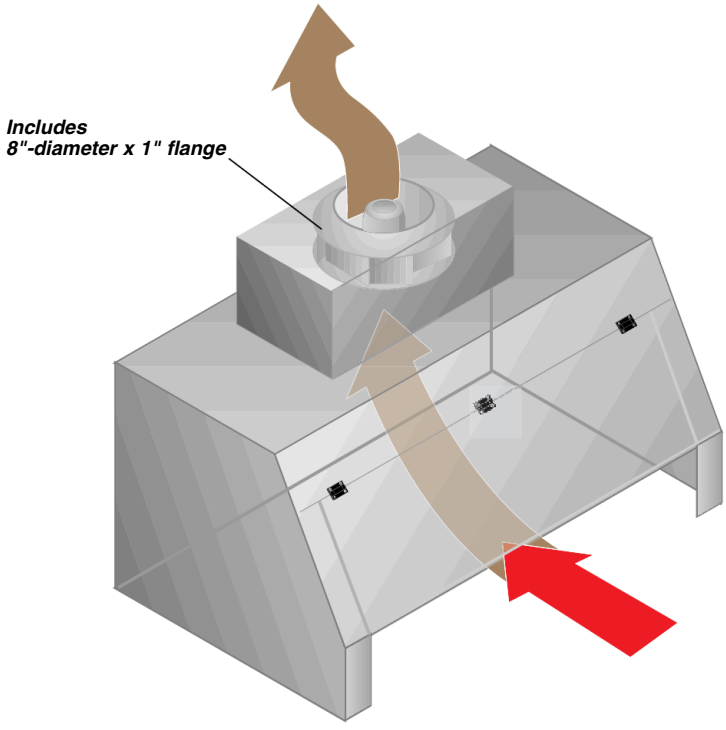
Flange Adapter Panels



These panels provide a 3"-high flange for connection of an exhaust duct either to the blower housing or to the hood itself. They are available in a variety of materials and sizes, from 4" to 10" in diameter (see page 401 for full ordering information). **Note:** Blower modules come with a 8"-diameter flange on a standard basis, made of the same material as the housing.

Blower Module*			
Blower Type (@ 0" static pressure)	**Electrical** Cat. #	**Stainless Steel** Cat. #	**Polypropylene** Cat. #
1200 CFM	115VAC/60Hz	**1715-55**	**1684-98**
	230VAC/50Hz	**1715-55-220**	**1684-98-220**

* ***Dimensions: 22.75W x 13.50"D x 7.25"H***



Portable Exhaust Fume Hood
- Room Air
- Exhaust Fume (to in-house exhaust)

Select **Adapter Panel** for connection to in-house ventilation system

Note: Twin stations require two blower modules, two filter housings, and two filter sets

Ionizing Equipment

Includes ionizing nozzles mounted inside a brushed aluminum bar, which is mounted at the top of the hood. A self-balancing, no-maintenance power supply (included) emits a balanced stream of positive and negative ions to neutralize any static charge imbalances that might exist under the hood. See page 421 for more information.

For Hood Width	Cat. #
36"	**1526-30**
45"	**1525-97**
72"	**1526-33**
90"	**1526-35**

Lighting Fixture

This externally mounted fixture is designed not to interfere with conditions under the Universal Hood. It provides cool illumination of operations, and is recommended for use with stainless steel and polypropylene hoods (which permit only partial visibility of the work area). Two fixtures are recommended for twin stations. See page 420 for more details.

	Cat. #
Vapor-Proof Light Fixture Only (installed)	
115VAC, 50/60Hz	**2400-21**
230VAC, 50Hz	**2400-21-220**
Fluorescent Tube	**1682-26**
Standard Fixture With Stainless Steel Reflector (installed)	
115VAC, 50/60Hz	**1681-05**
230VAC, 50Hz	**1681-05-220**

Power Strips

Provide 4 receptacles for 115VAC/60Hz equipment. Include a master on/off switch and 15-Amp circuit breaker. Price includes installation at rear of work surface.

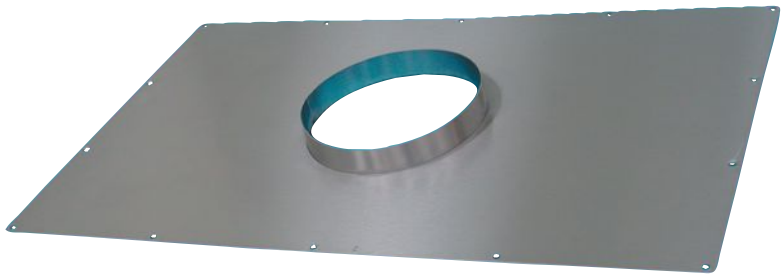
Cat. #
1681-80

Flange Adapter Panels

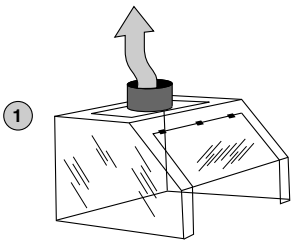
- **Available for use with all Universal Hood modules**
- **Allow easy ducting in exhaust fume applications**
- **Available in several sizes and materials**

These panels can be mounted to a filter housing, blower housing, or hood to allow easy connection of conduit duct in an exhaust fume venting or purification application.

Panels are available to suit several conduit duct sizes. All feature 3" high flanges. Select a material compatible with your system and application. Prices below include installation when the panels are ordered with the appropriate Universal Hood modules specified.

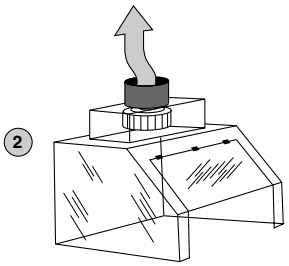


For Universal Hoods only: Adapter panels below are ideal for exhaust fume applications involving your own in-house ventilation system (i.e., when no blower or filters are necessary). 30"W x 15¼"D.



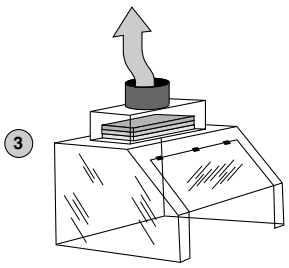
For Universal Hoods (select compatible material)					
Flange Size	Polypropylene Cat. #	Acrylic Cat. #	Static-Dissipative PVC Cat. #	Nondissipative PVC Cat. #	Stainless Steel Cat. #
4" O.D.	1531-05	1531-00	1531-01	1531-04	1531-02
6" O.D.	1531-06	1531-09	1531-12	1531-15	1531-18
8" O.D.	1531-07	1531-10	1531-13	1531-16	1531-19
10" O.D.	1531-08	1531-11	1531-14	1531-17	1531-20

For Universal Hood Blower Modules: Select one of the panels below if the standard 6" flange provided with standard blower modules is not suitable for your application. This application allows you to direct exhaust (whether purified or not) out of a work area. 22¼"W x 13"D.



For Universal Hood Blower Modules (select compatible material)		
Flange Size	Polypropylene Cat. #	Stainless Steel Cat. #
4" O.D.	1531-21	1531-37
6" O.D.	1531-22	1531-38
8" O.D.	1531-23	1531-39
10" O.D.	1531-24	1531-40

For Universal Hood Filter Modules: Select one of the panels below if your application requires a purification or particle filter but no blower (for operation with an in-house ventilation system). 28"W x 13¼"D.



For Universal Hood Filter Modules (select compatible material)		
Flange Size	Polypropylene Cat. #	Stainless Steel Cat. #
4" O.D.	1531-41	1531-57
6" O.D.	1531-42	1531-58
8" O.D.	1531-43	1531-59
10" O.D.	1531-44	1531-60

Toxic Gas Detector System

- **Complete, easy-to-use sampling and analysis system**
- **Detects and measures hazardous gases and vapors**
- **Ideal for monitoring performance of Exhaust Purification Filters (see page 424)**
- **The most cost-effective solution to air sampling and analysis**

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Benchtop Laminar Flow Hoods

- **Portable, economical system converts any benchtop surface into a laminar flow station**
- **Provides an average air flow speed of 90 feet/minutes (measured with HEPA filter)**
- **Quiet operation: 50 dBA measured 30" from filter face**
- **Select vertical or horizontal flow configuration to meet your requirements**
- **Available with a variety of hood materials, including static-dissipative PVC**
- **Work surfaces available to meet any cleanliness requirement**

CE

This versatile laminar flow hood gives you a particle-free work environment on any available work surface.

FFU: Quiet, Reliable Operation

It consists of two modules: a filter/fan unit (FFU), which houses a particle filter, and a hood. The 24" x 48" x 12.25" FFU houses a HEPA filter, rated 99.99% efficient with 0.3 micron particles. Its internal baffle system ensures uniform face velocity, and its 50 dBA noise rating is the best in the industry. The low vibration level ensures minimal disruption of high-precision assembly or test procedures performed inside the hood.

Hood Provides a Versatile Enclosure Configured to Your Requirements

Terra manufactures hoods out of five materials to meet a broad range of chemical and cleanliness requirements.

Lightweight acrylic affords full visibility of work in progress. Static-Dissipative PVC eliminates static charges and the particles they attract, making it ideal for the most critical contamination requirements. Polypropylene offers superb chemical compatibility, and stainless steel provides outstanding durability and resistance to most cleaning solvents. All hood materials are housed in a stainless steel frame for strength and easy cleaning. All hoods include a hinged front access shield that restricts the air exit and enhances laminar flow.

Shown with optional work bench (ordering information on next page)

Filter/Fan Unit

Includes HEPA filter rated 99.99% efficient @ 0.3µm particles. Avg. flow @ 90 FPM: 650 CFM. Dimensions: 24" x 48" (nominal). See page 208 for full specifications.

	Cat. #
110VAC, 60 Hz	**6701-99**
220VAC, 50/60Hz	**6701-99-220**

Hoods

Stainless steel frame provides durable support for hood material indicated below. Each model includes a hinged access shield that increases air speed by restricting the air exhaust. Overall dimensions (nominal): 48"W x 24"D x 28"H (vertical); 48"W x 28"D x 24"H (horizontal). Custom sizes available.

Benchtop Hoods

Hood Material*	Vertical Flow Cat. #	Horizontal Flow Cat. #
Acrylic	**1686-50**	**1686-55**
Static Dissipative PVC	**1686-51**	**1686-56**
Nondissipative PVC	**1686-52**	**1686-57**
Polypropylene (Nondissipative PVC)	**1686-53**	**1686-58**
Stainless Steel (Safety Glass)	**1686-54**	**1686-59**

**** Unless indicated in parentheses, shield is made of the same material as the hood.***

AirGard™ Air Velocity Monitor

Monitors air velocity (70 - 250 ft/sec; 0.35 - 1.25 m/sec) to ensure laminar flow or ventilation efficiency. LCD display shows constant digital reading of face velocity; and LED and audible High/Low alarms indicate when air speed falls below user selectable level. Part number includes flush-mount installation on specified hood (laminar flow or exhaust fume). Refer to page 586 for full specifications.

	Cat. #
110 VAC, 50/60 Hz	**6704-65**
220 VAC, 50 Hz	**6704-65-220**

CleanCube™ Vertical Laminar Flow Hood

- **Seamless hood features radius corners for easy cleaning and full visibility**
- **Lightweight design and small footprint allow convenient benchtop positioning**
- **Ideal for pharmaceutical and biotech applications that require frequent wipe-down**

Terra's CleanCube™ provides a vertical laminar flow of filtered air to provide a particle-free processing environment.

Its one-piece hood design eliminates cracks and crevasses where germs or particles can collect. The radius corners are easy to wipe down, and the absence of corner support members ensures a full view of work in progress. It also eliminates the cramped, claustrophobic feeling that operators experience when working with only partial visibility.

Select a hood of acrylic or polycarbonate. The filter/fan unit attached to the top of the hood provides 480 CFM under filter load (2' x 3' unit), at an average speed of 90 feet/minute. Its internal baffle system ensures uniform face velocity. The low vibration level ensures minimal disruption of high-precision assembly or test procedures performed inside the hood.

For optimal performance, select the optional AirGard® Air Velocity Meter.

Access shield tilts up to accommodate process equipment.

CleanCube™ Vertical Laminar Flow Hood			Corresponding Filter/Fan Unit*	
Dimensions (in., Nominal)	Material		With HEPA Filter	
	Acrylic	Polycarbonate	110VAC, 60Hz	220VAC, 50/60Hz
24W x 24D x 28H	2003-10	2003-12	6702-10	6702-10-220
36W x 24D x 28H	2003-11	2003-13	6702-08	6702-08-220

**** See page 208 for full specifications***

Cleanroom Benches
for CleanCube and Benchtop Laminar Flow Hoods

For Vertical Flow Applications (Benches are 32"H x 33"D)					
For Hood Size (No. of Blowers)	Nondissipative Laminate	Dissipative Laminate	Polypropylene	Stainless Steel Top with Painted Frame	
				Solid Top	Perforated Top
	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #
Up to 28"W	1684-14	1684-17	1684-20	1684-23	1684-26
Up to 42"W	1684-15	1684-18	1684-21	1684-24	1684-27
Up to 56"W	1684-16	1684-19	1684-22	1684-25	1684-28

For Horizontal Flow Applications (Benches are 32"H x 44"D)					
For Hood Size (No. of Blowers)	Nondissipative Laminate	Dissipative Laminate	Polypropylene	Stainless Steel Top with Painted Frame	
				Solid Top	Perforated Top
	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #
Up to 28"W	1684-35	1684-38	1684-41	1684-44	1684-47
Up to 42"W	1684-36	1684-39	1684-42	1684-45	1684-48
Up to 56"W	1684-37	1684-40	1684-43	1684-46	1684-49

Note: 28"W benches are recommended for use with the CleanCube™ using a 2'x 2'FFU. 42"W benches are recommended for use with the CleanCube™ using a 2'x 3'FFU. 56"W benches are recommended for use with all Benchtop Laminar Flow Hoods on page 402

Cleanroom Work Benches

These benches provide the perfect work surface for use with Terra's Benchtop Laminar Flow Hoods and CleanCube™ Laminar Flow Hoods. Select the width and depth that corresponds to your hood. The 33"D benches are ideal for use with vertical flow hoods (including the CleanCube™); 44"D benches provide ample support for horizontal flow hoods. The "C"-base features recessed legs for operator comfort. All steel members have a white epoxy finish. Select desired top from chart.

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Purifier® Class II, Type A/B3 Biological Safety Cabinets

- **Protects personnel, product, and environment against biohazards (suitable for Biosafety Level 1, 2 or 3 containment)**
- **Provides and average of 105 linear feet/minute airflow into the work area, meeting criteria for Class II, Division A/B3 Biological Safety Cabinets**
- **Crevice-free stainless steel interior panels are easy to clean and resist contamination**
- **Intrinsically safe design surrounds all contaminated positive pressure ducts with negative-pressure plenums**
- **Easy-to-read differential pressure gauge monitors backpressure, indicating condition of the HEPA filters**
- **Angled 3-position sash allows introduction of parts up to 18" high; locks at operating position of 8"**

The Purifier® Class II Biological Safety Cabinet provides three-way protection: of personnel, of product and of the external environment.

Within the Class II designation, Type A and Type B3 cabinets recirculate 70% of the contaminated air through one HEPA filter, and exhaust the remaining 30% through a second HEPA filter (see illustrations). Type B3 meet slightly more stringent requirements by operating with a minimal airflow of 100 linear feet per minute into the work area and by allowing for hard ducting of exhaust via a remote ventilation system*.

The performance-tested airflow design of the Purifier® meets and exceeds these requirements. It carries the NSF International mark and ETL Testing laboratories seal in the U.S. and ETL-C seal in Canada, signifying that it meets requirements for NSF Standard Number 49 for Biohazard Cabinetry, UL Standard 3101-1 and CAN/CSA C22.2 No. 1010.1-92. Beyond this, the Purifier® surrounds all contaminated positive pressure ducts with negative pressure plenums, which catch any exhaust leaks that might develop and force the air through a HEPA filter.

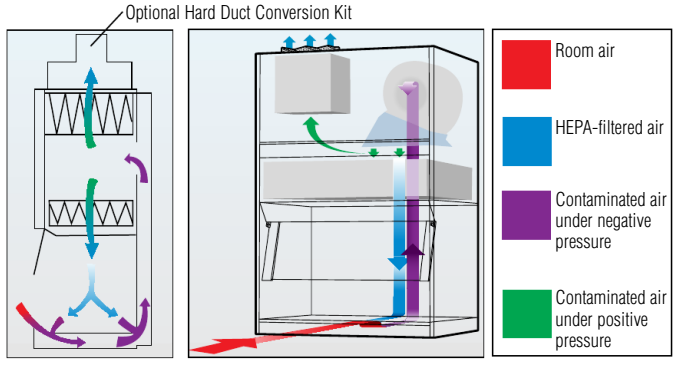
Incoming air enters the Purifier® work area at an average velocity of 105 FPM and is directed downward into a plenum, where it is mixed with contaminated air and directed upward through a common plenum. Roughly 30% of this air is forced under positive pressure through an exhaust HEPA filter, and the remaining 70% is forced downward through a separate HEPA filter and into the work area. (HEPA filters are rated 99.99% efficient @ 0.3µm particles.) This airflow design makes this system suitable for Biosafety Level 1, 2, and 3 agents.*

Clean, Durable Construction

These units are fabricated of a crevice-free stainless steel interior for contaminant resistance and easy wipe-down. The exterior is fabricated of corrosion-resistant, epoxy-coated steel panels that stay cleaner and are easier to maintain than surfaces with exposed bolts and fasteners. The stainless steel interior is also easy to clean and resists a broad range of process chemicals.

The solid state speed control is rated for 25 amps—more than twice that of the competition—and control voltage compensation holds a steady motor voltage even if line voltage fluctuates. Both HEPA filters are secured by spring-loaded clamps that apply even pressure across the filters. These mechanisms compensate for filter gasket compression, minimizing the chance of leaks. An easy-to-read pressure gauge monitors internal pressure, indicating the condition of the HEPA filter. This unit may be exhausted to the room, thimble ducted or hard ducted to the outside.

Both fluorescent and UV lights are controlled by a single 3-way switch that powers only one light at a time, helping to protect the operator from inadvertent UV exposure. All electrical controls are located in a module that can be easily removed should service be required. Keyed electrical connections assure error-free installation, and unit includes two electrical duplexes with splash-resistant covers.



The clear ⅜" safety glass is sloped at 17° for less glare and closer, more comfortable viewing. This sash swings open and locks to a maximum opening height of 18", and locks in the operating position of 8", eliminating the need for a sash alarm.

***Note:** Equipped with an optional Type B3 exhaust duct conversion kit, these cabinets are suitable for work with biological agents treated with minute quantities of toxic chemicals and trace quantities of radionuclides as long as they will not interfere with the work if recirculated in the downflow air.

Specifications

Dimensions:	50.1875"W x 30.25"D x 58.6875"H (127.5cm x 76.8cm x 149cm)
Power Supply:	115Volts/60Hz/12 amps or 230 Volts/50Hz/7 amps. Includes two electrical duplex outlets.
Filters:	Two HEPA filters, 99.99% efficient on all particles 0.3µm.
Inflow velocity:	Nominal inflow velocity of 105 feet per minute (fpm)
Air recirculation:	Approximately 70%
Sash:	Angled ⅜" locking safety glass with 8" access opening, adjustable to three open positions up to 18" high
UV light:	254nm UV lamp, factory installed
Shipping weight:	624 lbs. (283kg)
Warranty:	Two years

Purifier® Class II, Type A/B3 Cabinet

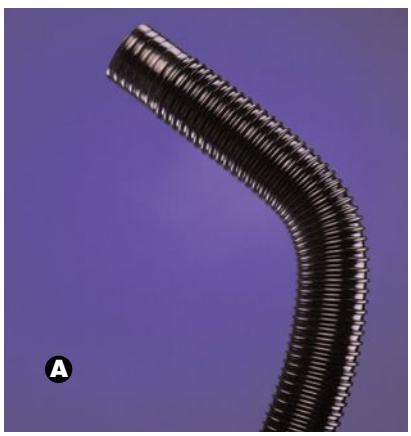
Includes UV light and service fixture.	Cat. #
110VAC/60Hz/12A	**5645-30**
230VAC/50Hz/7A	**5645-31**

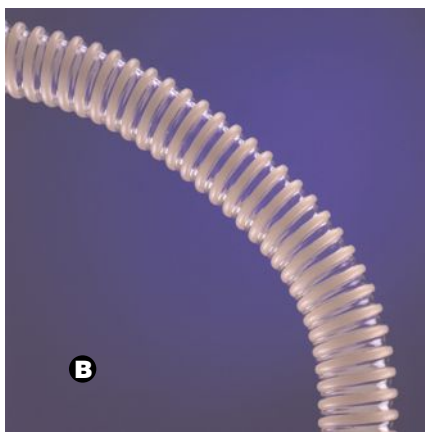
Purifier® Cabinet Base Stand

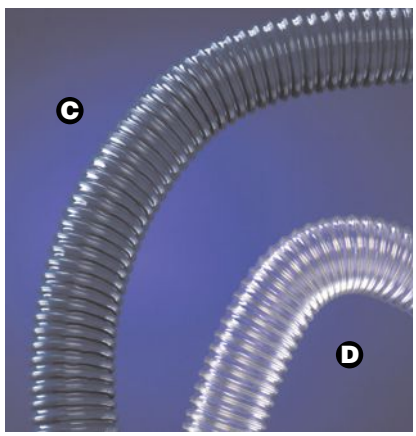
These base stands, constructed of charcoal epoxy-coated steel, securely support the Purifier® Class II, Type A/B3 safety cabinets in either a sitting or standing height. They are approved by the National Sanitation Foundation International (NSF®).

Base Stand

Type	Dimensions (inches)	Shipping Weight	Cat. #
Sitting	50.375 x 30.75 x 28.75	106 lbs (48 Kg)	**5645-32**
Standing	50.375 x 30.75 x 34.75	106 lbs (48 Kg)	**5645-33**







Conduit Hosing

- **Several materials available for safe ducting of fumes, both in and out of the cleanroom**
- **Ideal for use in Terra Universal Hoods and Environmental Control Modules**

A. Cleanroom Conduit Hosing

This hosing is ideal for low-pressure fume or ventilation applications. Made completely of polyethylene with a smooth interior, it resists a wide range of chemicals and has good "memory" to resist crushing. It also offers superior flexibility and excellent resistance to tearing. It does not outgas, so it is compatible with cleanroom applications.

B. Static-Dissipative Hosing

Constructed of specially formulated thermoplastic, static-dissipative hosing features permanent inherent static dissipation that is effective even in low-humidity environments. This clear hosing incorporates a copper grounding wire in the plastic helix and meets the Electronics Industry Association Standard 541 for static-dissipative classification.

Static-dissipative Hosing offers excellent abrasion resistance, tear strength, clarity and flexibility, as well as good chemical resistance and endurance against UV and ozone attack. It will not outgas and is free of fillers, halogens and surface oils, making it ideal for demanding critical applications in electronics/microelectronics device manufacturing and pharmaceutical production.

C/D. Vinyl Reinforced-Wall Hosing

This hosing is constructed of polyvinylchloride wall, reinforced with a wire helix to provide superb bending characteristics; because of its flexibility, you will generally require a shorter length than you would of other hosing. It is ideal for fume removal, ventilation and dust control, and other more rigorous industrial requirements. It has a smoother interior than competitive hoses, and its unique construction eliminates solvent odor that other hose products emit.

Conduit Hosing (Use quantity to specify number of feet desired)

Type (See photo)	Temperature Range	Color Cat.#/Foot	4" Diameter Cat.#/Foot	8" Diameter
A	-30 to +160°F	Black	**1720-01**	—
B	-20 to +160°F	Clear	**1720-05**	—
C	-20 to +180°F	Blue	**1720-02**	**1720-06**
D	-20 to +180°F	Clear	**1720-03**	**1720-07**

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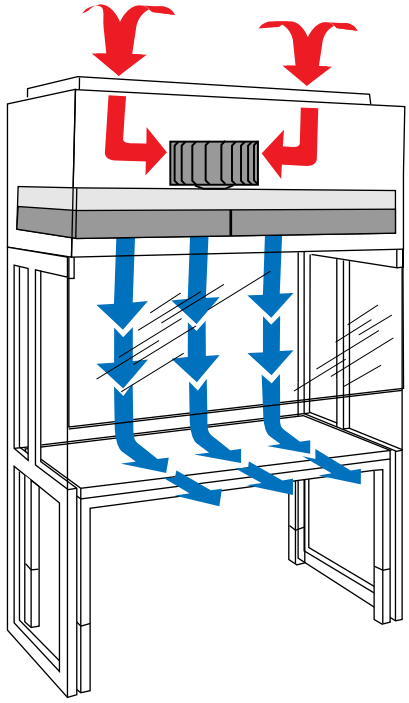
Vertical Laminar Flow Stations

- **Economical system provides a laminar flow of HEPA-filtered air to meet the most critical contamination requirements**
- **Incorporates industry-leading 50 dBA blowers for quiet, low-vibration operation**
- **All-stainless steel construction is cleanroom compatible and easy to clean**
- **Side panels and optional front sliding shield effectively control the laminar air stream to achieve the air speed you require**
- **Fluorescent illuminators ensure easy viewing**
- **Optional ionization equipment safely neutralizes static charges throughout the work area for effective ESD protection**
- **Accommodates standard Terra work benches in many materials, as well as standard Terra wet processing stations (see page 550)**

CE



Terra Universal's Vertical Laminar Flow Station combines several of our most advanced products in a state-of-the-art work station that removes particulate airborne contamination.

The backbone of the system is the reliable Filter/Fan Unit (FFU), which provides a flow of microfiltered air to meet cleanliness standards down to Class 1 (per FED-STD-209)

Patented baffling technology ensures uniform airflow across the filter face and attenuates sound for the lowest noise level in the industry: approximately 50 dBA (see "Specifications" below). Select the HEPA (High Efficiency Particulate Air) filter, rated 99.99% efficient removing 0.3-micron particles. Each unit includes a high/low adjustment switch.

Tests show that the work station exceeds Federal Standard 209E for a Class 10 work environment with HEPA filter.

Side and Front Panels Let You Control Laminar Flow

The Vertical Laminar Flow Station comes complete with transparent acrylic side panels that restrict the laminar flow and ensure an effective wash of HEPA filtered air over the entire work surface.

For additional control of the laminar flow, select the Sliding Shield, which can be adjusted up or down along the front of the access area to the level you require. This feature allows you to control the force of the laminar flow to accommodate your application: stronger flows ensure optimal cleanliness; and weaker flows reduce turbulence that might disturb small parts.

Vibration-Free Workstations are available for work with microscopes, see page 346.

The Sliding Shield is made of Static-Dissipative PVC, a transparent material that features a surface resistivity of about 10^7 ohms/square. This static-dissipating characteristic eliminates not only static charges that can damage sensitive components, but also the particles that static charges attract. As a result, the sliding shield remains clean—inside and out. **Note:** To ensure optimal static and contamination protection, Terra recommends that you select side panels made of Static-Dissipative PVC if you select the sliding shield option; see ordering table on the next page.

VLF stations are available with work surfaces that accommodate every application. The standard work surface is a nonconductive laminate top sealed on all sides to meet cleanroom requirements. Others are available with tops made of dissipative laminate, stainless steel, and polypropylene.

For delicate microscope operations, select the Vibration-Free Work Station, which eliminates up to 90% of all building vibrations to ensure a steady work surface (see page 346 for more information on these work stations).

Static-Dissipative PVC Eliminates Contamination Magnets

- Surface resistivity between 10^6 and 10^8 ohms/square
- Resists a wide range of acids and corrosive chemicals
- Eliminates particle attraction and build-up
- Renders nonconductive plastics obsolete in many applications
- See page 596 for full specifications and ordering information

Complete Line of Benches

Perforated Stainless Steel Top Table

In addition to standard tops listed on the following pages, Terra also offers a vented polypropylene or stainless steel work surface that is ideal for a broad range of wet processing applications. This station features perforations that allow hazardous fumes and liquids to drain into a plenum chamber beneath the work surface. Perforations also provide a more uniform air flow by eliminating much of the surface area that can cause air turbulence.

A discharge port located at the rear of the station lets you safely remove fumes to an in-house exhaust fume system, and a drain beneath the plenum chamber allows easy removal of liquid spills.

Adjustable ErgoHeight™ bench with subsurface plenum, see page 350

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Terra Wet Processing Station positioned beneath a Vertical Laminar Flow Hood

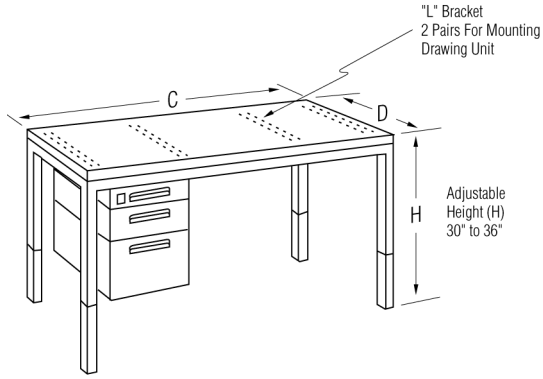
Static Control

A 4" space under the HEPA filter accommodates optional ionizing equipment for complete static safety.

An ionizing bar houses nozzles that emit balanced streams of positive and negative ions downward to safely neutralize any static imbalances that may exist in the work area. See page 421 for more information.

Operation with Terra Wet Processing Station

The Vertical Laminar Flow Station is completely compatible with Terra's Wet Processing Station. When operated together, these stations form an integrated processing system that accepts a host of wet processing modules to accommodate your applications. See pages 546-556 for a complete description of Terra's Wet Processing Station and accessories.



Ordering Information

Order the Vertical Laminar Flow Station, Filter/Fan Units (FFUs), and other optional accessories separately from the charts below. Selected accessories are installed in the corresponding Vertical Laminar Flow Station and shipped as a turnkey system, ready for operation.

Motorized Shield Control

Automatically retracts and extends optional access shield at the press of a button. Includes installation of clean-operating brushless motor and safety mechanism that stops shield in the event of power failure. Order shield separately.

Cat. # **2001-61**

Filter/Fan Units (FFUs)*
See chart below for quantity required

Nominal Dimensions (width x length)	Avg. Flow @ 90 FPM	115VAC, 60Hz Cat. #	230VAC, 50Hz Cat. #
2' x 4'	650 CFM	**6701-99**	**6701-99-220**
2' x 3'	480 CFM	**6702-08**	**6702-08-220**
2' x 2'	360 CFM	**6702-10**	**6702-10-220**

**** ULPA (Ultra-Low Penetration Air) filtered system also available. See page 208.***

Vertical Laminar Flow Station					Side Panel*	Sliding Shield**	Corresponding Solid Top	
Dimensions (inches)			No. of FFUs required (order above)	Order FFUs and Benches separately	Static-Dissipative PVC	Static-Dissipative PVC	Nonconductive Top	Conductive Top
A	B	C x D		120VAC, 50/60Hz Cat. # / 220VAC, 50Hz Cat. #	Cat. #	Cat. #	Cat. #	Cat. #
52	49	48 x 30	(1) 2' x 4'	**2001-30** / **2001-30-220**	**2004-03**	**9207-04**	**1722-00**	**1728-00**
64	61	60 x 30	(1) 2' x 2' + (1) 2' x 3'	**2001-31** / **2001-31-220**	**2004-03**	**9207-05**	**1724-00**	**1730-00**
76	73	72 x 30	(1) 2' x 4' + (1) 2' x 2'	**2001-32** / **2001-32-220**	**2004-03**	**9207-06**	**1726-00**	**1732-00**
100	97	96 x 30	(2) 2' x 4'	**2001-33** / **2001-33-220**	**2004-03**	**9207-07**	**2402-00**	**2400-00**

**** Replaces standard plexiglass side panels (each station requires two). Static-Dissipative PVC is recommended on units equipped with optional dissipative sliding shield. See page 596 for more information.***
***** See motor control above.***

Specifications

General Construction:	Fabricated of 1½" x 3" stainless steel members. FFUs encased in stainless steel overhead housing. Base includes 1" stainless steel leveling feet.
Side Panels:	29"D x 32"H acrylic (static-dissipative PVC available)
Prefilters:	Washable polyurethane foam, located at top of FFUs
Final Filters:	99.99% efficient HEPA (rated @ 0.3µm particles)
Fan Motor:	Direct drive, forward curve, centrifugal-type with sealed bearings; rated for continuous duty; furnished with overload protection and a two-speed switch. Rated ¼ HP @ low speed; ⅓ HP @ high speed (2' x 4' models)
Average airflow velocity:	90 (± 10) FPM (.45 m/sec) at low speed, measured 6" below filter face
FFU Air Flow:	650 (2' x 4'); 480 (2' x 3'); 360 (2' x 22') - all models rated @ 90 FPM under HEPA filter load
Sound level:	50 dBA, measured no more than 30" from filter face @ 90 FPM
Vibration level:	0.09 MILS
FFU housing:	0.63-inch thick aluminum with mill finish; includes integral air baffle system to ensure even air distribution. FFU fully encased in stainless steel housing.
Lighting:	Fluorescent, 100 foot-candles. Does not disturb the air flow.
Electrical:	110VAC, 50/60Hz or 220VAC, 50 Hz. Meets the requirements of the National Electrical Code and applicable local codes. All components UL listed and CE marked.
Performance:	Dust count exceeds Class 10 requirements.
Installation:	System is shipped as turnkey system; no installation required.

Modular Cleanroom Drawers

Three sizes can be mounted on either side of the bench. Available in durable, dent-resistant white plastic or stainless steel; plastic models feature rounded corners inside and outside for easy cleaning. Smooth, quiet slides ensure a flush, noncontaminating pull that won't interfere with material handling. Inside dimensions are 14"W x 15"D.

Note: Stainless Steel Drawers are available in 6" and 12" heights only.

Cleanroom Drawers

No. of Drawers	Min. Drawer Height	ABS Plastic (white) Cat. #	Stainless Steel Cat. #
1	3"	**1740-23**	—
1	6"	**1740-02**	**1741-20**
1	12"	**1740-98**	**1741-21**
2	3", 6"	**1740-14**	—
2	6", 6"	**1740-15**	**1741-22**
2	6", 12"	**1740-06**	**1741-23**
3	3", 6", 12"	**1740-07**	—
3	6", 6", 6"	**1740-09**	**1741-24**
4	3", 3", 6", 6"	**1740-08**	—

Cleanroom Drawer Locks

For added security of drawer contents. Price includes installation on any drawer listed above.

Cat.#
1700-97

Power Strip

Four-outlet strip includes master on/off switch, 15-amp circuit breaker.

Cat#
2004-31

Operating Manual

Cat#
1800-20

Work Benches†		Perforated-Top Work Benches†		Perforated Tops w/Plenum††		Ionizers
Stainless Steel Top Cat. #	Polypropylene Top Cat. #	Stainless Steel Cat. #	Polypropylene Cat. #	Stainless Steel (Polypropylene Plenum) Cat. #	Polypropylene Cat. #	Includes Power supply See page 421 Cat. #
1521-45	**1522-00**	**1522-76**	**9207-00**	**1526-50**	**1522-42**	**1526-31**
1751-00	**1522-01**	**1522-77**	**9207-01**	**1526-51**	**1522-43**	**1526-32**
1752-00	**1522-02**	**1522-78**	**9207-02**	**1526-52**	**1522-44**	**1526-33**
1753-00	**1522-04**	**1522-80**	**9207-03**	**1526-54**	**1522-46**	**1526-35**

† Complete with top (of specified material) and epoxy finished steel frame with telescoping legs.
†† Perforated top is made of material indicated. Plenum chambers are made of polypropylene.

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Horizontal Laminar Flow Station

- **Stainless steel interior (side panels and work surface) ensure optimal cleanliness and chemical resistance for sensitive work in pharmaceuticals, biotechnology, and electronics**
- **Dual multi-speed filter/blower modules direct a continuous wash of HEPA- or ULPA-filtered air forward across the work area**
- **Take-up ducts along front and side edges minimize turbulence and backwash in the work area**
- **Face velocity is adjustable from less than 90 FPM to higher than 130 FPM**
- **Built-in recessed illuminator provides diffused lighting without interfering with laminar flow**
- **Electropolishing available to remove embedded subsurface particles in stainless steel surfaces**
- **System options include vacuum, gas and DI water petcocks**

Terra's Horizontal Laminar Flow Station provides an economical work environment that exceeds the most stringent contamination requirements in the pharmaceuticals, biotech, electronics and semiconductor industries.

CE

Powerful filter/blower modules provide a back-to-front laminar flow of filtered air across the work surface. The adjustable multi-speed, direct-drive 1/2 HP blower lets you adjust air speed (90-130 feet per minute) to meet your requirements. It also provides a low noise level.

Select the easy-to-replace filters to meet your requirement: HEPA filters are rated 99.99% efficient at removing particles 0.3 microns or larger, and ULPA filters are rated 99.999% efficient @ 0.12 micron particles. Terra's advanced air-flow design ensures a uniform face velocity across the rear of the station, eliminating negative-pressure "dead spots" that create turbulence and lead to contamination. The low-profile design of these filter/blower modules takes up minimal floor space while leaving plenty of working space (three widths are available) with 30" of vertical clearance above the 30"H work surface (larger stations are available on a custom basis).

Return Air Ducts Maintain Laminar Flow and Keep Particles Out

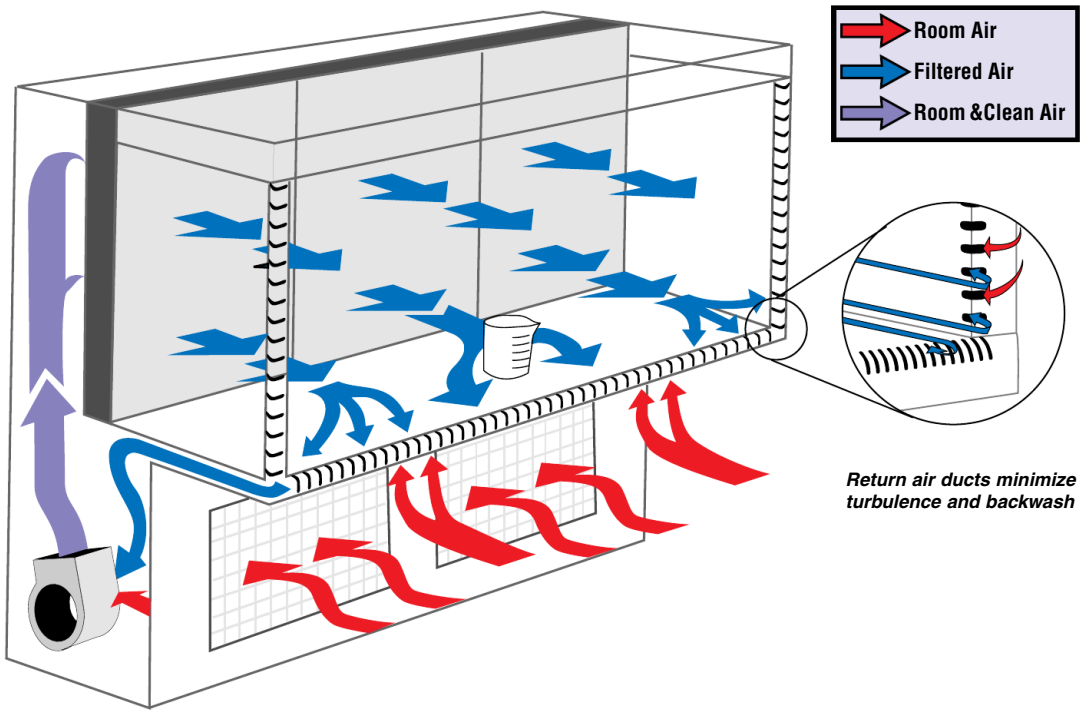
For enhanced air-stream control, this station also features return ducts along the front and side edges of the work area. These ducts enhance system efficiency by reducing backwash, the most common source of turbulence in a laminar flow system.

On less sophisticated systems, an object placed near the front edge of a horizontal air-stream interrupts the laminar flow and provides an opportunity for unfiltered air to wash back into the work area, bringing contaminants with it. On Terra's system with return air ducts, inrushing air is drawn down through the ducts to the filter/blower before it can enter the work area. The flow of filtered air thus remains uniform across the work surface, and contaminants are drawn through the ducts and into the filter before they can contaminate work in progress.

Clean, Durable Construction

All materials used in this work station are selected for durability and contamination control. Interior surfaces, including the side panels and work surface, are stainless steel; on an optional basis, these components can be electropolished to provide an ultra-clean finish free of sub-surface contaminants. The exterior features a chip-resistant, epoxy finish. The display panel, including the ON/OFF switch and blower speed control, is mounted above the work area. For operational convenience, a duplex 115VAC/60Hz power outlet is included on a standard basis.

The Horizontal Laminar Flow Station also includes a recessed fluorescent lighting assembly that provides shadow-free illumination of the entire work area without disturbing the air flow.



Return air ducts minimize turbulence and backwash

Select HEPA or ULPA filters from the ordering table below. Disposable prefilters (included with the system) help extend the life of the main HEPA/ULPA filters.

Note: This work station is designed for particle-sensitive applications but does not protect operators against hazardous fumes, vapors or aerosols. See Terra's exhaust purification systems for operations involving hazardous fumes.

Specifications

Construction:	Fabricated from welded 16-gauge C.R. steel; includes adjustable levelers.
Work Surface:	Stainless steel.
Finish:	Exterior surfaces feature a chip-resistant, white epoxy finish.
Prefilters:	Disposable fiberglass.
Final Filters:	Choice of HEPA (rated 99.99% efficient @ 0.3µm particles) or ULPA (rated 99.999% efficient @ 0.12µm particles).
Lighting:	Fluorescent type, 100 foot-candles. Recessed to eliminate air flow disturbance. Accepts lens for yellow light, if necessary.
Blower Module:	Direct-drive, 4-speed 1/2 HP electric motor, 1050 RPM, Class A. Speed is electronically controlled by a solid state voltage regulator. Speed controller is located above the control panel. Motor isolation provides low noise of approximately 65 decibels. Features a 10 5/8" diameter wheel. Delivers up to 1645 CFM flow at 1.0" static pressure.
Electrical:	115VAC, 60Hz, single phase (220VAC, 50Hz available). Meets the requirements of the National Electrical Code and applicable local codes. All components UL listed. Requires 8 amps. Other voltages available. Includes duplex 115VAC/60Hz power outlets.
Options:	Audible/visible filter alarm system (measures face velocity); ionizing system (including self-balancing power supply); petcocks for vacuum, DI water, or gas; electropolished stainless steel surfaces; special paint; special voltage and frequency.

Petcocks

	Cat. #
Nitrogen/Clean Dry Air (CDA)	**9620-07**
Vacuum	**9620-08**
DI Water	**9620-09**

Horizontal Laminar Flow Station (order filters separately)						Filters		
Overall Dimensions (W x D x H)	Work Surface Dimensions (W x D x H)	Standard Station 115VAC,60Hz Cat. #	Standard Station 220VAC, 50Hz Cat. #	UltraClean Station* 115VAC,60Hz Cat. #	UltraClean Station* 220VAC, 50Hz Cat. #	HEPA Rated 99.99% efficient @ 0.3µm particles Cat. #	ULPA Rated 99.999% efficient @ 0.12µm particles Cat. #	Replacement Prefilter Cat. #
52" x 42" x 66 3/4"	48" x 30" x 29 1/2"	**9620-02**	**9620-02-220**	**9620-05**	**9620-05-220**	**9620-12**	**9620-15**	**9620-18**
64" x 42" x 66 3/4"	60" x 30" x 29 1/2"	**9620-01**	**9620-01-220**	**9620-04**	**9620-04-220**	**9620-11**	**9620-14**	**9620-17**
76 1/4" x 42" x 66 3/4"	72" x 30" x 29 1/2"	**9620-00**	**9620-00-220**	**9620-03**	**9620-03-220**	**9620-10**	**9620-13**	**9620-16**

**** Features electropolished stainless steel side panels and work surfaces.***

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Portable CleanBooth™

- **Castered frame positions Filter/Fan Unit (FFU) above benchtop, large process equipment, repair operations—anyplace you need a temporary laminar flow of filtered air**
- **FFU provides an average air flow speed of 90 feet/minutes (measured with HEPA filter)**
- **Quiet operation: 50 dBA measured 30" from filter face**
- **Flexible side panels create a 3-sided enclosure, enhancing the laminar flow**
- **Available with a variety of work surfaces to meet your requirements**

Terra's Portable CleanBooth™ provides a mobile, versatile mini-cleanroom wherever you need it! It is ideal for operations with probe stations, screen printers and other free-standing process equipment, as well as benchtop kitting or assembly.

Adjustable design positions filter face 45"- 70" above floor.

FFU: Quiet, Reliable Operation

It consists of two modules: a filter/fan unit (FFU), which houses a particle filter, and a mobile support frame. The 24" x 48" x 12.25" FFU houses a HEPA filter, rated 99.99% efficient with 0.3 micron particles. Its compact, lightweight design makes it ideal for mounting either to the mobile frame or to any standard 2' x 4' ceiling grid. Its internal baffle system ensures uniform face velocity, and its 50 dBA noise rating is the best in the industry.

Mobile Frame Support

The FFU is attached to a castered support frame for easy positioning at locations throughout your facility.

Fabricated of 1" x 2" square steel members, it positions the filter face 70" above the floor (38" above the standard work benches offered below). The nonmarking castered wheels lock in place to keep the station where you need it. Its sturdy construction safely supports the FFU with minimal vibration. And because the frame does not come in contact with the bench top or equipment it services, this blower vibration is effectively isolated from the work in progress.

Flexible Side Panels Restrict Air Flow to Optimize Cleanliness

For enhanced laminar flows, select the optional side panels, available in three materials:

Cleanroom-Grade Vinyl is fire retardant and low outgassing.

Static-Dissipative Vinyl is manufactured with permanent built-in static inhibitors that, unlike topical treatments, will not wear off.

Non-outgassing **Polysim X1200** is made from inherently static-dissipative polyurethane that provides permanent, humidity-independent ESD protection for sensitive manufacturing conditions. Polysim contains no plasticizer, making it virtually non-outgassing.

Side softwall panels attach to the FFU by means of a unique, noncontaminating Flex-Track mounting system that eliminates cracks and seams where germs or particles can collect.

CE

Filter/Fan Unit (FFU)

Includes HEPA filter rated 99.99% efficient @ 0.3µm particles. Avg. flow @ 90 FPM: 650 CFM. Dimensions: 24" x 48" (nominal). See page 208 for full specifications.

	Cat. #
110VAC, 60 Hz	**6701-99**
220VAC, 50/60Hz	**6701-99-220**

Mobile Frame Support

Includes set of 4 casters, 2 with locking brakes, and installation of Filter/Fan Unit (order separately).

	Cat. #
Fixed (positions filter face 70" above floor)	**1870-01**
Adjustable (positions filter face 45" - 70" above floor)	**1870-06**

Side Softwall Panel Kits

Includes (1) four-foot wide and (2) two-foot wide panels that attach to the FFU. Kit catalog number includes installation of Flex-Track mount on two sides and rear of FFU. Panel length: 60". Panels can be cut to bench level.

	Cat. #
Cleanroom Vinyl	**1330-00**
Antistatic Vinyl	**1330-01**
Polysim X1200	**1330-02**

Work Benches

These benches provide a work surface 32" above the floor. Several surface materials are available to meet specific applications. The epoxy-finished steel frame includes a stainless steel scuff guard on the lower leg member to prevent scratching and chipping. The "C" base features recessed legs for operator comfort and convenience.

Work Benches

Bench Top Dimensions (W" x D")	Nonconductive Laminate Cat. #	Conductive Laminate Cat. #	Polypropylene With Raised Lip Cat. #	Stainless Steel–Solid Cat. #	Stainless Steel–Perforated Cat. #
34 1/4 x 23	**1682-02**	**1682-03**	**1715-17**	**1715-21**	**1715-25**
44 1/4 x 27	**1715-03**	**1715-07**	**1715-18**	**1715-22**	**1715-26**

Wall-Mounted Hood

- **Mounts on wall above work bench to provide effective, convenient exhaust venting**
- **20-gauge stainless steel construction protects against corrosive fumes**
- **Available with filter/blower modules for effective exhaust venting and purification**

These Wall-Mounted Hoods provide effective, economical venting of exhaust fumes.

Because they mount on the wall above your work bench, they don't require any floor space. Simply connect the discharge to your in-house ventilation system; an integral baffle conducts the gas flow into the hood from all sides. Their stainless steel construction is cleanroom compatible and resists a wide range of corrosive fumes. Includes mounting hardware.

Blower/Filter Modules Extend System Performance

A 24"W x 15"D x 10"H stainless steel blower module mounts to the hood to provide ventilation of exhaust fumes. It houses a continuous-duty, RPM impeller blower that provides a 1200 SCFM exhaust flow. For ductless exhaust purification, select the filter module, which contains an activated charcoal purification filter that safely removes a wide range of toxins to allow safe indoor release of exhaust (see page 424 for complete specifications).

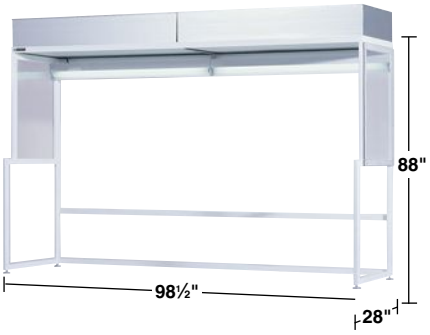
For applications using a charcoal filter, select a prefilter and postfilter to contain gross contaminants. A HEPA final filter can be added to allow exhaust release into a cleanroom.

Wall-Mounted Hoods			Blower Module		Filter Module	Filters		
Dimensions (L x W x H)	Accepts Duct Size	Cat. #	Includes blower 110VAC, 50Hz Cat. #	220VAC, 50Hz Cat. #	Order filter(s) separately Cat. #	Activated* Charcoal Cat. #	HEPA** Cat. #	Pre/Post-Filter Cat. #
48" x 30" x 18"	10"	9000-00	1684-90	1684-90-220	1684-91	1716-00	1681-02	1681-04A
72" x 30" x 18"	12"	9000-01						

** Rated 98% efficient with a wide range of organic fumes (see page 424).* ***Rated 99.99% efficient with 0.3µm particles.*

Narrow-Profile Vertical Laminar Flow Hood

- **Dual 2' x 4' HEPA Filter/Fan Units provide laminar flow of clean air to the work surface (order FFUs and work bench separately)**
- **Epoxy-finished CR steel frame includes static-dissipative PVC side panels**
- **Custom sizes and configurations available—call Terra with your requirements!**



	Cat#
Laminar Flow Hood	**1690-95**
HEPA Filter/Fan Unit (requires two)	
Provides 650 CFM of HEPA-filtered air. Runs @ 50 dBA	
110VAC, 60Hz	**6701-99**
220VAC, 50Hz	**6701-99-220**
Cleanroom Work Station (96"W x 30"D)	**2402-00**

See full line of work benches beginning on page 320

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Ductless Work Station

- **Lightweight, portable design**
- **Ideal for removing aerosols, soldering fumes, chemical vapors, and other hazards**
- **Activated charcoal filter is rated 98% effective with a wide range of organic compounds (see page 424)**
- **Adjustable safety shield allows wide visibility and arm motion**

This compact, portable exhaust purification system provides effective protection against fume exposure. It is easy to relocate and set up and allows unrestricted access to the work in progress. This convenience makes it practical to guard against hazardous fumes in even the smallest jobs.

The heart of each unit is a powerful but quiet 1675 RPM, variable-speed impeller blower that draws fumes from the work area into an activated charcoal purification filter. This filter effectively removes a wide range of organic fumes, allowing safe indoor release of the exhaust stream in compliance with OSHA and other environmental guidelines. A HEPA filter is available postfiltration of the air flow.

Specifications

Dimensions:	14½"W x 15"D x 16"H (front shield adjustable 10½"-13½" from the filter/blower housing)
Weight:	33 lbs.
Blower:	1675 RPM impeller-type, runs on 0.6 amps/60 watts at 115VAC, 50/60Hz
Filter:	Activated charcoal purification filter, 12" x 12" x 3" (see page 424 for specifications)

CE

	115VAC, 50/60Hz Cat. #	230VAC, 50/60Hz Cat. #
Ductless Work Station	**9083-20**	**9083-20-220**

Includes housing and blower; order desired filter(s) and shield separately.

Safety Shield

Static-Dissipative PVC	**9083-22**
Nondissipative PVC	**9083-23**

Filters (see page 422)

Purification (activated carbon)	**1701-90**
Pre/Post Filters (contains gross media) Two per system recommended.	**1701-93**
HEPA Final Filter (99.99% efficient @ .3µm)	**2100-30**

DownDraft™ Work Station

- **Enhances operator safety during soldering, chemical processing, adhesive coating, and other operations involving noxious fumes**
- **Sub-surface blower/filter module draws fumes through perforated stainless steel work platform**
- **Activated charcoal filter safely removes a wide range of organic fumes for safe indoor exhaust release**

This work station is ideal for soldering or chemical processing that requires the removal of potentially hazardous fumes.

Its powerful 1200 CFM blower draws exhaust fumes downward, away from the operator, for safe removal and purification. The activated charcoal filter removed 98% of more organic chemical vapors, allowing safe release (see page 424 for information on this and other chemical vapor filters). An 8"-diameter exhaust flange also allows fumes to be ducted away from the bench for external release.

Benchtops are made of cleanroom-grade white laminate, sealed on all sides to prevent particle release. Legs, made of 1½" square steel tubing, raise the work surface 32" off the floor and feature a white epoxy finish and leveling feet. Exhaust fumes enter the filter through three perforated stainless steel platforms positioned at the center of the work surface. Specify other desired platform sizes or locations.

Benchtop Dimensions

(32"H, including leveling feet)	110VAC/60Hz Cat. #	220VAC/50Hz Cat. #
48"W x 30"D	**1728-01**	**1728-01-220**
60"W x 30"D	**1728-02**	**1728-02-220**
72"W x 30"D	**1728-03**	**1728-03-220**
48"W x 34"D	**1728-06**	**1728-06-220**
60"W x 34"D	**1728-07**	**1728-07-220**
72"W x 34"D	**1728-08**	**1728-08-220**

CE

	Cat. #
Activated Charcoal Filter	**1716-00**
Pre/Post-Filter Two recommended to contain gross particulates.	**1681-04A**
HEPA Final Filter Allows cleanroom exhaust release.	**1681-02**

Exhaust Fume Hoods

- **Stainless Steel or CR Steel Hood safely vents noxious or hazardous fumes away from the work surface**
- **Optional Exhaust Purification System (with explosion-proof ventilator) safely removes hazardous fumes for safe indoor release of exhaust**
- **Transparent PVC side panels and sliding shield control negative pressure under the hood, reduce risk of fumes escaping**
- **Steel frame provides sturdy support, isolates hood from work surface**
- **Optional vapor-sealed lighting improves visibility**
- **Variety of work surfaces available, including vibration-free work stations and dissipative benches**

This Exhaust Fume Hood is designed to afford you maximum economy and flexibility in designing the system that's just right for your application.

Practical Design Combines Strength, Versatility

The frame is fabricated from welded 1½" x 3" 16-gauge C.R. or 20-gauge stainless steel to ensure sturdy support for the exhaust fume hood. The finish is a chip-resistant, baked semigloss white enamel. The frame also isolates the hood (and any vibrations the hood causes) from the work surface.

The hood features a 6" round discharge; this allows easy connection to your in-house exhaust system to provide the internal negative pressure necessary to safely remove fumes from the work surface. This hood is completely noncontaminating and resists a wide range of corrosive materials; select stainless or cold rolled steel.

Side panels made of transparent PVC ensure that no fumes escape from beneath the hood while allowing full visibility from the side and eliminating the claustrophobic feeling operators often experience in an all-stainless steel enclosure.

Custom Design

CE

Shown with optional Cleanroom Bench

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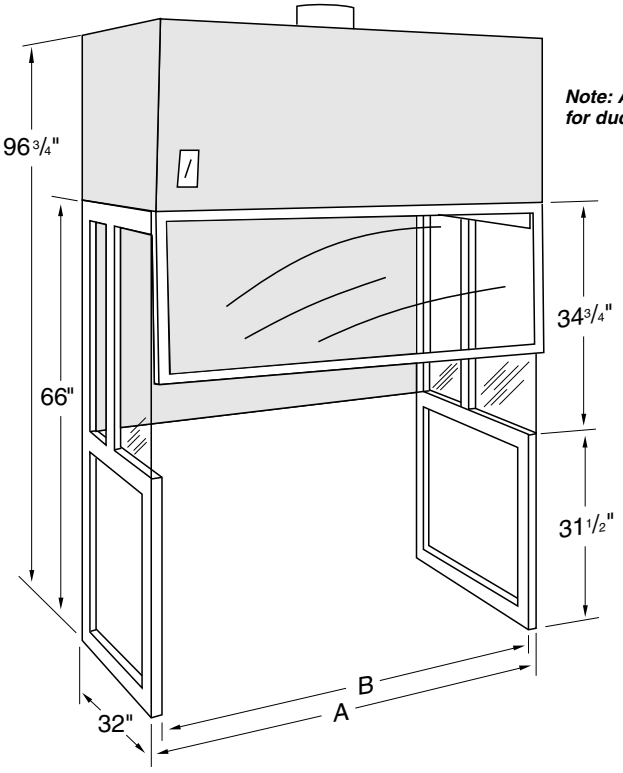
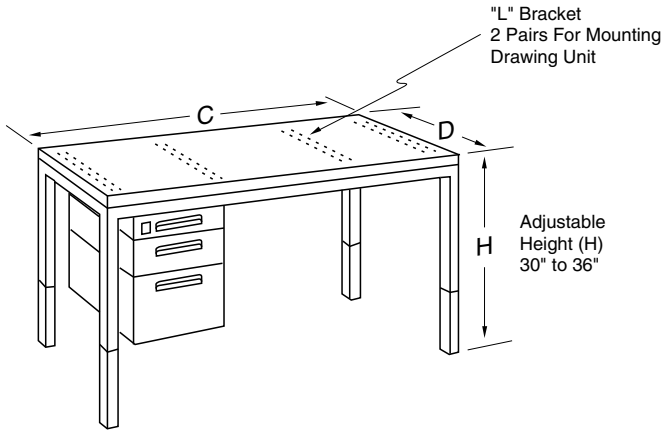
Dimensional Guide:
For Exhaust Fume Hood and Cleanroom Bench

Refer to table below for dimensions.



Note: Add 15" to height of hood for ductless purification models.



Easy-Glide Sliding Shield Enhances System Flexibility

The front of the unit features an easy-glide sliding shield (also made of transparent PVC mounted in an epoxy-coated aluminum frame). Because this front shield is counterweighted, it can be positioned at any place you desire to restrict or open up access to the work area. You can even modify the shield to accommodate protruding process equipment or an operator's arms. Extending it downward effectively increases the negative pressure under the exhaust hood and reduces the chance of fumes escaping into the surrounding area. Because it is transparent, this shield affords full visibility of the entire work surface, even when fully extended. Extension below hood: 35" (fully extended); 8" (fully retracted).

Ductless Exhaust System Extends Capabilities

Terra offers a number of options to meet particular requirements. The Ductless Exhaust Purification Hoods include an explosion-proof blower installed inside the hood and provisions for mounting purification filters and particle filters that safely remove a wide array of fumes to allow safe indoor release of exhaust. This system is ideal for use in such processing operations as screen printing, soldering and etching. When used without filters, this option enables you to vent exhaust fumes by means of exhaust conduit.

Other options include a vapor-sealed fluorescent lighting assembly, which enhances visibility under the hood, and a number of work surfaces. See our selection of work benches beginning on page 319.

Specifications

General Construction: The station is fabricated from welded 16-gauge C.R. steel 1½" x 3" frame tubing. Hood is available in epoxy-finished steel or stainless steel.

Frame Finish: Chip-resistant, baked enamel, semigloss. Standard color: White. Hood also available in stainless steel.

Side Panels: Transparent PVC

Blower Motor (Ductless Models): Direct-drive, ¾ HP electric motor features a spark-resistant 10¾-inch impeller wheel. Runs at 1140 RPM; provides up to 2190 cubic feet per minute of free air displacement @ 0" static pressure.

Custom Design

Dimensions			Exhaust Fume Hoods*		Ductless Exhaust Purification Hoods**	
Overall Length A	Inside Length B	Optional Work Surface C x D	Stainless Steel Cat. #	Epoxy-Finished CR Steel Cat. #	Stainless Steel Cat. #	Epoxy-Finished Steel Cat. #
52"	49"	48" x 30"	**2400-03**	**2400-08**	**2400-12**	**2400-16**
64"	61"	60" x 30"	**2400-04**	**2400-09**	**2400-13**	**2400-17**
76"	73"	72" x 30"	**2400-05**	**2400-10**	**2400-14**	**2400-18**
100"	97"	96" x 30"	**2400-06**	**2400-11**	**2400-15**	**2400-19**

**** Supporting frame is made of steel tubing; stainless steel frame is available on a custom basis.***
***** Order Purification Filters separately. See page 424 for complete information on filter performance. These systems include a ¾ HP explosion-proof blower mounted for negative-pressure venting.***

Modular Cleanroom Drawers

Three sizes of modular drawers can be mounted on either side of the bench. Select the modules to suit your needs; you can mount several beneath each bench. Available in durable, dent-resistant white plastic or stainless steel; plastic models feature rounded corners inside and outside for easy cleaning. Smooth, quiet slides ensure a flush, noncontaminating pull that won't interfere with material handling. Inside dimensions are 14"W x 15"D. **Note:** Stainless Steel Drawers are available in 6" and 12" heights only.

Custom Design

Cleanroom Drawers

No. of Drawers	Min. Drawer Height	ABS Plastic (white) Cat. #	Stainless Steel Cat. #
1	3"	**1740-23**	—
1	6"	**1740-02**	**1741-20**
1	12"	**1740-98**	**1741-21**
2	3", 6"	**1740-14**	—
2	6", 6"	**1740-15**	**1741-22**
2	6", 12"	**1740-06**	**1741-23**
3	3", 6", 12"	**1740-07**	—
3	6", 6", 6"	**1740-09**	**1741-24**
4	3", 3", 6", 6"	**1740-08**	—

Other sizes now available—see page 363.

Vibration-Free Work Station

This unique vibration-free work station eliminates up to 90% of all floor vibration. Models below feature epoxy-finished frames. For full specifications and other designs, see our separate catalog listing, page 346.

Work Surface (W x D)	Non-Conductive Top Cat. #	Dissipative Top Cat. #	Stainless Steel Top Cat. #
48" x 30"	**1570-00**	**1570-26**	**1570-52**
60" x 30"	**1570-01**	**1570-27**	**1570-53**
72" x 30"	**1570-02**	**1570-28**	**1570-54**
96" x 30"	**1570-04**	**1570-30**	**1570-56**

Exhaust Purification Filter (for Ductless Exhaust Applications)

These filters safely remove a wide array of fumes to allow safe indoor release of exhaust fumes (see page 424 for full specifications). Four are recommended for each fume hood (two stacks of two filters each). Pre/post-filters are added for retention of purifying medium (one is mounted above and/or below each stack of purifying filters, see ordering information at right).

	Cat. #
Purification Filter	**1716-00**
Pre/Post Filter	**1681-04A**

Particle Filters (for use with Purification Filters)

These particle filters retain the charcoal filtering medium in purification filters to avoid particle contamination of work area or exhaust stream. Select one for each stack of purification filters.

	Cat. #
HEPA (99.99% efficient @ 0.3µm-diameter particles)	**1681-02**

Vapor-Resistant Fluorescent Illuminator (see page 420)

This 40-watt, 48-inch rapid-start fixture is classified for Class I, Div. 2 environments. It resists dust and vapors. Acrylic-coated housing protects against moisture, dirt, vapor, corrosion and chipping. Dimensions: 53"L x 15¾"W x 8"H. Includes dual fluorescent tubes. Operates on 120 VAC/60Hz.

	Cat. #
Installed	**3800-70**
Noninstalled	**3800-71**
Replacement Tube	**3800-72**

Corresponding Cleanroom Bench†

With Non-Conductive Top Cat. #	With Static-Dissipative Top Cat. #	With Stainless Steel Top Cat. #	With Polypropylene Top Cat. #
1722-00	**1728-00**	**1521-45**	**1522-00**
1724-00	**1730-00**	**1751-00**	**1522-01**
1726-00	**1732-00**	**1752-00**	**1522-02**
2402-00	**2400-00**	**1753-00**	**1522-04**

† Complete with top, adjustable legs, and right/left drawer mounting brackets. Drawer unit optional.

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Exhaust Fume Filter System

- **Versatile exhaust system removes annoying fumes to maintain a healthy workplace!**
- **Swing-arm design allows effective placement of exhaust pick-up tools**
- **Modular design lets you select the items required for your application**
- **Powerful Exhaust Filter/Fan Module removes most organic fumes to allow safe indoor release (see following page)**

This versatile system removes smoke and fumes from soldering, epoxies, solvents or other sources.

It is ideal for highly localized operations, for which an exhaust fume hood may be too constrictive or cumbersome. The easy-position swing arm lets you position the pick-up tool exactly where you need it yet won't interfere with soldering or other operations.

The exhaust arm can be mounted to either a benchtop or wall. A complete system includes the following modules (select each separately, using the diameter to suit your requirements): an Exhaust Filter/Fan Module, an exhaust arm (2" or 3" diameter), and corresponding mounting bracket, connection hose, and pick-up tools.

In choosing the exhaust arm, keep in mind that the smaller, 2"-diameter arm may, under full blower force, create a sucking sound, which reminds an operator of the vacuum force but which may be distracting. The larger, 3" arm requires an adapter for use with the 2" connecting hose.

Module	2"-diameter Cat. #	3"-diameter Cat.#
Exhaust Arm	**9001-00**	**9001-01**
Exhaust Arm- Anti-Static	**9001-02**	—
Table Mounting Bracket	**9001-04**	**9001-34**
Wall Mounting Bracket	**9001-05**	**9001-35**
Connection Hose, 2" diameter*		
8 feet	**9001-06**	—
12 feet	—	**9001-36**
Adapter (Connects 2" hose to 3" exhaust arm)	**9001-14**	
Pick-Up Tools		
Slit Nozzle, 8"W, Anti-Static	**9001-38**	—
Slit Nozzle, 8"W	**9001-10**	—
Slit Nozzle, 10"W	—	**9001-30**
Slit Nozzle, 12"W	**9001-11**	
Slit Nozzle, 16"W	—	**9001-31**
Pipe Nozzle, 4"L	**9001-12**	
Pipe Nozzle, 4"W, Anti-Static	**9001-39**	—
Pipe Nozzle, 5"L	—	**9001-13**
Acrylic Hood, 14"W	**9001-15**	**9001-32**
Funnel Nozzle, 8" Dia.	**9001-16**	**9001-33**
Funnel Nozzle, 8" Dia. with Halogen Light	**9001-17**	—

* Hoses include one set of clamps. Select the adapter to use 2"-diameter hose with 3"-diameter exhaust arm.

CE

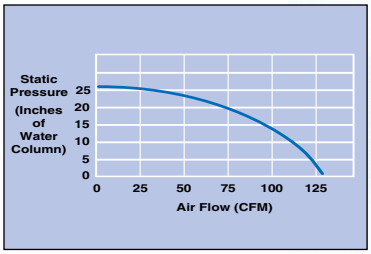
Filter/Fan Module

Designed for remote exhaust ventilation applications, the module incorporates a 125-CFM continuous-duty, brushless blower designed for quiet operation and automatic thermal protection.

It accommodates an activated charcoal exhaust purification filter to allow safe release of exhaust fumes (see page 424 for full specifications on exhaust filters). Pre- and post-filters are recommended to capture charcoal particles that escape the filter. In addition, a HEPA or ULPA final filter may be specified for exhaust release into a cleanroom.

This module comes with a standard 8"-diameter stainless steel flange for connection to exhaust hosing. Select either a 2"- or 3"-diameter flange for use with hosing from the Exhaust Fume Filter System.

Housing Dimension: 14"W x 13.5"D x 32.25"H



	Cat. #
Filter/Fan Module	
120 VAC, 50/60Hz	**9001-18A**
220 VAC, 50 Hz	**9001-18A-220**
Exhaust Flanges (stainless steel)	
2" diameter	**9001-19A**
3" diameter	**9001-40**
Activated Charcoal Filter	**1716-00**
See page 425 for chemical ratings.	
Pre/Post-Filter (select two)	**1681-04A**
HEPA Final Filter	**1681-02**
Rated 99.99% efficient @0.3µm	
ULPA Final Filter	**1681-10**
Rated 99.999% efficient 0.12µm	

Spiralock™ Zephyr-D Vacuum Hose

- **Crush-proof and built to last and last**
- **Ideal for use in Terra's Exhaust Fume Filter System**
- **Easily and quickly installed by anyone**
- **Easily cut or coupled on the job**

Terra's Spiralock™ Zephyr-D Vacuum Hose is ideal for moving air, gases, dust, fumes or liquid by suction, gravity or pressure. It will give you high-quality performance at a reasonable price. It features a smooth interior and excellent flexibility in a crush-proof construction made to withstand rugged daily use. The non-wire interlocking construction allows it to be crushed, kinked, jumped on, twisted, or run over by a truck—it will come right back to shape. There is no metal used in the construction and therefore none to corrode. Use it with dry or wet-dry vacuums.

This hose will handle a great many chemicals (information on chemical resistance is available from Terra). It is not, however, meant to be used with any petroleum-based products such as gasoline, kerosene, oil and solvents. A wide range of temperature uses from -50°F to +150°F are acceptable.

Spiralock Zephyr-D Vacuum Hose
Specify desired length as quantity (e.g., quantity (6) = 6-ft length)

	Cat. #/Foot
2", Gray	**9001-23**
	Cat. #/Each
2" Vinyl Cuff	**9001-24**

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Vapor-Proof and Explosion-Proof Illuminators

- **A variety of models ensure safe lighting in the presence of flammable vapors and dusts**
- **Vapor-sealed models are ideal for Class I, Division 2 environments**
- **Explosion-proof model is suitable for Class 1, Division 1 environments**
- **Static-Dissipative PVC (available on select housings) helps control static charges and the particles they attract**

These illuminators help meet safety requirements in applications involving flammable dust or vapor. They are ideal for use in a variety of work stations.

Vapor-Proof Design Features Air-Tight Seal

Terra offers several sizes of fluorescent vapor-sealed illuminators designed for use near potentially flammable vapors. Vapor-sealed models are suitable for Class I, Division 2, Groups A, B, C and D hazardous locations, as defined by the National Electrical Code (NEC). (Class I defines the hazard as a combustible vapor or gas atmosphere; Division 2 restricts use to those locations in which volatile fluids or gases are handled, processed or used, but in which the hazardous liquids, vapors or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of equipment. These fixtures are not designed for Class 1, Division 1 hazardous locations.)

No. 2400-26, Explosion Proof

Models No. 2400-21 through 2400-25 feature a Static-Dissipative PVC sealed housing that resists a wide range of chemicals and also helps control static charges and the particles they attract. This material maintains a surface resistivity of about 10^7 ohms/square, making it ideal for use around materials sensitive to ESD (electrostatic discharge). See page 956 for a complete description of Static-Dissipative PVC.

Explosion-Proof Illuminator For Optimal Safety

This incandescent hazardous-environment illuminator meets a broad range locations defined by the National Electrical Code (NEC): Class I, Div. 1 and 2 (Groups C and D); Class II, Div. 1 and 2 (Groups E and F); and Class III, Div. 1 and 2 (all groups). It is thus suitable for locations in which ignitable mixtures exist under normal conditions.

It includes a mounting hood for easy installation in a ceiling panel or sealed enclosure.

No. 2400-25 (Vapor-Sealed)

No. 2400-24 (Vapor-Sealed

No. 3800-71 (Vapor-Sealed)

No. 2400-28 (Dust-Sealed)

All models are for 110VAC/60Hz operation (for 220VAC, add "220" to the cat. no.)

Illuminator Type	Dimensions (in.)	Installed Cat. #	Uninstalled Cat. #
Vapor Sealed	27L x 5W x 3H	**2400-21** ⓧ	**2400-24** ⓧ
	50 1/2L x 5W x 3H	**2400-22** ⓧ	**2400-25** ⓧ
	53L x 5W x 3H	**3800-70**	**3800-71**
Explosion-Proof	27L x 15 3/4W x 8H	**2400-23**	**2400-26**
Dust-Sealed	25 13/16L x 7W x 5H	**2400-27**	**2400-28**

ⓧ ***Feature static-dissipative seal (see description above)***

Replacement Tubes
(for vapor-sealed illuminators)

Length	Cat. #
24"	**1682-26**
48"	**3800-72**

Ionizing Bars

- **Mount under Terra's Vertical Laminar Flow Stations and Universal Hoods, as well as other controlled-environment work stations**
- **Neutralize surface charges and protect sensitive components against ESD damage**
- **Rugged design and noncontaminating materials ensure safe, reliable operation**

These Ionizing Bars are designed to provide electrostatic protection in Laminar Flow Stations, Universal Hoods, and other large work stations. They perform two important functions: by emitting a continuous stream of positive and negative ions, they prevent the build-up of static charges that can damage sensitive components, and they also neutralize static charges that may already exist on a component. They are thus ideal for operations that involve nonconductive materials, such as plastic boxes and nonconductive waffle packs, which cannot be discharged by grounding.

Each of these units incorporates several ionizing nozzles mounted in a brushed aluminum bar; the number of nozzles depends on the length of the bar you order. Like Terra's Ionizing Nozzles, Ionizing Bars perform their ionizing function by breaking up the gas molecules that pass through them into positive and negative ions. These ions then neutralize static imbalances by combining with surface charges of the opposite polarity.

Ionizing Bars (installed) - contact Terra for custom sizes

For Work Station		Ionizing Bar only (order Power Supply separately) Cat. #	Ionizing Bar and Power Supply (installed) Cat. #
Vertical Laminar Flow Stations:	48"W	1525-90	1526-31
	60"W	1525-91	1526-32
	72"W	1525-92	1526-33
	84"W	1525-94	1526-34
	96"W	1525-95	1526-35
Universal Hoods:	36"W	2002-11	1526-30
	45"W	2002-10	1525-97
Environmental Control Chambers:	28"W	1526-36	1526-39
	42"W	1526-37	1526-40
	56"W	1526-38	1526-41

All hardware is made of noncombustible, oxidation-proof, non-contaminating materials for a long operating life. In addition, all nozzles mounted inside the bar use positive, non-surface contacts for added reliability. These units can be easily mounted under Terra Laminar Flow hoods; simply order the appropriate length for the work station you have. The bars are mounted on the upper inside surface of the work station so that they project the ion stream onto the work bench. Custom sizes are available for virtually any work station you currently have. Ionizing Bars require the IonWatch™ Power Source (Cat. No. 2003-02).

Call to specify custom lengths.

Automatic IonWatch™ Ionizing Power Supply

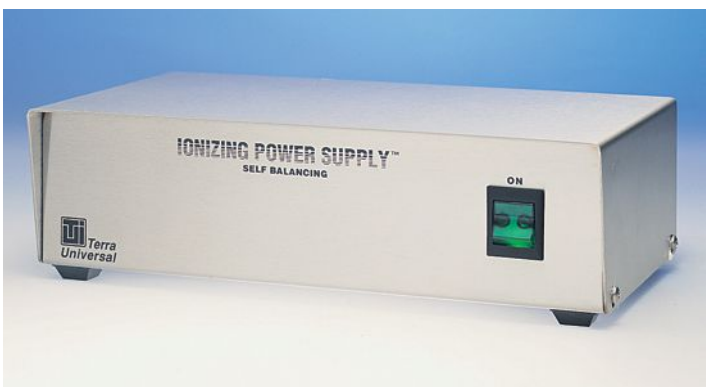
CE

- **Automatically balances output of positive and negative ions for safe static neutralization**
- **Pulse-width modulation allows safe placement of stored materials next to nozzles**
- **Eliminates problem of RFI and ozone generation**
- **For use in laminar flow stations and hoods (see page 140 for desiccator ionizing equipment)**

The Automatic IonWatch™ Ionizing Power Supply generates no RFI or ozone. Further, its pulse-width modulated design automatically adjusts the stream of positive and negative ions to compensate for charge imbalances that exist in the work area (under a laminar flow hood or inside a glove box).

This sophisticated feature ensures the safety of static-sensitive materials by guaranteeing that the power supply does not create a charge imbalance instead of neutralizing it.

A 5-foot cord is fitted with a 3-prong plug for a grounded, 3-terminal 120 VAC receptacle (220 VAC model requires user-supplied plug). Each power unit accepts two power cable connectors. Dimensions: 11"W x 3"H x 6½"D.



Note: This power supply provides the ionizing power necessary for effective static neutralization under laminar flow hoods. For static neutralization inside desiccators, select the ionizing equipment listed on pages 140-141.

		Cat. #
Automatic IonWatch™ Ionizing Power Supply	120 VAC	**2003-02**
	220 VAC	**2003-04**

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Particle Filters
(HEPA and ULPA)

- **HEPA (High-Efficiency Particulate Air) Filters rated 99.99% efficient with particles 0.3 microns and larger in diameter**
- **ULPA (Ultra-Low Penetration Air) Filters rated 99.999% efficient with particles 0.12 microns in diameter**
- **Come in a variety of sizes to fit Terra work stations**

These filters are specially designed for use in cleanrooms and precision assembly areas.

They come in a wide range of sizes (see ordering table below) for use in Terra work stations and many other applications. They can also be used as final filtration filters in applications with purification filters (see following pages for information on purification filters).

The filtration medium consists of highly efficient microporous polyurethane minipleats held in place by strong, rigid plastic separators that keep the medium from nesting. This design channels air flow with optimal efficiency to reduce resistance. The filer is sealed into the sturdy aluminum frame with a fire-retardant adhesive.

All HEPA filters are tested for air flow resistance and DOP (dioctylphthalate) smoke penetration (with a mean particle diameter of 0.3 microns) by measuring upstream and downstream concentrations with a laser. They are rated 99.99% efficient with particles 0.3 microns or larger in diameter.

ULPA Filters Available for Class 10 Particle Requirements

Terra also offers ULPA (Ultra-Low Penetration Air) filters rated 99.999% efficient with particles 0.12 microns or larger in diameter. These filters are available in standard sizes for Terra work stations; other sizes can be custom ordered.

Dimensions	Application	HEPA Filters	ULPA Filters
Inches	See Key At Right	Rated 99.99% efficient @ 0.3 micron particles Cat. #	Rated 99.99% efficient @ 0.3 micron particles Cat. #
24 x 47 3/8 x 5 7/8	—	**2100-04**	—
24 x 60 x 5 7/8	—	**2100-05**	—
24 x 72 x 5 7/8	—	**2100-06**	—
13 x 27 3/4 x 3	1	**1681-02**	**1681-10**
49 1/2 x 31 1/2 x 3	2	**9620-12**	**9620-15**
61 1/2 x 31 1/2 x 3	3	**9620-11**	**9620-14**
73 1/2 x 31 1/2 x 3	4	**9620-10**	**9620-13**
48 x 24 x 6	—	**3800-50**	**3800-51**
46 1/2 x 17 1/2 x 3 1/8	5	**1529-35**	**1529-33**
46 1/2 x 27 1/2 x 3 1/4	6	**1530-61**	**1530-62**
12 x 13 x 3	7	**2100-30**	**2100-29**

Notes: Filters above are used with the TUI products below as indicated:

(1) Universal Hoods (page 394), ECMs (page 378), Remote Filter/Blower Modules (page 418), Wall-Mount Hood (page 413), CleanStocker (page 151), Storage Cabinets (page 153), Garment Storage Cabinets (page 310)

(2) Horizontal Laminar Flow Station No. 9620-02 (page 410)

(3) Horizontal Laminar Flow Station No. 9620-01 (page 410)

(4) Horizontal Laminar Flow Station No. 9620-00 (page 410)

(5) PureFlow No. 1529-20 (page 176)

(6) PureFlow No. 1529-30 (page 176)

(7) Ductless Exhaust Purifier (page 414)

Shown in Terra desiccator

Adjustable Shelf Support (for hoods and glove boxes)

These low-profile electropolished stainless steel supports lend added strength to Terra hoods and glove boxes—without taking up valuable space. They ensure that cabinets will not warp or crack under heavy loads (up to 150 pounds). Their retractable design makes installation easy. Only 11/16" high, they are mounted behind a lip beneath the top in an area that is otherwise unused. Typical installation requires two supports—one 3" from the front and the other 3" from the rear of the chamber; select appropriate size for your enclosure. Price includes installation.

Length (compressed/extended)	Cat. #
15"/26"	**2200-21**
21"/35"	**2200-20**
84"/90"	**2200-22**

Toxic Gas Detector System

- **Complete, easy-to-use sampling and analysis system**
- **Detects and measures hazardous gases and vapors**
- **Ideal for monitoring performance of Exhaust Purification Filters (see page 424)**
- **The most cost-effective solution to air sampling and analysis**

This Toxic Gas Detector System is an ideal, easy-to-use method for day-to-day gas checking. It allows effective monitoring of exhaust purification filter efficiency. It also provides a valuable aid to QC in the lab, plant or office and spot testing for a wide variety of hazardous gases and vapors.

This low-cost, portable system consists of two components: detector tubes detect specific vapors; and a precision sampling pump draws an air sample through the detector tube. One sample is all that is needed for most analysis, compared to other devices that require that you keep track of multiple strokes and introduce the possibility of operator error.

More than 200 detector tubes are available to measure a wide variety of hazardous gases and vapors. Each is formulated with high purity reagents that absorb and react with the gas or vapor being measured. The reaction causes a colorimetric stain which corresponds in length to the concentration of the gas or vapor being measured.

Ordering Information

	Cat. #
Toxic Gas Detector Kit Includes pump, maintenance items and carrying case. Tubes not included.	**9002-00**

Other Detector Tubes Available! Refer to page 573 for complete ordering information

	Cat. #
General Sampling Detector Kit Includes the Toxic Gas Detector Kit above plus a 10 meter extension hose and one box of tubes each for sampling Ammonia (50-900 PPM), Benzene (5-200 PPM), Carbon Dioxide (.05-1.0%), Carbon Monoxide (10-250 PPM), Hydrogen Sulfide (100-2000 PPM), Nitrogen Dioxide (0.5-30 PPM) and Sulfur Dioxide (20-300 PPM).	**9002-01**

Air Flow Testing Kit

- **Determines flow and strength of air currents**
- **Provides an inexpensive way to monitor the proper flow of vapors under the Exhaust Fume Hoods**

The Air Flow Testing kit allows you to check the strength and flow patterns of slow-moving air currents. The kit is ideal for monitoring the correct operation of ventilators, air conditioners, and laminar flow stations; it also ensures that hazardous vapors under the fume hoods are properly vented. And because it helps determine the distribution of toxic vapors in the workplace, it allows you to determine the optimal measuring points for conducting air analysis with Terra's Gas Detector Kit (see above for a full description).

The Air Flow Testing kit consists of a hand-held rubber aspirator bulb, four rubber plugs, and ten air current tubes. A plastic case contains all components and includes a device for opening the air current tubes. Each of the 4¾"-long tubes contains a porous element impregnated with fuming sulfuric acid that produces the smoke. To release smoke, you simply break off the tips of a tube, insert one end into the bulb, and squeeze. Each tube contains two domed metal screens that hold the chemical reagent securely in place without hampering the free flow of smoke.

After use, simply remove the tube from the bulb and plug both ends with a rubber stopper. Tubes can be reused until the smoke is exhausted. Kit dimensions: 5¾" x 2" x 2½". Kit Weight: 6 oz.

	Cat.#
Air Flow Testing Kit	**1718-62**
Package of 10 Air Current Testing Tubes	**1718-63**

1. This Air Flow Testing kit cannot be used to test nitrogen flow because the smoke generated in a completely dry environment is invisible. The density of the smoke increases with increasing atmospheric humidity.
2. The smoke particles generated have acidic properties (sulfuric aerosol).
3. The smoke cannot cause ignition because it is generated without heat. The smoke can therefore be safely used in air containing solvent vapors.

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Purification Filters

- **Remove a wide range of chemicals from airstream to allow ductless exhaust fume purification**
- **Help meet OSHA and other environmental regulations**
- **Select filter configuration for your system and chemical application**
- **Custom sizes available—call Terra with your specifications**

Terra Universal offers several exhaust fume purification filters for use in all Terra-manufactured fume hoods.

Our most popular models use activated charcoal, which has been proven effective at removing a wide range of organic fumes. Other models employ impregnated activated charcoal to provide safe removal of lower-weight organic compounds as well as inorganic gases (see filter descriptions below).

Purification filters are designed for use in the Terra systems listed in the ordering table below (other sizes can be custom ordered). Typically, each Terra ductless exhaust system includes a filter housing that holds the desired purification filter along with any prefilter or postfilter required. For optimal filter effectiveness, Terra recommends use of a prefilter to extend the time that the exhaust fume is exposed to the filter medium. In particle-sensitive environments, a HEPA or ULPA postfilter may be added (see ordering information on previous page).

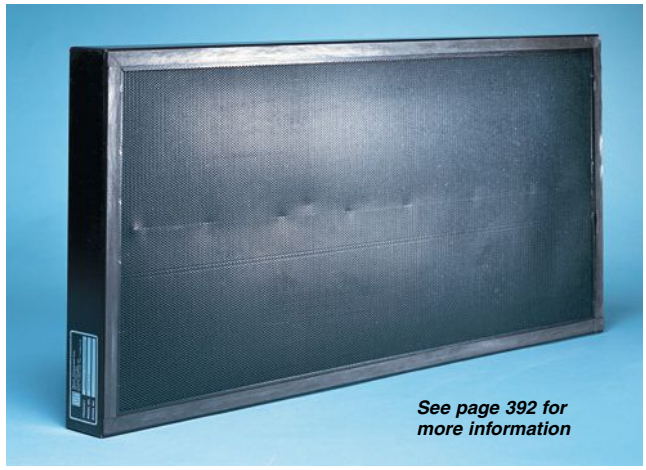
Note: Terra recommends thorough testing of filter performance in each application prior to exhaust release, and assumes no responsibility for damage or injury that may result as a consequence of improper filter selection or use.

Purification Filter Types

Activated Charcoal Filter: These popular filters, manufactured from coconut-shell based activated charcoal of 8-12 mesh size, are used to remove a broad range of organic compounds and solvents fumes. Special processing ensures a large surface area per gram weight. They function through physical adsorption of molecules in the pores of the activated charcoal by Van der Waals forces.

Alkaline-Odor Filter: These filters are ideal for use in air purifiers to remove odors resulting from urine, excreta and other alkaline substances.

Acid Filter: Removes acid odors caused by organic decay, as well as other acidic odors.



See page 392 for more information

Inorganic Acid Filter: Impregnated with alkali, this filter neutralizes such volatile inorganic acid vapors as hydrochloric and hydrofluoric acids, and such acid gases as sulfur and nitrogen dioxides.

Cyanide Filter: Impregnation with several materials enables this filter to remove hydrogen cyanide gas. Because many other cyanide compounds evolve HCN gas when acidified, this filter is suitable for use with any cyanide compound.

Mercury Filter: This filter is impregnated with iodine compounds to allow efficient removal of mercury vapor.

Formaldehyde Filter: An impregnated oxidizing agent in this filter reacts with formaldehyde to form formate salts.

Amines Filter: Impregnation with copper compounds enables this filter to efficiently remove ammonia vapor, low molecular-weight amines, and other nitrogen compounds.

Sulphur Filter: This potassium iodide-impregnated filter efficiently removes hydrogen sulfide and low molecular-weight mercaptans.

Iodine Filter: This filter is impregnated with halide salts to allow removal of iodine and methyl iodide. It can also be used for iodination reactions with low-level radioactive iodine.

Ether Filter: This impregnated filter promotes filter capacity, which is normally diminished when diethyl ether is adsorbed on activated carbon.

Purification Filters

Dimensions:	13" x 27 3/4" x 2"	23 1/4" x 17 1/4" x 2"	12" x 12" x 3"
For Terra Product (page no.): *Call for custom sizes!*	Universal Hood (394), Environmental Control Modules (378), Filter/Blower Modules (419), Fume Hoods (415)		Ductless Work Station (414)
Filter Type	Cat. #	Cat. #	Cat. #
Activated Carbon	**1716-00**	**1681-50**	**1701-90**
Alkaline Odor	**1717-01**	**1717-11**	**1717-21**
Acid	**1717-02**	**1717-12**	**1717-22**
Inorganic Acid	**1717-03**	**1717-13**	**1717-23**
Cyanide	**1717-04**	**1717-14**	**1717-24**
Mercury	**1717-05**	**1717-15**	**1717-25**
Formaldehyde	**1717-06**	**1717-16**	**1717-26**
Amines	**1717-07**	**1717-17**	**1717-27**
Sulphur	**1717-08**	**1717-18**	**1717-28**
Iodine	**1717-09**	**1717-19**	**1717-29**
Ether	**1717-10**	**1717-20**	**1717-30**

Refer to page 573 for Toxic Gas Detector Tubes!

Chemical Filtration Table

The table below indicates the filter recommended for use with a wide range of chemicals commonly found in laboratory and manufacturing environments. For each chemical, it also provides an estimate of filter capacity.

Unless otherwise specified, filter efficiency with the chemical indicated approaches 100%. An asterisk (*) indicates poor adsorption by any filter; use of the specified filter is not recommended with these chemicals except where they occur in low concentrations, and frequent exhaust testing is advised.

Filter capacity is given as the equilibrium saturation capacity, a standard test procedure for activated carbon (ASTM-D3467). The capacity is expressed as the final filter weight at saturation as a percentage of initial filter weight. The actual capacity obtained will depend on the conditions of use (concentration of contaminant feed, temperature, humidity, etc.).

Note: All data below represent typical, not guaranteed, test results. Terra recommends thorough testing of filter performance in each application prior to exhaust release, and assumes no responsibility for damage or injury that may result as a consequence of improper filter selection or use.

Chemical	Filter	Satur. Cap. (%)
Acids		
Acetic	AC	33
Acetic anhydride	AC	33
Acrylic	AC	40
Butyric	AC	40
Caprylic	AC	40
Carbolic	AC	40
Formic	AC/I	20
Lactic	AC	40
Osmium tetroxide	AC	40
Palmitic	AC	40
Phenol	AC	40
Proprionic	AC	40
Valeric	AC	40
Alcohols		
Amyl	AC	40
Butyl	AC	40
Cyclohexanol	AC	45
Ethyl	AC	32
Isopropyl	AC	40
Methyl (methanol)	AC	32
Propyl	AC	40
Aliphatic Hydrocarbons		
Acetylene	AC	20
Iso-butane	AC	10
Butylene	AC	10
Butadiene*	AC	—
Cyclohexane	AC	35
N-decane*	AC	—
Ethane*	AC	—
Ethylene*	AC	—
N-heptane*	AC	—
Heptylene*	AC	—
Hexane	AC	35
Hexylene*	AC	—
Methane*	AC	—
N-nonane*	AC	—
N-octane*	AC	—
N-octylene*	AC	—
Pentane	AC	26
Propane*	AC	—
Propylene	AC	10

Chemical	Filter	Satur. Cap. (%)
Aromatic Hydrocarbons		
Benzene	AC	40
Napthalene	AC	47
Ninhydrin	AC	47
Styrene monomer	AC	47
Toluene	AC	47
Toluidine	AC	47
Xylene	AC	40
Esters		
Butyl acetate	AC	40
Cellosolve acetate	AC	45
Ethyl acetate	AC	40
Ethyl acrylate	AC	45
Ethyl formate	AC	40
Isopropyl acetate	AC	45
Methyl acetate	AC	40
Methyl acrylate	AC	45
Methyl formate	AC	40
Aldehydes & Ketones		
Acetone	AC	32
Acetaldehyde	FOR	10
Acrolein	AC	32
Benzaldehyde	AC	40
Butyraldehyde	AC	32
Caproaldehyde	AC	40
Crotonaldehyde	AC	40
Cyclohexanol	AC	40
Diethyl ketone	AC	32
Dipropyl ketone	AC	40
Formaldehyde	FOR	10
Mesityl oxide	AC	40
Methyl butyl ketone	AC	40
Methyl ethyl ketone	AC/I	32
Methyl isobutyl ketone	AC	40
Propionaldehyde	AC	32
Valeraldehyde	AC	40
Valeric aldehyde	AC	40
Ethers		
Amyl	AC	35
Butyl	AC	35
Cellosolve	AC	40
Dioxan	AC	45
Diethyl (ethyl)	ETH	10
Ethylene oxide	AC	20
Isopropyl	AC	25
Methyl	ETH	10
Methyl cellosolve	AC	45
Propyl	AC	30

Chemical	Filter	Satur. Cap. (%)
Halogens		
Bromine	AC	53
Butyl chloride	AC	40
Carbon tetrachloride	AC	65
Chlorine	AC	20
Chlorobenzene	AC	53
Chlorobutadiene	AC	40
Chloroform	AC	60
Chloro picrin	AC	65
Chloro nitropropane	AC	60
Dibromoethane	AC	60
Dichlorobenzene	AC	60
Dichlorodifluoromethane	AC	20
Dichlorodifluoroethane	AC	40
Dichloro ethyl ether	AC	53
Dichloromethane	AC	53
Dichloromono-fluoromethane	AC	20
Dichloropropane	AC	53
Dichlorotetra-fluoroethane	AC	20
Ethyl bromide	AC	20
Ethyl chloride	AC	20
Ethylenechlorohydrin	AC	40
Ethylene dichloride	AC	53
Fluorotrichloro-methane	AC	50
FREON® (BP> -20°C)	AC	45
Hydrogen bromide	AC/I	5
Hydrogen chloride	AC/I	4
Hydrogen iodide	AC/I	7
Iodine	AC	55
Iodoform	AC	53
Methyl bromide	AC	25
Methyl chloride	AC	20
Methyl chloroform	AC	45
Methylene chloride	AC	45
Monochlorobenzene	AC	45
Paradichlorobenzene	AC	45
Perchloroethylene	AC	45
Propyl chloride	AC	40
Tetrachloroethane	AC	53
Tetrachloroethylene	AC	53
Vinyl chloride	AC	20
Sulfur Compounds		
Carbon disulfide	AC	20
Dimethyl sulfate	AC	50
Ethyl mercaptan	SUL	40
Hydrogen sulfide	SUL	20
Mercaptans – high MW	SUL	40
Sulfur dioxide	AC/I	10
Sulfur trioxide	AC/I	20
Sulfuric acid	AC/I	40
Tetrahydrothiapene	AC	40

Chemical	Filter	Satur. Cap. (%)
Nitrogen Compounds		
Ammonia	AM	10
Amines – low MW	AM	10
Amines – high MW	AM	40
Aniline	AC	40
Diethyl amine	AM	20
Diethyl aniline	AC	53
Dimethyl amine	AM	20
Ethyl amine	AM	20
Hydrogen cyanide	CYN	20
Indole	AC	53
Nicotine	AC	40
Nitric acid fumes	AC/I	10
Nitrobenzene	AC	53
Nitroethane	AC	53
Nitrogen dioxide*	AC/I	—
Nitromethane	AC	40
Nitropropane	AC	40
Nitrotoluene	AC	53
Pyridine	AM	53
Urea	AC	53
Uric acid	AC	53
Miscellaneous		
Adhesives	AC	40
Animal Odors	ALK	30
Camphor	AC	40
Carbon monoxide*	AC	—
Carbon dioxide*	AC	—
Citrus fruits	AC	40
Cooking odors	AC	40
Deodorizers	AC	20
Detergents	AC	40
Hospital odors	ACD	30
Human odors	ACD	30
Leather	AC	30
Ozone	AC	30
Perfumes	AC	30
Gasoline	AC	40
Putrescine	ACD	30
Resins	AC	30
Toilet odors	ALK	30

Filter Types

(see previous page for explanation)

ACD	Organic Acid	SUL	Sulphur
AC/I	Inorganic Acid	ETH	Ether
ALK	Alkaline Odor	CYN	Cyanide
FOR	Formaldehyde		
AC	Activated Carbon		
AM	Amines (nitrogen compounds)		

Glove Boxes & Vacuum Chambers

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Selecting Your Glove Box

Terra's versatile designs let you configure a chamber to your exact process specifications—using standard control modules and standard pricing! This 2-step overview will help you select the right equipment for your application. Begin by selecting a glove box of the appropriate material. See the following page for custom modifications.

Turnkey System

Whichever modules you select, Terra will deliver a tested, turnkey system that's ready for service!

Step 1

CE

Plastic Glove Boxes (Series 100 and 200)—Begin on page 446

- Single or Twin (one or two operators)
- Five different polymers (see sidebar on "Glove Box Materials")
- Positive or Negative Pressure • Air locks and vacuum antechambers

Stainless Steel Glove boxes (Series 300 - 600)—Begin on page 455

- Single or Twin (one or two operators)
- Safety glass viewing windows or full-view plastic access panels
- Air locks and vacuum antechambers

Evaluating Materials

The glove box material must provide an effective isolation barrier, but it might also have to meet requirements for durability, wear and chemical resistance, cleanliness, thermal extremes, and static safety.

Keep these materials characteristics in mind when selecting materials for your enclosure (refer to the appendix for further information on chemical compatibility):

Stainless steel provides the best combination of durability and barrier protection. Terra glove boxes are fabricated of 304 stainless steel with a 4b satin finish. Viewing windows are safety glass.

Plastics are more economical but allow moisture and oxygen to penetrate the enclosure over an extended time. A continuous internal positive pressure of inert gas helps to compensate for this hygroscopic characteristic. Terra manufactures enclosures out of several polymers:

Acrylic is light weight, rigid, and affords full visibility.

Static-Dissipative PVC protects materials against electrostatic discharge (ESD) by safely dissipating surface charges. Nearly transparent, it allows clear viewing of glove box processes. It also aids in particle control by eliminating attractive forces.

Polypropylene is ideal for use with most chemicals, including acids and corrosives.

Polycarbonate offers wide chemical resistance and excellent resistance to thermal stress.

Gloves are available in several materials (specifications and ordering information begin on page 470).

Neoprene offers high tensile strength, dexterity, and flexibility. Neoprene gloves can be strengthened with an outer film of Hypalon.

Butyl features the highest impermeability to water vapor, gases, and toxic chemicals, including most acids and bases. It also resists swelling and attack by many solvents and oxidizing chemicals, and it remains flexible at temperatures as low as -40°C.

Hypalon offers outstanding resistance to abrasion, oxidizing chemicals, and ozone (a common source of glove failure in a dry box).

Latex is naturally more flexible than other glove materials. It also offers excellent dexterity, but may cause hypoallergenic reactions.

Glove Box Glossary

Glove boxes have as many names as they do shapes and sizes. This glossary provides background information on Terra's use of the terms commonly used to describe glove box configurations. For additional background, refer to the American Glovebox Society's *Guideline for Gloveboxes* (1998).

Barrier—A physical separation of a material from the ambient environment. Barriers must be evaluated for their effectiveness in specific applications. For example, plastics may form effective, inexpensive particulate barriers, but are permeable to water vapor.

Enclosure—A multi-sided barrier that effectively isolates the process environment from the ambient environment. Hoods and open-front chambers are non-isolated enclosures that rely on careful management of air flow to protect either the process or ambient environment. Glove boxes are isolated enclosures.

Dry Box—An enclosure that maintains a low-humidity environment, either through use of a dry purge gas (such as nitrogen, argon, or clean, dry air) or a desiccant. Glove boxes are dry boxes with sealed glove ports that allow an operator to manipulate isolated material and equipment. Desiccators are dry boxes without arm ports that are used primarily for storage or drying/degassing.

Isolation Glove Box—A glove box that protects materials or processes from the operator and/or the ambient environment. Isolation glove boxes may be configured to prevent specific kinds of exposure (to humidity, particles, static charges, low or high temperature, etc.). Terra glove boxes achieve this isolation through a variety of environmental control modules, including inert-gas controllers that maintain a continuous low-level positive pressure (see overview above).

Containment Glove Box—A glove box that protects the operator and/or ambient environment from the material or process inside the glove box. Containment glove boxes are commonly used to isolate hazardous materials in the pharmaceutical, biological, and nuclear industries.

Containment Glove Box—A glove box that protects the operator and ambient environment from materials or processes inside the glove box. In a positive-pressure application, air-tight seals protect the ambient environment from exposure to hazardous or toxic materials, but purged gas may require containment or treatment to prevent contamination. In negative-pressure applications, hazardous powders, vapors or fumes are ducted from the glove box or treated with an appropriate filter (particulate or vapor) to allow safe release.

GLOVE BOXES & VACUUM CHAMBERS

Ordering information begins on page 446.

Step 2

Environmental Control Modules

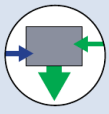
Customized Performance—Straight from Stock!

Refer to the pages indicated for ordering information and specifications on each of these control modules

Humidity Control—Begins on page 472

These modules monitor and regulate the process gas to maintain the humidity level you specify. Low-humidity modules achieve desired conditions by regulating the purge gas (nitrogen, argon, or dry air).

Dual Purge™ System
NitroWatch®
DewWatch™
Humex™



Process Gas Generation & Analysis—Begins on page 478

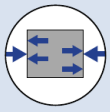
Terra provides gas generators, mixers, and monitors to guarantee a reliable processing environment.

Nitrogen Generator
Dryex™ Dry Air Generators
Dry Gas Generator
Gas Mixer
Trace Oxygen Analyzer

Temperature Control—Begins on page 485

A wide range of process temperature solutions, from -40° to +300°C. Double-wall, insulated glove boxes ensure stable temperatures. The Process Controller allows multi-cycle process documentation and control.

Process Gas Heater
Process Gas Cooler
Pass-Through Vacuum Ovens
Refrigeration Module
Process/Sequence Controller



Vacuum Control—Begins on page 490

Control modules and pumps are available for a wide range of process pressures, from 5" WG to one atmosphere.

Vacuum Chambers
Vacuum Controllers
Turnkey Fitting Kits
Vacuum/Nitrogen Pumps

Static Control—Begins on page 484

Terra engineers will configure the right combination of ionizers and dissipative materials to protect sensitive parts against ESD.

Ionizing Bar and Blower
Ionizing Gun
Static-Dissipative PVC

Particle and Germ Control—Begins on page 466

Terra helps you meet particle requirements as low as Class 1 through laminar flow and HEPA/ULPA filtration technologies. Radius corners and ultra-clean materials (including electropolished stainless steel) contribute to a clean, aseptic processing environment.

Filtration/Recirculation Modules
Laminar Flow Filter/Fan Modules

Custom Modifications

Our engineers work hand-in-hand with yours to develop cost-effective solutions to unique application challenges.

Terra Universal is a full-capability manufacturer, with over twenty years of design and fabrication experience in semiconductor, pharmaceutical, and other critical-environment applications.

In most applications, our standardized enclosures and processing modules can be economically configured to meet special process requirements. Terra performs all plastic and metal fabrication, electronics configuration, testing and certification on-site, giving our customers direct contact with every stage of the manufacturing process.

Call for more information on custom configurations!

Custom Sizes
Interface Modules
Double-wall Construction
Process Equipment Enclosures
Process Control Software
More!

Controlled Environment Glove Box—A glove box (either isolation or containment) that meets precise requirements for humidity, temperature, static safety, particulates, and/or other environmental conditions. Typically, such enclosures operate under a positive pressure of inert process gas or a negative pressure for fume or other contaminant removal.

Minienvironment—This term is broadly used in the same sense as "enclosure." However, it suggests specially configured enclosures that accommodate industry-specific automated process equipment, such as semiconductor probers or package sealers, or that facilitate robotic transfer of specialized containers, such as reticle pods.

Barrier Isolator (Isolator or Isolation Barrier)—An enclosure that protects both the process and the ambient environment. These industry-specific terms emphasize the need to maintain an absolute environmental barrier and to facilitate effective cleaning or sterilization, especially in pharmaceutical applications. Barrier isolators typically minimize cracks and crevices, where contaminants can collect, and feature radius seams and corners that are easy to sterilize.

Air Lock—A pass-through chamber used for transfer of small objects into and out of a glove box with minimal disruption of the controlled glove box environment. Also called a Transfer Chamber or Antechamber. Specialized air lock ports, such as Bag-In, Bag-Out Ports, further protect the external environment from hazardous vapors or powders inside a Containment Glove Box. Terra air locks feature connections to facilitate purging with an inert process gas. Interlocks are available on an optional basis to minimize cross-contamination.

Bag In, Bag Out Port

Bag-In, Bag-Out Port—A specialized port on a glove box or air lock that allows materials to be packaged with a barrier material (film or foil) before they are removed from a glove box.

Process Gas—A gas used to displace ambient air inside an enclosure. Generally, engineers base their selection of a process gas (or "purge gas") on its ability to retard chemical reaction, especially oxidation. Nitrogen is the most common process gas because it is inert, nontoxic, noncombustible, and relatively inexpensive. Trace gas mixtures, often including helium, are used in package sealing to allow subsequent leak testing in a vacuum chamber. Oxygen analyzers are used to ensure that oxygen levels in a process chamber remain below acceptable concentrations (often < 1 part per million by volume).

WC (Water Column)/ WG (Water Gauge)—a scale used to measure low-level negative pressure (e.g., 1" WG = pressure necessary to raise a column of water in a water gauge 1" = .07" Hg).

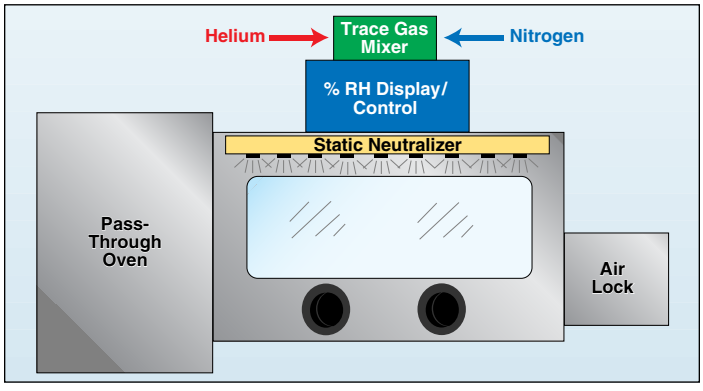
Sample Applications: Isolation Glove Boxes

Inert Gas Processing and Seam Welding Box

To eliminate embrittlements that result from a high-humidity air welding environment, this chamber maintains a dry nitrogen environment with automated humidity controls.

The chamber features a pass-through vacuum/nitrogen oven for degassing at temperatures up to 300°C, and a right-side air lock for easy parts removal. A trace gas mixer provides a precise He/N_2 gas mixture during seam welding, which allows for subsequent leak detection in a vacuum chamber. Ionization equipment provides fail-safe static neutralization to protect against ESD in the low-humidity environment.

Sealed quick-connect ports permit easy connection of welding electrodes, and dual service utility outlets are provided for 110/220VAC, 50/60Hz power.



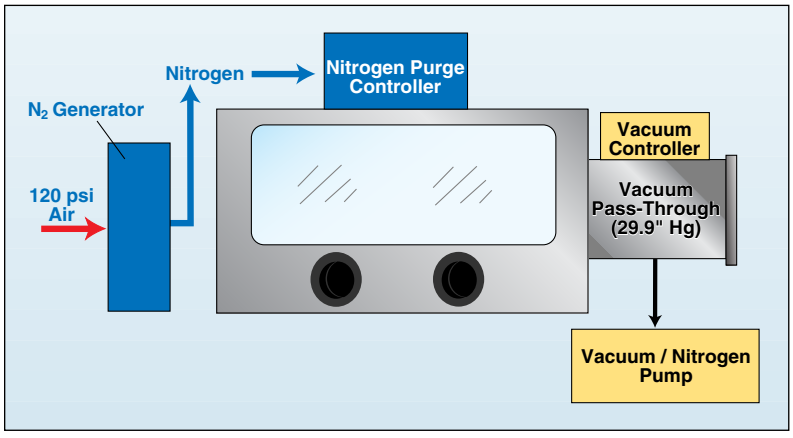
Application Requirements

✓ Temperature:	Degassing at up to 300°C in pass-through oven
✓ Humidity:	Subambient to 0%RH (± 2% RH)
✓ Process Gas:	20% He/80%N_2 (mixture accurate to 5 ppm)—or other process gas mixture
✓ Pressure:	0.1" WG
✓ ESD Safety:	Static neutralization in less than 30 sec. (1KV to 100V)
✓ Access:	Accordion sleeve gloves Air lock for parts removal Quick-Connect bulkheads for welding electrodes

Hybrid Package Drying/Degassing Chamber

Packages are cycled through a vacuum chamber to remove moisture prior to introduction into the main stainless steel isolation chamber. A dry nitrogen purge maintains a low humidity level for processing. A Nitrogen Generator provides a continuous flow of 99% pure nitrogen.

Parts are removed via the pass-through vacuum chamber, where they may undergo a second degassing cycle.



Application Requirements

- ✓ Humidity: 5 to 10% RH
- ✓ Process Gas: N_2, produced by Nitrogen Generator
- ✓ Pressure: 0.1" WG in isolation chamber; 29.9" Hg vacuum inside antechamber
- ✓ Access: Accordion sleeve gloves; Pass-through vacuum antechamber

Chamber shown: Series 400 Stainless steel Glove Box (see page 458)

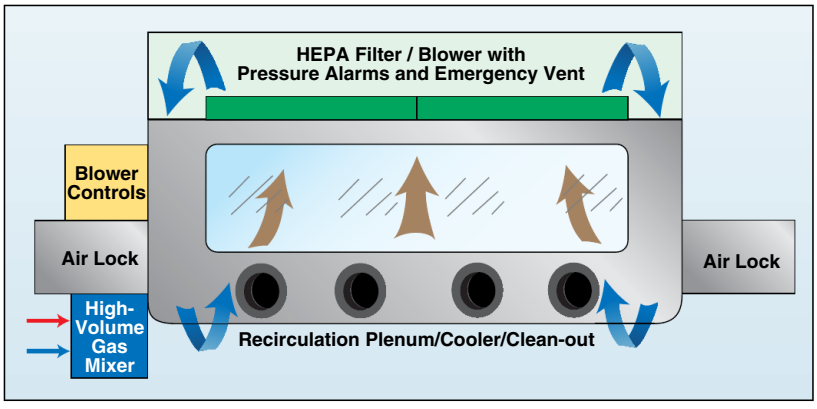
Sample Applications: Isolation Glove Boxes

Photoresist Deposition Glove Box

Designed to provide a clean, moisture-free environment for applying photoresist, this glove box is large enough to accommodate wafer spinners used in the deposition process.

It incorporates a high-volume process gas mixer that controls percentages of two process gases. A three-sided plenum design recirculates the process gas through dual filter/fan modules for HEPA filtration (99.99% efficient @ 0.3µm particles). Magnehelic® gauges and backpressure alarms ensure filter/fan efficiency. In addition, the bottom plenum includes cooling coils that compensate for heat-generating process equipment to ensure a constant temperature of 68°F.

Dual-side air locks afford easy loading and unloading of wafers. The radius corners of all internal seams allow easy wipe-down and eliminate cracks where particles can collect.



Application Requirements

- ✓ Temperature: 68°F constant (requires cooling)
- ✓ Humidity: 5 - 10% RH
- ✓ Process Gas: Various gas mixtures
- ✓ Pressure: 0.1" WG
- ✓ Access: Accordion sleeve gloves; Dual-side air locks; Bottom clean-outs
- ✓ Particle Control: Class 10 conditions, maintained by laminar flow of HEPA-filtered gas, recirculated via sub-floor & rear plenum chambers

Radius corners allow easy cleaning

Cat. No. 1695-01

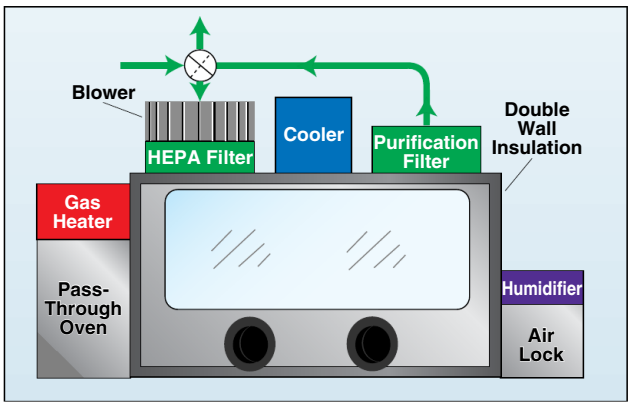
Material Stress Testing Chamber

This glove box is designed for accelerated-life testing of elastomers, fiber composites, and other materials over a broad range of temperature (-20°F to +140°F) and humidity (5 to 95% RH).

Double-wall construction is required on all sides. Viewing windows are double-pane polycarbonate for strength and temperature resistance. Stainless steel walls include 4" of polyurethane insulation.

A pass-though oven on one side of the processing chamber allows degassing at temperatures up to 300°C, and an opposing-side air lock allows parts removal. A closed-loop recirculation module continuously recycles air through a HEPA filter (rated 99.99% efficient @ 0.3µm particles) and an activated charcoal filter for removal of organic vapors.

A large chamber allows multiple-operator access, and hinged glove ports locking port caps facilitate quick glove change-outs without contamination of the chamber environment.



Application Requirements

✓ Temperature:	Stable (± 1°F for 30 min.) HOLD temperatures from -20°F to +140°F; Pass-through oven heating to 300°C
✓ Humidity:	5 to 95% RH, ± 2%
✓ Process Gas:	Air
✓ Access:	Neoprene gloves Hinged port covers for easy glove changes with no impact on chamber environment Air lock for product removal
✓ Particle Control:	Recirculation through HEPA filter (@ ≥ 4 air changes/minute) to meet class 10 requirements

Cat. # 1695-02

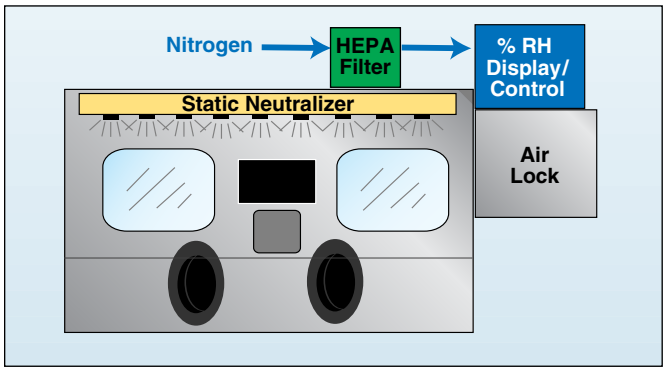
Sample Applications: Isolation Glove Boxes

Semiconductor Probe Station Mini-Environments

A continuous purge of filtered N_2 maintains low humidity and particle counts inside these probe station enclosures. Self-balancing ionizing equipment neutralizes static charges to protect against electro-static discharge (ESD) in the low-humidity environment.

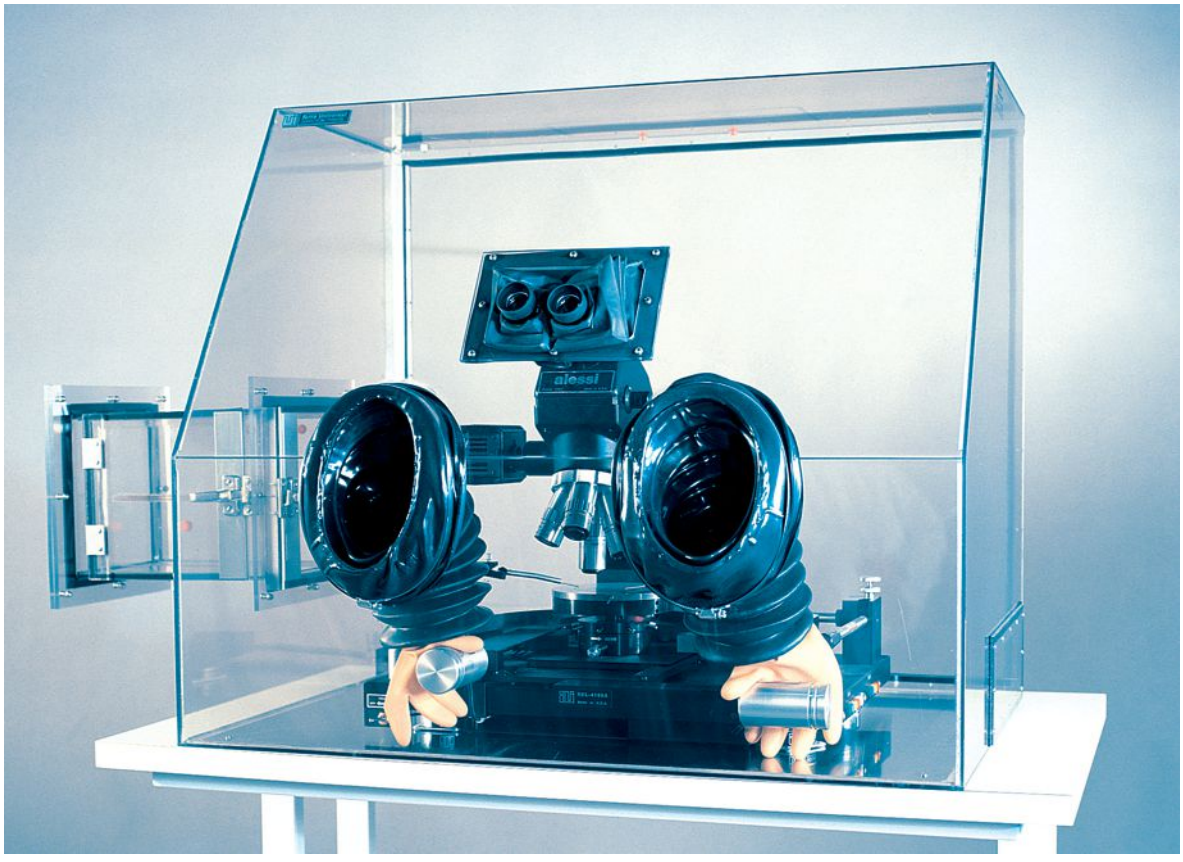
Accordion-sleeve gloves provide easy access to the probe station, including sensitive X-Y-Z controls. A microscope lens diaphragm seals around eyepieces to permit focusing without disturbing the internal environment. The removable, resealable back or side walls permit installation of bulky probe equipment.

Transparent plastics are acceptable in some applications. Others require the durability and enhanced moisture barrier protection of stainless steel with safety glass viewing windows.



Application Requirements

- ✓ Humidity: < 10% RH
- ✓ Process Gas: Nitrogen
- ✓ Pressure: .1" WG positive pressure
- ✓ Particle Control: Class 100 particle conditions
- ✓ ESD Safety: Static neutralization in less than 30 sec. (1KV to 100V)
- ✓ Access:
  - Air lock pass-through
  - Accordion-sleeve gloves
  - Microscope bellows to accommodate optics of standard probers (Alessi, Wentworth, etc.)
  - Removable & resealable rear wall (for equipment installation)



Model Shown: Enclosure for Alessi Probe Station #REL-4100

Dimensions: 35.5"W x 25"D x 30"H (plus 16" side clearance for air lock)

Acrylic	**Cat. No. 1540-00**
Static-Dissipative PVC	**Cat. No. 1540-01**

Model Shown: Enclosure for Wentworth Probe Station #MP-950

Dimensions: 34.5"W x 29.75"D x 24.75"H (plus 16" side clearance for air lock) **Cat. # 9000-04**

Protein Analysis Chamber

This chamber is used for protein analysis of meat samples in a refrigerated, inert atmosphere.

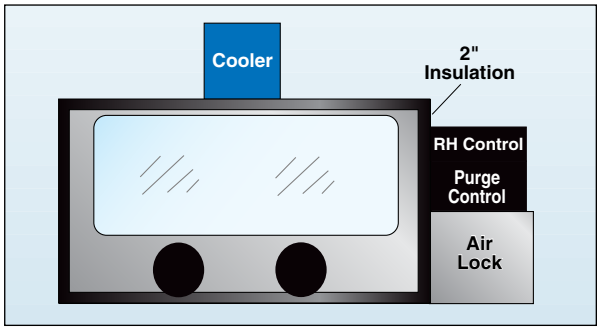
It includes a refrigeration module capable of maintaining temperatures as low as -20°C. The stainless steel chamber features double-wall construction with 4" of polyurethane insulation for optimal thermal efficiency. A humidity control system, including a variable purge controller and automatic humidity controller, regulates the nitrogen process gas to maintain an internal moisture level as low as 2%RH.

A microscope bellows accommodates the protein analysis equipment. The side air lock allows convenient introduction of samples, and tempered glass viewing window can be tilted open for easy removal of large equipment.

Application Requirements

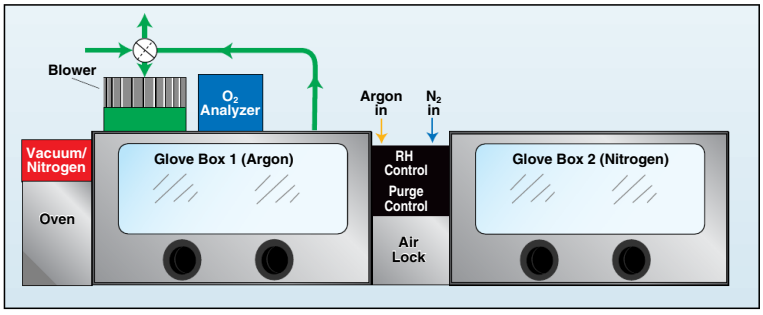
✓ Temperature:	-20°C
✓ Humidity:	< 5% RH
✓ Process Gas:	Nitrogen
✓ Pressure:	.1" WG positive pressure
✓ Particle Control:	Class 100 particle conditions
✓ Access:	Air lock pass-through Accordion-sleeve gloves Microscope bellows to accommodate microscope optics

Cat. # 1695-03



Sample Applications: Isolation Glove Boxes

LCD Processing



Chamber shown: Series 300 Stainless steel Glove Box (see page 455) Cat. #1695-04

Application Requirements

- ✓ Temperature: Oven heating to 300°C; Hot plate heating to 130°C (Glove Box 1)
- ✓ Humidity: < 5% RH
- ✓ Process Gas: GB 1: Argon (O_2 < 1 ppm); GB 2: Nitrogen; Trace oxygen monitoring (to 1ppm)
- ✓ Pressure: 1.1 bar
- ✓ Access: Air locks with interlocks to prevent cross contamination; Modification of Glove Box 1 to accommodate water spinner; Accordion Sleeve Gloves
- ✓ Particle Control: Class 10 (closed-loop filtration in GB 1)

Glass plates coated with photoresist are heated in a pass-through oven and then introduced into Glove Box 1, which is modified for installation of a wafer spinner positioned below the enclosure. A closed-loop filtration system maintains the high purity of argon process gas. Concentration of oxygen is closely monitored and must not exceed 1 ppm(v). A safety glass window allows visual inspection of the photoresist coating after processing.

Parts are then introduced into a three-door pass-through air lock. Interlocks prevent cross-contamination. Rejects are removed through the front door for reprocessing. Approved parts are passed into Glove Box 2 for further functional testing in a nitrogen environment, using photodetectors, current meters, and temperature probes. Parts are packaged before removal through a right-side air lock equipped with safety interlocks.

Cat. #1695-05

Lithium Battery Electrode Processing Chamber

This chamber is used for packaging lithium battery electrodes using an RF bag sealer. A humidity control system provides the low-moisture environment required during sealing, and a trace oxygen analyzer helps minimize the chance of oxidation by sensing oxygen levels as low as 1 ppm (v).

The sealed enclosure below the sealing chamber houses the RF sealer. Side ports allow easy connection to an externally mounted RF generator. An air lock allows easy parts transfer. Self-balancing ionizing equipment neutralizes static charges to protect against electro-static discharge (ESD) in the low-humidity environment

Application Requirements

- ✓ Humidity: < 5% RH
- ✓ Process Gas: Nitrogen, with trace oxygen monitoring (to 1 ppm)
- ✓ Pressure: 0.1" WG
- ✓ ESD Safety: Static neutralization in less than 30 sec. (1KV to 100V)
- ✓ Particle Control: Class 1000
- ✓ Access: Air lock; Dual-side accordion sleeve gloves; RF Sealer enclosure with sealed utility ports

Dry Ice Cleaning Station

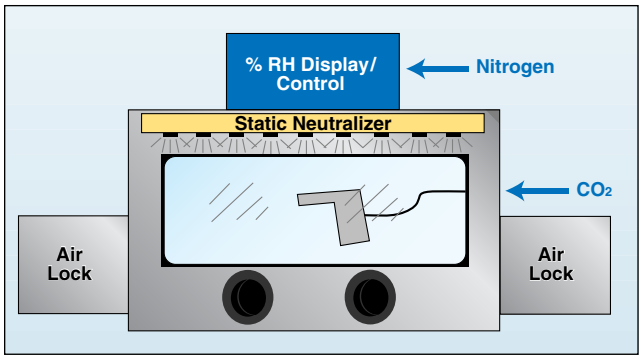
This glove box is designed specifically for use with the SNO-GUN™ II Dry Ice Cleaning System. By maintaining an extremely dry nitrogen environment, it prevents moisture condensation when very cold liquid CO_2 is used as a cleaning medium for sensitive parts.

In addition to nitrogen control systems, which must automatically maintain a very low dew point inside the glove box, this chamber includes a static neutralizing bar to protect parts against ESD (electrostatic discharge) in the dry environment. Quick-connect ports allow easy connection of the SNO GUN to a purified CO_2 source.

See complete specifications and ordering information on page 272.

Application Requirements

✓ Humidity:	< 1 ppm(v) water vapor
✓ Process Gas:	Nitrogen
✓ Pressure:	0.1" WG
✓ ESD Safety:	Static neutralization in less than 30 sec. (1KV to 100V)
✓ Access:	Dual-side air locks Accordion sleeve gloves Quick-connect ports for SNO GUN; optional tilt-up window



Sample Applications: Isolation Glove Boxes

RF Sealing Chamber

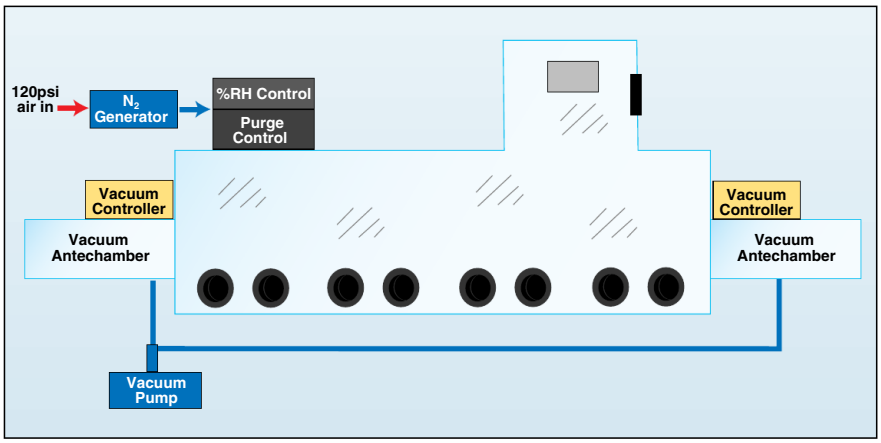
Extremely delicate museum artifacts, including manuscripts, fossils, and other fragile specimens, are dried under vacuum and then transferred to an acrylic isolation chamber for preparation and sealing in an inert nitrogen environment.

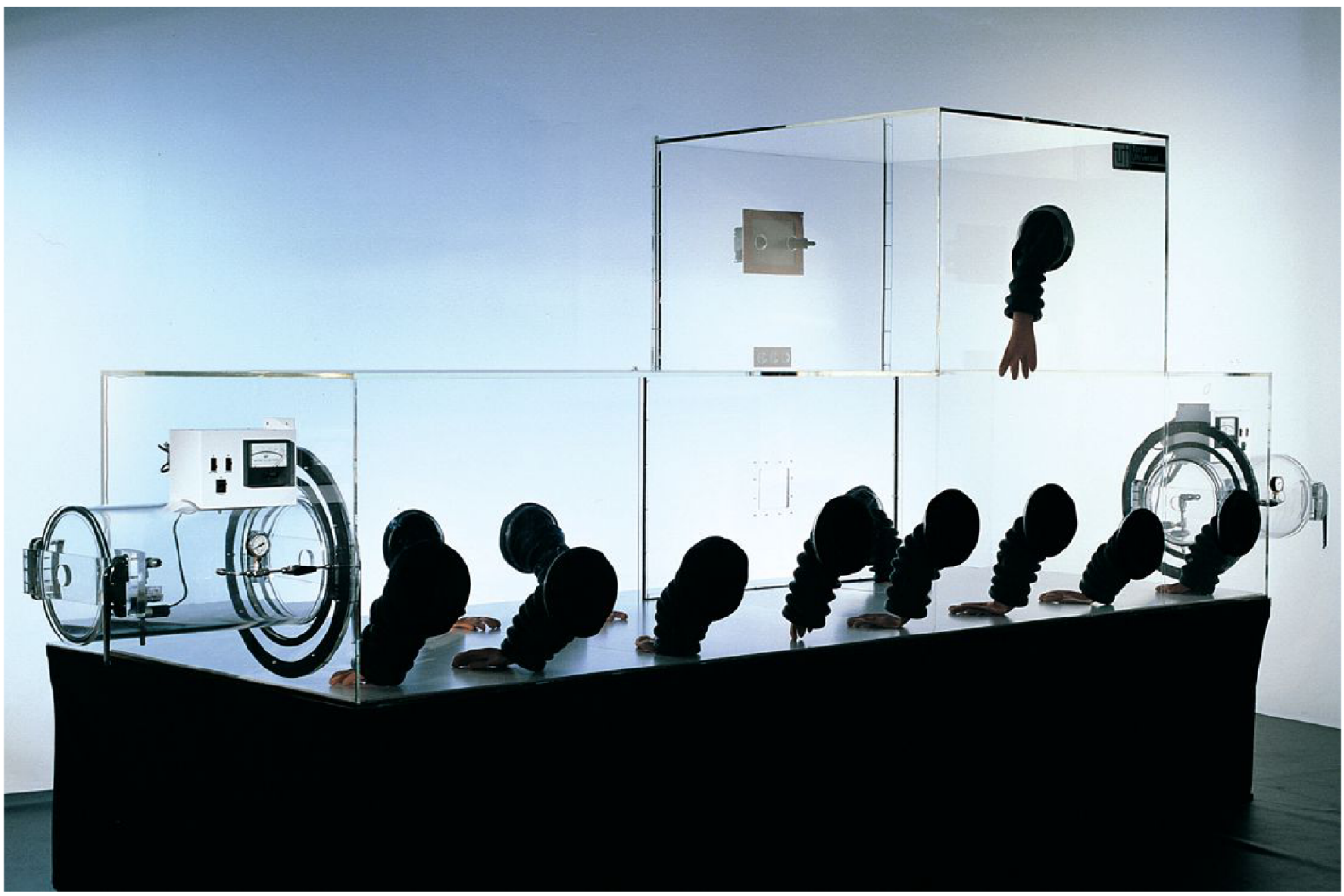
Due to the susceptibility of artifacts to moisture damage, this chamber includes a Dual Purge™ System and NitroWatch® to control nitrogen purging and maintain a low relative humidity level automatically. A Nitrogen Generator provides an uninterrupted source of 99.9% pure nitrogen.

Application Requirements

- ✓ Humidity: < 10% RH
- ✓ Process Gas: Nitrogen (N_2 Generator for uninterrupted supply)
- ✓ Pressure: .1" WG (main chamber); 29.9" Hg vacuum (antechambers)
- ✓ Access: Dual side pass-through antechambers
  Gloves for up to 10 operators
  Special access ports for electromagnetic sealer

Cat. #1695-06





Pharmaceuticals Drying Chambers

This integrated system provides controlled heating and vacuum drying of pharmaceuticals in multiple vacuum/nitrogen ovens.

A sequence controller allows programming of up to 999 heating/vacuum cycles in up to 9 processing chambers. Each 1600W process oven is rated for 220°C heating and includes a high-limit thermostat to protect against overheating that could cause sublimation in chemical drying applications.

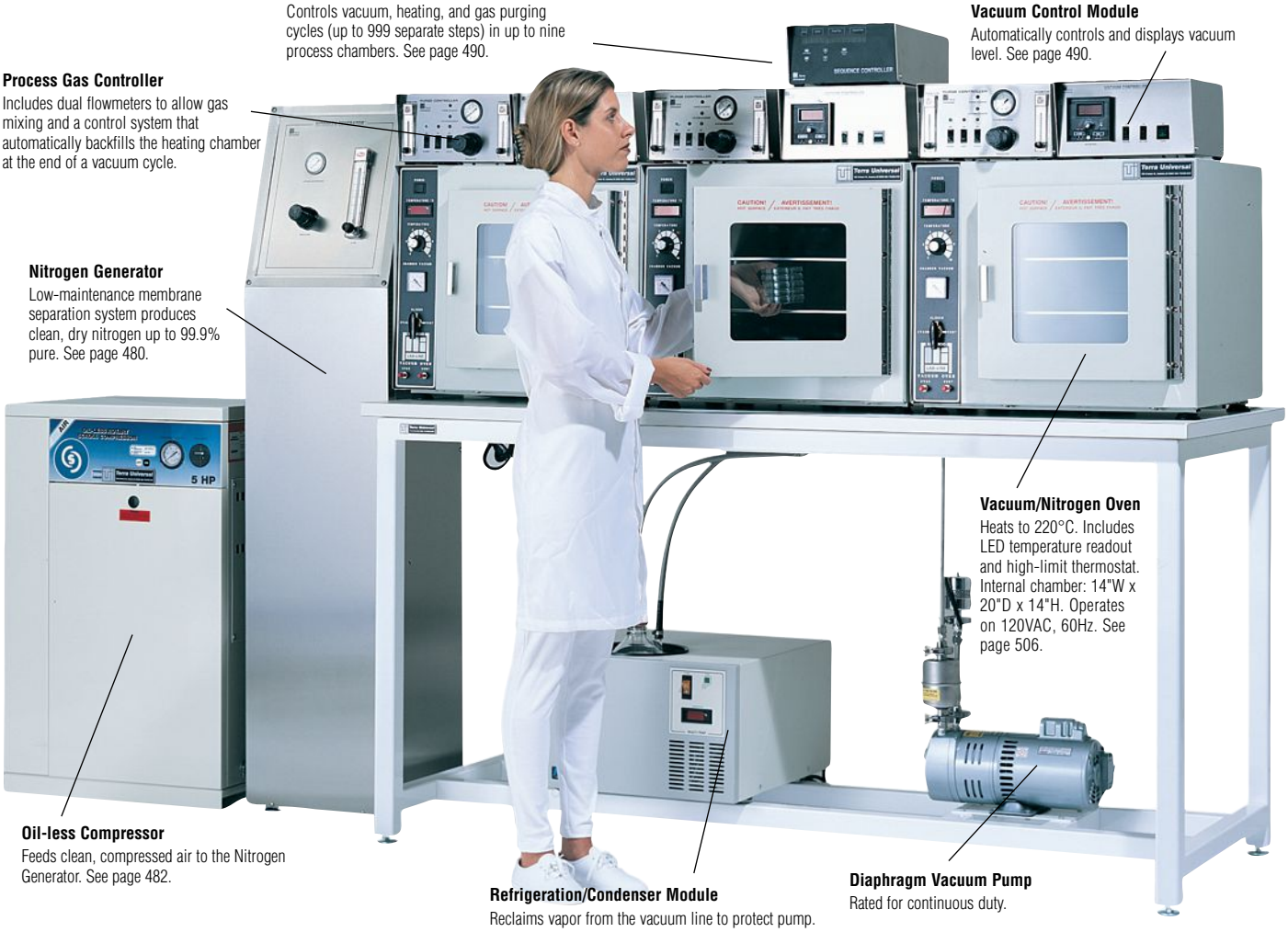
Vacuum control modules for each chamber control pump operation to maintain the desired vacuum level (to 29.9" Hg). A refrigeration/condenser module reclaims vapors from the vacuum line to ensure trouble-free pump operation.

A process gas controller backfills the heating chamber with a N_2/CO_2 gas mixture to ensure a clean, nonreactive drying environment. A Nitrogen Generator produces a continuous flow of 99.9% pure nitrogen from a compressed air feed for use in facilities without high-volume N_2 supply.

Application Requirements

✓ Temperature:	Up to 220°C; refrigeration of vacuum line
✓ Humidity:	Subambient to 0%RH (± 2% RH)
✓ Process Gas:	N_2/CO_2 mixture
✓ Pressure:	Up to 29.9" Hg vacuum
✓ Sequencing:	Up to 99 heating/vacuum cycles in any of the process ovens

Cat. No. 1695-07



Sequence Controller
Controls vacuum, heating, and gas purging cycles (up to 999 separate steps) in up to nine process chambers. See page 490.

Vacuum Control Module
Automatically controls and displays vacuum level. See page 490.

Process Gas Controller
Includes dual flowmeters to allow gas mixing and a control system that automatically backfills the heating chamber at the end of a vacuum cycle.

Nitrogen Generator
Low-maintenance membrane separation system produces clean, dry nitrogen up to 99.9% pure. See page 480.

Vacuum/Nitrogen Oven
Heats to 220°C. Includes LED temperature readout and high-limit thermostat. Internal chamber: 14"W x 20"D x 14"H. Operates on 120VAC, 60Hz. See page 506.

Oil-less Compressor
Feeds clean, compressed air to the Nitrogen Generator. See page 482.

Refrigeration/Condenser Module
Reclaims vapor from the vacuum line to protect pump.

Diaphragm Vacuum Pump
Rated for continuous duty.

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Sample Applications: Containment Glove Boxes

Carbon Monoxide Sensor Calibration Chamber

In this application, potentially lethal CO gas is fed into a large chamber at precise concentrations to allow accurate sensor calibration.

A gas mixing system maintains a ratio of 2% CO/98% air during calibration. To meet requirements for high-humidity sensor performance, a Humex™ humidifier raises the moisture level inside the chamber to 95% RH. A process gas heater and cooler provide two precise calibration temperatures: 68°F and 120°F. Circulation fans ensure uniform temperature and humidity throughout the main chamber.

Upon completion of calibration, an emergency ventilation system evacuates the CO/air mixtures from the main chamber and air locks through an exhaust line plumbed vertically to the facility ceiling. The 740 CFM fan requires less than 20 seconds to reduce the CO concentration to safe levels.

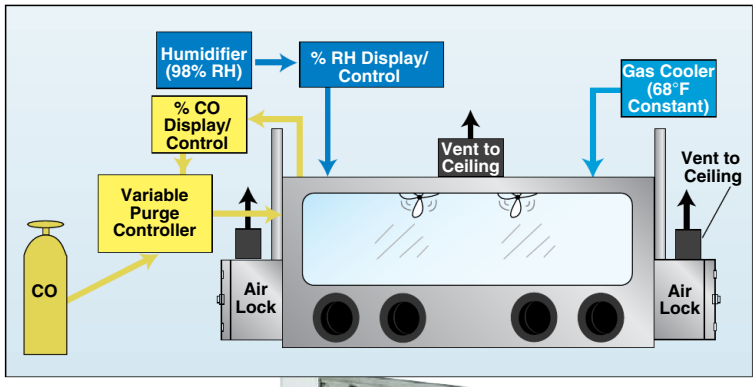
Because the large chamber size precludes easy access to the air lock, sensors are loaded and unloaded on a trolley conveyor. The air lock pneumatic doors are opened and closed by means of an easy-access control mounted outside the chamber.

Application Requirements

✓ Temperature:	Stable (± 1°F for 30 min.) HOLD temperatures at 68°F and 120°F
✓ Humidity:	Ambient to 95% RH
✓ Process Gas:	2% CO/95% air mixture
✓ Access:	Pneumatic access door (externally activated) with trolley conveyor
	Neoprene gloves
✓ Pressure:	On-demand emergency ventilation (chamber environment purged in <20 seconds)

Air Locks feature pneumatic doors with trolley conveyor for parts transfer

Cat. #1695-08



Full-View Toxic Chemical Repackaging Chamber

This stainless steel containment chamber features dual-side static-dissipative PVC viewing windows. It is used for repackaging toxic chemical solids, mounted on a 3"-diameter mandrel, for subsequent disposal.

Side doors slide open to allow insertion of the support mandrel, which contains one or two chemical containers. Doors then slide shut to seal around the mandrel. A constant negative pressure inside the isolation chamber, generated by a remote ventilation system, draws fumes into an exhaust line in the chamber ceiling. This exhaust system protects operators as they repackage the chemical solids in disposal containers. Pressure safety valves ensure that negative pressure remains below 2" WG, protecting chamber and glove seals.

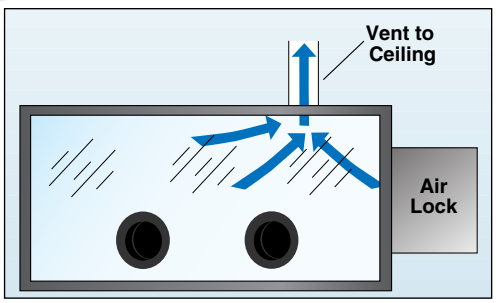
Disposal containers are removed from the chamber through a trap door on the chamber floor, and the side doors are then reopened to allow removal of the mandrel.

Application Requirements

✓ Pressure: Negative pressure to 2" WG (main chamber)

✓ Access: Neoprene gloves
Rapid-access sliding side doors
8" x 12" disposal trap door

Cat. #1695-09



Chambers are easily joined to accommodate multiple operators

Chamber shown: Series 500 Full-View Glove Box (see page 462)

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Sample Applications: Containment Glove Boxes

Chemical Mixing Ventilation Chamber

This chamber allows safe mixing and handling of fuming chemistries. Half-inch thick acrylic chamber walls support a negative pressure of up to 5" WG, typically more than adequate for ventilating the chamber with either a vacuum pump or an exhaust fan. Ductless exhaust applications include an activated charcoal filter for safe removal of specific chemicals from the exhaust flow.

Arm port caps are opened when the chamber is being ventilated to allow influx of make-up air, and closed during purge operations to permit precise regulation of the negative pressure. A built-in pressure safety valve automatically opens at negative pressures in excess of 5" WC to protect the chamber.

A negative pressure air lock, with ¼" vacuum line fittings and pressure safety valve, is specified for low-level negative pressures (to 5" WG), and a cylindrical pass-through vacuum antechamber is specified for processing at full vacuum.

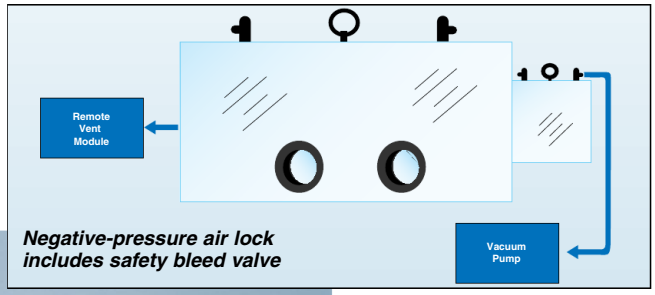
Application Requirements

✓ Pressure: Negative pressure to 5" WG (main chamber), 29.9"Hg (vacuum antechamber)

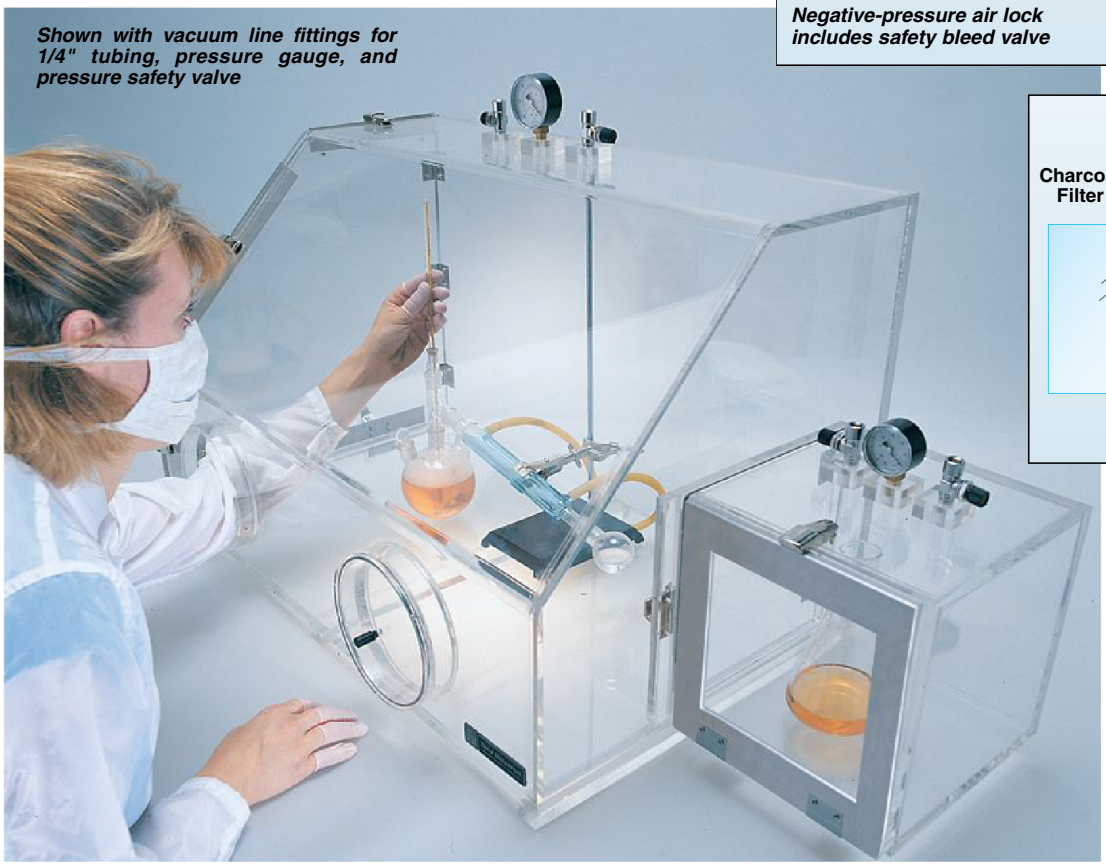
✓ Access: Negative-pressure air lock or vacuum antechamber; arm ports with sealing port caps

Vacuum antechamber supports full vacuum (29.9" Hg)

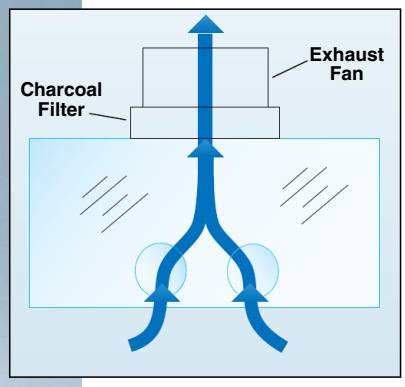
Remote filter/fan unit ventilates either the main chamber or the negative-pressure air lock



Negative-pressure air lock includes safety bleed valve



Shown with vacuum line fittings for 1/4" tubing, pressure gauge, and pressure safety valve



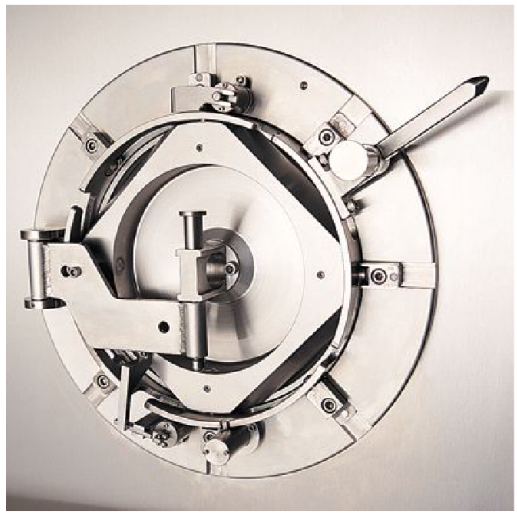
Ductless ventilation module includes charcoal filter for chemical vapor removal

Chamber shown: Series 200 Negative-Pressure Glove Box (see page 450)

Radioactive Material Handling Chamber

This 12-gauge stainless steel isolation glove box is designed for safe handling of radioactive materials used in medical applications. It features two chambers connected by a vacuum port. Three-eighths-inch safety glass allows full viewing from the front and top. One-piece gaskets and heavy-duty counter-balanced port hatches ensure a low leak rate of 0.5% of the volume of the total enclosure per hour (tested under 5" WG of vacuum).

The chambers include flanges for connection to a ventilation system and utility ports for introducing power and vacuum service. Both chambers are rated for 10" WG vacuum. All seams feature radius corners for easy wipe-down. Removable glove ports allow fast glove change-out.



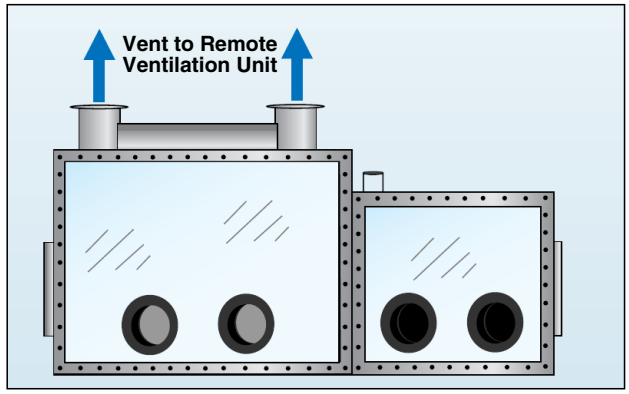
Cat. #1695-10

Bag-in, Bag-out access port allows safe handling of packaging containing radioactive materials

Application Requirements

✓ Pressure: Negative pressure to 10" WG (both processing chambers)

✓ Access: Bag-in, Bag-out Port
Vacuum port hatches with O-ring seals
Removable glove ports



Radius corners simplify cleaning, eliminate seams and cracks

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Sample Applications: Containment Glove Boxes

Pharmaceutical Powder Packaging Chamber

This containment chamber allows safe handling and packaging of chemotherapy powders and other hazardous materials.

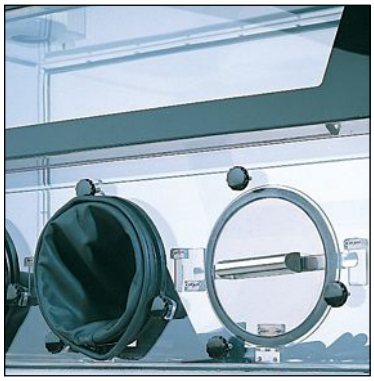
A filter/fan unit mounted on the chamber ceiling draws air through a HEPA filter (99.99% efficient @ 0.3µm particles). Exhaust air is drawn through a second HEPA filter and then ventilated through a 4"-diameter conduit to a remote secondary filtration unit. Filter port covers enable the operator to seal the chamber when the filtration system is turned OFF, allowing weighing or handling of fine powders in a still-air, contamination-free environment.

A right-side air lock is provided for passing material in and out of the chamber. In addition, swing-up viewing windows allow convenient front loading of scales, sealers, and other larger processing tools.

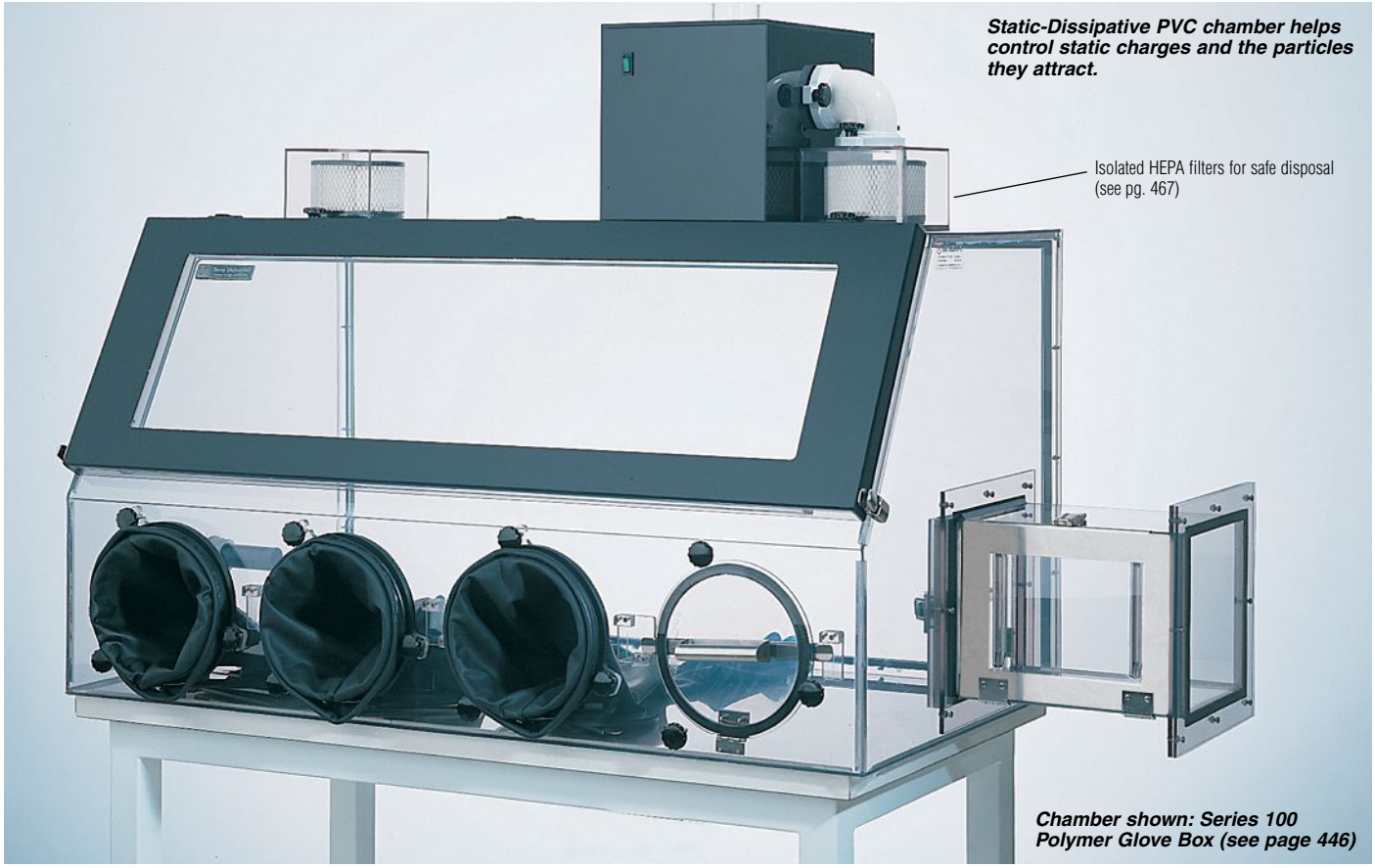
Application Requirements

- ✓ Particle Control: Open-loop filtration module with dual HEPA filters (@ ≥ 4 air changes/minute)
- ✓ Access: Right-side pass-through air lock
  Glove ports for two operators
  Swing-up access window for front loading equipment

Tilt-up access window allows convenient transfer of large equipment. (see pg. 454)



Hinged port caps allow fast, easy glove change-out without contaminating internal environment. (see pg. 454)

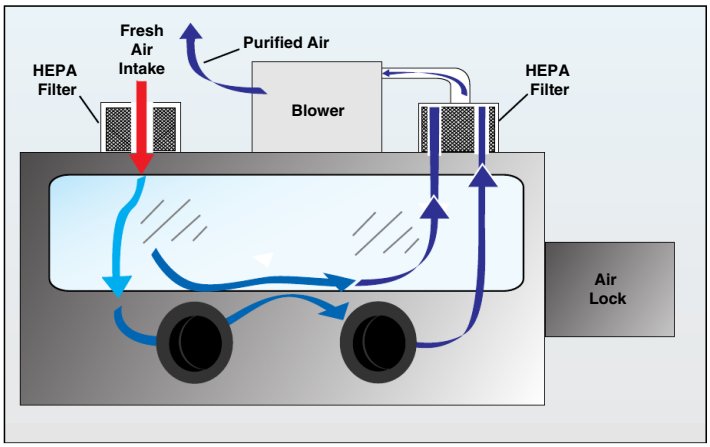


Static-Dissipative PVC chamber helps control static charges and the particles they attract.

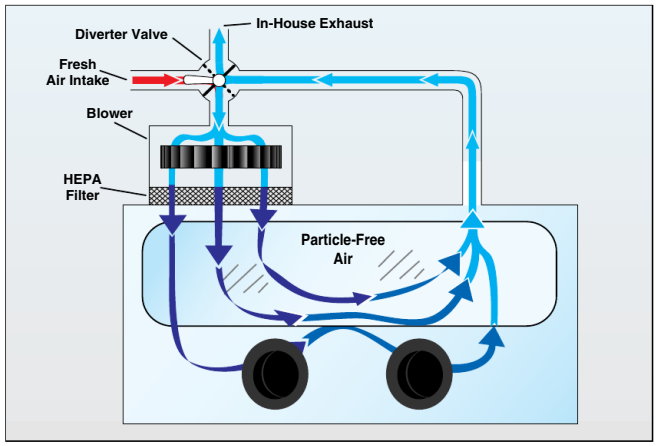
Chamber shown: Series 100 Polymer Glove Box (see page 446)

GLOVE BOXES & VACUUM CHAMBERS

Ordering information begins on page 446.



Open Loop



Closed Loop

Open-Loop Filtration Module

For safe indoor exhausting

A 740-CFM impeller blower, mounted in an acrylic housing, draws air through an inlet filter into the glove box. This filter (HEPA or ULPA) removes particulates, aerosols, spores, and other contaminants to ensure a clean processing environment. A HEPA or ULPA filter removes contaminants from the exhaust gas to make it safe for indoor release. Both filters are enclosed in a disposable acrylic housing for safe, easy handling and disposal.

Closed-Loop Filtration Module

Continuous recirculation exceeds Class 10 requirements

A 740-CFM impeller draws air into the glove box through an inlet HEPA or ULPA filter, which removes particles, aerosols, spores and other contaminants to ensure a clean process environment. A 4-position PVC diverter valve determines the percentage of fresh make-up air entering the chamber (100%, 50% or 0%).

Stainless steel chamber is durable and easy to wipe down. Available with radius corners for aseptic applications.

Chamber Shown: Series 300 Stainless Steel Glove Box (see page 455)

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Series 100
Polymer Glove Boxes

- **An economical controlled processing environment for a wide range of manufacturing and testing operations**
- **Dual-gasketed side doors and a fully gasketed back permit introduction of small and large equipment**
- **Optional gas purge controls automatically**
  - ✓ **establish a particle-free environment**
  - ✓ **maintain a humidity set point down to 0% RH**
  - ✓ **minimize system recovery time**
- **Arm ports accept a wide variety of gloves, including Terra's accordion sleeve and glove assembly**
- **Select single model (with two glove ports) or twin model (with four glove ports)**
- **Available in five materials: acrylic, static-dissipative PVC, nondissipative PVC, polypropylene and polycarbonate**
- **System options include blower/filter module (for recirculating/purifying exhaust), ionizing equipment (for complete static protection), and external fluorescent or UV lighting**
- **Other designs available—see page 428 for an overview of Terra glove boxes and atmospheric chambers**

Terra's Series 100 Polymer Glove Boxes provide a clean, low-humidity environment for critical processing operations in such industries as semiconductor and pharmaceutical manufacturing. Their modular design lets you select the options you need for your application.

Materials for Every Requirement

Select from a variety of materials to suit your requirements. Economical acrylic is ideal for general purpose processing. Transparent Static-Dissipative PVC helps eliminate static charges and the particles they attract, keeping your glove box clean inside and out. Nondissipative PVC is ideal for operations with many corrosive chemicals, and polypropylene offers even greater chemical resistance (polypropylene glove boxes feature a transparent Static-Dissipative PVC viewing window). Select polycarbonate for operations that involve thermal stress.

All glove boxes are fabricated to meet the most rigorous standards for cleanliness and durability. Solvent welding ensures a strong, noncontaminating structure. The 45° front slope allows the operator an uninterrupted overview of work in progress.

Improved Access Doors Reduce Wear, Enhance Performance

Dual side access doors open inward to allow easy parts transfer from inside the chamber. Doors feature stainless steel reinforcement frames that increase the structural rigidity of the door by a factor of five. A built-in LiftLatch securely seals the door without applying lateral torque that could damage hinges.

Stainless steel door frames with unique "e" profile elastomer gasket increase structural rigidity, extend service life, improve sealing performance

All doors include a unique, one-piece "e"-profile elastomer gasket that will not compress or migrate over time. Its superb sealing capability saves nitrogen, eliminates maintenance, and extends the service life of access doors—typically the only component of a glove box that shows wear.

Air Locks Allow Convenient Access

These glove boxes can be outfitted with air locks that maintain the integrity of the controlled environment without sacrificing convenience.

Standard and pass-through air locks mount on the right side of the chamber (left-mounting air locks are available on a custom basis). They minimize nitrogen loss and contamination inflow while parts are introduced or removed. Universal Air Locks extend system flexibility by mounting to either the right or left side of the chamber; their double flange design allows several chambers to be connected in series. All air locks include a ⅛" NPT pipe-tapped opening for connection of purge gas and a ¼" NPT outlet to accommodate an Automatic RB® (Relief/Bleed) Valve.

For applications involving large equipment, you can simply remove and then reinstall the fully gasketed back wall. Dual 8" round arm ports come equipped with flanges for easy connection to Terra's many gloves, including the accordion-type glove assemblies.

Nitrogen Controls Ensure Low-Humidity, Contamination-Free Atmosphere

For optimal processing conditions, select Terra's Glove Box Dual Purge™ System and NitroWatch®, which work in tandem to provide completely automatic gas purging.

The Dual Purge™ System delivers a variable nitrogen purge into the glove box. During normal operation, it provides a continuous low-flow purge to maintain a positive pressure that blocks out contaminants. In the event of a sudden pressure drop, it activates a high-flow purge to block out contaminants and to quickly purge any moisture or contaminants that do enter the chamber.

The NitroWatch® provides automatic low-humidity control. It monitors the internal relative humidity and activates the high-flow purge when the moisture climbs above an adjustable set point. The Automatic RB® (Relief/Bleed) Valve provides safe pressure relief with these control systems and also functions as a check valve, ensuring that no moisture or contaminants enter the chamber in the event of a negative pressure. All glove boxes feature a tapped ⅛" NPT inlet and a ¼" NPT outlet for connection to these controls.

Select the single or twin model; twin glove boxes feature two pairs of glove ports to accommodate two operators (order gloves separately). Other system options include a filter/blower module for filtering and recirculating purge gas or purifying exhaust; self-balancing ionizing equipment for complete static safety; and an externally mounted fluorescent or UV illuminator for enhanced viewing (which is especially important in the polypropylene glove box).

Note: These glove boxes are not designed for use under vacuum. Select Terra's Negative Pressure Glove Boxes for low-level vacuum applications (see page 450).

Specifications

Door Openings:	10" x 10" with gasketed doors, on both sides of chamber; doors open inward.
Arm Ports:	8" round with flange for connecting glove assembly
Gas Ports:	Tapped ⅛" NPT inlet (for connecting flowmeter or Dual Purge™ System) and ⅛" NPT system pressure port; ¼" NPT outlet (for connecting Terra Automatic RB® Valve)

Note: A stainless steel work surface is recommended on all plastic glove boxes to prevent scratching; this protection is especially important with static-dissipative PVC.

See ordering information on the following pages.

GLOVE BOXES & VACUUM CHAMBERS

GLOVE BOXES & VACUUM CHAMBERS

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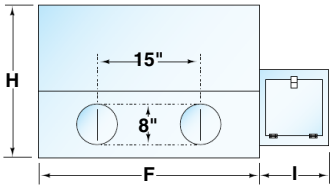
800 S. Raymond Ave., Fullerton, CA 92831 CA

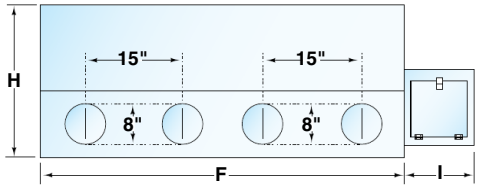
How to Order:

1. Select the glove box of the desired size (single or twin) and material from the ordering table below.
2. Select the Air Lock for your application. The Standard or Pass-Through Air Lock is for connection to one glove box; Universal Air Lock allows connection of two glove boxes in series. Right-side mounting is standard.
3. Read across the table to select the appropriate accessories for your system; all prices include installation. Other optional accessories are listed on the following pages.

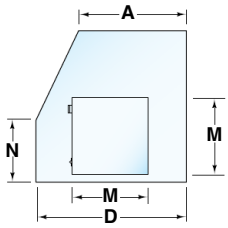
Custom Design



Single Model (2 Arm Ports)



Twin Model (4 Arm Ports)

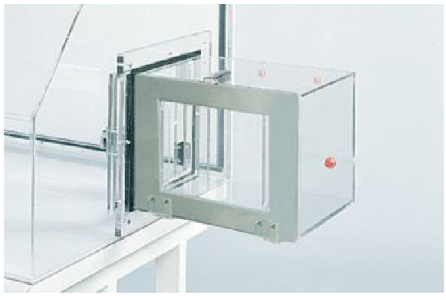


Type	A	D	F	H	I	M	N
Single	16 1/4	24	35	20 3/8	11 1/2	10	9
Twin	16 1/4	24	59	20 3/8	11 1/2	10	9

All dimensions in inches.

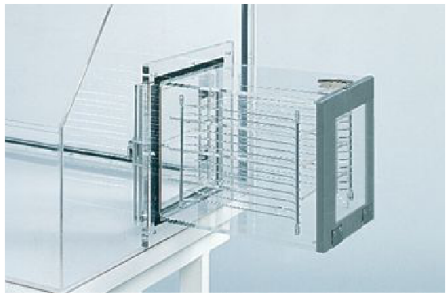
Type	Series 100 Plastic Glove Boxes ①					
See Dimensions above	**Acrylic** Cat. #	**Static Dissipative PVC** ② Cat. #	**Nondissipative PVC** Cat. #	**Polypropylene** ③ (Dissipative PVC viewing window) Cat. #	**Polycarbonate** Cat. #	**Stainless Steel Work Surface** (prevents scratching) Cat. #
Single Models (2 glove ports)	**1689-00B**	**3305-00B**	**3305-03B**	**1681-29B** ③	**1681-31B**	**1689-11**
Twin Models (4 glove ports)	**1689-16B**	**3305-10B**	**3305-11B**	**1681-30B** ③	**1681-32B**	**1681-33**

① ***Complete with 1/8" NPT inlet and 1/4" NPT outlet.***
② ***Includes grounding terminals. The Stainless Steel Work Surface is required with the Static-Dissipative PVC glove box to prevent scratching.***
③ ***Includes 110VAC, 50/60Hz fluorescent illuminator (for 220VAC/50Hz, add "-220" to the part number).***



Standard Air Lock

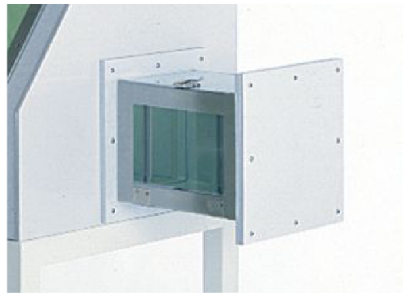
These air locks mount on the right side of the glove box to allow easy pass-through of parts into and out of the chamber. They feature a swing-down door on the front (outside) and a second door that is easy to open by a gloved hand from inside the glove box. One-piece nonadhesive gasket enhances sealing performance and extends service life. Capped ports are provided to allow purging of the air lock with nitrogen. Right mounting is standard.



Pass-Through Air Lock

Feature chrome-plated racks that accommodate adjustable shelves. Their in-line double-door construction lets you pass small parts easily into the glove box; you simply slide a shelf through the outside door to load parts and then through the inside door to unload them in the chamber. Order shelves separately. Right mounting is standard.

	Cat. #
Acrylic Shelf	**1680-67**
Stainless Steel Shelf	**1680-68**



Universal Air Lock

The Universal Air Lock features dual flanges (each with gaskets) to permit mounting on either the right or left side of any Terra plastic glove box. They also allow multiple glove boxes to be connected in series. Each air lock includes a capped 1/8" NPT inlet and 1/4" NPT outlet for connection to purge gas and Automatic RB® Valve. Select material compatible with your glove box(es). Right mounting is standard.

Stainless steel frames now standard on all access doors.

Type	Series 100 Air Locks (each includes ports for nitrogen purging/bleeding)					
See Descriptions above	**Acrylic** Cat. #	**Static Dissipative PVC** Cat. #	**Nondissipative PVC** Cat. #	**Polypropylene** (Dissipative PVC viewing window) Cat. #	**Polycarbonate** Cat. #	**Stainless Steel Work Surface** (prevents scratching) Cat. #
Standard Air Lock	**1680-78**	**1680-81**	**1680-84**	**1680-87**	**1680-90**	**1680-69**
Pass-Through Air Lock	**1680-79**	**1680-82**	**1680-85**	**1680-88**	**1680-91**	**1680-69**
Universal Air Lock	**1680-80**	**1680-83**	**1680-86**	**1680-89**	**1680-92**	**1680-69**

GLOVE BOXES & VACUUM CHAMBERS

Bonded Sleeve and Glove Combination

For optimal economy and long-term durability, this combination features gloves that are permanently vulcanized to sleeves. The sleeves are made of heavy-duty, chemical-resistant neoprene and are designed for 8" port size. Hands are also made of sturdy neoprene; select desired size. Clamps included. See page 471 for full specifications.

6" Port Size Available

Glove Size	Cat. #
8	**1689-02**
9	**1689-03**
10	**1689-04**

Changeable Sleeve and Glove Combination

These accordion sleeves can be used with a variety of gloves, allowing you to change glove size or type without changing the sleeve itself. The convoluted section keeps the sleeve off the operator's arm for better air circulation and greater comfort. Supplied with one pair of tempered latex industrial gloves (select desired size). Clamps included.

See Terra's complete line of gloves, beginning on page 470.

Glove Size	With 12" Sleeve Cat. #	With 24" Sleeve Cat. #
8	**1689-05**	**1681-90**
9	**1689-06**	**1681-91**
10	**1689-07**	**1681-92**

Corresponding Options

Ionizing Blower (see page 484 for application guide) Cat. #	Fluorescent④ Illuminator Cat. #	Power Strip⑤ 110VAC/60Hz Cat. #	Dual Purge System (see page 472) Cat. #	NitroWatch® (see page 473) Cat. #	Automatic RB® Valve (see page 475) Cat. #	Operating Manual Cat. #
2005-02	**1681-78**	**1681-80**	**1603-57**	Control: **9500-00A**	**1600-60B**	**1800-42**
2005-02	**1681-79**	**1681-80**	**1603-57**	Sensor: **9500-02A**	**1600-60B**	**1800-42**

④ ***Comes standard on polypropylene models. Models above are 110VAC/60Hz. Add "-220" to the catalog number for 220VAC/50Hz power.***
⑤ ***Mounted horizontally on the inside rear wall, 3" from the bottom (specify other position, if desired). Includes master on/off switch, 15-Amp circuit breaker and 4 outlets.***

Series 100 Glove Box Accessories *See page 454 for complete listing*

Polypropylene Glove Box No. 1681-29B

Stands for Series 100 Glove Boxes

Constructed of all-welded 2" square tubing, these stands are specially designed to support Series 100 glove boxes. Select epoxy finished (white) steel or stainless steel stands, with or without hard rubber casters.

	For Single Models (35"W x 24"D x 30"H) Cat. #	For Twin Models (59"W x 24"D x 30"H) Cat. #
Epoxy-Finished Steel Stand	**1681-48**	**1681-51**
Stainless Steel Stand	**1681-49**	**1681-52**
Casters (set of 4, 2 with brakes)		**1700-44**

Double-Wall Construction with Temperature Control

See page 486 for ordering information on refrigeration and heating modules. Double-wall polycarbonate and stainless steel glove boxes feature up to 4" of polyurethane insulation for energy efficiency at process temperatures between 120°F and –40°F. Call Terra to discuss your application!

Filtration Modules

These modules allow continuous recirculation of process gas through a HEPA or ULPA filter to remove particles, aerosols, microbes, chemical powders, and other fine contaminants. A variety of open/closed-loop configurations allow 100% exhaust, 100% recirculation, or a mixture of filtered and fresh make-up air. See page 466 for ordering information.

Tilt-Up Viewing Window

Swings open for easy access. Dual piston mechanisms hold the window securely open. Price includes modification of Series 100 glove box to include hinged viewing window. Must be ordered together with affected glove box.

Cut-Out Dimensions:	Dissipative PVC Cat. #	Acrylic Cat. #
For single chamber (29"W x 11"H)	**1681-81**	**1681-83**
For twin chamber (53"W x 11"H)	**1681-82**	**1681-84**

Fixed Rear Wall

A fixed rear wall can be specified in place of the removable rear wall furnished standard with Series 100 glove boxes.

Cat. # **1681-58**

Detachable Bottom

Allows Series 100 glove box to be lifted for easy placement over large equipment. Bottom attaches and seals to glove box by means of dual-gasketed latches located along the base.

Cat. # **1681-55**

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800 S. Raymond Ave., Fullerton, CA 92831 CA

Series 200 Negative-Pressure Glove Boxes

- **Ideal for drying, degassing, and ventilation applications**
- **Clear construction (of acrylic or polycarbonate) provides full visibility of work in progress**
- **Sturdy construction allows sustained negative pressure operation at 5" WG (29.9"Hg in vacuum antechamber)**
- **Solvent welding and chrome-plated hardware ensure a completely noncontaminating environment**
- **Optional remote filter/blower module provides safe exhaust fume venting or purification**
- **Select cylindrical vacuum chamber for higher vacuum levels**
- **8" round arm ports accommodate port caps and sleeve/glove combinations**
- **Vacuum safety valve included to prevent damage to walls or seals**

CE

These economical vacuum glove boxes are designed for degassing operations, chemical mixing, biological tests, and other processes requiring sustained negative pressure.

Clean, Sturdy, Versatile

Each chamber is fabricated out of solvent-welded ½" transparent material that combines full visibility with light weight, cleanliness and durability. Dual glove ports allow full access to work in progress. Select acrylic for general applications, or polycarbonate for resistance to a wide range of chemicals and thermal stress.

Equipped with a vacuum safety valve on a standard basis, these chambers are designed for operations with sustained negative pressures down to 5" WG (Water Gauge). All hardware, including latches and hinges, is chrome-plated, and solvent welding ensures a strong, seamless, air-tight structure that won't leak or outgas.

Improved Access Doors Reduce Wear, Enhance Performance

Dual side access doors open inward to allow easy parts transfer from inside the chamber. Doors feature stainless steel reinforcement frames that increase the structural rigidity of the door by a factor of five. A built-in LiftLatch securely seals the door without applying lateral torque that could damage hinges.

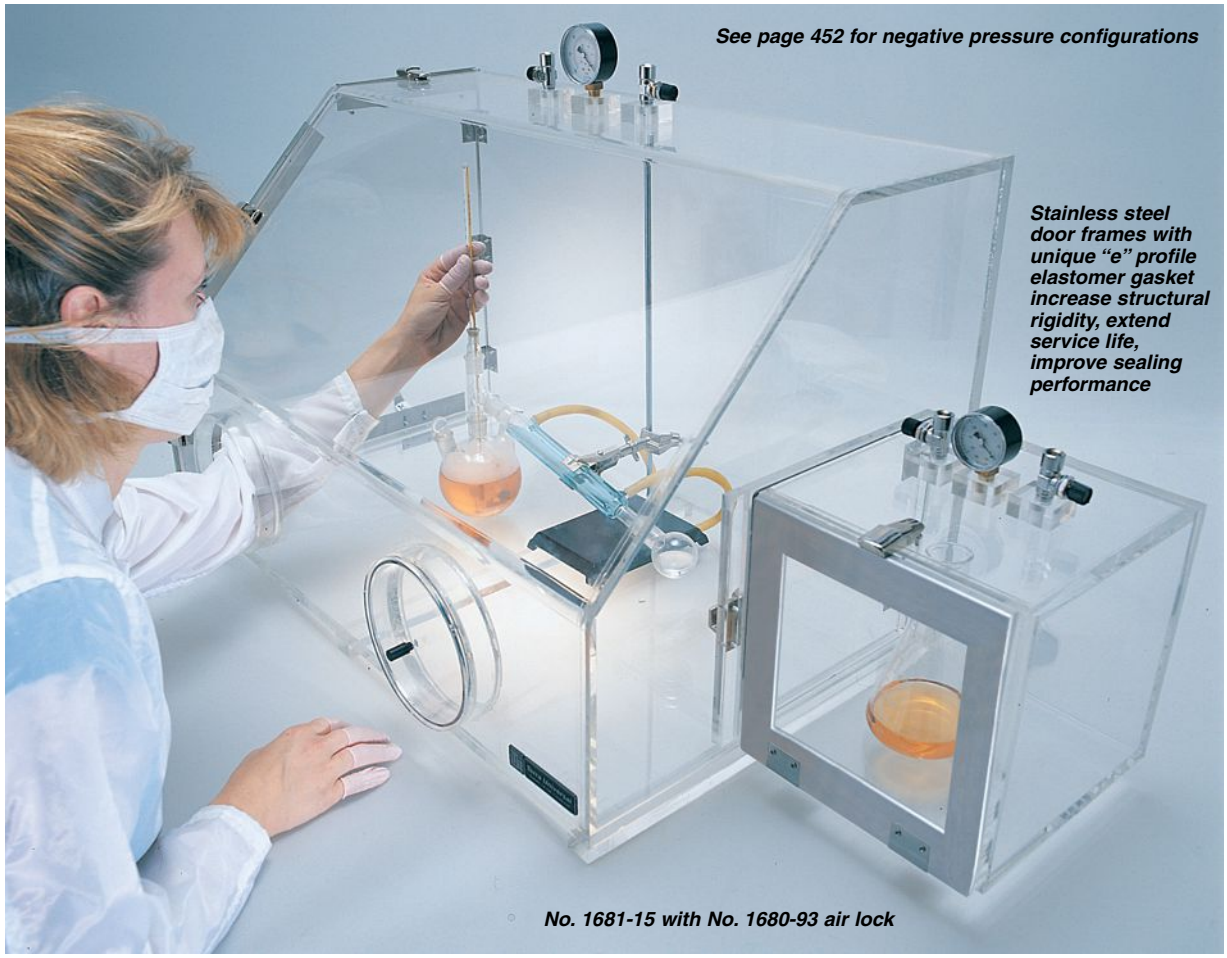
All doors include unique, one-piece "e"-profile elastomer gaskets that will not compress or migrate over time. Their superb sealing capability saves nitrogen, eliminates maintenance, and extends the service life of access doors—typically the only component of a glove box that shows wear.

Versatile Configurations Support Many Negative Pressure Applications

These glove boxes are designed for applications requiring low-level negative pressures, continuous high-volume ventilation, or sustained vacuum at one atmosphere. See following pages for more information on each configuration outlined below.

By attaching a vacuum pump and vacuum controller, you can dry or degas components at up to 5" WG of negative pressure in either the main chamber or negative pressure air lock. In this application, dual vacuum shut-off valves allow connection to the pump and vacuum bleeding. A safety pressure valve ensures that internal pressure does not exceed 5"WG.

See page 452 for negative pressure configurations



Stainless steel door frames with unique "e" profile elastomer gasket increase structural rigidity, extend service life, improve sealing performance

No. 1681-15 with No. 1680-93 air lock

GLOVE BOXES & VACUUM CHAMBERS

For degassing at one atmosphere (29.9" Hg), select the vacuum antechamber. The pass-through design of this antechamber lets you introduce parts measuring up to 10" x 10" into the glove box for packaging or other processing following vacuum cycling.

Two configurations are available for continuous ventilation of the glove box during soldering, chemical mixing, or other operations that generate noxious fumes. A remote filter/blower module can be connected to the glove box via a 6" flange. Fumes are drawn through the conduit for remote exhausting or vapor removal. Make-up air enters the chamber either through iris glove ports or a HEPA-filtered intake port on top of the box. As an alternative to remote ventilation, a filter/fan unit can be installed directly on top of the glove box. Its ventilation fan draws fumes through a charcoal filter for purification or into an exhaust conduit for remote exhausting. Make-up air enters the chamber through iris glove ports.

Two ½"-thick plexiglass port caps are included with each Negative Pressure Glove Box to allow the 8" round arm ports to be sealed. These caps are recommended during processes with negative pressure in order to relieve strain on gloves and glove clamps (gloves must be ordered separately).

Note: The vacuum safety valves provided with each Series 200 Negative Pressure Glove Box and Negative Pressure Air Lock are essential to safe operation of this system, especially when operated with a vacuum pump. Removal of these valves could result in damage to your equipment!

Specifications

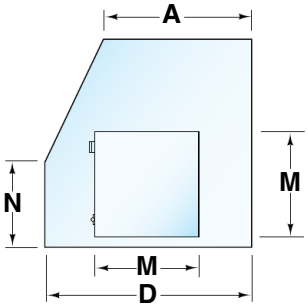
Construction:	Solvent-welded ½"-thick clear acrylic or polycarbonate; chrome-plated hardware
Door Openings:	10" x 10" gasketed (accommodates either vacuum interchange chamber or standard Terra Air Lock); gasketed front access door optional (for introduction of large objects)
Arm Ports:	8" round with flange for connecting glove assembly/port caps
Vacuum Control:	0-30" vacuum gauge provided with dual shut-off valves and barbed-hose fittings. Flange with outlet port provided with selection of remote filter/blower module.

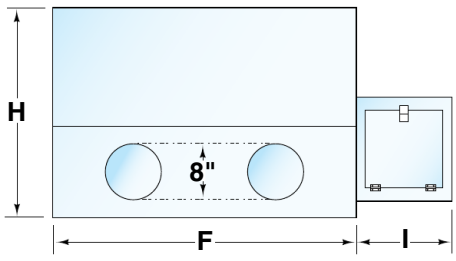
Note: Vacuum gauge and shut-off valves are standard with all applications that include vacuum service. For applications with a filter/fan unit, this hardware is not included. See following pages for more information.

How to Order:

1. Select the glove box of the desired material (either acrylic or polycarbonate). Models are available with or without the swing-up front access panel. Note: Terra recommends selection of a stainless steel work surface to prevent scratching in all plastic chambers.
2. Read across the ordering table to select a vacuum antechamber or air lock (price includes standard right-side installation). Refer to description on following page for more information on these options.
3. Select other accessories below.

	Cat. #	$/Each
Operating Manual	**1800-42**	**25.00**





All dimensions in inches.

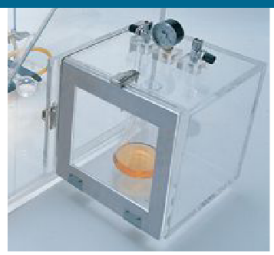
Glove Ports	A	D	F	H	I	M	N
2	16¼	24	35	20⅜	11½	10	9

Custom Design

Series 200 Negative-Pressure Glove Boxes				Corresponding Accessories			
With Front Access Panel		Without Front Access Panel		Vacuum Antechamber (12" Diameter)		Negative Pressure Air Lock	Standard Air Lock
Acrylic	Polycarbonate	Acrylic	Polycarbonate	12"L	23"L	See below	See page 448
Cat. #	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #
1681-13	**1681-14**	**1681-15**	**1681-16**	**1681-63**	**1681-67**	**1680-93**	**1680-78**

Other Optional Accessories

Swing-Up Front Access Panel
Allows convenient introduction of large parts into the processing chamber. Cut-out size: 20"W x 10"H (other sizes available; specify when ordering). See ordering information above.



Air Locks
Negative pressure air locks (shown above) include a 0 - 30" Hg vacuum gauge, dual vacuum shut-off valves, and a pressure safety switch (set at 5"WG). Dimensions: 11½" x 10" x 10". Stainless steel door frames ensure durable, rigid structure that won't crack or warp. Standard mounting is on the right side of the glove box. See ordering information above.

Changeable Sleeve and Glove Combination
These accordion sleeves fit into the ports of Terra's atmospheric chambers for safe, easy handling of materials. They can be used with a variety of gloves, allowing you to change glove size or type without changing the sleeve itself. Supplied with one pair of tempered latex industrial gloves (select desired size). Clamps included. See Terra's complete line of gloves, beginning on page 470.

Glove Size	with 12" Sleeve Cat. #	with 24" Sleeve Cat. #
8	**1689-05**	**1681-90**
9	**1689-06**	**1681-91**
10	**1689-07**	**1681-92**

Stainless Steel Work Surface
Protects the bottom of the chamber against scratching. Price includes installation.

Cat. #
1680-69

Replacement Glove Port Caps
Each 8"-diameter, ½"-thick acrylic port cap features an "O"-ring to ensure a tight seal during negative pressure service, along with a handle for easy removal.

Cat. #
1681-65

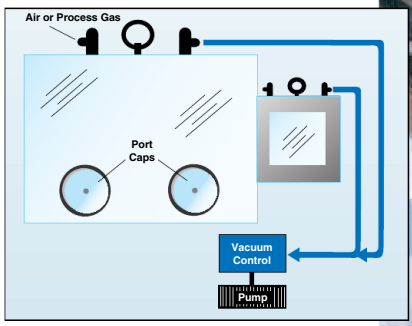
See following pages for vacuum control accessories.

Negative-Pressure Applications: Series 200 Glove Box *with Vacuum Service to 5" WG*

This application, which supports sustained negative pressure to 5" WG in either the main chamber or the air lock, is ideal for degassing or applications with fuming chemistries.

The Series 200 Glove Box includes dual shut-off valves (for vacuum line and backfill), vacuum gauge and pressure release valve. Port caps, included with the box on a standard basis, allow the operator to seal the box during negative pressure processing. After bleeding the vacuum, the operator can remove these ports to allow access to the chamber.

A Low-Vacuum Control Module ensures safe, efficient pump operation. The Solenoid vacuum kit includes all vacuum connections required for turnkey operation.



Series 200 Glove Box
See previous page.

Negative-Pressure Air Lock *See previous page.*

Low-Vacuum Control Module 110 VAC, 50/60Hz Cat. # **1685-99**
220 VAC, 50/60Hz Cat. # **1685-99-220**
Includes a vacuum gauge with set point control, on/off switches for pump and vacuum solenoid. See page 490 for full description.

Low-Vacuum Turnkey Connection Kit Cat. # **5400-31**
Includes fittings necessary for connection of vacuum pump to Vacuum Control Module above.

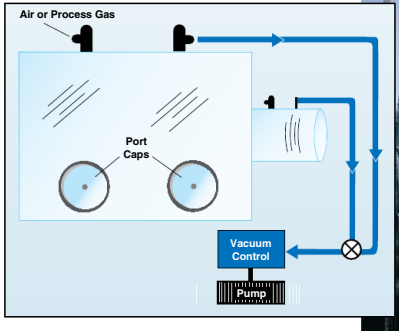
Diaphragm Vacuum Pump 110 VAC, 50/60Hz Cat. # **7903-00**
220 VAC, 50Hz Cat. # **7903-01**
Two-stage, air-cooled pump provides safe vacuum operation for Series 200 Glove Boxes equipped with a safety pressure valve. See page 496 for full specifications. Includes metering kit.

Negative-Pressure Applications: Series 200 Glove Box *with Vacuum Service to 29.9" Hg*

Like the configuration above, this application supports sustained negative pressure to 5" WG in the Series 200 Glove Box. The addition of a vacuum antechamber allows drying or degassing at up to one full atmosphere (29.9"Hg). This acrylic pass-through antechamber is available in two lengths (12" or 23") and accommodates materials up to 10" x 10".

Glove box and antechamber include dual shut-off valves (for vacuum line and backfill) and a 0 - 30"Hg vacuum gauge. The glove box also features a pressure safety switch and port caps.

A Full-Vacuum Control Module maintains a user-defined pressure level and ensures safe, efficient pump operation. The Solenoid Vacuum Kit includes all vacuum connections required for turnkey operation.



Vacuum Antechamber, shown with Vacuum Control Module

Series 200 Glove Box *See previous page.*

Vacuum Antechamber
12" Diameter x 12"L Cat. # **1681-63**
12" Diameter x 23"L Cat. # **1681-67**
Made of ½"-thick acrylic, this antechamber safely supports vacuum to 29.9"Hg, making it ideal for degassing, vacuum encapsulation, and vacuum testing. It mounts on the right side of the Series 200 Negative Pressure Glove Box for easy pass-through operation. Includes a vacuum gauge and dual shut-off valves. Price includes installation.

Vacuum Control Module 110 VAC, 50/60Hz Cat. # **1681-75**
220 VAC, 50Hz Cat. # **1681-76**
Includes a vacuum gauge with programmable set point control, on/off switches for pump and vacuum solenoid. Order pump and connection kit separately. See page 490 for full description.

Turnkey Conection Kit Cat. # **5400-20**
Includes solenoid valve and fittings necessary for connection of vacuum pump to vacuum antechamber Vacuum Control Module above.

Vacuum Pump 110 VAC, 50/60Hz Cat. # **7901-00**
220 VAC, 50Hz Cat. # **7901-08**
Two-stage, air-cooled pump provides safe vacuum operation for Series 200 Glove Boxes equipped with a safety pressure valve. See page 494 for full specifications.

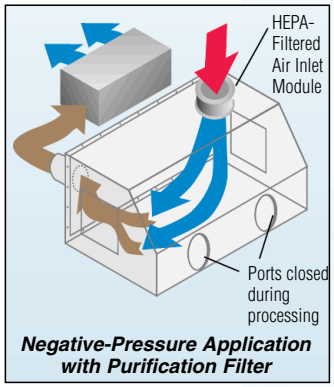
Exhaust Fume Applications: Series 200 Glove Box *with Remote Ventilation*

In this configuration, noxious fumes generated inside the Series 200 Glove Box are ducted through a 6"-diameter conduit to a remote filter/blower module.

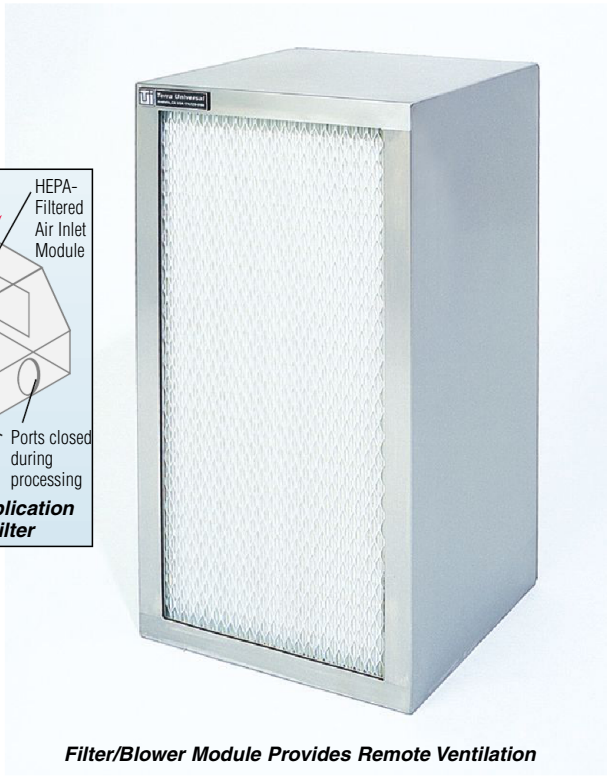
A variety of filters are available to help you meet OSHA and other environmental requirements for exhaust purification. The activated charcoal filter listed below removes most organic chemical vapors to allow safe indoor release. Specialized filters are available for other fumes—refer to page 422 for more information. HEPA or ULPA particle filters can be used to remove particles as small as 0.12µm.

For particle-sensitive applications, an ULPA-filtered Air Inlet Module is mounted on top of the Series 200 chamber. In this application, an operator uses gloves to access materials inside the chamber.

If particles are not a concern, specify iris ports. These ports, made of multi-layered, self-closing silicone panels, allow make-up air to enter the chamber. **Note:** in this configuration, port caps cannot be used while the ventilation unit is turned on.



Negative-Pressure Application with Purification Filter


Filter/Blower Module Provides Remote Ventilation

Series 200 Glove Box **See page 451**

Air Inlet Module Cat.# **1685-81**
Replacement ULPA Filter Cat.# **3333-35**
Features a 3"-diameter inlet port. An acrylic enclosure houses an ULPA filter, rated 99.999% efficient at removing particles 0.12 microns in diameter.

Exhaust Flange Acrylic Cat.# **1681-85**
Polycarbonate Cat.# **1681-86**
This 6"-diameter flange allows connection of conduit to a remote filter/blower module or other ventilation system. Specify other flange diameters.

Remote Filter/Blower Module Cat.# **1681-68A**
Activated Charcoal Purification Filter Cat.# **1716-00**
HEPA Filter Cat.# **1681-02**
ULPA Filter Cat.# **1681-10**
The 14"W x 13.5"D x 32.25"H stainless steel module houses a 1200 CFM variable-speed blower (rated @ 0" W.G. static pressure). Several filters are available for removal of organic chemical vapors or particles (order separately). All models are 110VAC/60Hz (add "-220" to part number for 220VAC/50Hz).

Accordion Sleeve/Glove Assembly **See page 470**
For convenient parts access in configurations with an Air Inlet Module.

Iris Ports Cat.# **1685-93**
These self-closing silicone ports allow convenient access to glove box without the need for special gloves. They also allow make-up air to enter the chamber in configurations without an Air Inlet Module.

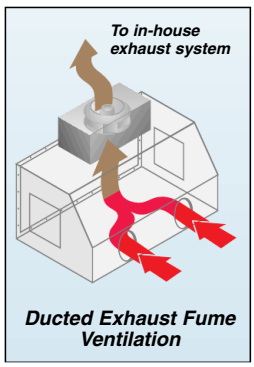
Exhaust Fume Applications: Series 200 Glove Box *with On-Board Ventilation Module*

This configuration includes a Filter/Blower Module that ventilates fumes inside the Series 200 Glove Box.

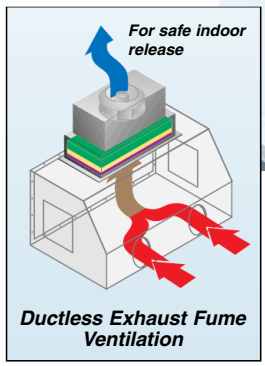
This module, available in several materials, allows exhaust fumes to be ducted to an in-house exhaust system or purified by an activated charcoal filter for safe release. The versatile filter housing also accommodates a final particle filter (HEPA or ULPA). See page 422 for filter specifications.

Make-up air enters the chamber through iris ports made of multi-layered, self-closing silicone panels. **Note:** In this configuration, port caps cannot be used while the ventilation unit is turned on.

Series 200 Glove Box with Filter/Blower Module



Ducted Exhaust Fume Ventilation



Ductless Exhaust Fume Ventilation

Exhaust Purification Filter
Room Air
Class 10,000 Filter
Exhaust Fume
ULPA/HEPA Filter
Purified/Filtered Air Stream

Series 200 Glove Box **See page 451**

Filter Module Cat.# **1685-82**
Exhaust Purification Filter (activated charcoal) Cat.# **1716-00**
HEPA Filter (99.99% efficient @ 0.3µm) Cat.# **1681-02**
ULPA Filter (99.999% efficient @ 0.12µm) Cat.# **1681-10**
The stainless steel housing accommodates a charcoal purification filter and a HEPA or ULPA final particle filter.

Blower Module
110VAC, 60Hz Cat.# **1685-83**
220VAC, 50Hz Cat.# **1685-83-220**
The stainless steel housing encloses a 740 CFM variable-speed impeller that draws fumes upwards. One-piece gasket ensures leak-tight performance. Price includes installation on specified Series 200 chamber.

Iris Ports
See above

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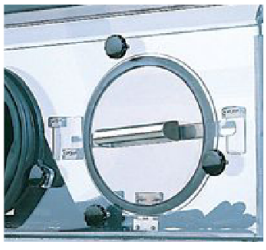
Accessory Checklist for Series 100 & 200 Glove Boxes

Tilt-Up Viewing Window

Swings open for easy access. Dual piston mechanisms hold the window securely open. Price includes modification of Series 100 glove box to include hinged viewing window. Must be ordered together with affected glove box.

	Cat. #
Static Dissipative PVC (Cut-out)	
For single chamber (29"W x 11"H)	**1681-81**
For twin chamber (53"W x 11"H)	**1681-82**
Acrylic (Cut-out)	
For single chamber (29"W x 11"H)	**1681-83**
For twin chamber (53"W x 11"H)	**1681-84**



Hinged Removable Glove Port Covers

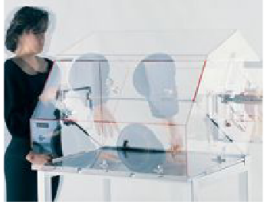
Allow you to seal the system and then remove gloves for cleaning or change-out—while maintaining the integrity of the internal glove box environment. The hinged port covers lie flat on the glove box floor when not in use. Part number is for one port cover.

Acrylic	Cat. # **1685-89**
Static-Dissipative PVC	Cat. # **1685-90**
Polypropylene	Cat. # **1685-91**
Polycarbonate	Cat. # **1685-92**

Swing-Up Front Access Panel

Allows convenient introduction of large parts into the processing chamber. Cut-out size: 20"W x 10"H (other sizes available; specify when ordering). Must be ordered together with affected glove box (Series 100 or 200).

Acrylic	Cat. # **1685-85**
Polycarbonate	Cat. # **1685-86**
Static-Dissipative PVC	Cat. # **1685-87**
Nondissipative PVC	Cat. # **1685-88**



Detachable Bottom

This feature allows the glove box to be detached from its bottom and lifted for easy placement over large equipment. The bottom attaches and seals to the glove box by means of dual-gasketed latches located along the base.

Cat. # **1681-55**

Bellows Eyepiece Interface

This cut-out is sealed with a bellow-type diaphragm to allow viewing of a stereo microscope positioned inside any of Terra's stainless steel glove boxes. Standard cut-out size is 8"W x 6"H. Specify desired location or custom size when ordering.

Cat. # **1681-53**

Stainless Steel Glove Ports

These 8½" ports can be retrofitted onto any existing glove box (requires 8½"-diameter cut-outs). Price includes gasket, mounting hardware and one port.

Cat. # **1694-50**

Glove Box Dual Purge™ System

Cat. # **1603-57**

Provides variable-flow purge control to save nitrogen expenses.

— See page 472

NitroWatch® Controller Cat. # **9500-00A**
NitroWatch® Sensor Cat. # **9500-02A**

Works in tandem with the Dual Purge System to maintain the selected relative humidity level.

— See page 473

Automatic RB® (Relief/Bleed) Valve

Cat. # **1600-60B**

Safeguards glove box against overpressures. Required for operation with Dual Purge System.

— See page 475

Dryex™ Gas Dryer

Cat. # **9082-00**

Removes moisture and particulates from compressed air feed.

— See page 479

Nitrogen Generator

Cat. # **2700-09**

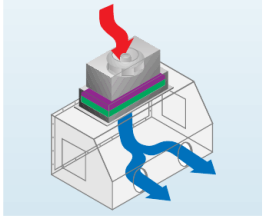
Semiporous micromembrane technology yields 99.9% pure nitrogen to ensure an economical, reliable, uninterrupted gas source

.

—See page 480

Filtration Modules

These modules allow continuous recirculation of process gas through a HEPA or ULPA filter to remove particles, aerosols, microbes, chemical powders, and other fine contaminants. A variety of open/closed-loop configurations allow 100% exhaust, 100% recirculation, or a mixture of filtered and fresh make-up air. See page 467 for ordering information.



Universal Filter/Blower

This positive pressure system, designed for use on Series 100 Glove Boxes, directs a flow of particle-free air into the glove box. Select HEPA or ULPA filter. **Note:** Gloves must be removed to allow air to escape the enclosure. See page 453 for negative pressure system.

Blower (740 CFM, acrylic housing)	Cat. # **1681-27**
Filter Housing (acrylic)	Cat. # **1687-13**
HEPA Filter	Cat. # **1681-02**
ULPA Filter	Cat. # **1681-10**

Series 300 Stainless Steel Glove Box

- **Provides a clean, air-tight, controlled environment for a wide range of manufacturing processes in semiconductor, pharmaceutical, and other industries**
- **Air Lock features recessed polyurethane seals and heavy-duty latches and hinges for enhanced durability and sealing performance**
- **Side flanges simplify insertion/removal of process equipment and allow easy addition of ovens and air locks**
- **Removable arm ports can be interchanged to meet specific requirements and accept a wide variety of gloves**
- **Select single model (with two glove ports) or twin model (with four glove ports)**

The Series 300 Stainless Steel Controlled Atmosphere Chamber provides a hermetically sealed environment for such manufacturing operations as resistance welding of semiconductor hybrids, parts degassing, temperature and humidity testing, and chemical mixing in a nonreactive environment.

Optional gas purge controls automatically—

- ✓ establish a Class 1 particle-free environment
- ✓ maintain a humidity set point down to 0% RH/0.5 ppm(v) H_2O
- ✓ minimize system recovery time
- ✓ provide precise gas mixtures for leak testing and other processes

Configure a turnkey system to your process specifications—

- ✓ Humidity Controllers
- ✓ Process Gas Mixers
- ✓ Gas Cooler/Heater
- ✓ Recirculation Filtration Module
- ✓ Pass-Through Ovens
- ✓ More!

GLOVE BOXES & VACUUM CHAMBERS

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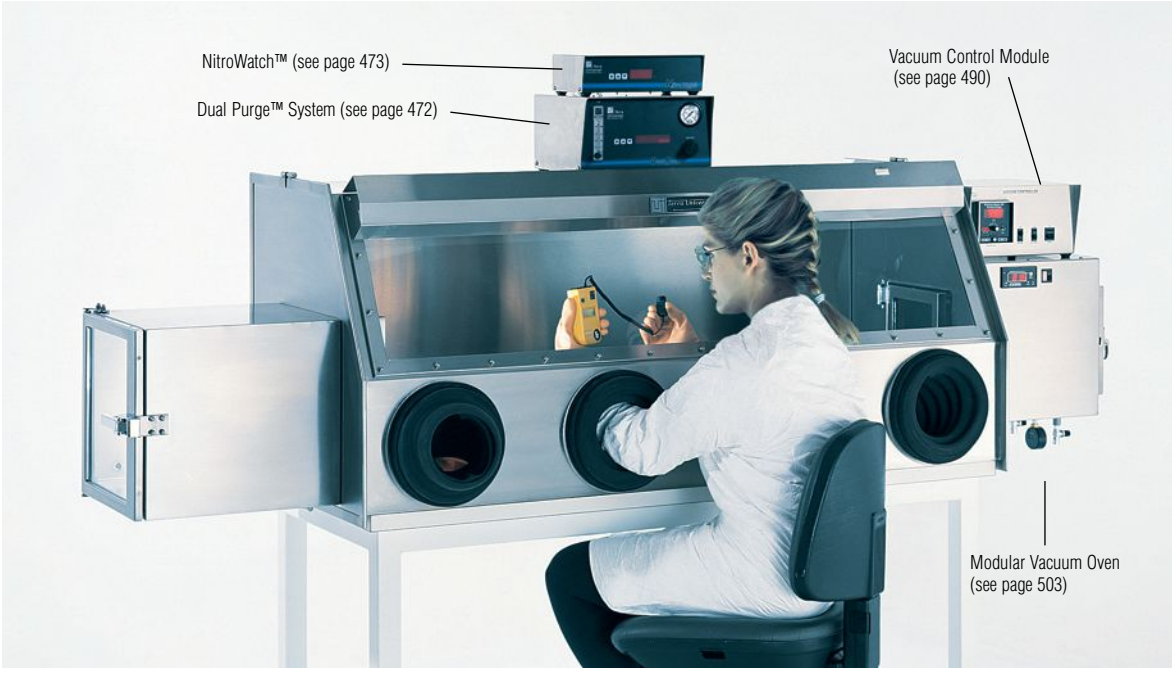
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

A wide safety glass viewing window is tightly installed using gasketed seals that ensure minimum vapor loss and stand up to positive pressures. A fluorescent light fixture, cord and switch are mounted to the exterior of the chamber to ensure proper illumination without contaminating the internal environment or posing a combustion hazard in the presence of flammable gases.



Convenient Access, Optimal Versatility

These chambers come standard with removable arm ports (two or four, depending on the model selected) that are double-gasketed and bolted to the chamber wall for strength and optimal seal integrity. They can be easily removed and replaced with either Terra's iris arm ports or custom ports designed to meet specific requirements. (Order gloves separately.)

Like our other stainless steel chambers, all Series 300 models also feature side access flanges that allow easy attachment of Terra's process modules (ovens and air locks) and also permit "cascading" of several chambers in series. These flanges are easy to remove and reinstall and feature a "U-channel" double-gasketed seal that guarantees the integrity of the internal environment.

Air Locks Allow Convenient Access

These glove boxes can be outfitted with air locks that maintain the integrity of the controlled environment without sacrificing convenience.

All air locks are pre-mounted to a side flange that is easy to install on the Series 300 chamber; select locks for right- or left-side installation. They minimize nitrogen loss and contamination inflow while parts are introduced or removed, particularly when equipped with their own gas controls. Their safety glass viewing windows are sealed with one-piece, nonadhesive compression gaskets. On a custom basis, air locks can be ordered with dual mounting flanges to "cascade" several atmospheric chambers in series. All air locks include a ⅛" NPT pipe-tapped opening for connection of purge gas and a ¼" NPT outlet to accommodate an Automatic RB® (Relief/Bleed) Valve.

Note: For vacuum requirements up to 29.9" Hg, select a Series 400 Atmospheric Chamber along with Terra's Vacuum Antechamber.

Nitrogen Controls Ensure Low-Humidity, Contamination-Free Atmosphere

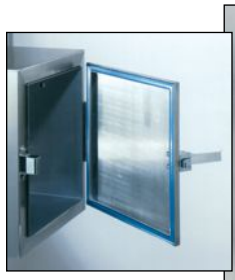
Two plugged ¾" NPTF openings—an inlet in the upper left corner of the back panel and an outlet in the lower right corner of the back panel—allow you to purge the chamber with nitrogen in order to guarantee an environment free of contaminants and moisture. For optimal processing conditions, select Terra's Glove Box Dual Purge™ System and NitroWatch®, which work in tandem to provide completely automatic gas purging.

The Dual Purge System delivers a variable nitrogen purge into the glove chamber. During normal operation, it provides a continuous low-flow purge to maintain a positive pressure that blocks out contaminants. In the event of a sudden pressure drop, it activates a high-flow purge to block out contaminants and to quickly purge any moisture or particles that do enter the chamber.

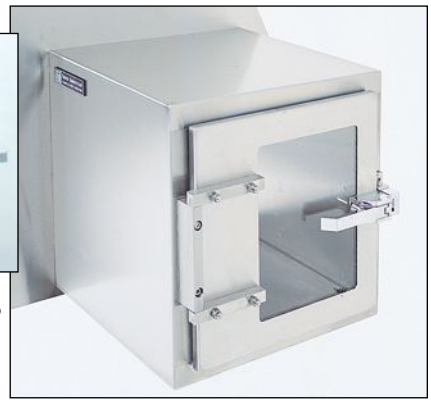
The NitroWatch provides automatic low-humidity control. It monitors the internal relative humidity, and activates the high-flow purge when the moisture climbs above an adjustable set point. For ultra-low humidity requirements, select the DewWatch™ instead, which works with the Dual Purge System to automatically maintain moisture levels as low as 0.5 ppm(v). The Automatic RB® (Relief/Bleed) Valve ensures safe pressure relief with these control systems and also functions as a check valve, ensuring that no moisture or contaminants enter the chamber in the event of a negative pressure. For economical operation, gas can be directed from the RB Valve outlet to an adjacent air lock, thereby conserving nitrogen consumption.

Select the single or twin model; twin glove boxes feature two pairs of glove ports to accommodate two operators (order gloves separately). Other system options include a filter/blower module for filtering and recirculating purge gas or purifying exhaust; self-balancing ionizing equipment for complete static safety; and a variety of gas mixers and analyzers for use in precisely controlled gas environments. See complete information on accessories beginning on page 468.

Note: These glove boxes are designed for use under positive or low-level (to 1" Hg) negative pressures. Higher-level vacuums (to 29.9" Hg) can be achieved in Terra's Vacuum Antechamber, which operates with the Series 400 chambers (see page 459).



Elastomer seal for superior performance



Air Lock Provides Convenient Access. Shown with optional viewing window. See page 461.

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GLOVE BOXES & VACUUM CHAMBERS

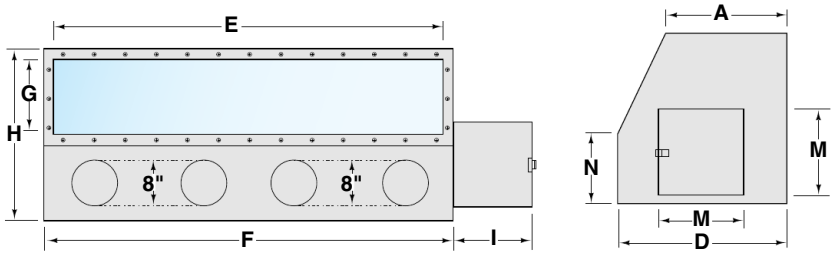
Specifications

Door Openings: 12½" x 12½" with gasketed doors supplied with air locks (see ordering information below); doors open inward.

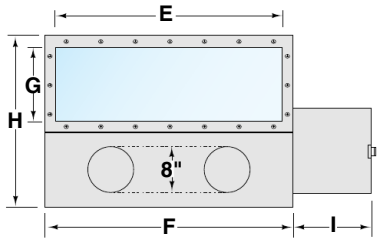
Arm Ports: 8" round with flange for connecting glove assembly

Gas Ports: Tapped ¾" NPT inlet (for connecting flowmeter or Dual Purge™ System) and ¾" NPT system pressure port; ¾" NPT outlet (for connecting Terra Automatic RB® Valve). Appropriate adapter inserts are supplied for any Terra gas systems ordered.

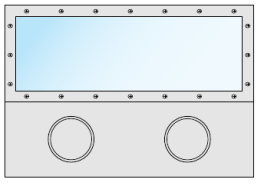
Light: 120VAC/60Hz fluorescent. For 220VAC/50Hz, add "-220" to the part number



Custom Design



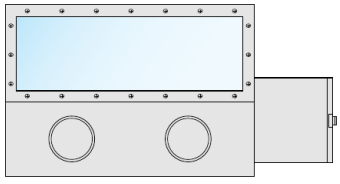
Model	Glove Ports	A	D	E	F	G	H	I	M	N
Single	2	16 9/16	24	28 1/4	35	11 3/4	24	16	14 3/4	10
Twin	4	16 9/16	24	54 3/4	59	11 3/4	24	16	14 3/4	10



Series 300 Atmospheric Chamber with no Air Lock Unit

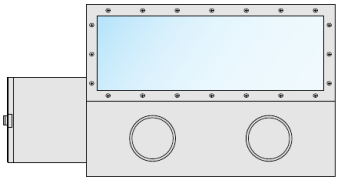
Select desired access door below

	Cat. #
Single	**1694-01**
Twin	**1694-02**



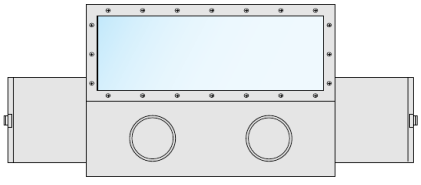
Series 300 Atmospheric Chamber with right hand Air Lock Unit

	Cat. #
Single	**1694-03**
Twin	**1694-04**



Series 300 Atmospheric Chamber with left hand Air Lock Unit

	Cat. #
Single	**1694-05**
Twin	**1694-06**



Series 300 Atmospheric Chamber with two Air Lock Units

	Cat. #
Single	**1694-07**
Twin	**1694-08**

No. 1690-03

Stands for Series 300 Glove Boxes

Constructed of all-welded 2" square tubing. Select oven support for use with Terra's High-Performance Pass-Through Oven (No. 5401-00). All stands raise chambers 30" off of floor (add 3" for casters).

	Epoxy-Finished Steel		Stainless Steel	
	Chamber Only Cat. #	Chamber and Oven Cat. #	Chamber Only Cat. #	Chamber and Oven Cat. #
For Single Models (2 ports)	**1690-03**	**5401-01**	**1694-09**	**1694-11**
For Twin Models (4 ports)	**1690-04**	**5401-02**	**1694-10**	**1694-12**

Heavy-Duty Casters (set of 4, 2 with brakes) Cat. # **1700-44**

Other Optional Accessories—See page 468 for more information

Glove Box Dual Purge™ System **1603-57**

NitroWatch® **9500-00A**

NitroWatch® Sensor **9500-02A**

Stainless Steel Automatic RB® Valve **1606-60**
Required for operation with Dual Purge™ System

Accordion Sleeve/Glove Combination **1689-06**
12"L, with size 9 gloves (see pg. 471 for other sizes)

Right-Side Access Door **1685-94**

Left-Side Access Door **1685-96**

High-Performance Vacuum Oven
See pg. 502 for specifications and ordering information.

Modular Vacuum Oven
See pg. 503 for specifications and ordering information.

Stainless Steel Arm Ports **1694-50**
Can be retrofitted to any chamber with 8" cutouts.

Ionizing Blower **2005-02**
Neutralizes static charges inside the glovebox. See pg. 484.

Operating Manual **1800-13**

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Series 400 Stainless Steel Glove Box

- **Provides all the features and capabilities of Terra's Series 300 models in a more spacious chamber**
- **Interfaces with Vacuum Antechamber for vacuum operations down to 29.9" Hg**
- **Optional gas purge controls automatically establish a Class 1 particle-free environment and maintain a humidity set point down to 0% RH/0.5 ppm(v) H_2O**
- **Select single model (with two glove ports) or twin model (with four glove ports)**

These chambers are a larger version of the Series 300 chambers listed on the preceding pages.

In addition to all of the features of the Series 300 models, these chambers also accommodate Terra's Vacuum Antechamber, which supports vacuums down to 29.9" Hg for a wide range of operations in many industries. Their double-gasketed side flange allows easy insertion of large process equipment into the work chamber and easy mounting of the antechamber, a vacuum/nitrogen oven, or a standard air lock.

Select single models (with two glove ports) or twin models (with four glove ports) to meet your applications. Dual inlet and outlet ports allow connection of Terra's complete line of gas control systems, including the Dual Purge™ System, which provides variable purging to flush out moisture and contaminants; and either the NitroWatch® or DewWatch™, which work in tandem with the Dual Purge to control humidity levels down to 0.5 ppm(v). See options listing beginning on page 468 for information on these systems.

Specifications

Door Openings: 12" x 12" gasketed doors supplied with air locks (see ordering information below); doors open inward.
Arm Ports: 8" round with flange for connecting glove assembly
Gas Ports: Tapped 3/4" NPT inlet (for connecting flowmeter or Dual Purge™ System) and 3/4" NPT system pressure port; 3/4" NPT outlet (for connecting Terra Automatic RB® Valve). Appropriate adapter inserts are supplied for any Terra gas systems ordered.

How to Order:

1. Select either a single model (2 glove ports) or twin model (4 glove ports) from the table below. **Note:** Chambers include access door(s) only when ordered together with antechamber, air lock or oven.
2. Read across the table to order other system options. Be sure to specify the side on which you would like any system modules mounted (right or left when facing the front of the chamber). All prices include installation and any necessary access door(s).

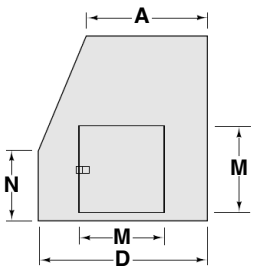
Series 400 Chambers

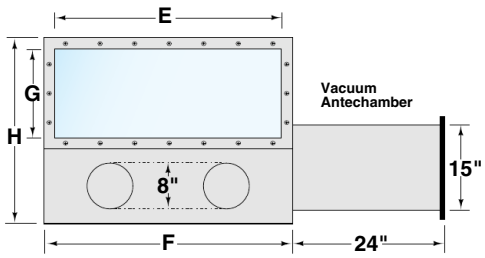
Model	Glove Ports	Cat. #
Single	2	**1694-13**
Twin	4	**1694-14**

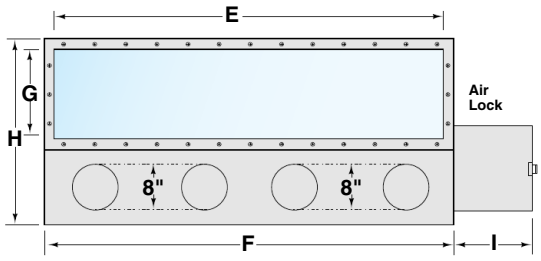
Order Air Locks from table on the next page

Model shown: Single Chamber (Cat. No. 1694-13) with Dual Purge System, Vacuum Antechamber and Vacuum Control Module

GLOVE BOXES & VACUUM CHAMBERS







Glove Ports	A	D	E	F	G	H	I	M	N
2	27	33	28 1/4	33	12 13/16	33	16	12	11
4	27	33	56 1/2	60	12 13/16	33	16	12	11

All models include a 120VAC/60Hz fluorescent illuminator. For 220VAC/50Hz power, add "-220" to the catalog number. For electropolishing of any stainless steel component, add "-2" to the catalog number and 30% to the price.

	Cat. #
Operating Manual	**1800-13**

Vacuum Antechamber (see below)				Air Lock**		Vacuum/Nitrogen Ovens (left side mounting standard)			
Aluminum**		Stainless Steel**				High Performance Pass-Through Oven* (see page 502)		Modular Oven (see page 503)	
Right Mount Cat. #	Left Mount Cat. #	Right Mount Cat. #	Left Mount Cat. #	Right Mount Cat. #	Left Mount Cat. #	Right Mount Cat. #	Left Mount Cat. #	Right Mount Cat. #	Left Mount Cat. #
5400-01	**5400-03**	**5400-04**	**5400-05**	**1698-01**	**1698-02**	**5401-12A**	**5401-00A**	**9602-30**	**9602-03A**

**** Requires support stand for safe operation (order below). For 220 VAC operation, add "-220" to the part number.***
***** Prices for left-mount and right-mount models are the same. Optional 7"W x 9½"H safety glass viewing window—Cat. # 1702-02.***

Series 400 Vacuum Antechamber
(for use with Series 400 chambers only)

- **Ideal for processing in vacuums down to 29.9" Hg**
- **Allows complete transfer of components with no risk of contaminating chamber environment**
- **Evacuation/refill valve, vacuum gauge allow precise antechamber management (select Vacuum Control Module for automatic control)**
- **Equipped with 23" sliding tray for easy loading of parts**
- **Available in aluminum or stainless steel**

This vacuum antechamber assures a safe, contamination-free atmosphere for use with Terra's Series 400 chambers.

Available in aluminum or stainless steel, it features dual center-clamped, counterbalanced doors for easy, sure operation and sealing. A sliding tray extends 14" beyond the antechamber opening when fully extended, gliding smoothly on ball bearings. With its high vacuum design and TIG welded structure, this interchange has been tested and certified with no detectable leaks at full vacuum with a helium mass spectrometer calibrated to 3 x 10^{-10} std. cc/sec. Together with a Terra Vacuum Control Module, it provides completely automated vacuum control at any point you require down to 29.9" Hg.

Specifications

Construction:	6061 Aluminum (with brass fittings); or stainless steel (with stainless steel fittings); high-vacuum design; TIG welded structure
Dimensions:	15" dia. x 24" long
Tray Dimensions:	12" x 23"; extends to 14" beyond opening for loading
Doors:	Single center-clamped, O-ring sealed, counterbalanced, vertical travel; stainless steel on both models
Vacuum Capability:	1 x 10^{-3} Torr
Vacuum Gauge:	2½" compound Bourdon tube dial type
Connections:	1" evacuation valve, 1/4" backfill valve, 1/4" IPS plug

Custom Design

Ordering Information

Select a Vacuum Antechamber from the ordering table above. Standard mounting is on the right side of the chamber. Note that this antechamber requires a support stand for safe operation.

Vacuum Pump — Cat. #
110 VAC, 50/60Hz — **7901-00**
220 VAC, 50Hz — **7901-08**
This time-proven air-cooled vacuum pump provides the reliable vacuum performance for operating the Vacuum Nitrogen Oven or Vacuum Antechamber (see complete specifications on page 494).

Vacuum Control Module — Cat. #
110 VAC, 50/60Hz — **1681-75**
220 VAC, 50Hz — **1681-76**
Allows automatic vacuum control. Includes a vacuum gauge with set point controller and on/off switches for built-in vacuum solenoid and pump (order pump separately).

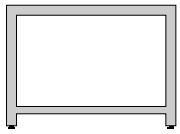
Vacuum Antechamber Connection Kit Cat. # **5400-21**
Includes solenoid valve and fittings necessary for connection of vacuum pump to vacuum control module and antechamber.

Stands for Series 400 Glove Boxes

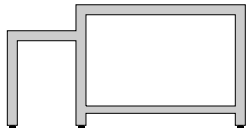
Constructed of all-welded 2" square tubing, these stands are specially designed to support Series 400 glove boxes. Select epoxy finished (white) steel or stainless steel stands, with or without rubber casters. Select oven support for use with Terra's High-Performance Pass-Through Oven (No. 5401-00), and antechamber support for use with the Series 400 Vacuum Antechamber. All stands raise chambers 30" off of floor (add 3" for casters).

Heavy-Duty Casters (set of 4, 2 with brakes) **1700-44**

For chamber only

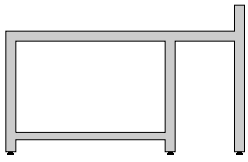


For chamber and oven No. 5401-00

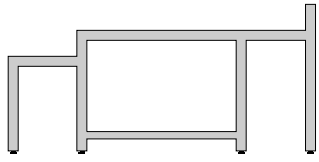


	Stainless Steel Cat. #	Painted Steel Cat. #	Stainless Steel Cat. #	Painted Steel Cat. #
For Single Models (2 ports)	**1694-15**	**1694-17**	**1694-19**	**1694-21**
For Twin Models (4 ports)	**1694-16**	**1694-18**	**1694-20**	**1694-22**

For chamber and vacuum antechamber



For chamber, vacuum ante-chamber, and oven No. 5401-00



	Stainless Steel Cat. #	Painted Steel Cat. #	Stainless Steel Cat. #	Painted Steel $Cat. #
For Single Models (2 ports)	**1694-23**	**1694-25**	**1694-27**	**1694-29**
For Twin Models (4 ports)	**1694-24**	**1694-26**	**1694-28**	**1694-30**

Other Optional Accessories—See page 468 for more information

Glove Box Dual Purge™ System **1603-57**

NitroWatch® **9500-00A**

NitroWatch® Sensor **9500-02A**

Stainless Steel Automatic RB® Valve **1606-60**
Required for operation with Dual Purge™ System

High-Performance Vacuum Oven
See pg. 502 for specifications and ordering information.

Modular Vacuum Oven
See page 503 for specifications and ordering information.

Stainless Steel Arm Ports **1694-50**

Ionizing Blower **2005-02**
Neutralizes static charges inside the glove box.

Operating Manual **1800-13**

Changeable Sleeve and Glove Combination

These accordion sleeves fit into the ports of Terra's atmospheric chambers for safe, easy handling of materials. They can be used with a variety of gloves, allowing you to change glove size or type without changing the sleeve itself. Supplied with one pair of tempered latex industrial gloves (select desired size). Viton gloves available. Glove clamps included.

See Terra's complete line of dry box gloves, beginning on page 470

Glove Size	with 12" Sleeve Cat. # (per pair)	with 24" Sleeve Cat. # (per pair)
8	**1689-05**	**1681-90**
9	**1689-06**	**1681-91**
10	**1689-07**	**1681-92**

GLOVE BOXES & VACUUM CHAMBERS

Stainless Steel Air Locks

Terra's improved air lock design ensures a leak-proof environment that minimizes nitrogen loss and contamination inflow while parts are passed into and out of the glove box. "Knife" edges along the doors seat against recessed polyurethane gaskets. Double-wall stainless steel construction, with heavy-duty door latches and hinges, ensures a long service life.

Comes with a safety glass viewing window on the access side. Includes a ⅛" NPT opening for connection of purge gas and a ¼" NPT outlet to accommodate an Automatic RB® (Relief/Bleed) valve.

Ordering Information: The chart below provides ordering information for air locks installed on each Terra glove box. Each air lock comes with a mounting flange that allows it to be retrofitted onto the specified glove box.

Elastomer seal for superior performance

Optional mechanical interlocks: Cat. # 1702-03

Shown with optional 7"W x 9½"H safety glass viewing window (Cat. # 1702-02)

Glove Box Air Locks*

Dimensions (ID): / For Glove Box	12"W x 12"H x 14"D Right Mount Cat. #	12"W x 12"H x 14"D Left Mount Cat. #	12"W x 12"H x 16"D Right Mount Cat. #	12"W x 12"H x 16"D Left Mount Cat. #	16"W x 16"H x 16"D Right Mount Cat. #	16"W x 16"H x 16"D Left Mount Cat. #	12"W x 20"H x 16"D Right Mount Cat. #	12"W x 20"H x 16"D Left Mount Cat. #	20"W x 24"H x 30"D Right Mount Cat. #	20"W x 24"H x 30"D Left Mount Cat. #
Series 300 (page 455)	**1702-10**	**1702-11**	**1681-17**	**1681-18**	—	—	—	—	—	—
Series 400 (page 458)	**1698-01**	**1698-02**	**1681-19**	**1681-89**	**1702-18**	**1702-19**	**1702-37**	**1702-38**	—	—
Series 500 (page 462)	**1702-12**	**1702-13**	**1681-93**	**1681-94**	**1702-31**	**1702-32**	**1702-39**	**1702-40**	—	—
Series 600 (page 464)	**1702-14**	**1702-15**	**1681-95**	**1681-96**	**1702-33**	**1702-34**	**1702-41**	**1702-42**	—	—
Custom**	**1702-16**	**1702-17**	**1681-97**	**1681-98**	**1702-35**	**1702-36**	**1702-43**	**1702-44**	**1702-45****	**1702-46****

Part numbers are for an air lock of the specified size with a flange for right or left mounting to the Terra glove box indicated. (No part numbers in a column indicates that the air lock does not fit that glove box).

****This air lock is designed for large custom glove boxes (it will not fit on standard Series 300 - 600 models).***

Air Lock with Pneumatic Door

- **Allows easy, convenient parts transfer—no awkward reaching for door handles**
- **Vertical door track eliminates clearance requirements inside the glove box**
- **Operates reliably, without contamination**
- **Custom sizes and interface cut-outs available**

This pneumatic access door solves several problems associated with pass-through air locks.

Because it travels vertically in an isolated track, it eliminates clearance requirements—giving you full use of every square inch of valuable glove box space. The pneumatic assembly and all moving parts are positioned outside the glove box in a separate housing, so the door will not threaten the integrity of the environment inside the process chamber. When the door closes, a piston mechanism seats it against the door frame to form an air-tight seal.

Ideal for Large Glove Boxes

Unlike standard air lock doors, this unit requires no awkward stretching with gloved hands—a common problem in large glove boxes with hard-to-reach air locks. A lever mounted outside the glove box allows easy opening and closing, making operation fast and convenient in even the largest glove boxes. The reliable operating mechanism requires no adjustment after initial installation.

Specifications

Construction:	Brushed aluminum door mounted in stainless steel housing
Service Requirement:	Compressed feed air regulated at 110 psi
Dimensions:	22"W x 4"D x 26"H (overall); 12"W x 12"H (inside door opening)

Shown with optional trolley and parts caddy (not included)

Door sealed in housing outside chamber

Air Lock with Pneumatic Door	Right Side Cat. #	Left Side Cat. #
For Series 300 Chamber	**1530-70**	**1530-74**
For Series 400 Chamber	**1530-71**	**1530-75**
For Series 500 Chamber	**1530-72**	**1530-76**
For Series 600 Chamber	**1530-73**	**1530-77**

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Series 500 Full-View Glove Box

- **Combines the full visibility of plastic glove boxes with the strength and processing capabilities of a stainless steel chamber**
- **Transparent front and back panels (of either Static-Dissipative PVC or polycarbonate) feature opposing glove ports for easy manipulation of materials**
- **Optional split-panel sliding doors open and close by means of a hand clamp for easy introduction/ removal of large process equipment**
- **Large chamber size leaves plenty of clearance for bulky process equipment**
- **Versatile side flanges allow several units to be connected in series; also permit easy addition of air lock**
- **System options include ionizing equipment; process gas mixers, analyzers and heaters; and a remote filter/blower module for gas recirculating or exhaust fume purification**

The Series 500 Full-View Controlled Atmosphere Chamber combines advantages of several other Terra lines of glove chambers.

The Best of Both Worlds

Like our plastic glove boxes, it allows full visibility of operations in process, reducing the claustrophobic sensation that operators often experience when working with a stainless steel chamber. Transparent front and rear panels also allow easy modifications to suit particular requirements, such as custom sealed cut-outs for microscope optics, cameras, or other process equipment. Inlet/outlet ports can also be specified for connection of gas purge and humidity controls. Select either Static-Dissipative PVC, which resists many chemicals, eliminates static charges, and aids in particle controls, or polycarbonate, which resists heat.

Like our other stainless steel chambers, the Series 500 ensures a strong, static-safe design that is ideal for a broad range of controlled temperature and humidity tests in many gas environments. Its spacious size accommodates bulky equipment, and its side flanges allow the addition of air locks and also permit several units to be connected in series.

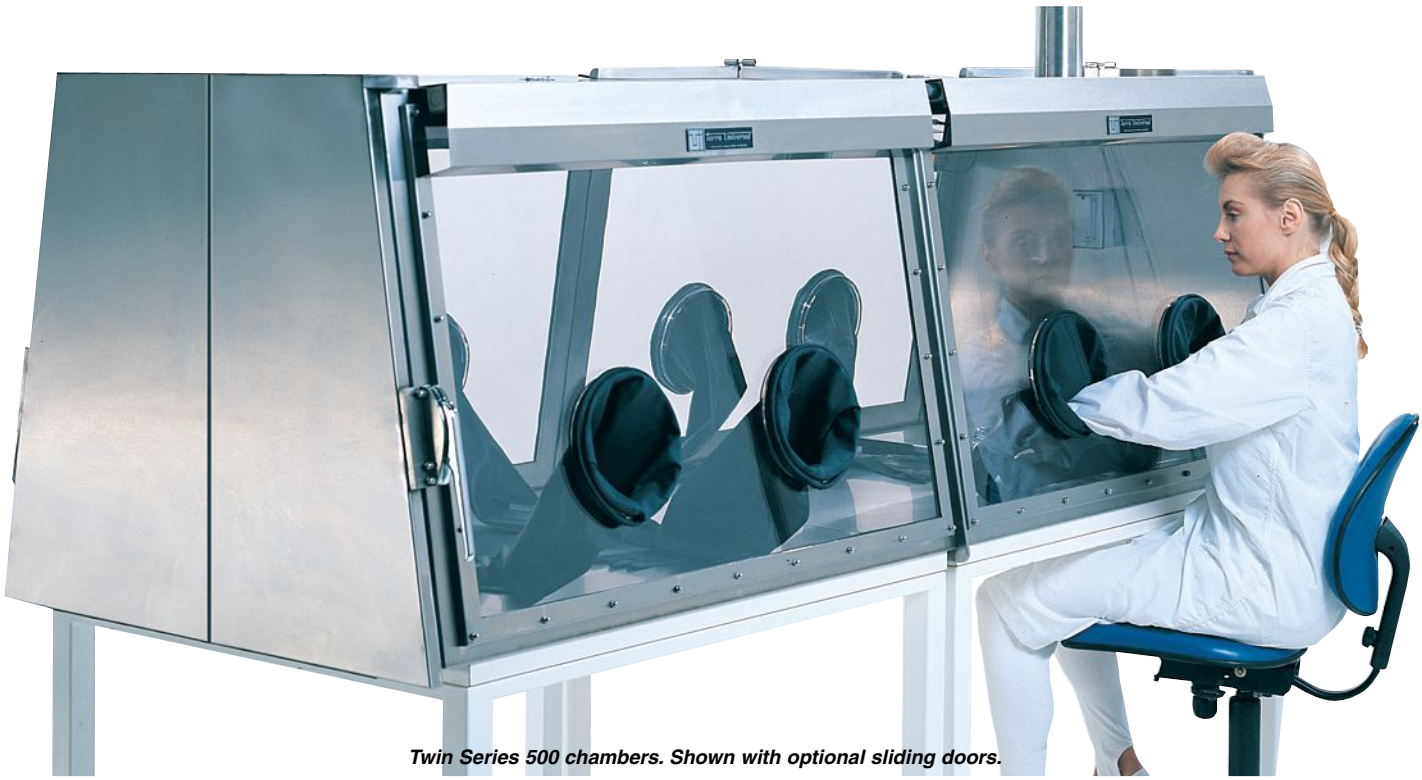
The front and rear panels are tightly installed using double-gasketed, compression seals that ensure minimum vapor loss and stand up to both positive and negative pressures. A fluorescent light fixture, cord and switch are mounted to the exterior of the chamber to ensure proper illumination without contaminating the internal environment or posing a combustion hazard in the presence of flammable gases. UV lighting is also available.

Convenient Access, Optimal Versatility

These chambers come standard with dual opposing arm ports (two in front and two in the rear) that can be used with any gloves designed for 8" round flanges (including bonded or accordion-type gloves; order separately). Other glove port configurations, including iris glove ports, are also available on a custom basis.

Split-panel sliding doors further enhance convenience by providing easy-open, easy-close right or left side access. Doors are made of stainless steel for optimal durability, and feature one-piece gaskets.

Optional air locks help maintain the integrity of the controlled environment without sacrificing convenience. All air locks are pre-mounted to a side flange that is easy to install on the Series 500 chamber; select air locks for right- or left-side installation. They minimize nitrogen loss and contamination inflow while parts are introduced or removed, particularly when equipped with their own gas controls. On a custom basis, air locks, can be ordered with dual mounting flanges to "cascade" several atmospheric chambers in series. All air locks include a 1/8" NPT pipe-tapped opening for connection of purge gas and a 1/4" NPT outlet to accommodate an Automatic RB® (Relief/Bleed) Valve.



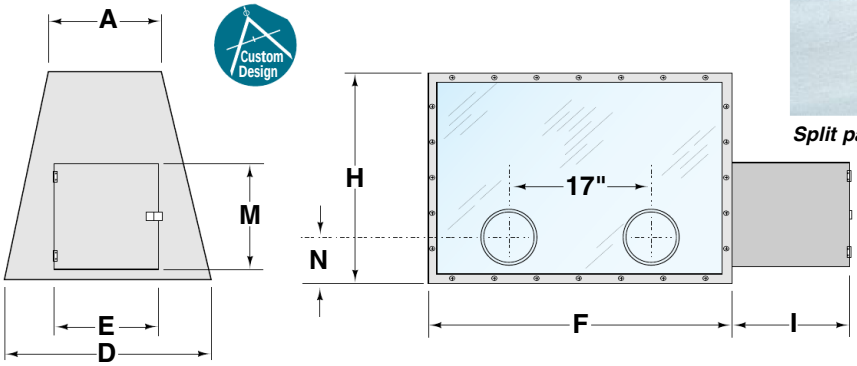
Twin Series 500 chambers. Shown with optional sliding doors.

GLOVE BOXES & VACUUM CHAMBERS

Note: For vacuum requirements up to 29.9" Hg, select a Vacuum Antechamber.

See page 468 for a checklist of optional accessories.

Glove	A	D	E	F	H	I	M	N
2	26	36	14 3/4	48	30	16	14 3/4	10
4	26	36	14 3/4	96	30	16	14 3/4	10



Split panel sliding doors accommodate large parts.

Note: All models include a 120VAC/60Hz fluorescent illuminator. For 220VAC/50Hz operation, add "-220" to the catalog number.

	Cat. #
Operating Manual	**1800-13**

Model	Series 500 Full-View Chambers		Split-Panel Sliding Doors*		Air Locks*	
	Static-Dissipative PVC Panels	Polycarbonate Panels	Right Mount	Left Mount	Right Mount	Left Mount
	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #
Single	**1694-31**	**1694-33**	**1694-35**	**1694-37**	**1702-12**	**1702-13**
Twin	**1694-32**	**1694-34**	**1694-35**	**1694-37**	**1702-12**	**1702-13**

**** Prices for left-mount and right-mount models are the same. Dimensions: 12" x 12" x 14"D (See page 461 for other sizes)***

Stands for Series 500 Glove Boxes

Constructed of all-welded 2" square tubing, these stands are specially designed to support Series 500 glove boxes. Select epoxy finished (white) steel or stainless steel stands, with or without rubber casters. All stands raise chambers 30" off of floor (add 3" for casters).

	For Single Chamber Cat. #	For Twin Chamber Cat. #
Series 500 Stainless Steel Stand	**1694-39**	**1684-75**
Series 500 Epoxy-Finished Steel Stand	**1694-40**	**1684-76**
Casters (set of 4, 2 with brakes)	**1700-44**	

Improved design can be retrofitted onto any Terra glove box—just give us your perimeter dimensions.

Optional viewing window (Cat. # 1702-02)

Air Locks

Air locks minimize nitrogen loss and contamination inflow while parts are introduced or removed, particularly when equipped with their own gas controls. They feature safety glass viewing windows on doors, sealed with one-piece, nonadhesive compression gaskets. Knife-edge door frame seals against noncontaminating polyurethane gasket in a recessed channel. On a custom basis, air locks can be ordered with dual mounting flanges to "cascade" several atmospheric chambers in series. All air locks include ⅛" NPT pipe-tapped opening for connection of purge gas and a ¼" NPT outlet to accommodate an Automatic RB® (Relief/Bleed) Valve.

Order air locks for the Series 500 chamber from the table above.

	Cat. #
Optional Viewing Window (7"W x 9½"H safety glass)	**1702-02**

Series 600 Glove Box with Transparent Front Viewing Window

- **Polycarbonate or Safety Glass front window allows full view of processing operations**
- **Cut-outs and sealed interfaces available for microscopes and other equipment**
- **Multiple chambers can be cascaded together to allow pass-through operations**

Standard system measures 37½"W x 29"D (24"D at top) x 39"H and includes an externally mounted fluorescent illuminator and dual 8" flanges for gloves (order gloves separately). Select desired front window material; remainder of glove box is 304 stainless steel. Includes a 120VAC/60Hz fluorescent illuminator (for 220VAC/50Hz operation, add "-220" to the catalog number). Call Terra for custom sizes and configurations.

	Polycarbonate Cat. #	Safety Glass Cat. #
Series 600 Glove Box	**9670-00**	**9670-01**
	Stainless Steel Cat. #	**Painted Steel Cat. #**
Series 600 Stand	**9670-02**	**9670-03**
	Right-Mount Cat. #	**Left-Mount Cat. #**
Air Locks	**1702-14**	**1702-15**

Other Optional Accessories—See page 468 for more information

Glove Box Dual Purge™ System **1603-57**

NitroWatch® **9500-00A**

NitroWatch® Sensor **9500-02A**

Stainless Steel Automatic RB® Valve **1606-60**
Required for operation with Dual Purge™ System

High-Performance Vacuum Oven
See pg. 502 for specifications and ordering information.

Modular Vacuum Oven
See pg. 503 for specifications and ordering information.

Stainless Steel Arm Ports **1694-50**

Ionizing Blower **2005-02**
Neutralizes static charges inside the glove box.

Operating Manual **1800-13**

Changeable Sleeve and Glove Combination

These accordion sleeves fit into the ports of Terra's atmospheric chambers for safe, easy handling of materials. They can be used with a variety of gloves, allowing you to change glove size or type without changing the sleeve itself. Supplied with one pair of tempered latex industrial gloves (select desired size). Viton gloves available. Glove clamps included.

See Terra's complete line of dry box gloves, beginning on page 470.

Glove Size	with 12" Sleeve Cat. # (per pair)	with 24" Sleeve Cat. # (per pair)
8	**1689-05**	**1681-90**
9	**1689-06**	**1681-91**
10	**1689-07**	**1681-92**

GLOVE BOXES & VACUUM CHAMBERS

High-Performance Pass-Through Vacuum/Nitrogen Oven

- **Heavy-duty construction allows efficient, high-temperature operation for heavy throughput**
- **Double doors facilitate easy pass-through operations**
- **Pre-heated gas manifold guarantees temperature uniformity during gas flow**
- **Stainless steel, perforated 8" and 14" removable shelf allows easy insertion and removal of materials**
- **Includes high-temperature cut-out for safe operation**

This Vacuum/Nitrogen oven features double doors for such pass-through operations as resistance and seam welding of hybrids and many other microelectronic packages. The rugged ½" thick stainless steel doors operate smoothly from both ends, and are designed to allow easy attachment to the left side of the Terra Series 300 or 400 stainless steel atmospheric chamber. Door flanges hold circulating water to speed up the cooling of the chamber during cycling operations; the oven can then remove the moisture completely prior to sealing operations.

The flexible design of the oven allows it to accept a wide range of additional features, whether or not they're offered by Terra Universal, including vacuum pumps, oil mist eliminators, automatic doors, and temperature and vacuum controllers and recorders. Call us for a quotation when you have selected the components you need; we will deliver them as a complete turnkey system.

Note: These ovens require a support platform when mounted on a chamber; select a Terra stand with oven support. Select fittings kit for operation with Full-Vacuum Control Module (see page 490).

Vacuum/Nitrogen Oven with manual door (see page 502 for full specifications).

Power: 120VAC/60Hz (for 220VAC/50Hz, see below)
Temperature range: Up to 300°C continuous, 350°C intermittent
Degree of vacuum: Up to 10^{-6} Torr and higher; helium mass spectrometer tight

	Right Mount Cat. #	Left Mount Cat. #
High Performance Pass-Through Vacuum/Nitrogen Oven	**5401-12A**	**5401-00A**

For 220VAC/50Hz operation, add "-220" to the catalog number.

Vacuum Control Fittings Kit **5400-22**

Modular Vacuum/Nitrogen Oven

- **Economical oven delivers wide temperature and vacuum range at an affordable price**
- **Modular design allows easy attachment to Terra Stainless Steel Atmospheric Chambers**
- **Double-door design enhances flexibility, allows pass-through operations**
- **Tempered glass window permits full viewing of contents**

This unit provides a compact, economical alternative to Terra's larger Vacuum/Nitrogen Oven for applications that don't require extremely high temperatures or vacuums; it is ideal for R&D, laboratory, and production operations.

Specifications

Vacuum range: Atmosphere to 10 microns, with adequate pump
Temperature range: 10°C to 149°C
Capacity: .48 cu. ft.
Power: 120VAC/60Hz (for 220VAC/50Hz, see below)

	Right Mount Cat. #	Left Mount Cat. #
Modular Vacuum/ Nitrogen Oven	**9602-30**	**9602-03**

with Interface Attachment for Series 300 Chamber.
For 220VAC/50Hz operation, add "-220" to the catalog number.

Vacuum Control Fittings Kit **5400-23**
Includes fitting for turnkey installation with Terra's Vacuum Control Module and vacuum pump (see page 490).

See page 503 for full information

Note: The Modular Vacuum/Nitrogen Oven can be custom-ordered to retrofit any stainless steel atmospheric chamber. Contact Terra for ordering information. Please have available the overall dimensions of the appropriate endplate from your chamber, the exact locations of mounting hole, if any, and/or description of mounting hardware desired.

Filtration Modules

For Series 300 and Series 400 Glove Boxes

- **Closed-loop system continuously filters process gas to meet cleaner-than-Class 10 requirements**
- **Open-loop system draws chemical powders or other exhaust particles through a filter for safe, noncontaminating indoor release**
- **Complete line of filters includes 99.99% efficient HEPA filter (rated @ 0.3µm particles) and 99.999% efficient ULPA filter (rated @ 0.12µm particles)**
- **Designed for installation on any standard Terra Universal Series 300 or 400 stainless steel glove box**

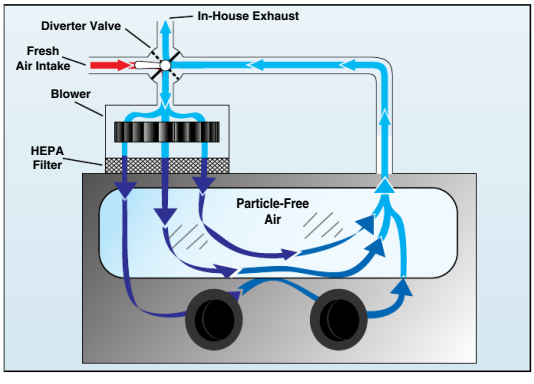
Turnkey System

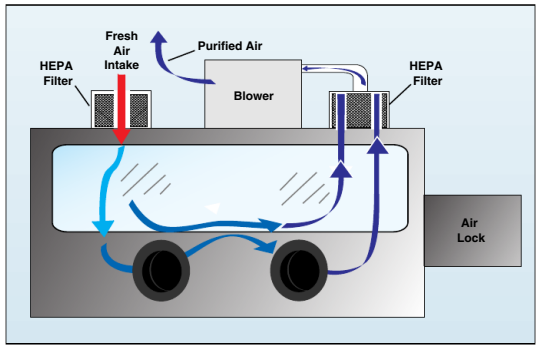
Turnkey Convenience!

Whichever modules you select, Terra will configure a turnkey system that's ready for operation.

Stainless Steel Twin Glove Box
(Cat. No. 1684-04) equipped with

- Open-loop filtration module
- Air Lock
- Hinged Viewing Window
- Glove and Sleeve Combination
- Hinged Glove Port Covers





Closed-Loop Filtration Module
for Continuous Recirculation

This configuration includes a 740-CFM impeller blower, mounted in a plexiglass housing, that draws air into the glove box through an inlet HEPA, ULPA or charcoal filter. HEPA and ULPA filters remove particulates, aerosols, spores and other contaminants to ensure a clean process environment. The charcoal filter removes common organic vapors. A 4-position PVC diverter valve lets you determine the percentage of fresh make-up air entering the chamber: either 100% (no recirculation); 0% (complete recirculation); or 50% (half fresh, half recirculated). Pipes are 2"-dia. PVC (other sizes and materials available).

	Cat. #
Closed-Loop Filtration Module	**1684-81**

Includes mounting on Series 300 and 400 Stainless Steel Glove Boxes. Order Glove Box and filters separately.

HEPA Filter	**2100-30**
ULPA Filter	**2100-29**
Purification Filter (activated charcoal)	**1701-90**

Open-Loop Filtration Module
for Safe Indoor Exhausting

This configuration includes a 740-CFM impeller blower, mounted in an acrylic housing, that draws air through an inlet filter into the glove box. This filter (HEPA or ULPA) removes particulates, aerosols, spores, and other contaminants to ensure a clean processing environment. A HEPA or ULPA filter removes contaminants from the exhaust gas to make it safe for indoor release. Both filters are enclosed in a disposable acrylic housing for safe, easy handling and disposal.

Select HEPA or ULPA filters (2 required).

	Cat. #
Open-Loop Filtration Module	**1684-83**

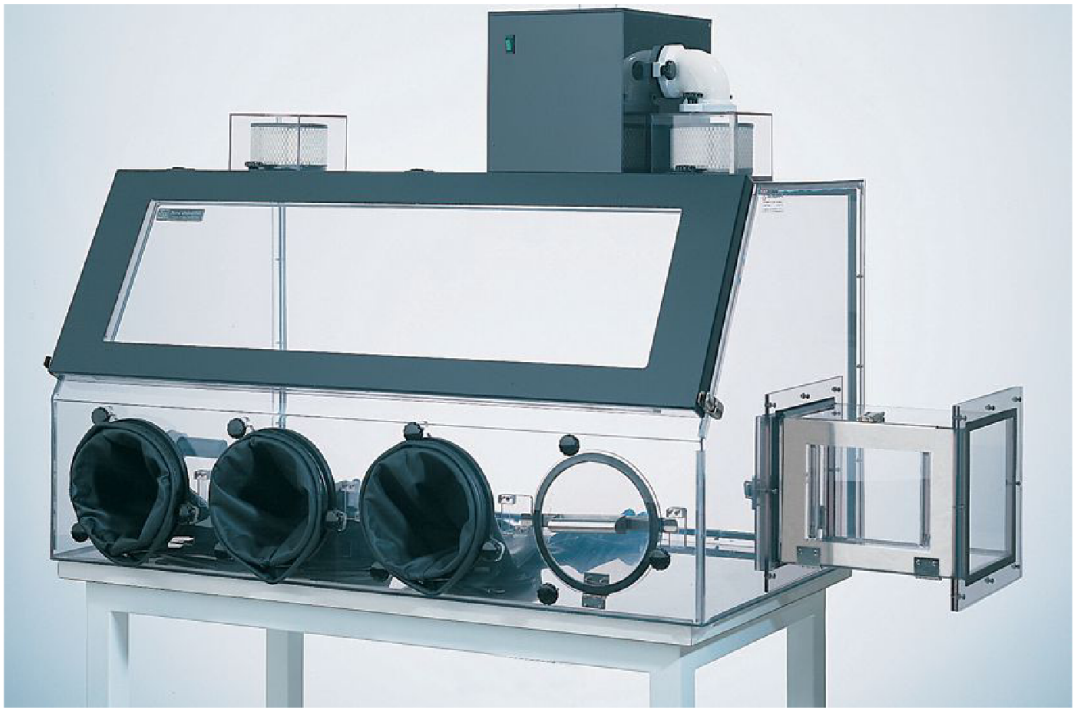
Includes mounting on specified Series 300 or 400 Stainless Steel Glove Box. Order Glove Box and filters separately.

HEPA Filter Module	**1684-84**
ULPA Filter Module	**1685-81**

Includes specified filter in acrylic housing. Two required.

Filtration Modules
For Series 100 Glove Boxes

- **Closed-loop system continuously filters process gas to meet cleaner-than-Class 10 requirements**
- **Open-loop system draws chemical powders or other exhaust particles through a filter for safe, noncontaminating indoor release**
- **Complete line of filters includes 99.99% efficient HEPA filter (rated @ 0.3µm particles) and 99.999% efficient ULPA filter (rated @ 0.12µm particles)**
- **Designed for installation on any standard Terra Universal Series 100 polymer glove box**

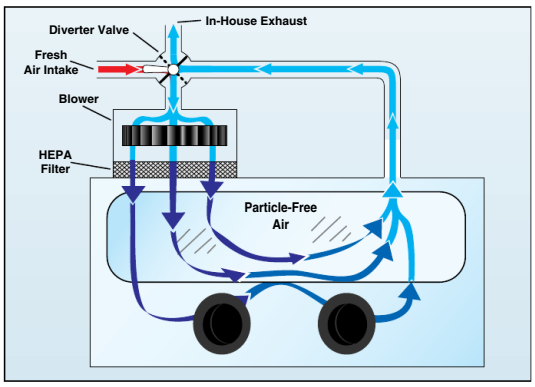


Turnkey System

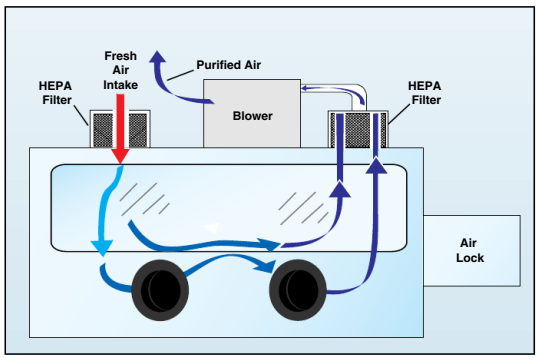
Turnkey Convenience!

Indicate affected Series 100 Glove Box when you order.

Whichever modules you select, Terra will configure a turnkey system that's ready for operation.



See Terra's full line of particle and chemical vapor filters on page 422.



Close-Loop Filtration Module
for Continuous Recirculation

This configuration includes a 740-CFM* impeller blower, mounted in a acrylic housing, that draws air into the glove box through an inlet HEPA filter (rated 99.99% efficient @ 0.2 micron particles). This filter removes particulate, aerosols, spores and other contaminants to ensure a clean process environment. A 4-position PVC diverter valve lets you determine the percentage of fresh make-up air entering the chamber: either 100% (no recirculation); 0% (complete recirculation); or 50% (half fresh, half recirculated). Pipes are 2"-dia. PVC (other sizes and materials available).

	Cat. #
Closed-Loop Filtration Module (For Series 100 Polymer Glove Boxes. Order Glove Box separately.)	**1684-80**
Replacement HEPA Filter	**2100-30**

* Rated @ 0" WG static pressure. Flow rate drops depending on filter.

Open-Loop Filtration Module
for Safe Indoor Exhausting

This configuration includes a 460-CFM* squirrel-cage blower, mounted in a plexiglass housing, that forces air into the glove box through an inlet HEPA filter (rated 99.99% efficient @ 0.2 micron particles). This filter removes particulate, aerosols, spores and other contaminants to ensure a clean process environment. A HEPA exhaust filter removes contaminants from the outflowing air to ensure that air exiting the system is safe for indoor release. Both filters are enclosed in a disposable acrylic housing to ensure safe handling and disposal when they must be replaced.

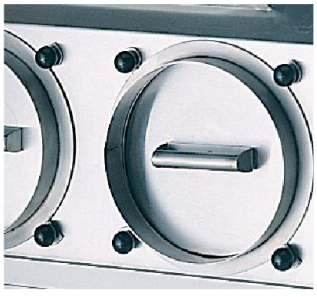
	Cat. #
Open-Loop Filtration Module (For Series 100 Polymer Glove Boxes. Order Glove Box separately.)	**1684-82**
Replacement Filter Module (Includes HEPA filter in acrylic housing)	**1684-84**

Accessory Checklist for Series 300, 400, 500 & 600 Stainless Steel Glove Boxes

Tilt-Up Viewing Window

Swings open for easy access. Dual piston mechanisms hold the window securely open. Price includes modification of Series 300 or 400 stainless steel glove box to include hinged viewing window. Must be ordered together with affected glove box. Dimensions given are for cut-out.

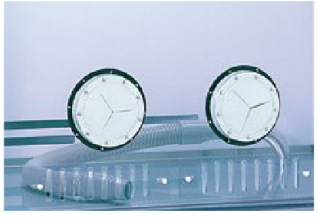
	Cat. #
For single chamber (28.25"W x 12.75"H)	**1684-92**
For twin chamber (52.625"W x 12.75"H)	**1684-93**



Hinged Removable Glove Port Covers

Allow you to seal the system and then remove gloves for cleaning or change-out—while maintaining the integrity of the internal glove box environment. The hinged port covers lie flat on the glove box floor when not in use. Part number is for one port cover.

Cat. # **1684-09**



Iris Ports

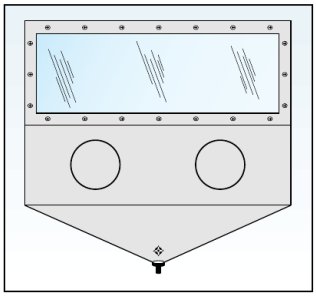
Self-closing silicone ports allow convenient access to glove boxes without the need for special gloves; the iris opens when you insert hands and closes when you remove them. Easy to install onto standard glove ports—simply slip them into the port from the inside of the glove box. Iris ports can also be used when glove-box gloves are installed.

Cat. # **1681-57**

Disposal Trap Door

Hinged door can be installed on any stainless steel glove box to allow easy disposal of waste or introduction/removal or small parts. Chrome-plated latch is easy to engage and forms an airtight seal. Standard location is next to air lock. Dimensions: 8" x 12"

Cat. # **1694-41**



Sloping Bottom with Drainage Valve

Ideal for solvent cleaning and other chemical processing. A platform (either perforated stainless steel or wire grid) provides a level work surface. Chemical spills drain to a reservoir with a convenient drain valve (specify stainless steel, PTFE, polypropylene, or other valve material).

Cat. # **1694-42**

Stainless Steel Automatic RB® (Relief/Bleed) Valve

Cat. # **1606-60**

Safeguards glove box against overpressures. Required for operation with Dual Purge System.

— See page 475

Glove Box Dual Purge™ System

Cat. # **1603-57**

Provides variable-flow purge control to save nitrogen expenses.

— See page 472

NitroWatch® Controller

Cat. # **9500-00A**

NitroWatch® Sensor

Cat. # **9500-02A**

Works in tandem with the Dual Purge System to maintain the selected relative humidity level.

— See page 473

Gas Mixer

Cat. # **2701-00**

Allows precise mixtures of process gases, such as He/N_2 or He/Ar used in package seam welding.

— See page 475

Trace Oxygen Analyzer

	Cat. #
110 VAC, 50/60Hz	**2005-01**
220 VAC, 50Hz	**2005-01-220**

Detects concentration as low as 1 ppm(v).

—See page 476

Nitrogen Generator

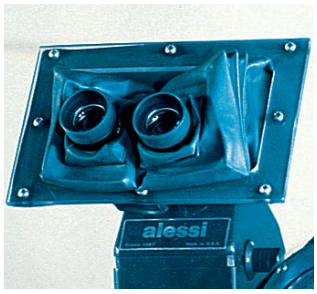
Cat. # **2700-09**

Semiporous micromembrane technology yields 99.9% pure nitrogen to ensure an economical, reliable, uninterrupted gas source

.

—See page 480

GLOVE BOXES & VACUUM CHAMBERS



Bellows Eyepiece Interface
This cut-out is sealed with a bellow-type diaphragm to allow viewing of a stereo microscope positioned inside any of Terra's stainless steel glove boxes. Standard cut-out size is 8"W x 6"H. Specify desired location or custom size when ordering.
Cat. # **1681-53**

Humex™ Humidifier
Cat. # **9081-00**
Humidifies glove box from ambient to 100% RH.
— See page 477

Dry Gas Generator
Cat. # **1603-60**
Integrated system incorporates air compressor and moisture/particle filters to produce a continuous supply of clean, dry air.
— See page 478

Process Gas Heater
Cat. # **4320-00**
Heats process gas up to 350°F for high-temperature testing.
— See page 485

Process Gas Cooler
Cat. # **9450-00**
An economical way to cool process gas down to 10° below ambient.
—See page 486

Dryex™ Gas Dryer
Cat. # **9082-00**
Removes moisture and particulates from compressed air feed.
— See page 479

Refrigeration Module
Cat. #
110 VAC, 50/60Hz **1694-68**
220 VAC, 50Hz **1694-68-220**
Powerful, efficient closed-loop system maintains sub-freezing temperatures inside a glove box
—See page 486

Ionization Module
Provide safe, reliable static neutralization for any glove box enclosure.
—See page 484

Vacuum Control Module
Cat. # **1681-75**
Controls vacuum pump operation to maintain desired vacuum level inside the Series 400 vacuum antechamber or pass-through oven.
—See page 490

Dry Box Gloves and Sleeves

- **Available in a variety of materials to suit your working conditions**
- **Fit standard glove ports in Terra dry boxes, atmospheric chambers**
- **Seamless construction ensures long service life**

Terra offers an expanded line of dry box gloves to meet virtually every application condition to be encountered in the semiconductor, pharmaceuticals, biotech, and many other industries. Once you have selected the glove material for your requirements, choose the appropriate glove size. All gloves fit the standard 8" port size of Terra glove boxes and atmospheric chambers.

Please note these application guidelines (refer to Chemical Compatibility Appendix):

Hypalon offers outstanding resistance to abrasion and to ozone which is a common cause of glove failure in dry boxes. Hypalon also protects against oxidizing chemicals. Its natural softness enhances worker comfort.

Butyl features the highest impermeability to water vapor, gases, and toxic chemicals—including most missile fuels, acids and bases. It also resists swelling and attack by many solvents and oxidizing chemicals, such as simple alcohols, ketones and esters. It lacks the "spring" of natural rubber; many feel that this property reduces hand fatigue. Remains flexible to temperatures as low as -40 °C.

Neoprene offers high tensile strength and flexibility and is ideal for work that requires good sensitivity and dexterity. Neoprene gloves can be strengthened with an outer film of Hypalon.

All gloves are size 9, unless otherwise noted.

Renco

Neoprene Sleeve and Glove Combination

Select one-piece bonded or two-piece sleeve/glove combinations. Two-piece units provide the convenience of quick, easy glove replacement while leaving the sleeves attached to the glove box. Sleeve and glove are joined by a Glove-Under-Sleeve (GUS) connector, which ensures an air-tight, liquid-tight seal and protection against hazardous materials. Sleeves are designed for use on Terra's 8"-diameter glove box ports. Gloves feature a textured grip for improved dexterity. Weight: approx. 3.25 lbs. Length: 30" total (22" sleeve only, tapering to a 4"-diameter cut-off). Sleeve thickness: 0.030" - 0.040". Sleeves include .25" rolled bead.

Renco

Hypalon Sleeve and Glove Combination

Select one-piece fully-dipped glove or two-piece sleeve/glove combinations. Two-piece units provide the convenience of quick, easy glove replacement while leaving the sleeves attached to the glove box. Sleeve and glove are joined by a Glove-Over-Sleeve (GOS) connector, which ensures an air-tight, liquid-tight seal and easy glove changeout. Sleeves are designed for use on Terra's 8"-diameter glove box ports. Weight: approx. 3.25 lbs. Length: 32" total (22" sleeve only, tapering to a 4"-diameter cut-off). Sleeve thickness: 0.015". Sleeves include .19" rolled bead.

Neoprene Gloves

Hand Size	One-Piece Bonded Neoprene Dry Box Glove Cat. #/Pair	Neoprene Gloves 13" long, unlined textured grip Cat. #/Pair	Neoprene Sleeve Sections 22" long Cat. #/Pair
8	**1689-02**	**1670-83**	**1690-91**
9	**1689-03**	**1670-84**	with G.U.S. connectors
10	**1689-04**	**1670-85**	(see above)

Hypalon Gloves

Hand Size	One-Piece Fully-Dipped Hypalon Dry Box Glove Cat. #/Pair	Hypalon Gloves 14" long, unlined textured grip Cat. #/Pair	Hypalon Sleeve Sections 22" long Cat. #/Pair
8	**1671-09**	**1671-05**	**1671-08**
9	**1671-10**	**1671-06**	with G.O.S. connectors
10	**1671-11**	**1671-07**	(see above)

GLOVE BOXES & VACUUM CHAMBERS

Renco
Hypalon-Neoprene Gloves

These gloves combine the flexibility and dexterity of neoprene with Hypalon's exceptional resistance to ozone and chemicals. They thus provide an extra long service life under unusually severe conditions. Their all-white surface ensures good visibility and won't hide contamination. Weight per pair: 3½ lbs.Size: 9. Length: 32".

	Cat. #
Heavyweight (.030 in.)	**1689-33**

Renco
Butyl Sleeve and Glove Combination

Select one-piece fully-dipped or two-piece sleeve/glove combinations. Two-piece units provide the convenience of quick, easy glove replacement while leaving the sleeves attached to the glove box. Sleeve and glove are joined by a Glove-Under-Sleeve (GUS) connector, which ensures an air-tight, liquid-tight seal and optimal protection against potent hazardous materials. Sleeves are designed for use on Terra's 8"-diameter glove box ports. Gloves feature a textured grip for improved dexterity. Weight: approx. 3¼ lbs. Length: 32" total (22" sleeve only, tapering to a 4"-diameter cut-off). Thickness: 0.015" or 0.030".

Renco Butyl Gloves

Hand Size	One-Piece Fully-Dipped Glove Lightweight (.015") Cat. #/Pair	One-Piece Fully-Dipped Glove Heavyweight (.030") Cat. #/Pair	Gloves 14" long 17 mil Cat. #/Pair	Gloves 14" long 32 mil Cat. #/Pair	Sleeve Sections Lightweight (.015") Cat. #/Pair	Sleeve Sections Heavyweight (.030") Cat. #/Pair
8	**1671-01**	**1671-12**	**1670-73**	**1670-78**	**1670-50**	**1670-51**
9	**1671-02**	**1671-13**	**1670-74**	**1670-79**	with G.U.S. connectors (see above)	
10	**1671-03**	**1671-14**	**1670-75**	**1670-80**		

Changeable Latex Sleeve & Glove Combination

These accordion sleeves, made of natural latex, can be used for any size and type of gloves. The economy feature of these sleeves is the convenience of changing different glove sizes and types for different operators or applications without the expense of changing the sleeve itself. The corrugated section keeps the sleeve off the operator's arm for better air circulation and greater comfort. It also prevents collapsing of sleeve around the arm due to the pressure within the dry box. When not in use, natural firmness of the sleeve keeps it inside the dry box and prevents blowback. Order additional latex gloves as described below. Includes mounting clamps.

Specifications

Port Size:	8"
Overall Length:	30"
Glove Thickness:	18 mil
Clamp Weights:	1.9 oz.
Accordion Sleeve Weight:	24 oz.

Glove Size	12" Sleeve Cat. #	24" Sleeve Cat. #
8	**1689-05**	**1681-90**
9	**1689-06**	**1681-91**
10	**1689-07**	**1681-92**

Ansell-Edmont
Heavyweight Latex Gloves

With a 29-mil palm thickness that is 50% thicker than most standard flock-lined gloves, these heavy-duty latex rubber gloves provide unusual durability while maintaining optimum levels of form, fit and function. Latex is naturally more flexible than other glove materials. It fits more smoothly, yet without discomfort. The textured surfaces on the palms and fingers offer excellent gripping capability for wet and slippery objects. Flock lining inside facilitates putting on and taking off.

While protecting sensitive materials from contamination by worker's hand, these high-quality latex gloves also protect hands from cuts, abrasions, and irritating chemicals such as acids, alkalis, salts, ketones, and many others.

Glove Size	13" Sleeve Cat. #
8	**1689-08**
9	**1689-09**
10	**1689-10**

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800 S. Raymond Ave., Fullerton, CA 92831 CA

Glove Box Dual Purge™ System

- **Ensures a constant positive pressure inside glove boxes and other enclosures to block contamination and moisture inflow**
- **Automatically activates high-flow purge in response to pressure drop to ensure fast, effective purge of particles and moisture when an air lock is opened**
- **Operates in tandem with humidity controllers to maintain any desired sub-ambient moisture level (down to 0% RH with the NitroWatch®, or down to 1.0 ppm of water with the DewWatch™)**
- **Guards against pressure damage to chamber doors and seals**

Economizes on nitrogen consumption up to 78%

In most applications, glove boxes must be continuously purged with nitrogen or another process gas in order to ensure a controlled environment free of contaminants and moisture.

Unfortunately, however, a steady gas inflow can't guarantee the clean, dry conditions you require. A flow adequate to maintain a safe internal positive pressure when doors are closed is insufficient to overcome the backflow of outside air that occurs when a door or air lock is opened. A higher-level purge that might guard against this backflow wastes nitrogen and leads to overpressures that warp doors and damage seals.

Variable-Purge Security

The Glove Box Dual Purge System solves these problems. It employs an air pressure sensor to activate high- and low-flow gas purges, and is especially designed for use with Terra's plastic and stainless steel glove boxes.

The pressure sensor in these units indicates pressure drops below a programmable low-pressure threshold. When gas pressure falls below this point, as it does when an access door or air lock is opened, the high-flow purge is activated to quickly and effectively purge any moisture and contaminants that might enter the chamber—before they can affect sensitive materials inside.

When pressure returns above the set point, the high-flow purge continues to purge the chamber for 60 seconds (programmable), and then the low-flow purge is automatically reestablished. The Automatic RB® (Relief/Bleed) Valve, which is required for use with the Dual Purge System, safely relieves excess pressure before it can cause any damage.

The dual-purge capabilities of these units ensure that contaminants and moisture stay outside the processing chamber and at the same time guard against dangerous overpressures that can lead to warped doors, failed seals—even explosions! And because the Dual Purge System delivers only as much gas as is necessary, it economizes on nitrogen consumption; tests show that in many applications, these units can pay for themselves in a matter of months.

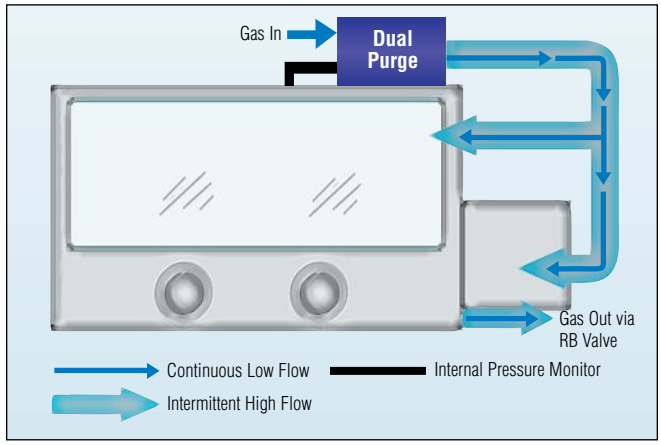
Safety Alarms Ensure Worry-Free Operation

The Dual Purge System incorporates a flowmeter, a line pressure gauge and glove box pressure sensor for easy monitoring of nitrogen flow and pressure. A "Low-Pressure" sensor is activated if the incoming line pressure is ever interrupted. This dual audible/visible alarm alerts you to a disconnected supply line, an empty gas storage pod, or other problem that could spell disaster for contents of a glove box!

Terra Humidity Controllers Expand Capabilities

The Dual Purge System operates in tandem with Terra humidity controllers to provide the most effective moisture control available.

The NitroWatch® includes a humidity sensor that continuously monitors the internal RH level and activates the Dual Purge to automatically maintain any sub-ambient humidity threshold you require (down to 0% RH). For more critical requirements, select the DewWatch, which works with the Dual Purge System to maintain ultra-low dew points (with moisture levels as low as 1.0 ppm by volume). In all of these applications, the Automatic RB® Valve is required to ensure safe relief of overpressures that can build inside a chamber.



Dual Purge™ System: Variable Level Purge

Specifications

Dimensions:	12"W x 11¼"D x 7"H
Weight:	16 lbs.
Flowmeter:	0-20 SCFH
Line Pressure Gauge:	0-60 psi
Chamber Sensor:	0 - .4" WG (factory set at 0.02" WG)
Inlet/Outlet:	¼" (accepts ¼" OD polyethylene tubing)
Case Material:	Stainless steel; brass or stainless steel internal fittings
Power Requirement:	110/220VAC, 50/60Hz (requires no manual power setting)
Timer Adjustment:	0-8 minutes (factory set at 1 minute)

	Cat. #
Dual Purge™ System	**1603-57**
0.2 Micron Filter	**1314-00**

Removes contaminants from gas line; see page 136.

CE

NitroWatch®

For operation with Terra's Dual Purge™ System

Extends shelf lives of stored materials by controlling moisture and moisture-related defects

- **Automatically controls Dual Purge™ System to maintain the desired low relative humidity level (0%RH to ambient) in a glove box or other enclosure**
- **Reduces nitrogen costs by up to 78%**
- **Continuously monitors and displays relative humidity level**
- **Automatically compensates for shifting environmental variables, eliminating guesswork and reliance on supervisory personnel**
- **New miniaturized sensor eliminates dead space inside glove boxes**
- **Easy-program control functions**

CE

Purging a cabinet with nitrogen is an effective way to maintain a low-humidity storage environment. Using a flowmeter to control the nitrogen purge gas, however, causes unnecessary costs!

If you set the gas flow level too high, expensive nitrogen is wasted and cabinet seals are exposed to excessive pressure that could lead to leaks (or even ruptures!). If you set the flow level too low, you may wind up with ineffective contamination and moisture control and expensive component damage. Both problems have cost the semiconductor industry millions of dollars annually, simply because no adequate controller has been available.

Terra Universal's NitroWatch® solves these problems by sensing and displaying the relative humidity of an enclosed environment, such as a desiccator, Faraccator, or glove box. More importantly, it operates with the Dual Purge™ System to precisely control the flow of nitrogen into the enclosure and maintain a preset humidity level.

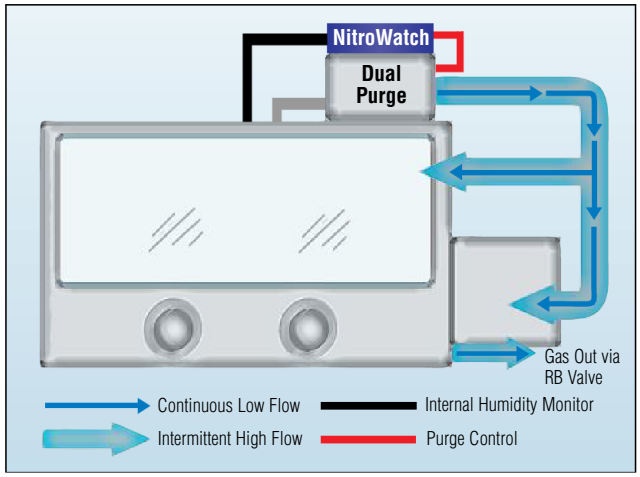
Operation is simple and reliable. Simply program the desired level, and then let the system do its job. The fast-response, capacitive-type sensor detects the relative humidity; the level is indicated on a 4-digit LED display. The NitroWatch® controls Dual Purge System operation to maintain the setpoint level—no matter how often doors are opened, or how large the system is, or what the ambient humidity is, or what time of the day or night. High-flow purges are initiated only when a door is opened or the humidity climbs above the set-point. The moment acceptable conditions are restored, the system returns to low-flow purging.

Additional Savings Through Reduced Nitrogen Waste

Higher quality control and reduced part rejects are two convincing reasons to consider the NitroWatch®. But they aren't the only ones.

Your biggest savings will probably come in reduced nitrogen expenses. Typically, the nitrogen flow in a desiccator cabinet is set at a level high enough to compensate for access to stored parts during working hours; this means that a constant high-level purge is required. Yet in most cases, doors remained closed for over 75% of the time! During off hours, weekends and holidays, unnecessarily high amounts of nitrogen are fed through the system and bled out as waste—even though no flow (or only a very minute flow) may be needed to maintain the appropriate internal humidity and positive pressure. Excess nitrogen bleeding can even endanger worker safety if ambient oxygen levels fall too low.

When you turn out the lights and lock the door, the NitroWatch® will cut out the nitrogen waste. This savings alone in most cases pays for the system within six months. Test data show typical savings of 78% of nitrogen consumption. And you'll be assured that stored components (and your workers) are safe.



NitroWatch®: Humidity Monitor & Control (Dual Purge System, RB valve required)

Space-Saving Sensor

The NItroWatch sensor can be placed nearly anywhere inside a sealed enclosure without interfering with shelves, doors, process equipment, or stored materials. This sensor features miniaturized components that provide better than 3%RH accuracy over the 10%-90%RH range. Further, it never requires calibration.

The NitroWatch® controller comes complete with all necessary controls for monitoring the relative humidity level. For automatic humidity control, the unit must be connected to Terra's Dual Purge System (see separate description, page 472). Order the NitroWatch® Sensor separately (see below).

Specifications

Controller

Dimensions:	11"W x 6½"D x 3"H
Weight:	4.42 lbs.
Power:	12 VDC (provided by Dual Purge™ System)
Case Material:	Stainless Steel
Output:	0-5 V
Measuring Range:	0-100%RH
Display Resolution:	±.1%RH
Temperature Dependence:	±.04%RH/°C

Sensor

Dimensions:	1½" x ¾" x 4"
Weight:	3 ozs.
Measuring Range:	0-100%RH
Accuracy (at 20°C):	± 3%RH
Housing Material:	Stainless Steel
Calibration:	None required.

	Cat. #
NitroWatch® Controller	**9500-00A**
NitroWatch® Sensor	**9500-02A**

(One required per enclosure)

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DewWatch™ Hygrometer

- **Monitors and displays dew/frost point between -80 and +20 degrees C on LED readout**
- **Features extreme sensitivity—measures moisture volumes from 0.5 PPM to 23,000 PPM**
- **Mounts in dry boxes and other hermetically sealed enclosures for accurate in-place moisture monitoring and control**
- **Interfaces with Terra's Dual Purge System for completely automatic nitrogen purging**
- **Panel mountable for continuous monitoring of cleanrooms and other controlled areas**
- **Takes the guesswork out of moisture control while saving on nitrogen consumption!**

No one has the time to attend to all of the factors involved in maintaining the desired humidity conditions inside an enclosed environment. Therefore, you need a nitrogen control system that will automatically regulate the gas purge to compensate for such operating variables as the size and condition of the chamber, the frequency and duration of access, and changing ambient humidity levels.

The DewWatch™ meets these monitoring/control requirements—economically and reliably.

Maintains Consistent, Traceable Glove Box Environment—Automatically

The extreme sensitivity and precision of the DewWatch™ makes it suitable for your most demanding applications. It operates over the -80 to +20 degree C dew point range, which is equivalent to 0.5 PPM_V to 23,000 PPM_V in gases at 1 atmosphere.

In glove box applications, the DewWatch™ performs a dual function. The LED display provides a continuous readout of the dew/frost point inside the chamber in whichever scale range you order (see specifications below). More importantly, it operates with the Dual Purge™ System to precisely control the flow of nitrogen into the enclosure and maintain a preset dew point.

Simple, Reliable Operation

All you have to do is find out from your supplier or process engineer exactly what dew point you need to maintain, set the desired level, interface the unit with Terra's Dual Purge™ System and then let it do its job. The unit's quick response sensor, when properly installed inside the chamber, will deliver a quick readout of the internal dew point. The controller will allow the Dual Purge™ System to adjust the nitrogen flow to maintain this desired dew point within 2 degrees C (3 degrees C in the -80 to -65 degree C range) no matter how operating or ambient conditions may change.

Special Design Features for Versatile Applications

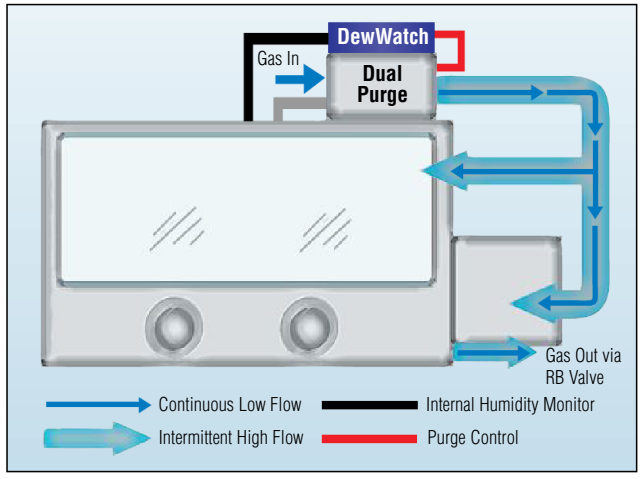
Each DewWatch™ unit is individually calibrated and consists of a control unit and a humidity sensor (order separately).

Specifications

Electronics

Standard Dew/Frost Point Range:	-80°C to +20°C
Power:	120VAC, 50/60Hz
Operating Temp:	0°C to +60°C
Storage Temp.:	-30°C to +70°C
Warm-up Time:	3 min.
Output:	0 to 20mA, 4 to 20mA, 0 to 100mV, 0 to 2V
Case:	General purpose, panel mount, RF shielded
Dimension:	11"W x 6.5"D x 3"H
Weight:	1.65 lbs. (0.75 kg)

CE



DewWatch™: Humidity Monitor & Control (Dual Purge System, RB valve required)

Moisture Probe (order separately)

Type:	Aluminum Oxide Moisture Sensor Element
Calibrated Range:	-80°C to +20°C
Pressure Rating:	5000 psig
Operating Temp.:	-110°C to +70°C
Storage Temp.:	+70°C max.
Flow Rate:	10,000 cm/sec. linear velocity max. in gas phase.
Calibration Accuracy:	± 2°C in range of -65°C to +20°C, ± 3°C in range of -80°C to -65°C
Calibration Data:	On EPROM

DewWatch™ Controller Unit

(Includes LCD meter, recorder output in mA or mV, one Form C alarm relay, calibration EPROM, and User's Manual)

	Cat. #
110 VAC, 50/60Hz	**1401-07**
220 VAC, 50/60Hz	**1401-07-220**

DewWatch™ Sensor Probe — **1401-12**

(includes 5' cable and connector)

Trace Gas Mixer

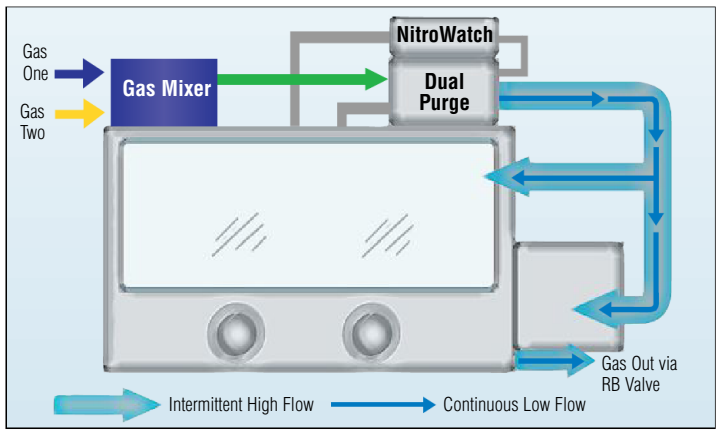
- **Assures accurate gas mixtures, including the 90% nitrogen/10% helium mixture used in hybrid packaging**
- **Regulates constant, correct flows**
- **Aids in leak detection**
- **Easy to install**
- **Adaptable to most atmospheric chambers**

CE

This Trace Gas Mixer assures the accurate nitrogen/helium mixtures commonly required in the preparation of hybrid and other microelectronic component packages.

It is designed to operate in conjunction with resistance and seam welders in a dry-box environment or a vacuum leak detector. By backfilling a carefully regulated 10% helium mixture into each component package, the Trace Gas Mixer aids in subsequent leak detection and guarantees the integrity of your products. After sealing a package, you simply place it in a vacuum leak detector and check for helium traces.

Other gas mixers commonly regulate line pressure only, and resulting pressure differentials frequently cause back-ups that lead to imprecise gas mixtures and can damage equipment. Because this mixer regulates both line pressure and flow pressure, it assures that you get the precise mixture you bargained for. Its compact, lightweight design lets you easily adapt this unit to most operations in atmospheric chambers. No power required. Dimensions: 7"H x 12"W x 11¼"D. Weight: 12 lbs.



Typical application with NitroWatch/DualPurge humidity controllers (not included)

Trace Gas Mixer

Flow Range (SCFH)	Cat. #	Flow Range (SCFH)	Cat. #
2-20 and 2-20	**2701-00**	5-50 and 5-50	**2703-00**
2-20 and 5-50	**2702-00**	5-50 and 10-100	**2704-00**

Automatic RB® (Relief/Bleed) Valve

- **Continuously bleeds off excess internal gas to maintain a safe positive pressure inside glove boxes**
- **Variable release mechanism automatically discharges any sudden surge of incoming gas**
- **Protects against accidental negative pressure by functioning as a check valve**
- **Extends life of doors and gaskets**
- **100% reliable, noncontaminating and maintenance-free!**

CE

The Automatic RB® Valve ensures a safe, continuous positive pressure in Terra Universal glove boxes, desiccators, and other purged enclosures.

In provides three crucial functions. During normal operation, it allows a continuous low-level release of gas to maintain a safe internal positive pressure. In the event of a sudden increase in the incoming gas supply, it automatically opens to relieve the high pressure. Finally, it functions as a check valve to ensure that air and contaminants cannot enter the enclosure in the event of a momentary negative pressure.

Most important, it provides operator peace of mind. Its field-proven reliability guarantees that your cabinets maintain a safe positive pressure, even when subjected to a high-flow of purge gas. It also safeguards your investment in a processing chamber by preserving doors and seals.

Miniaturized Design for Series 100, 500 and 600 Glove Boxes

Select this model for use in Terra's Series 100 polymer glove boxes. The compact size makes it ideal for mounting either internally or externally. The styrene-acrylonitrile resin (SAN) body resists a wide range of process gases and chemicals.

For Stainless Steel Enclosures

	Cat. #
⅝" x 1" x 1⅛"	**1606-60**

For Polymer Enclosures

	Cat. #
7/16" W x 7/16" D X 1½" H	**1600-60B**

For effective pressure relief select one valve per air lock and two valves per glove box (up to 45 cu. ft.)

Stainless Steel Design for Series 300 and 400 Glove Boxes

Terra's stainless steel Automatic RB® Valve is designed for use in stainless steel glove boxes (Series 300 and 400). It incorporates a Teflon® valve mechanism that allows a higher rate of gas release, allowing a single valve to safely exhaust any chamber size.

Both models come with all necessary mounting hardware. Installation is included if ordered with glove box.

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Trace Oxygen Analyzer

- **Perfect for high-precision oxygen detection inside a glove box or other enclosure**
- **Long-life zirconium-oxide sensor provides ppm-precision and a rapid response time for increased productivity**
- **Includes control module, sensor, and sample pump in one compact housing**
- **Features auto range or fixed range scales for operational versatility**

This Trace Oxygen Analyzer provides continuous, highly precise monitoring of glove box oxygen concentrations, making it ideal for applications in which even minute concentrations of oxygen can degrade parts.

All-In-One Housing Simplifies Connection and Operation

The control housing contains everything needed for operation: the electronics module, the sensor, the sample cell, and a high-purity pump that draws sample gas from the glove box for analysis.

The compact electronics module is a user-friendly, microprocessor-controlled oxygen analyzer. It includes an LED digital display that indicates oxygen concentration and color-coded LEDs that indicate system status (see specifications below). The unit's auto ranging function selects among five scales, or a fixed range can be specified. Alarms indicate system fault (such as when a scale limit has been exceeded) as well as sensor heater status.

Rapid-Response Sensor Boosts Productivity

The solid-state zirconium-oxide sensor delivers high-precision readings—down to 0.1 ppm oxygen by volume. Because it uses a non-depleting technology, it operates up to ten times longer than electrochemical cells.

It is mounted in a sample cell, where gas from the glove box is drawn for analysis. The cell is constructed of a ceramic tube with a platinum coating on the inside and outside. At 725°C, oxygen is electrochemically reduced at the cathode. The voltage produced is proportional to the net difference between the partial pressure of oxygen in the reference gas and that of oxygen in the sampled gas. The unique design results in a sensor that has a wide measurement range: 100% to ppm oxygen concentrations. Its extreme responsiveness enables it to adjust from ambient to ppm O_2 in a matter of minutes. You save not only in set-up time but also in process gas expenses.

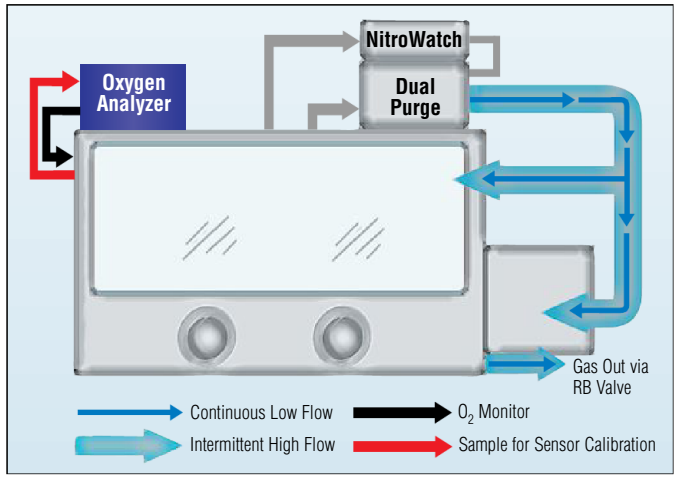
Fast, Easy Calibration

A ⅛" compression fitting on the rear housing allows connection of the sample line to the glove box. A second port can be used to calibrate the sensor using air or other gas of a known oxygen concentration. Generally, high-precision applications require a calibration span gas with a concentration of 80% of the mean reading for optimal accuracy (e.g., 8 ppm O_2 when working with concentrations in the 1 - 10 ppm range). Calibration is the only maintenance typically required.

A high-purity pump draws oxygen samples from the glove box or calibration gas source. It features a stainless steel head, Teflon diaphragm, and Viton seals to ensure non-contaminating operation.

Specifications

Sensor	Rapid-response zirconium-oxide sensor
Measurement Range	0 - 10 ppm / 0 - 100 ppm / 0 - 1000 ppm / 0 - 10,000 ppm / 0 -100%, Auto range or fixed range
Display	0.75" (19.05mm) LED digital display; color-coded LEDs for system status. Alarms 1 & 2: red = system fault; yellow = OK; and green = online
Response Time	< 10 seconds to ppm from air, < 15 seconds to 50 ppm from air @ 1 LPM flow
Warm-Up Time	20 minutes (approx.) to reach thermal equilibrium with ambient temperature
Intrinsic Error (accuracy)	At constant temperature pressure: 2% full scale range Over operating temperature range: 5% full scale range
Operating Temperature	5 - 40°C



Typical application with NitroWatch/DualPurge humidity controllers (not included)

Humidity	0 - 95% non-condensing
Signal Interface	RS-232 service port, 4 - 20 mA negative ground, 0 - 10 VDC range ID and choice of 0 - 1 VDC or 0 - 5 VDC or 0 -10 VDC analog oxygen signal
Alarm Outputs	Two alarms with adjustable form C relay outputs. Configurable for fail-safe or fail-alarm mode, ascending or descending trip. One system fault relay (measurement exceeds selected scale). One alarm/relay for sensor heater OK. Status LEDs for each alarm.
Sample Port	⅛" compression fittings on rear of housing
Power	5 watts at 115/230 VAC 50/60 Hz, single phase or 12 - 30 VDC (battery backup capability)
Environmental Rating	Faceplate: NEMA type 4, IP66 (analyzer module)
Sample Flow	2 - 4 SLPM (standard liters/min.) in a typical glove box application with minimal positive pressure
Pump Materials	316 SS/Teflon-coated neoprene
Housing	304 stainless steel
Dimensions:	8" W x 12 "D x 12"H
Weight:	7.5 lbs.

Trace Oxygen Analyzer Cat. #
Includes connection to specified glove box.

110VAC, 50/60Hz	**2005-01**
220VAC, 50Hz	**2005-01-220**

Humex™ Automatic Humidifier

- **Humidifies process gases (such as air or nitrogen) to produce precisely controlled moisture levels between ambient and 100%RH in a processing chamber**
- **Includes humidity sensor and automated controller with %RH display for continuous humidity monitoring**
- **Operates with flow rates up to 170 CFH (higher-capacity models also available)**
- **Can be used with a Dryex™ or Nitrogen Generator to alternate low- and high-humidity conditions**
- **Ideal for conducting failure tests on moisture-sensitive components in a processing chamber**

The Humex™ Automatic Humidifier allows controlled moisture testing in an atmospheric chamber. It is ideal for determining failure rates of materials in many industries, from microelectronics to pharmaceuticals to cosmetics.

All-In-One Design Simplifies Operation

The Humex controller module houses all the components necessary for maintaining a pre-set moisture level in a remote processing chamber. To begin operation, you simply determine the desired humidity setpoint for your processing chamber by adjusting the control knob on the front panel; a 3½-digit LCD display indicates this humidity setpoint for easy reference.

During operation, steam generated through controlled heating of water from an internal reservoir is routed to a gas supply line and then on to a process chamber (not included). There, the Humex fast-response, capacitive-type sensor detects the relative humidity level and feeds this information back to the Humex display to allow continuous chamber monitoring. The moment the humidity level falls below the user-defined setpoint, additional steam is generated and directed into the incoming gas line. When the setpoint is reached, the water supply to the heating element is shut off to halt steam generation. Automatic water level controls inside the water reservoir ensure a safe water level, and overtemperature protection maintains safe heat and vapor pressure.

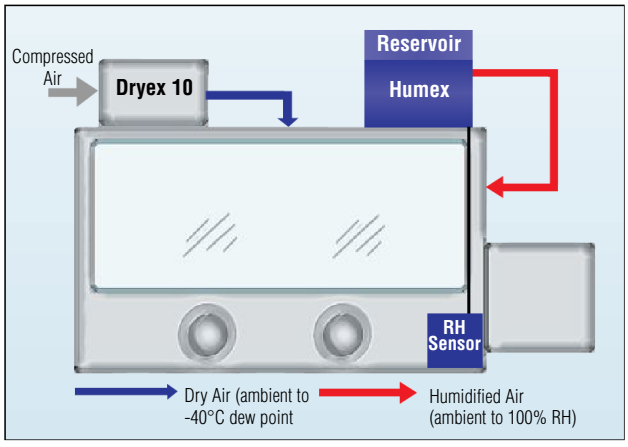
Select a model for 110VAC or 220VAC operation. The system includes a stainless steel housing containing a heating unit, stainless steel water reservoir with automatic water level controls, an automatic humidity controller, and a 3½-digit LCD display. Order the fast-response humidity sensor separately (see specifications and ordering information below). A ⅜" stainless steel bulkhead fitting allows connection of a process gas line.

Note: For ordering information on Terra's stainless steel atmospheric chambers, see descriptions beginning on page 455.

Specifications

Dimensions:	16½"W x 10"D x 13½"H
Weight:	27 lbs.
Case Material:	Stainless steel
Incoming Flow:	1500 SCFH (max.)
Measuring Range:	0-100% RH
Display Resolution:	± .1% RH
Sensor:	Fast-response, capacitive type
Sensor Dimensions:	½" dia. x 2¾"L
Sensor Accuracy:	± 3% @ 20°C
Sensor Housing:	ABS plastic
Calibration:	None required; capacitive sensor pickup should be replaced every five years under normal use (see ordering information below)

High-capacity models available for humidifying a large work area—call TUI



Typical application with Dryex 10 (not included)

	Cat.#
Humex™ Automatic Humidifier	
110VAC, 50/60Hz	**9081-00**
220VAC, 50Hz	**9081-01**
Humex™ Humidity Sensor Includes installation in TUI processing chamber	**9500-02A**
Replacement Sensor Pickup Plug-in/plug-out design; should be replaced every 5 years.	**1000-92A**

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800 S. Raymond Ave., Fullerton, CA 92831 CA

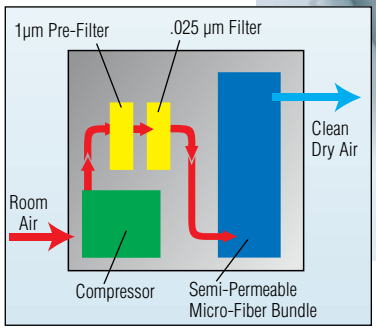
Dry Gas Generator

- **Everything you need to produce a reliable, continuous clean, dry air supply**
- **Fully integrated system incorporates low-maintenance compressor, filters and hollow membrane separation module**
- **Provides up to 75 SCFH of dry air (less than 5% RH)**
- **Dual prefilters remove particles down to 0.025µm**
- **Ideal for use as a dry air source for glove boxes and other process environments**

The Dry Gas Generator provides an economical flow of clean, dry air (or other process gas) for use in a wide range of processing, testing and calibration procedures.

Reliable, Low-Maintenance Membrane Technology

The core of the system is a hollow-membrane module that separates water vapor and other impurities from a gas stream, yielding a final product gas of less than 5% RH.



This highly reliable module contains no moving parts and never needs maintenance. It consists of bundles of hollow fiber, semipermeable membranes, each of which has a perfectly circular cross-section and uniform core. This uniform wall thickness of each fiber contributes to the physical strength of each membrane. As the air stream is forced through the filter fibers, the heavier-weight water molecules are separated from the gas and bled off through water traps.

An integral air compressor provides the pressure necessary to ensure effective drying. Operating virtually noise-free (45dbA), this vibration-free unit feeds air to a one-gallon reservoir, ensuring a constant product gas flow up to 75 SCFH (at 90 psi). An automatic safety valve protects against overpressures.

The system feeds compressed gas through two filters before passing it into the membrane module. The first of these, rated for one-micron absolute filtration, features dual glass coalescing micro-fiber filter beds that remove 100% of water droplets and 70% of oil aerosols. The final coalescing filter is rated 99.999+% efficient at oil removal, with absolute filtration at 0.025µm particles (nominal filtration @ 0.010µm particles). Both filters include an internal drain and differential pressure alarm to signal the need for replacement.

The unit includes a flowmeter (2 - 20 SCFH), pressure regulator and gauge (0 - 160 psi), and dual chrome-plated carrying handles. **Note:** for use with a process gas other than air, an inlet connection must be provided. Specify when ordering.

Specifications

Dimensions:	18 1/4"W x 18 1/4"D x 17"H (excluding hardware)
Weight:	95 lbs.
Flow:	20 SCFH @ 90 psi (yields typical RH less than 5%)
Compressor:	12 mbar pressure rating; operates at 45 dbA
Prefilter:	One-micron absolute filtration
Final Filter:	99.999+ efficient oil removal; absolute filtration @ 0.025µm particles
Moisture Filter:	Semipermeable hollow fiber bundle
Utilities: Electrical:	110/220VAC, 50/60Hz
Gas - inlet:	No inlet connection necessary for air service; 1/2" NPT inlet can be used for inert gas service (specify when ordering)
Gas - outlet:	Quick connect/disconnect for 1/4" gas tubing

	110VAC/60Hz Cat. #	220VAC/50Hz Cat. #
Dry Gas Generator	**1603-60**	**1603-61**
Replacement Filters		
1µm Prefilter		**9082-03**
0.025µm Coalescing Filter		**9082-02**

Comparative Guide to Terra Gas Dryers

Product	Cat. Page	Design Type	Outlet Flow Capacity	Service Requirement	Prefilters included	Overall Dimensions (W x D x H inches)	Recommended Application
Nitrogen Generator	480	Membrane	0-600 SCFH (see performance chart, pg 481)	Air Compressor (#9505-47, pg 482)	Yes (micro-fiber & coalescing)	16 1/16 x 14 1/4 x 67 5/16	Glove boxes, desiccators & N_2-based process equipment in labs where N_2 is preferable to dry air
Dryex™ 10 Gas Dryer	479	Membrane	54-105 SCFH (see performance chart, pg 479)	Air Compressor (#9505-43, pg 482)	Yes (micro-fiber & coalescing)	16 x 7 1/4 x 6 1/2	Low-humidity applications (in glove boxes or desiccators) where clean, dry air is acceptable
Dryex™ 80 Gas Dryer	479	Membrane	420-900 SCFH (see performance chart, pg 479)	Air Compressor (#9505-43, pg 482)	Yes (micro-fiber & coalescing)	15 x 13 x 42	Low-humidity applications (in glove boxes or desiccators) where clean, dry air is acceptable
Dry Gas Generator	478	Membrane	20 SCFH @ 90PSI	110/220VAC (built-in compressor)	Yes (micro-fiber & coalescing)	18 1/4 x 18 1/4 x 17	Low-humidity applications (in glove boxes or desiccators) where clean, dry air is acceptable and no compressed air feed is available

Dryex™ Gas Dryer

- **Efficient membrane separation design never needs regenerating (unlike desiccant dryers)**
- **Gives you control over outlet flow and dew point**
- **Low-maintenance, light-weight, compact design includes no moving parts**
- **Requires no electrical service—simply connect to a compressed air feed line and it's ready for operation**
- **Ideal source for purge gas in moisture-sensitive storage and processing applications**
- **Choose between two models to meet your outlet flow requirements**

The Dryex™ Gas Dryer is designed to provide reliable gas drying without the hassle and expense associated with desiccant drying systems.

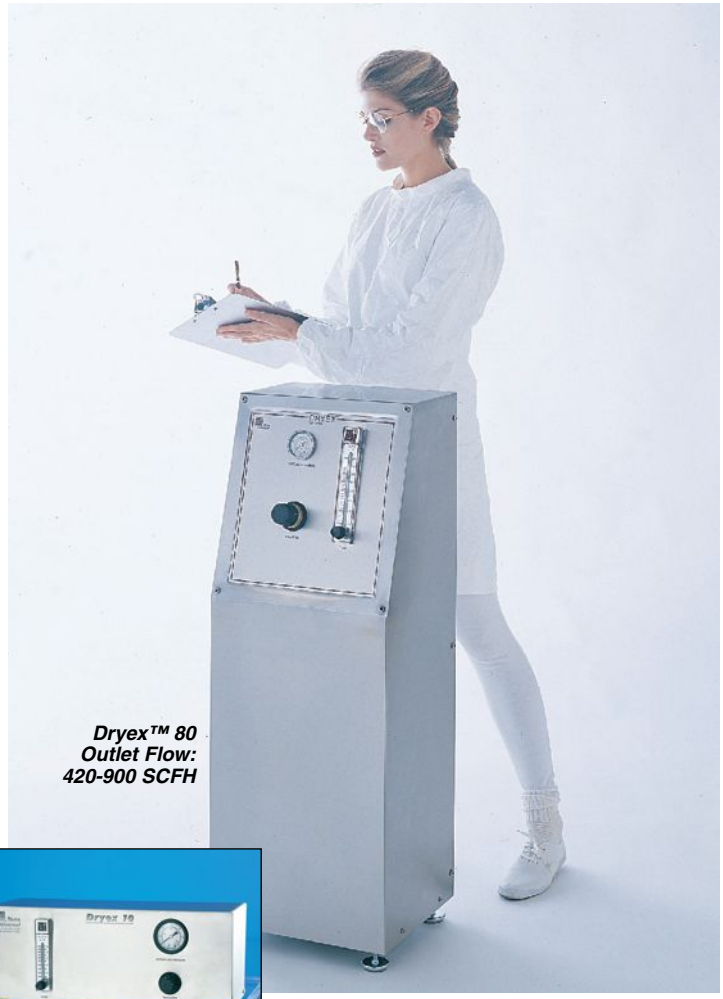
Complete Product Control

It relies on membrane-separation technology to remove moisture from an air stream. This simple but highly reliable design gives you complete control over humidity removal—merely by regulating the flow of air into the Dryex, you can precisely determine the humidity of the air output (see the performance graph). Because this technology requires no moving parts and consumes no energy, it is surprisingly economical to operate and maintain—the main expense is the energy required to provide a stream of compressed feed air.

Each system contains a gas pressure regulator, control valves and instruments, a coalescing filter and carbon filter (which remove oil vapors and particles from the feed line), and the moisture membrane module.

The membrane module consists of bundles of hollow fiber, semipermeable membranes, each of which has a perfectly circular cross-section and uniform core. This uniform wall thickness of each fiber contributes to the physical strength of each membrane. Because the fibers are so small, many can be packed into a limited space, providing an extremely large membrane surface area that can produce a relatively high volume product stream.

Compressed air is introduced into the center of the fibers at one end of the module and contacts the membrane as it flows down the fiber core. Water vapor passes through the outside of the fibers and is discharged as a by-product. The clean, dry air emerges at atmospheric pressure ready to use.



Dryex™ 80 Outlet Flow: 420-900 SCFH

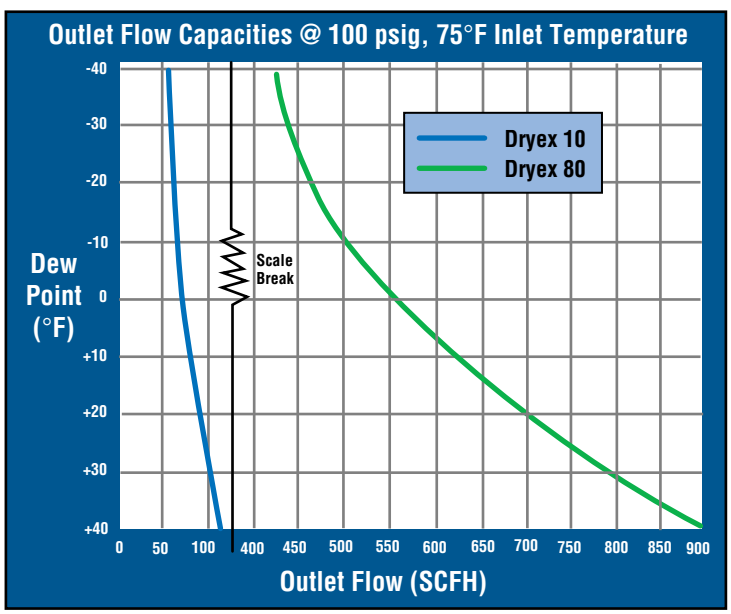
Dryex™ 10 Outlet Flow: 54-105 SCFH

CE

Easy to Set Up and Maintain

This compact, light-weight design lets you move the Dryex anywhere you have a compressed air feed line. Because the heart of the system, the membrane module, contains no moving parts, it requires no maintenance. The only attention the Dryex typically requires is an occasional change of the coalescing filter element, an easy operation completed in seconds.

Each Dryex unit includes a stainless steel case housing the membrane filter, a charcoal particle filter, a coalescing filter, regulator, pressure gauge, and stainless steel compression fittings for connection of incoming and outgoing air.



Specifications	Dryex™ 80	Dryex™10
	Cat. # **9082-00**	Cat. # **9082-01**
Overall Dimensions:	15"W x 13"D x 42"H	16"W x 7¼"D x 6½"H
Weight:	55 lbs.	11 lbs.
Feed Air Pressure:	60-200 PSIG	60 - 200 PSIG
Outlet Flow @100psig:	420 - 900 SCFH	54 - 105 SCFH
Feed Air Temperature:	40°F to 150°F (75°F recommended)	
Utilities Requirement:	Electricity required only for user-supplier air compressor/conditioner (see page 482)	

Replacement Filters		Cat. #
For Dryex 80:	1-micron Prefilter	**9082-03**
	0.025-micron Coalescing Filter	**9082-02**
For Dryex 10:	93% Prefilter	**9082-06**
	99.99% Prefilter	**9082-04**

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Nitrogen Generator

- **State-of-the-art membrane separation technology produces dry nitrogen up to 99.9% pure**
- **Eliminates drawbacks of conventional nitrogen sources—gives you control of rate and purity of nitrogen production**
- **Delivers gas flows up to 600 SCFH or more depending on nitrogen purity requirements (even higher flows possible if only dryness is desired)**
- **Compact, lightweight design allows set-up wherever there's a compressed air supply**
- **Ideal for the complete range of cleanroom applications—from glove boxes to automatic storage systems**
- **Simplicity of field-proven design ensures completely reliable, economical operation, virtually eliminates maintenance**

This Nitrogen Generator represents a series of advances by the world leader in hollow-fiber membrane technology used in the first artificial kidney. It gives you complete control of the production of nitrogen for use in a wide range of cleanroom applications—and in most cases quickly pays for itself.

State-of-the-Art and State-of-the-Budget

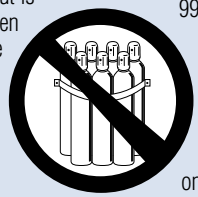
A nitrogen membrane provides a low-cost, highly efficient means of separating air into its component gases. Because this technology requires no moving parts and consumes relatively little energy, it is surprisingly economical to operate and maintain—the main expense is the energy required to provide a stream of compressed feed air. Each system contains gas pressure control valves and instruments, a coalescing filter and carbon filter (which removes particles and liquid vapors from the feed line), and the nitrogen membrane module.

The membrane module consists of bundles of hollow fiber, semipermeable membranes. Each fiber has a perfectly circular cross-section and a uniform core through its center. The wall thickness of each fiber is thus consistent, which contributes to the physical strength of each membrane. Because the fibers are so small (about the diameter of a human hair), a great many can be packed into a limited space, providing an extremely large membrane surface area that can produce a relatively high volume product stream.

On-Site Nitrogen Generation: The Practical, Reliable Alternative

For more and more manufacturers, on-site nitrogen membrane separation has become a preferable alternative to conventional sources of purified nitrogen (whether in liquid customer stations or nitrogen cylinders).

High-volume suppliers of purified nitrogen typically rely on the cryogenic distillation process, which provides excellent purity levels (99.99+%) but is energy intensive and hence inherently expensive. For occasional nitrogen requirements that demand ultra-high purity, these sources remain the most economical; but for many other applications—including most high-volume storage situations—non-cryogenic generation on-site makes better sense.



Optimal Source of Purge Gas for Glove Boxes, Desiccators, and Other Enclosures

Membrane systems can be sized to deliver as little as 100 SCFH efficiently and economically, and in most cases lead to significant savings, even when high purity levels are necessary.

For nitrogen-purged storage and process systems with automatic humidity controls (like Terra desiccators, glove boxes and automated stockers), this purity level may not even be necessary. Terra systems automatically regulate the nitrogen purge to maintain the most critical humidity levels typically required, which can generally be achieved with purity levels below the 99.99% you are currently paying for.

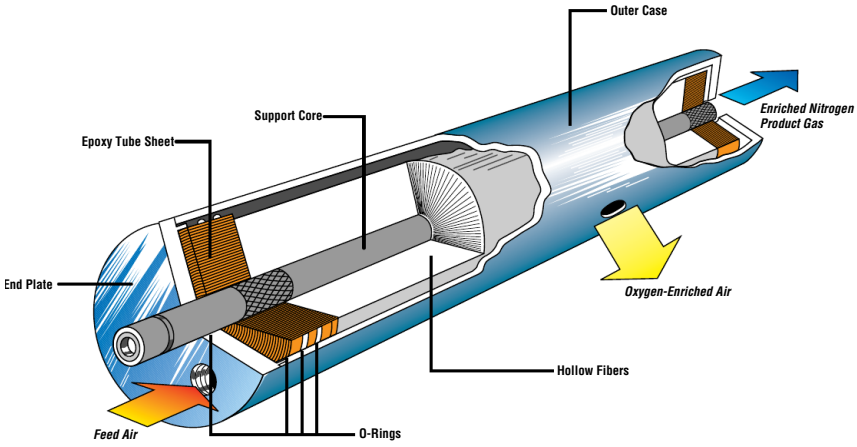
Long-Term Stability, Complete Supply Control

These membrane nitrogen separators provide additional savings—and greater convenience—by eliminating the need to rent tanks and pay for delivery services. Of course, they also free you from price increases on the part of your nitrogen distributor. Once your system is installed, you pay only minimal electricity expenses: your gas costs remain completely predictable.

And your supply remains secure. You'll never need to worry about overbuying to compensate for tight supplies or delivery disruptions.

The hollow fibers are assembled parallel to a central core tube, and the bundle is inserted into an outer case to form the air separation module. Compressed air is introduced into the center of the fibers at one end of the module and contacts the membrane as it flows down to fiber bores. Oxygen, water vapor and other "fast gases" pass through the outside of the fibers. The oxygen-rich gas stream then flows through the fiber bundle to the periphery of the case, where it is discharged as a by-product.

While all but a small fraction of the oxygen passes through the membrane material to the exterior of the hollow fibers, most of the nitrogen present in the feed air is contained within the hollow fiber membrane. Since water vapor passes through the membrane along with the oxygen, this nitrogen product is essentially moisture-free. The nitrogen stream emerges at a pressure slightly below that of the feed air pressure.



Design Simplicity Means Easy, Reliable Operation

Because the heart of the system, the membrane module, contains no moving parts, it requires no maintenance. The only attention a system typically needs is an occasional recalibration of the oxygen analyzer and filter change. Even if one module's performance should drop below purity specifications, it can simply be valved off until it can be repaired or replaced.

Complete Product Control

The purity of nitrogen, flow rate of the gas, and feed air temperature and pressure all affect the performance of the membrane separation system. By altering these variables, you can deliver nitrogen with precisely the right purity and flow for your applications.

Nitrogen purity can be regulated (up to a maximum of 99.9%) by adjusting the input air pressure and temperature. In most cases, the greatest system efficiency is achieved at purities of 95-99%, levels adequate for most cleanroom applications. See Figure 1.

The **flow rate** of the enriched nitrogen product is a function of the purity required. The higher the nitrogen purity required, the lower the flow rate produced, assuming constant feed air temperature and pressure. To produce a higher purity nitrogen product, more oxygen must permeate the membrane. You increase oxygen permeation by increasing the pressure difference across the membrane. This transports more gas, including more of the total oxygen content of the feed air, through the membrane. With more oxygen permeating the membrane, the oxygen level in the nitrogen product gas is reduced and purity improved.

Feed air temperature also affects the performance of the system. The higher the feed air temperature, the higher the feed air flow rate required, assuming constant air pressure and nitrogen purity. As feed air temperature rises, the membrane permeability increases, requiring an increased feed air flow rate to maintain product flow. However, feed air temperature also affects the membrane material. High feed air temperature shortens the life of the membrane. See Figure 2 for the relationship between feed air temperature and flow rate.

When the feed air temperature increases, the feed air flow required rapidly escalates. Therefore, the system must be designed to provide required feed air flow rate of the maximum anticipated feed air temperature, or an air conditioner must be used to control the feed air temperature.

Dew point is the temperature at which a given mixture of water vapor and gas is saturated. The dew point and trace contaminants of the nitrogen-enriched product gas are dependent on the water level and quality of the feed air. Operating in the purity range of 95-99% nitrogen, saturated feed air results in a product gas that contains less than 5 ppm water, depending on feed air conditions. The atmospheric dew point equivalent is -65°C (-85°F).

Water level in the feed gas is dependent on temperature and pressure. Therefore, if the feed air pressure is reduced, the dew point of the product may increase. If the temperature is increased, the feed dew point increases and the product stream dew point increases. Changes in dew point are minimized by using a refrigerated air dryer to condition the feed air.

Carbon dioxide in the product stream is typically less than .01% operating at 99% nitrogen, 135 psig and 25°C, based on feed air containing .03% carbon dioxide.

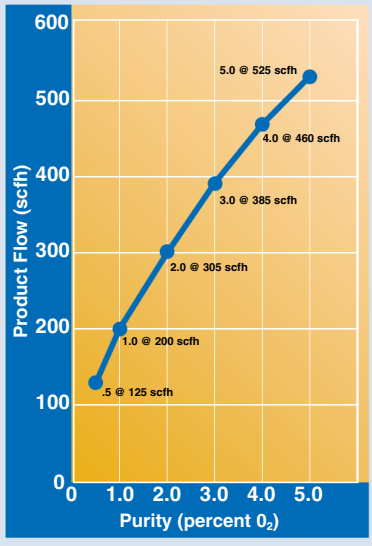


Figure 1
Purity vs. Product Flow Through Nitrogen Generator (25°C, 135 psig operation)

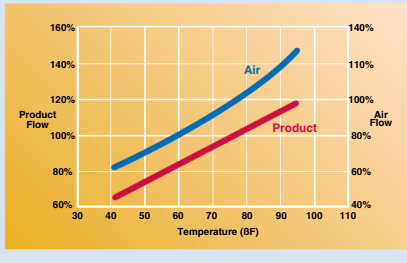
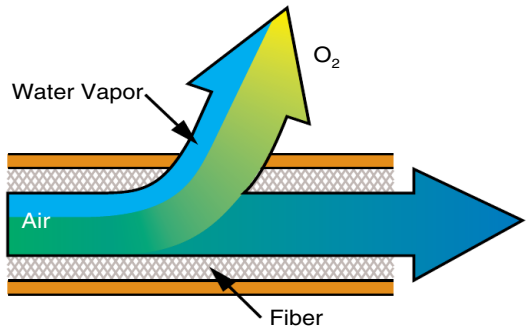


Figure 2
Temperature vs. Product Flow

Once the system is set up, you simply switch to START and push the RESET button to open the feed valve. After about three minutes, when gas purity levels are met, a product valve opens to deliver the nitrogen gas to your process line.

Each Nitrogen Generator consists of a membrane module, controls and instrumentation, and coalescing filters and traps to remove oil and liquids, organic contaminants, and other particulates from the feed air. Installation merely requires piping compressed air to the system, piping the nitrogen and oxygen-rich streams to their destinations, and calibrating the system's oxygen analyzer from time to time. Order Terra's oil-less clean air compressor separately (see ordering information, below).



Specifications

Note: These are typical values for the most common models. Specialized systems can be tailor-made to suit individual applications with Terra's Auto-Strat Desiccators, desiccators, or other nitrogen-based systems; specifications for these customized systems will vary.

Dimensions:	$16\frac{1}{16}$"W x $14\frac{1}{4}$"D x $67\frac{5}{16}$"H
Weight:	161 lbs. (185 lbs. with crate)
Feed Air Pressure:	140 PSIG max.
Feed Air Flow:	200-600 SCFH
Permeate Back Pressure:	0.5 PSIG max.
Feed Air Temperature:	40°F min./120°F max. (75°F recommended)
Feed Air Hydrocarbon Content:	0.1 PPM (C5 Hydrocarbons or higher)
Feed Air Moisture Content:	Max. saturated 90%
Feed Air Particulate:	.01 micron max.

Product Nitrogen Purity:	Up to 99.90%
Product Nitrogen Pressure:	Up to 110 psig
Electrical Requirements:	Required only for user-supplied air compressor

	Cat. #
Nitrogen Generator (200-600 SCFH)	**2700-09**
Replacement Filters	
1-µm Filter	**2701-09**
0.025µm Coalescing Filter	**2701-10**

Oil-less Scroll Compressors

- **Coolest oil-less compressors on the market**
- **Operate with virtually vibration-free, with very low noise level (49 dba)**
- **Design simplicity yields reliability and durability**
- **Inlet cartridge filters 99% of incoming particulates**

These oil-less scroll compressors offer very low noise levels, virtually vibration-free operation, and maintenance-free performance.

Their simple design, with only two moving parts, assures reliability and durability. An integral cooling fan keeps operating temperature low, extending the life for bearings and seals. The self-lubricating, long-life tip seal enables the compressor to operate efficiently without oil and expensive filtration. The dry type inlet filter ensures that air enters the unit 99% particulate-free. Air delivery is continuous with only slight pressure pulsations. Other standard features include: motor overload protection, an hourmeter, an air pressure gauge and a high-temperature switch that shuts the unit down when an unusually high temperature in the air end is detected. Compressors are available as single-phase, 230V models or as three-phase, 208V/230V/460V models, with either 3 or 5 HP. Standard models come with air-cooled aftercooler, run hour meter, power-on light, run light and high-temperature light.

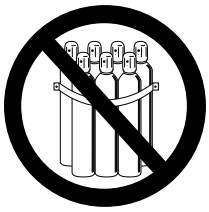
Specifications	**3 HP Models**	**5 HP Models**
Dimensions:	19"W x 24"L x 33"H	24"W x 25"L x 39"H
Weight:	256 lbs.	365 lbs.
Discharge pressure:	93 - 115 PSIG	93 - 115 PSIG
Air delivery:	8.6 CFM	14.4 CFM
Compressor speed:	2680 RPM	3020 RPM
Air receiver/tank	6.6 gal.	10 gal.

Warranty: 2 years or 5000 hours on scroll pump; all other components 1 year.

Compressors	3 HP Models Cat. #	5 HP Models Cat. #
208V, 3-phase	**9505-40**	**9505-44**
230V, 3-phase	**9505-41**	**9505-45**
460V, 3-phase	**9505-42**	**9505-46**
230V, single-phase	**9505-43**	**9505-47**

Regenerative Desiccant Compressed Air Dryers

- **Designed for consistent-pressure dew points**
- **Eliminate water and freeze-up in low ambients**
- **Come completely assembled, piped and wired, with a full charge of activated alumina desiccant**
- **Only hook-up of utilities is needed for operation**
- **Include structural steel frame, complete with floor stand**



Desiccant dryers lower the dew point of compressed air by adsorbing the water vapor in the compressed air onto the surface of the desiccant. Twin towers allow the inlet air to be dried in one tower while the desiccant in the other tower is being regenerated (dried).

These dual-tower regenerative desiccant dryers are an economical and reliable way to dry compressed air to dew points below the freezing point of water or to reduce the moisture content of compressed air for use in critical process applications.

Compressed air is continuously dried through the use of two identical towers, each with a desiccant bed. While one tower is on-stream drying the compressed air, the other tower is off-stream being regenerated (dried out). The inlet air is controlled by a switching valve and an electric timer. The towers are alternated in this manner so that dry desiccant is always in contact with the wet compressed air, resulting in a continuous supply of dry air downstream. The timer in the unit can be easily field adjusted to a 4-minute cycle for a -100°F pressure dew point or a 10-minute cycle for a -40°F pressure dew point. Inlet air temperature should be kept between 40°F and 120°F. Housed in NEMA 1 enclosure. All dryers should be installed with a prefilter and an after-filter.

Dryer shown with optional Sensatherm™ automatic purge saving system.

Regenerative Desiccant Compressed Air Dryers

Model	Average Outlet Flow Capacity*	Max. Working Pressure	Min. Working Pressure	In/Out Connect	Pressure Drop	Weight (lbs.)	Dimensions (inches)	Cat.#
60	51.4 scfm @ -40°F PDP 50.7 scfm @ -100°F PDP (60 scfm inlet flow)	150 psig	50 psig	3/4" NPT	Less than 3 psi	324	75 3/16 H x 24 5/8 W x 24 D	**9520-05**
260	222.6 scfm @ -40°F PDP 219.7 scfm @ -100°F PDP (260 scfm inlet flow)	150 psig	50 psig	1 1/2" NPT	Less than 3 psi	782	89 3/4 H x 34 1/2 W x 42 D	**9520-06**
590	505 scfm @ -40°F PDP 498.5 scfm @ -100°F PDP (590 scfm inlet flow)	150 psig	50 psig	2 1/2" NPT	Less than 3 psi	2,204	97 3/8 H x 48 W x 48 D	**9520-07**

**** Conditions for rating are 100 psig inlet air pressure and 100°F saturated inlet air temperature***

Compressed Air Filters

To ensure optimal purity of dry air, select the following filters for your Desiccant Dryer. All filters include a differential pressure gauge that indicates filter condition.

One-Micron Air Line Filter

This filter removes all solids one micron and larger, liquid loads up to 2000 ppm by weight, 100% of water droplets, and 70% of oil aerosols. It is used as an after-filter on desiccant dryers.

Oil Removal Filter

Removes all solids 0.025 microns and larger, liquid loads up to 100 ppm by weight, and more than 99.999% of oil aerosols.

Automatic Drains for Compressed Air Systems

Discharges moisture and oil from compressed air system, eliminating the need to drain or bleed lines manually.

Corresponding Filters and Drains

Used with Dryer Model	Location	Filter/ Drain Type	Cat.#
60	1st stage prefilter	1 micron	**9520-30**
60	2nd stage prefilter	Oil remover	**9520-31**
60	After-filter	1 micron	**9520-32**
260	1st stage prefilter	1 micron	**9520-33**
260	2nd stage prefilter	Oil remover	**9520-34**
260	After-filter	1 micron	**9520-35**
590	1st stage prefilter	1 micron	**9520-36**
590	2nd stage prefilter	Oil remover	**9520-37**
590	After-filter	1 micron	**9520-38**
590	Drain	Snap-Trap	**9520-39**

Compressed Air Filter with differential pressure gauge (included on all filters)

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Local Area Ionizing Blower

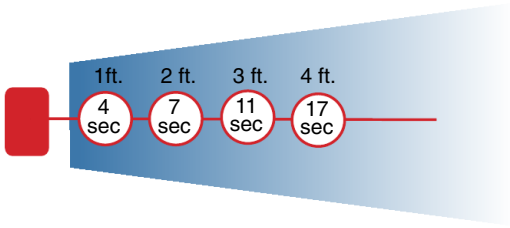
- **IsoStat® technology steady-state DC ionization ensures intrinsically balanced ion emission for safe, reliable static control**
- **Low-voltage operation and shielded emitter points protect against high electrostatic fields**
- **No calibration required**
- **Mounts to top of glove box to maximize work space**

Using patented IsoStat technology, this Ionizing Blower provides safe, effective static neutralization inside a glove box or similar enclosure, as well as on cleanroom workbenches.

Designed for overhead mounting or benchtop placement, this unit projects a balanced stream of positive ions for neutralization of static charges throughout a restricted area—without taking up valuable work space. Its steady-state DC ion emission enables fast discharge with low airflow, minimizing disruption of processing operations. Emitter points are electrostatically shielded to eliminate field-induced charge.

120 VAC model

230 VAC model



Discharge Time: ± 1,000 volts to 100 volts
Testing was performed with a charged plate monitor in accordance with Ionization Standard ANSI EOS/ESD S3.1-1991 of the ESD Association

Patented IsoStat Technology: Intrinsically Balanced Ion Stream

The patented IsoStat technology guarantees intrinsically balanced ionization and eliminates complicated feedback circuits, making this the most reliable ionizer available.

It never needs calibration and requires very little maintenance. By isolating the ionizer's emitter points from ground, IsoStat technology ensures equal numbers of positive and negative ions to better protect sensitive products.

For applications inside a glove box, select one or two units, depending on static neutralization requirements (see chart below). Price includes installation on the glove box ceiling as follows: Center mounting (for single unit); 24" spacing (for two units). Specify other desired locations when ordering.

Note: Power to the Ionizing Blower comes from a transformer connected to a power strip installed inside the glove box. Order transformer and power strip of desired voltage separately.

Specifications

Dimensions:	5.3"H x 5.0"W x 2.3"D (13.3 x 12.7 x 5.7 cm) 6"H x 5.8"W (15.2 x 14.7 cm) with bracket
Input:	24 VAC, 6 watts (order transformer separately)
Power Indicator:	Green incandescent power switch
Ion Emission:	IsoStat technology (steady-state DC)
Emitter Points:	Tungsten alloy; internally shielded; 5-year life
Air Flow:	240 FPM measured at 1' (30.5 cm), directly in front of grill; 40 CFM
Ozone:	< 0.005 ppm (24-hour accumulation)
Mounting:	Gimbaled bracket/stand with ¼" mounting hole
Ion Balance:	Better than ± 20 V at 12" (31 cm)
Weight:	32 oz. (907 g)
Warranty:	2-year limited warranty

	Cat. #
Glove Box Ionizer	**2005-02**

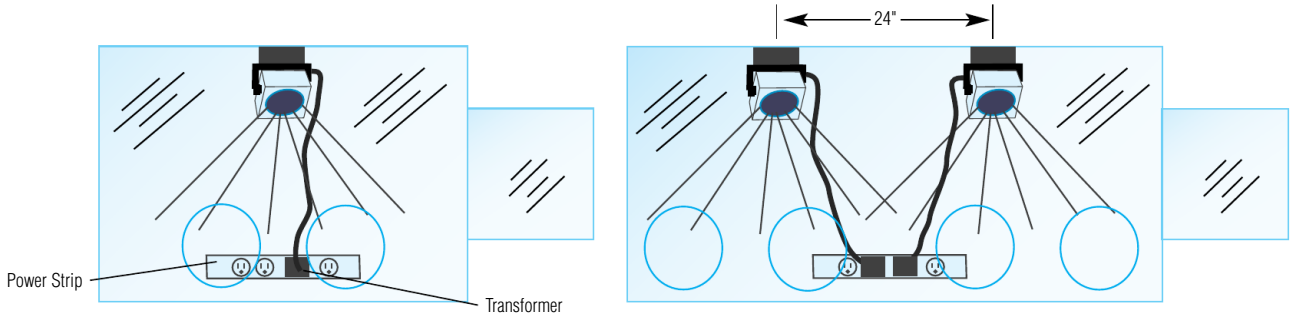
Transformer
24 VAC, 0.45 A output. Weight: 9.5 oz. (269 g). 2.4"H x 2.2"W x 1.6"D (6.1 x 5.6 x 4.1 cm)

	Cat. #
For 120 VAC, 50/60 Hz, 16 W	**2005-03**
For 230 VAC, 50/60 Hz	**2005-04**

4-Outlet Power Strip (installed along rear wall of glove box)
Includes master on/off switch and resettable 15-amp circuit breaker.

	Cat. #
120VAC, 50/60 Hz	**2004-31**

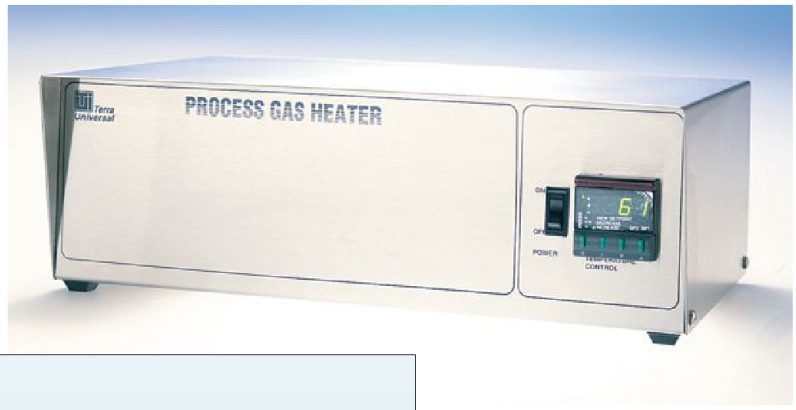
Standard Installation



Single Unit **Double Unit**

Process Gas Heater

- **Provides controlled heating of process gases (such as nitrogen and argon) to facilitate a wide range of manufacturing operations**
- **In a controlled atmosphere chamber,**
  - **✓ enhances component drying and epoxy curing;**
  - **✓ allows safe preheating of components before welding;**
  - **✓ performs temperature testing of finished components**
- **Reduces thermal shock before oven baking**
- **Features thermal exchange system with isolated heater for optimal safety and cleanliness**
- **Maintains stable temperatures**



Terra Universal's Process Gas Heater provides a safe and highly accurate way to enhance a variety of semiconductor and other processing operations.

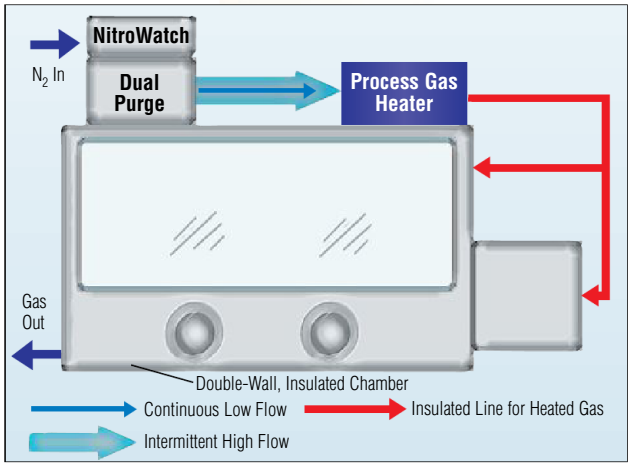
Programmable Controller Ensures Safe, Clean Heating, Provides Overtemperature Protection

Within a matter of seconds, it raises the temperature of the process gas (such as nitrogen, argon or oxygen) up to 350°F (see performance graphs). The thermostatic control ensures temperature stability.

Its isolated heating system provides controlled heating without direct contact with the process gas—guaranteeing safe, noncontaminating operation with potentially explosive gases. The "smart" programmable temperature controller monitors and responds to gas temperature measured at the outlet, continuously adjusting the temperature profile and guarding against temperature overshoot. A digital readout toggles between the user-defined set point and the actual gas temperature.

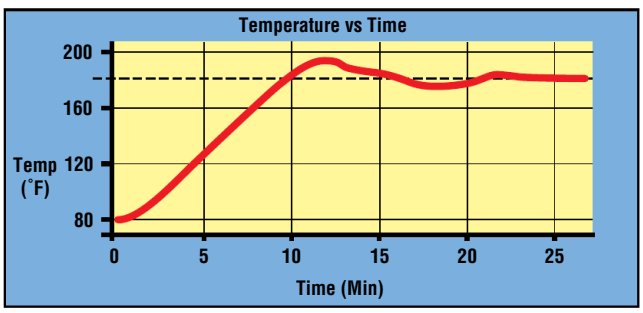
The Process Gas Heater comes complete with a temperature controller with digital LCD readout and ⅛" compression inlet/outlet fittings for gas tubing.

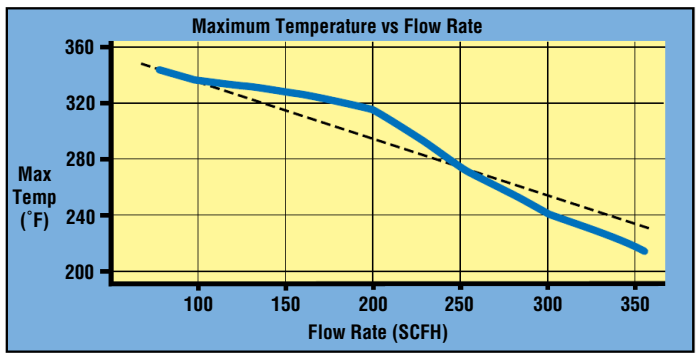
Dimensions: 17"W x 11"D x 5⅝"H
Shipping Weight: 20 lbs.



Typical application with NitroWatch/DualPurge humidity controllers (not included).

Process Gas Heater	Cat. #
120VAC/60Hz	**4320-00**
220VAC/50Hz	**4320-00-220**





Double-Wall, Insulated Chamber Boosts Thermal Efficiency!

If your application calls for heating or cooling, Terra will modify any standard glovebox to produce a more thermally efficient enclosure.

In most cases, these modifications include a double-wall design with 2" to 4" of polyurethane insulation, depending on the process temperature.

Call Terra to discuss your particular requirements!

Model shown:
Cat. # 1695-03
See page 435

Refrigeration Module

- **Closed-loop refrigeration unit uses environmentally friendly coolant (CFC free)**
- **Evaporator module with recirculating fan is mounted inside chamber for optimal efficiency**
- **Cools processing chamber as low as -40°C**

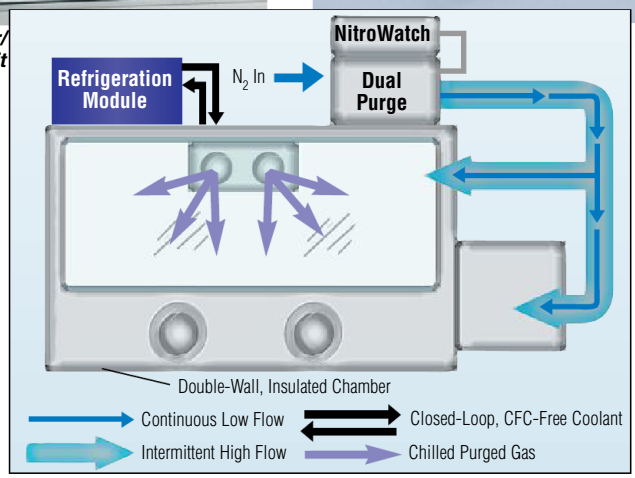
This integrated, closed-loop refrigeration system offers a more powerful alternative to Terra's flow-through Process Gas Cooler.

It consists of a ¼ HP compressor/condenser unit, mounted inside a stainless steel housing; and an evaporator cooler, mounted inside the glove box. The system operates with R134 coolant, an environmentally safe, CFC-free material. An RTD sensor provides feedback to the temperature controller, which provides continuous temperature display and includes overtemperature protection and an internal bypass to prevent temperature overshoot.

The system's 1050 BTU evaporator cooler, mounted in an aluminum housing, includes an integral fan that recirculates process gas inside the chamber through the cooling coils. A demisting coil mounted inside the control box removes water vapor to ensure safe, frost-free operation.

Compressor/ Condenser Unit

Evaporator Module



Typical application with NitroWatch/DualPurge humidity controllers (not included).

Specifications

Dimensions:	18"W x 15"D x 15"H (Condenser/Control Module) 15"W x 9"D x 7"H (Evaporator module)
Rating:	1050 BTU @ 15°F temp. differential
Power:	115VAC/60 Hz (includes 5A fuse) Consumes 250W (±10%), 220VC unit available
Control:	Microprocessor-based single-point controller
Sensor:	RTD type

Double-Wall, Insulated Glove Boxes Available! —Call for a quotation.

Refrigeration Module	Cat. #
110VAC, 50/60Hz	**1694-68**
220VAC, 50/60Hz	**1694-68-220**

Process Gas Cooler

- **Efficient refrigerated unit lowers the temperature of incoming process gas (such as nitrogen or argon) to as low as 30°F (lower temperature units available)**
- **Lowers dew point of incoming gas to retard chemical reactions and organic decay**
- **Compensates for heat-generating process equipment to maintain a stable processing environment**
- **Small, lightweight unit fits on top of chamber**
- **Can be used in conjunction with the Humex™, Dryex™, Nitrogen Generator and Process Gas Heater to form an integrated environmental control system**

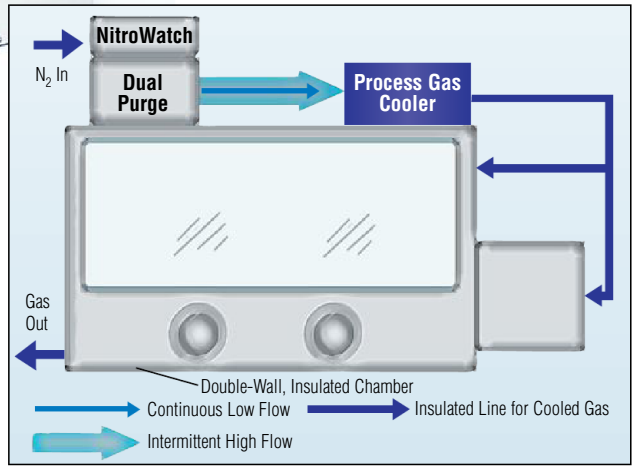
The Process Gas Cooler adds cooling capability to Terra's line of environmental control devices.

It incorporates a high-efficiency refrigeration unit that provides effective flow-through cooling down to 30°F. Used with a desiccator storage system, it helps to retard chemical processes (such as oxidation) and extend the shelf life of stored materials. This low-temperature capability is especially important in chambers that include heat-generating equipment that disrupts a stable processing temperature.

Price includes installation, with all necessary gas plumbing, in any desiccator, glove box or process chamber ordered from Terra.

Outside Dimensions: 14"H x 16"W x 15"D
Shipping Weight: 64 lbs.

Process Gas Cooler	Cat. #
120VAC/60Hz	**9450-00**
220VAC/50Hz	**9450-00-220**



Typical application with NitroWatch/DualPurge humidity controllers (not included).

GLOVE BOXES & VACUUM CHAMBERS

Acrylic Vacuum Chambers

- **Ideal for degassing small parts and mixed liquids, vacuum encapsulation, and general purpose vacuum experiments**
- **Provide a safe, convenient way to transport moisture- and particle-sensitive materials**
- **Clear acrylic construction provides full visibility of parts**
- **Sturdy construction supports vacuum level down to 29.8" Hg (see ordering tables for vacuum capacity of each model)**
- **Solvent welding, stainless steel and chrome-plated hardware ensure a completely noncontaminating environment**

Custom Designs Available!
Contact Terra for any shape or size.

These economical vacuum chambers provide a safe, reliable means for transporting contamination- and moisture-sensitive parts. They are also ideal for degassing operations, biological tests, and other processes requiring sustained low and intermediate vacuums.

Cleanroom-Compatible Construction

Seven different sizes are available in two basic designs: box-shaped chambers are available in six designs, and cylindrical chambers allow higher vacuums (see specifications below). All models are fabricated of transparent ½" acrylic. They feature chrome-plated latches and stainless steel hinges to ensure a noncontaminating environment.

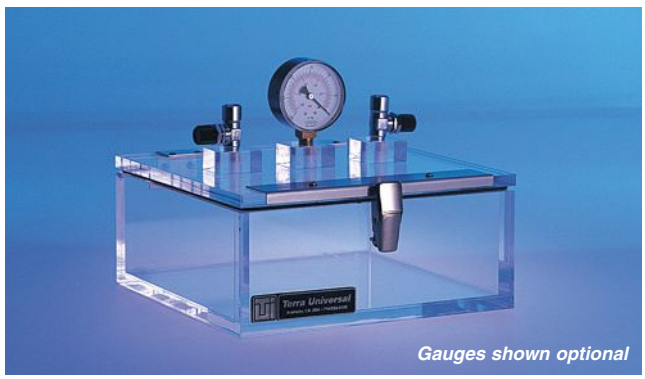
Terra will install a vacuum gauge and metering valves to permit flushing of the chamber with purge gas before application of vacuum (see ordering information on next page). A safety relief valve is mandatory on intermediate vacuum models (vacuums to 27" of Hg). Terra also features a full line of vacuum/nitrogen pumps; see description beginning on page 500.

Note: Due to the inherent permeability of plastic, these chambers will not maintain a stable vacuum level over extended periods. For long-term vacuum maintenance, leave vacuum pump connected and running (with a safety relief valve).

Vacuum Chamber "A"

Dimensions W" x D" x H"		Max Vacuum	Ship. Wt.	
Outside (excl. hardware)	Inside	in. of Hg	lbs.	Cat. #
16 x 10 x 11½	14 x 8 x 9½	6	22	**5235-00**

Vacuum Chamber "B"



Dimensions W" x D" x H"		Max Vacuum	Ship. Wt.	
Outside (excl. hardware)	Inside	in. of Hg	lbs.	Cat. #
12 x 12 x 6½	10 x 10 x 4½	6	15	**5235-01**

Vacuum Chamber "C"

Gauges shown optional

Dimensions W" x D" x H"		Max Vacuum	Ship. Wt.	
Outside (excl. hardware)	Inside	in. of Hg	lbs.	Cat. #
8 x 8 x 8½	6 x 6 x 6½	12	9½	**5235-02**

Vacuum Chamber "D"

Gauges shown optional

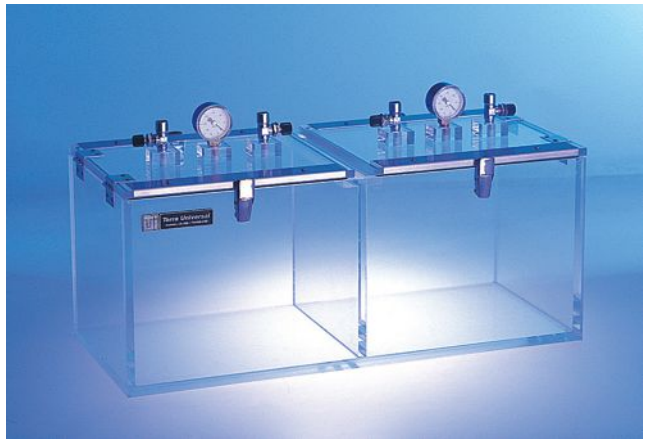
Dimensions W" x D" x H"		Max Vacuum	Ship. Wt.	
Outside (excl. hardware)	Inside	in. of Hg	lbs.	Cat. #
12 x 12 x 9½	10 x 10 x 7½	6	18	**5235-03**

Vacuum Chamber "E"

Dimensions W" x D" x H"		Max Vacuum	Ship. Wt.	
Outside (excl. hardware)	Inside	in. of Hg	lbs.	Cat. #
16 x 16 x 12 1/2	15 x 15 x 11 1/2	6	31	**5235-04**

Gauges shown optional

Vacuum Chamber "F"



Dimensions W" x D" x H"		Max Vacuum	Ship. Wt.	
Outside (excl. hardware)	Inside	in. of Hg	lbs.	Cat. #
25 x 10 x 11 1/2	11 x 8 x 9 1/2	6	33	**5235-06**

Gauges shown optional

Vacuum Chamber "G"

OM
ions

Gauges shown optional

Dimensions Dia." x H"		Max Vacuum		Ship. Wt.	
Outside (excl. hardware)	Inside	in. of Hg	Torr	lbs.	Cat. #
12 x 14 1/2	11 x 13 1/2	29.8	756.9	19	**5235-08**

Contact Terra for a custom chamber to meet your specs!

Metering Valve (two required per chamber)
Permits safe, convenient application of vacuum to the chamber. Dual valves allow purging of the chamber with nitrogen or other process gas before vacuum is applied. Price includes installation. **Note:** A safety relief valve is mandatory with all plastic vacuum chambers except No. 5235-08..

Cat. #
5235-09

Vacuum Gauge (one required per chamber)
Senses and indicates vacuums on 0-30" Hg scale. Price includes installation. **Note:** A safety relief valve is mandatory with all-plastic vacuum chambers, except No. 5235-08.

Cat. #
5235-10

Safety Relief Valve (one required per chamber)
Required for all plastic vacuum chambers except No. 5235-08.

Cat. #
For vacuum to 6" Hg **5235-11**
For vacuum to 12" Hg **5235-14**

Accessories for Vacuum Applications to 29.9" Hg

Diaphragm Vacuum Pump
See page 496 for full specifications.

	With metering kit Cat. #	Without metering kit Cat. #
120VAC, 60Hz	**7903-00**	**7902-00**
220VAC, 50Hz	**7903-01**	**7902-01**

Low-Vacuum Control Module
Cat. #
110VAC, 50/60Hz **1685-99**
220VAC, 50/60Hz **1685-99-220**
Includes vacuum gauge, vacuum solenoid, and on/off switches for solenoid and pump. Ensures safe pump operation. Dual gas inlet ports allow controlled backfill of chamber with process gas mixture. Order pump and connection kit separately.

Turnkey Connection Kit
(for Low-Vacuum Control) Cat. # **5400-30**
Includes required hardware. Order pump, Lo-Vac Control Module, Metering Valves, Vacuum Gauge, and Safety Relief Valve separately.

Accessories for Vacuum Applications to 29.9" Hg

Rotary Vane Vacuum Pump
See complete specifications on page 494.

Cat. #
110VAC, 50/60 Hz **7901-00**
220VAC, 50 Hz **7901-08**

Full-Vacuum Control Module
Cat. #
110VAC, 50/60Hz **1681-75**
220VAC, 50/60Hz **1681-76**
Allows set-point control of vacuum level inside Chamber No. 5235-08. Order pump and connection kit separately. See page 490.

Turnkey Connection Kit
(for Full-Vacuum Control) Cat. # **5400-24**
Includes required hardware. Order pump, Full-Vac Control Module, Metering Valves, and Vacuum Gauge separately.

Stainless Steel Vacuum Chamber

- **Versatile stainless steel chamber provides a vacuum environment for degassing, plastics curing, chemical processing, moisture removal, and a host of other operations**
- **Safely supports vacuums to 29.9" Hg**
- **Double-wall stainless steel construction adds durability, safely contains corrosive chemicals**
- **Dual metering valves allow simple, controlled application of negative pressure and safe bleeding**
- **Also ideal for transporting parts in a vacuum environment**

Terra's versatile Stainless Steel Vacuum Chamber meets a host of processing needs in industries from plastics to pharmaceuticals to microelectronics.

Its double-wall stainless steel construction supports vacuums to 29.9"Hg and makes it ideal for use with corrosive materials. This chamber is also ideal for contamination-sensitive applications: the smooth interior surfaces minimize exposure to particles and moisture. An 8" square tempered-glass window mounted in the access door allows full visibility of stored parts, and a silicone gasket ensures an air-tight seal when the door is latched shut. Dual carrying handles simplify transport of the unit.

A 0-30" vacuum gauge and dual metering valves allow easy connection for vacuum pumping and bleeding. This air-tight design also allows you to transport materials under negative pressure from one work station to another.

Specifications

Dimensions	
Outside:	13"W x 15"D x 14"H
Inside:	8"W x 12"D x 8"H
Construction:	304 stainless steel double wall with heat-resistant tempered-glass viewing window and silicon gasket
Metering:	Dual valves with quick connect/disconnect-type couplings

Gauge:	0-30"Hg
Shipping Weight:	32 lbs.

	Cat. #
Stainless Steel Vacuum Chamber	**3404-00**

See next page for recommended pump & controller.

Aluminum Vacuum Chamber

- **Ideal for vacuum processing of large components and assemblies**
- **Durable aluminum construction ensures a long service life under heavy service**
- **One-inch wall thickness sustains vacuum levels to 29.9"Hg**
- **Optional castered stand supports chamber and pump**

Terra's Aluminum Vacuum Chamber provides ample space for vacuum testing and processing to one atmosphere (29.9"Hg).

The 1"-thick aluminum walls provide the strength necessary for sustained vacuum service without warping, which can lead to vacuum leaks. An optional castered stand allows convenient transport of the chamber and vacuum pump. Chamber includes dual metering valves and a 0 - 30" Hg vacuum gauge. Dimensions: 31.375"W x 25.375"D x 18.75"H. Stand raises chamber an additional 17". Shipping weight: 375 lbs (chamber), 15 lbs. (stand).

	Cat. #
Aluminum Vacuum Chamber	**1590-60**
Vacuum Chamber Stand	**1590-61**

Shown with optional castered stand

Other configurations available; call with your requirements

Rotary Vane Vacuum Pump (See next page for controller).
This time-proven vacuum pump provides reliable vacuum performance for chambers rated for 29.9" Hg/760 Torr. See complete specifications on page 494.

	Cat. #
110VAC, 50/60 Hz	**7901-00**
220VAC, 50 Hz	**7901-08**

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Vacuum Control Module

- **Automatically controls pump operation to maintain stable vacuum levels inside a vacuum chamber**
- **Includes easy-to-read digital vacuum gauge and piezo-resistive pressure sensor for outstanding accuracy, stability and repeatability**
- **Enhances pump life and efficiency**

This automatic Vacuum Control Module is designed to solve several problems associated with vacuum pumping.

First, it controls pump operation to maintain a preset vacuum level (to 800 torr) in a remote vacuum chamber or vacuum furnace. This automatic vacuum control is especially important in testing or processing applications that require sustained exposure to a precisely regulated vacuum level.

Secondly, it helps extend the service life of your vacuum pump by allowing continuous pump operation. Repeated starts and stops, especially under existing vacuum pressure, can lead to backstreaming of pump oil into the vacuum line, resulting in contamination and premature pump failure. The Vacuum Control Module eliminates this problem by switching an optional solenoid vacuum valve on and off, which in turn controls vacuum pressure in the processing chamber.

Includes a 3-digit LED display mounted in a stainless steel housing, high and low vacuum control relays, and a piezo-resistive vacuum tube (price includes mounting of sensor tube in a Terra vacuum chamber). Order the vacuum solenoid for isolation of the vacuum pump from the processing chamber.

Specifications

Dimensions:	12"W x 11¼"D x 7"H
Weight:	16 lbs.
Range:	0-800 Torr (linear)
Range:	± 1% of full scale (0°C to 50°C)
Resolution:	1 Torr
Output:	0-8 VDC, minimum 1K ohm load

Vacuum Control Module	Cat. #
120VAC, 60Hz	**1681-75**
220VAC, 50/60Hz	**1681-76**

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Recommended Vacuum Accessories

Accessories for Vacuum Applications to 12" Hg

Diaphragm Vacuum Pump
Performs reliable, economical vacuum pumping for low-vacuum applications. See page 496 for full specifications. Includes hose barb fittings, two regulators, 0 - 30" Hg vacuum gauge, and 0 - 60 psi pressure gauge.

	Cat. #
120VAC, 60Hz	**7903-00**
220VAC, 50Hz	**7903-01**

Low-Vacuum Control Module
Provides convenient control of pump for vacuum applications to 12"Hg. Includes vacuum gauge, vacuum solenoid, and on/off switches for solenoid and pump. Vacuum bleed valve allows manual control of vacuum set point and ensures safe pump operation. Dual gas inlet ports allow controlled backfill of chamber with process gas mixture. Order pump and connection kit separately.

	Cat. #
110VAC, 50/60Hz	**1685-99**
220VAC, 50/60Hz	**1685-99-220**

Turnkey Connection Kits (for Low-Vacuum Control)
Includes required vacuum hoses and connection hardware. Order pump and Lo-Vac Control Module, separately.

	Cat. #
For Acrylic Vacuum Chambers	**5400-30***
For Series 200 Glove Box	**5400-31**

Accessories for Vacuum Applications to 29.9" Hg

Air-Cooled Vacuum Pump
Reliable vacuum performance for chambers rated to 29.9"Hg/760 Torr. See complete specifications on page 494.

	Cat. #
110VAC, 60Hz	**7901-00**
220VAC, 50Hz	**7901-08**
Oil Mist Eliminator (for oil-free exhaust)	**7901-01**
Disposable Vacuum Pump Inlet Filter	**9401-00**

See page 498 for specifications.

Vacuum Control Module
See description and ordering information above. Order pump and connection kit separately.

Turnkey Connection Kits (for Full-Vacuum Control)
Includes solenoid vacuum valve (# 3700-10) and all necessary hosing, clamps, adapters and other connection hardware for the specified application. Draws power from the Vacuum Control Module. Order vacuum pump, desired inlet/exhaust filters, and Vacuum Control Module separately. See illustration on page 491.

Power Requirements:	110VAC, 60Hz Cat. #	220VAC, 50Hz Cat. #
For Acrylic Chamber No. 5235-08 (page 488)	**5400-24***	**5400-24-220***
For Stainless Steel Chamber No. 3404-00 (page 489)	**5400-25***	**5400-25-220***
For Aluminum Chamber No. 1590-60 (page 489)	**5400-25***	**5400-25-220***
For Plastic Glove Box Antechamber (page 452)	**5400-20**	**5400-20-220**
For Aluminum Glove Box Antechamber (page 459)	**5400-21**	**5400-21-220**
For Vacuum/Nitrogen Oven (page 465)	**5400-22**	**5400-22-220**
For Modular Vacuum/Nitrogen Oven (page 465)	**5400-23**	**5400-23-220**

**** These applications require two metering valves (Cat. #5235-09), one vacuum gauge (#5235-10), and one safety relief valve (#5235-11).***

Solenoid Vacuum Valve

- **Enhances vacuum pump life and efficiency**
- **Prevents oil backstreaming into a vacuum chamber**
- **Allows automatic vacuum control, using Vacuum Control Module (order separately)**

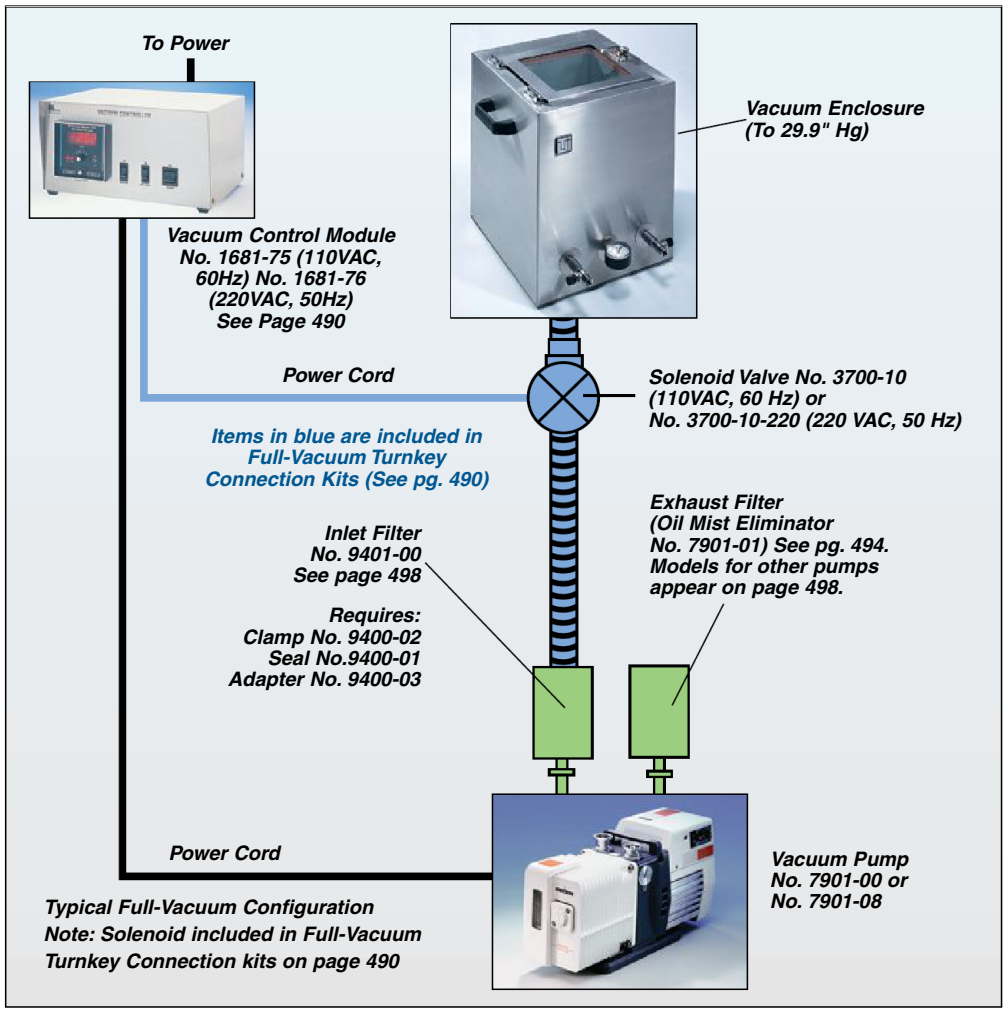
Repeated pump starts and stops can reduce the life of a pump, particularly under existing vacuum pressure. This Solenoid Vacuum Valve prevents premature pump failure, guards against oil backstreaming into the vacuum chamber, and allows automated vacuum control when used in tandem with Terra's Vacuum Control Module.

Configured properly, it lets you start a pump even when the chamber is under full vacuum, and allows continuous, shift-long pump operation without strain. Constructed of cast aluminum, it features inlet, outlet, and exhaust ports that accept male ¼" NPT fittings. Valve body measures 1⅛" diameter x 2⅞" high.

Note: Requires Vacuum Control Module for power and set point control (order separately). See illustration for typical recommended configuration.

Solenoid Vacuum Valve

	Cat#
110VAC, 60Hz	**3700-10**
220VAC, 50Hz	**3700-10-220**



Sequence Controller

- **Automatically controls vacuum level, cycle times and purge time of gas purged vacuum ovens**
- **Allows automatic batch drying of parts & chemical compounds**
- **Fully programmable to control up to nine ovens**

This Sequence Controller is designed to automatically control the vacuum and purging cycles of gas purged vacuum ovens and furnaces. Working in conjunction with our vacuum control module (see above) the controller is fully programmable with the ability of controlling up to nine vacuum ovens. The number of cycles per oven, the purge time per cycle and the vacuum time can be selected and set by a series of switches on the front panel.

	Cat. #
110VAC, 60Hz	**1698-90**
220VAC, 50Hz	**1689-90-220**

Pumps

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- Oil Mist Exhaust Filters 499

For additional vacuum control information, see pages 490 - 491.

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Rotary Vane Vacuum Pumps

- **Universal single-phase motor allows pump configuration for low or high voltage, without the need for hard wiring**
- **Natural lubrication design offers the lowest oil mist level, even with high throughputs**
- **Compact design makes these pumps ideal for use in cramped locations**
- **Integrated anti-suckback valve prevents pump damage or enclosure contamination when pump is turned off**
- **Choose among three pumping capacities, up to 120 m³/h (85 CFM)**

These Rotary Vane Pumps combine ruggedness and versatility to meet a wide range of applications in and out of the cleanroom.

Unique Universal Motors Comply with All Electrical Standards

They feature universal single-phase motors for optimal versatility. Although you can order pumps in either a low-voltage or high-voltage configurations, any can be easily modified to meet all worldwide voltages. Simply flip a rocker switch to reconfigure the motor for your local power. Selected voltage is displayed through a window provided in the box cover.

An IEC socket allows flexibility for a wide choice of power lead terminations. All models are thermally protected and comply with major international electrical standards, including UL/CSA/CE. Protection level: EP43 (TEFC type).

Clean, Compact Design

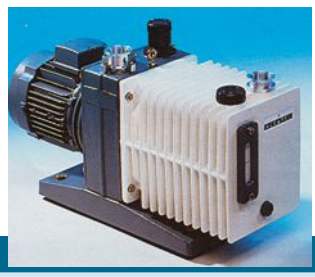
Their use of natural lubrication at the exhaust guarantees low oil mist level, even at high throughputs or frequent cycling between atmosphere and ultimate pressure. The reduced dimensions and a choice of horizontal or vertical inlet and exhaust ports enhance application versatility. All controls and service access are located on the front.

Pumping-Capacity Features:

From 5 to 21 m³/h: Models feature an integrated anti-suckback valve, O-rings at all static sealings, and an external shaft seal that can be renewed easily, without dismantling the pump.

From 33 to 100 m3/h: Models feature forced lubrication for continuous operation at all pressures. A built-in anti-suckback valve is activated by the oil pump for protection of vacuum system against pressure rise. Their rugged design improves efficiency and reliability.

From 5 to 100 m³/h: Models incorporate efficient gas ballast for vapor pumping. They offer high pumping speed from atmosphere to vacuum. Air cooled for optimal performance, these pumps are field serviceable using the appropriate maintenance kits.

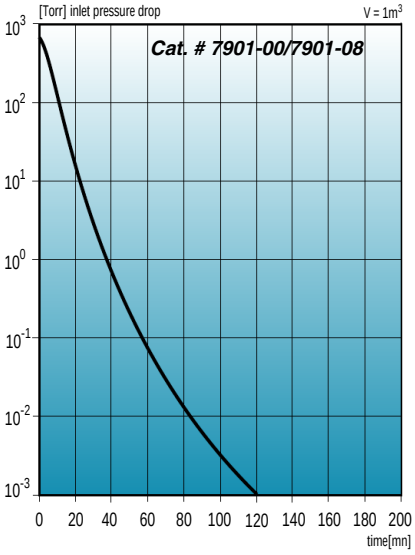


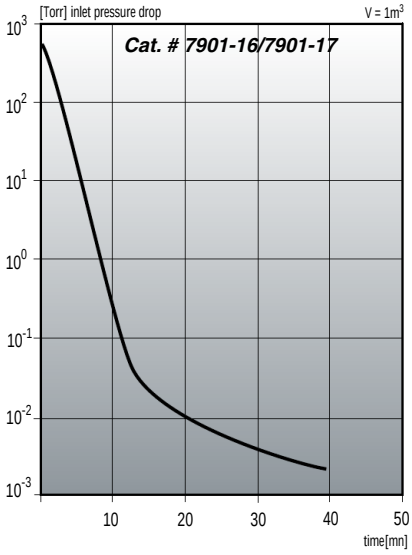
Rotary Vane Pumps

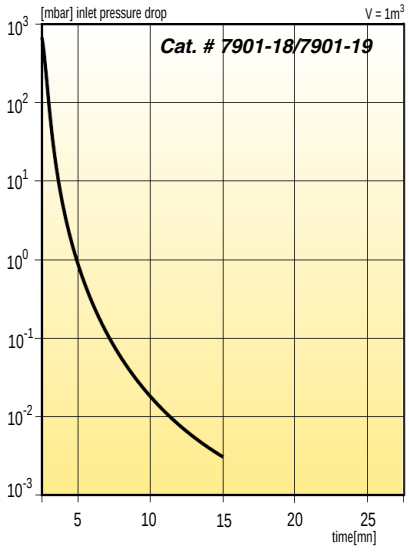
Power Requirements*		Cat. #	Cat. #	Cat. #
Low Voltage (90V to 132V, 50/60Hz)		**7901-00**	**7901-16**	**7901-18**
High Voltage (180V to 254V, 50/60Hz)		**7901-08**	**7901-17**	**7901-19**
Nominal Pumping Speed**	@50Hz	9.7 m³/h	30 m³/h	120 m³/h
	@60Hz	6.8 cfm	23.3 cfm	85 cfm
Pneurop Pumping Speed**	@50Hz	8.5 m³/h	27 m³/h	100 m³/h
	@60Hz	6 cfm	18.8 cfm	70.6 cfm
Ultimate Partial Pressure**		10^{-4} mbar	2.10^{-4} mbar	2.10^{-4} mbar
Ultimate Total Pressure** - closed gas ballast		2.10^{-3} mbar	3.10^{-3} mbar	3.10^{-3} mbar
Ultimate Total Pressure** - open gas ballast		10^{-2} mbar	2.10^{-2} mbar	3.10^{-2} mbar
Water Vapor Capacity (50/60Hz)		125/100 g/h	700 g/h	3000 g/h
Water Vapor Pressure (50/60Hz)		20/15 mbar	30 mbar	40 mbar
Weight (max.)		26kg (57.2 lbs)	61kg (134 lbs)	231kg (508 lbs)
Max. Nominal Power Rating (50/60Hz)		0.45/0.55kW	1.1/1.3kW	3/3.6kW
Min. Ambient Temperature		12°C (54°F)	12°C (54°F)	12°C (54°F)
Max. Ambient Temperature		45°C (113°F)	45°C (113°F)	45°C (113°F)
Oil Capacity		0.95 liters	3.6 liters	7.5 liters
Inlet Flange (ISO-KF)		DN 25	DN 40	DN 50
Outlet Flange (ISO-KF)		DN 25	DN 40	DN 50
Dimensions (Lmm x Dmm x Hmm)		437 x 188 x 240	783 x 213 x 438	984 x 344 x 528

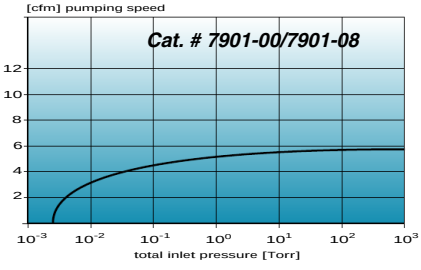
**** See description of Universal Motors above.***
***** According to Pneurop specification, with Alcatel mineral oil.***

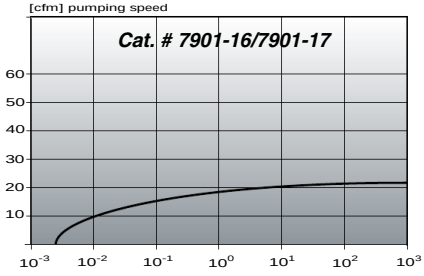
Performance Curves: 60Hz

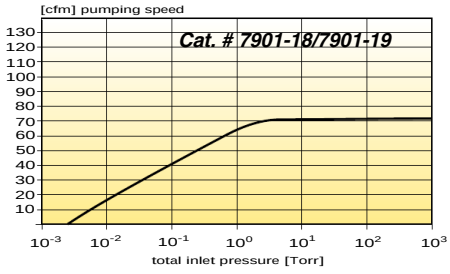




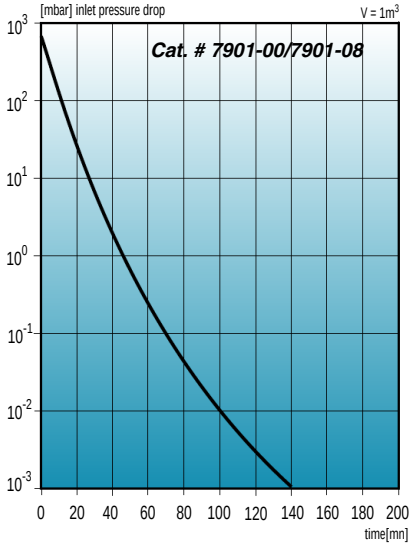


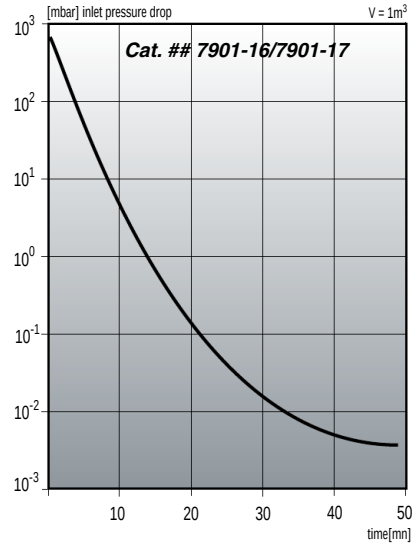


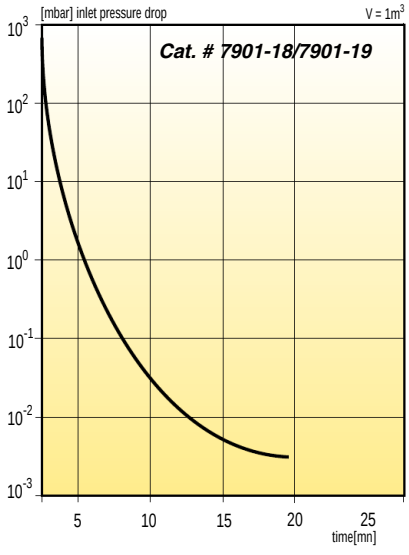


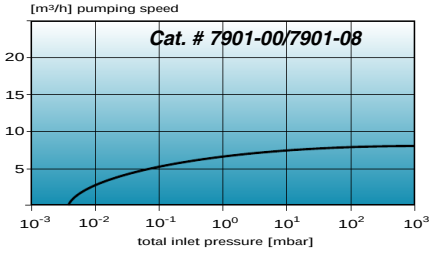


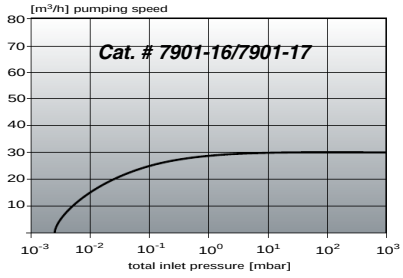
Performance Curves: 50Hz

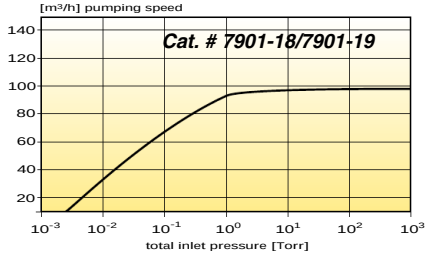












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Diaphragm Vacuum/Pressure Pump

- **Oil-less design for low maintenance, clean operation**
- **Low cost and extreme reliability make this diaphragm pump ideal for general-purpose laboratory applications**
- **Also suitable for wire bonders, die bonders, scribers, breakers, probing stations and many other kinds of microelectronics manufacturing equipment**

Oil-free and noiseless operation makes this motor-mounted unit one of the best suited vacuum pumps available for cleanroom environments.

It provides an effective vacuum for wire and die bonders, scribers, breakers, dicing saws and most other microelectronics manufacturing and testing equipment, as well as for a wide range of laboratory uses. The connecting rod in this pump is bonded to its bearing—not clamped, as in lighter duty pumps—to give it greater strength and durability under maximum work loads.

Maintenance is a breeze. Changing air filters is a 60-second screwdriver job. Installing the head assembly is a fool-proof operation: the non-symmetrical fastener pattern ensures that the head goes on correctly.

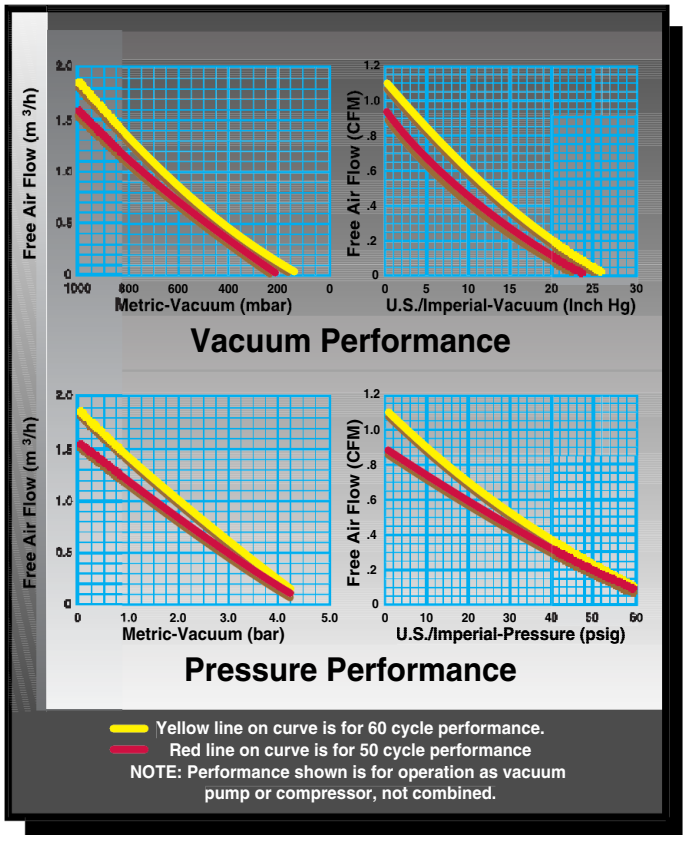
Output air is cool and oil-free, even at maximum duty. As ambient air enters and leaves the head, it never goes near the motor, where it might pick up heat and foreign matter. These cooler temperatures add to overall efficiency and service life.

Models are available for 115VAC and for 220/240VAC power, and include a thermotector, carrying handle, on/off switch, rubber feet, cord and hospital-grade plug. Pumps include two hose barb fittings, two regulators, and a 0-30" Hg vacuum gauge and a 0-60 psi pressure gauge.

Specifications

CFM Free Air:	1.10
Maximum Vacuum:	24" Hg
Maximum Pressure:	60 psi
Motor hp:	1/8
Power Requirements:	115VAC, 60Hz, single phase 220/240VAC, 50Hz, single phase
Shipping Weight:	18 lbs.

Performance Curves



Diaphragm Vacuum/Pressure Pump

Power	Cat. #
120VAC/60Hz	**7903-00**
220VAC/50Hz	**7903-01**

Perfect Performance for Low-Vacuum Applications!

This rugged, economical pump provides the low vacuum levels in Terra's plastic vacuum chambers and Negative-Pressure Glove Box.

For higher vacuum levels, select one of our Rotary Vane pumps (see page 496). See page 498 for information on turnkey vacuum controllers that ensure safe pump operation.

Negative-Pressure Glove Box Page 450

Vacuum Chambers Start on page 487

P30-TC .78 CFM

P50/24AL1.5 CFM

P100/24 3 CFM
Includes 4"–diameter rubber wheels

Panther Silent Air Compressors

- **Most quiet unit on the market–decibel level less than 45dB/A**
- **Silent operation and 0.01 micron outlet filter make these units ideal for a variety of laboratory and cleanroom applications**
- **Extensively tested to ensure long, trouble-free service life–warranted for two years!**
- **Available in six models and 110 or 220 volt configurations**
- **Receivers internally powder coated to prevent rusting**
- **Low power consumption**
- **Ideal for nitrogen and dry gas generator systems, pneumatic vibration isolators, sealers, and other process equipment**

These are the ideal air compressors for critical applications that require cleanliness and quiet, reliable operation.

They are the quietest air compressors available. Operating at a decibel level of less than 45dB/A, they are typically no louder than an average conversation. This advanced acoustical engineering allows you to locate them as close as you like to your application.

They are also clean. They feature a reciprocating design and include a dual filtration regulator, providing clean, high-quality air to your application. Outlet air is filtered to 0.01 micron using a coalescing filter element, which also drains moisture automatically when there is a pressure differential across the line.

These rugged air compressors are built to provide years of quality performance. The compressor pump and receiver are fabricated of cast iron, and the inside of the receiver is powder coated to prevent rusting. Each of the pistons and cylinders is manufactured to precise tolerances, ensuring that every unit performs to specifications.

Operation of these systems is as simple as plugging the unit in and turning the switch to the ON position. The air compressors are analog and supplied with standard electrical connections for easy hook-up to your power supply. Air outlet fittings are 1/4" NPT (female). Once turned ON, the units will build up pressure to 120 psi and then automatically turn-off. Once the pressure falls to 90 psi, the system will start up and pump again to 120 psi. This 30 psi pressure differential offers the convenience of safe, continuous operation, without the need to power down. The compressor will only operate when air is taken from the receiver.

These air compressors are available in 110 or 220-volt configurations and six models to meet your specific air compression requirements. All models come with a two-year warranty.

Accessories

	Cat. #
Coalescing Filter (0.01 micron)	**3370-12**
Drain Bottle	**3370-13**

P100/50 AL 3 CFM
P150/50 AL 4.5 CFM
Includes 5"–diameter rubber wheels

compressor motors

Black Panther 1.5 CFM
Includes 5"–diameter rubber wheels

Specifications

Model	Volts/Hz	HP (kw)	PSI (bar)	dB/A	Input CFM† (Lt)	Output CFM (Lt)	Tank Gal. (Lt)	Overall Dimensions (W x D x H x)	Shipping Weight lbs.	Shipping Weight Kg.	Ordering Information 115/60 Hz Cat.#	Ordering Information 220/50 Hz* Cat.#
P30-TC	115/60 220/50	0.25 (0.24)	120 (8)	40	1.1 (31)	0.78 (22)	0.93 (3.5)	11 x 11 x 11.8 (28 x 28 x 30 cm)	41.9	19	**3370-00**	**3370-01**
P50/24AL	115/60 220/50	0.5 (0.35)	120 (8)	40	2.2 (63)	1.5 (43)	6.3 (24)	16 x 16 x 27 (40 x 40 x 70 cm)	66	30	**3370-02**	**3370-03**
P100/24	115/60 220/50	1 (0.7)	120 (8)	42	4.4 (126)	3 (86)	6.3 24	27 x 13 x 26 (70 x 33 x 66 cm)	101	46	**3370-04**	**3370-05**
P100/50AL	115/60 220/50	1 (0.7)	120 (8)	42	4.4 (126)	3 (86)	13 (50)	41 x 13 x 27 (105 x 34 x 70 cm)	147	67	**3370-06**	**3370-07**
P150/50AL	220/50	(1)	(8)	45	(186)	(129)	(50)	41 x 13 x 27 (105 x 34 x 70 cm)	181	82	–	**3370-09**
Black Panther**	115/60 220/50	0.5 (0.35)	120 (8)	40	2.2 (63)	1.5 (43)	3.7 (14)	13.8 x 19 x 29 (35 x 48 x 75 cm)	88	40	**3370-10**	**3370-11**

** Expect a 20% air flow decrease for 220 Volt/50Hz versions*
*** Black Panther models can be equipped with a second 0.5 HP pump doubling the air output*
† Flow rate at 75 psi

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Disposable Vacuum Pump Inlet Filter

- **Protects vacuum pumps from damage by solid contaminants**
- **Recommended for vacuums to 10^{-6} Torr**

This filter provides high-efficiency removal of relatively large quantities of solids and liquids to prevent damage to vacuum pumps and the loss of valuable or hazardous materials. It also maintains a contamination-free environment by trapping particles fed into the pump.

Includes a stainless steel housing with welded KF-25 flange inlet and outlet and no drain port. Select the clamp, seal and adapter (see below) to attach filter to your pump. Used in conjunction with an exhaust filter, these units provide complete protection of the external environment against any contaminants involved in pumping operations.

Specifications

Recommended Vacuum Service:	10^{-6} Torr
Max. Flow Rating of Vacuum Pump:	9 CFM
Loss in Pumping Speed:	9% at max. flow rate
Inlet and Outlet Ports:	KF-25
Material of Construction (Head, bowl, etc.):	304 Stainless Steel
Maximum Temperature:	220˚F
Shipping Weight:	14 oz.
Dimensions:	4" diameter x 5.9"

	Cat. #
Disposable Vacuum Pump Inlet Filter	**9401-00**
Filter Clamp Clamps Inlet or Outlet Filter snugly onto most pumps.	**9400-02**
Clamp Seal Ensures a leak-proof seal between filter and clamp.	**9400-01**
Stainless Steel Adapter ¼" NPT	**9400-03**

Vacuum Control Module

- **Automatically controls pump operation to maintain stable vacuum levels inside a vacuum chamber**
- **Enhances pump life and efficiency**

This automatic Vacuum Control Module controls pump operation to maintain a preset vacuum level (to 800 torr) in a remote vacuum chamber or vacuum furnace. This automatic vacuum control is especially important in testing or processing applications that require sustained exposure to a precisely regulated vacuum level it helps extend the service life of your vacuum pump by allowing continuous pump operation. Repeated starts and stops, especially under existing vacuum pressure, can lead to backstreaming of pump oil into the vacuum line, resulting in contamination and premature pump failure. The Vacuum Control Module eliminates this problem by switching an optional solenoid vacuum valve on and off, which in turn controls vacuum pressure in the processing chamber.

Includes a 3-digit LED display mounted in a stainless steel housing, high and low vacuum control relays, and a piezo-resistive vacuum tube (price includes mounting of sensor tube in a Terra vacuum chamber). Order the vacuum solenoid for isolation of the vacuum pump from the processing chamber.

	Cat. #
Vacuum Control Module	
120VAC, 60Hz	**1681-75**
220VAC, 50/60Hz	**1681-76**

See page 490 for full specifications.

Solenoid Vacuum Valve

- **Enhances vacuum pump life and efficiency**
- **Prevents oil backstreaming into a vacuum chamber**
- **Allows automatic vacuum control, using Vacuum Control Module (order separately)**

Repeated pump starts and stops can reduce the life of a pump, particularly under existing vacuum pressure. This Solenoid Vacuum Valve prevents premature pump failure, guards against oil backstreaming into the vacuum chamber, and allows automated vacuum control when used in tandem with Terra's Vacuum Control Module.

Configured properly, it lets you start a pump even when the chamber is under full vacuum, and allows continuous, shift-long pump operation without strain. Constructed of cast aluminum, it features inlet, outlet, and exhaust ports that accept male ¼" NPT fittings. Valve body measures 1⅛" diameter x 2⅞" high.

Note: Requires Vacuum Control Module for power and set point control (order separately). See page 491 for typical recommended configuration.

Solenoid Vacuum Valve

	Cat. #
110VAC, 60Hz	**3700-10**
220VAC, 50Hz	**3700-10-220**

See page 491 for application information.

Oil Mist Exhaust Filters

Flow Range: 4.5 to 55 CFM

- **Safely remove exhaust air from vacuum pumps and systems with air streams less than 200°F**
- **Feature dependable steel construction with plated finish**
- **Wrapped fiber glass elements with polyester cloth trap media nominally 99.97% @ 0.3 micron**
- **Easy thumbscrew access for maintenance**
- **ISO flange fittings of mild steel with 32 RMS finish provide optimal sealing**
- **Special connections and sizes available**

These Oil Mist Exhaust Filters provide safe, effective isolation of oil mist and other contamination from a gas stream in pumping operations. Rated 99.97% effective with media down to 0.3µm in diameter, they make oil-lubricated pumping systems suitable for most cleanroom applications.

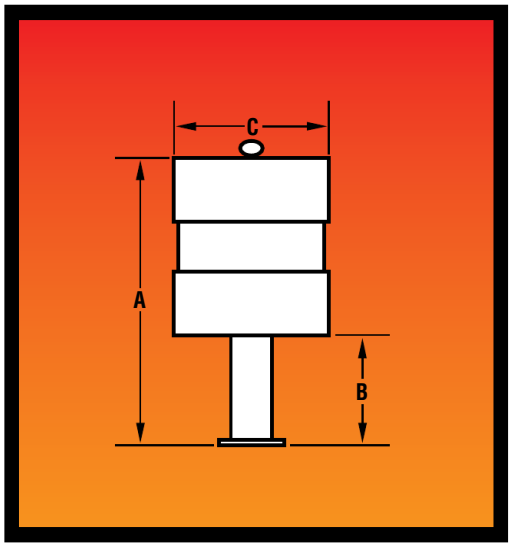
Select from a wide range of models to suit your applications, with flows between 4.5 and 55 CFM. Other sizes and connections are available; contact Terra for ordering information.

Oil Mist Exhaust Filters

Connection Size Diam/Type	Flow CFM	Dimensions			Approx. Wt. Lbs.	Plated Finish	Cat. #
		A	B	C			
16mm/ISO FLG	4.5	5 3/4"	2 1/8"	2 1/2"	1.2	Nickel Chrome	**9400-06**
16mm/ISO FLG	4.5	4 1/2"	7/8"	2 1/2"	0.6	Nickel Chrome	**9400-07**
1/2"/MPT	4.5	4 1/2"	1"	2 1/2"	0.9	Nickel Chrome	**9400-08**
25mm/ISO FLG	4.5	4 1/2"	7/8"	2 1/2"	1.4	Nickel Chrome	**9400-05**
3/4" MPT FINE	4.5	4 1/2"	1"	2 1/2"	0.9	Nickel Chrome	**9400-09**
1/2"/MPT	7	5 1/2"	1"	2 1/2"	1.8	Nickel Chrome	**9400-10**
3/4" MPT FINE	7	5 1/2"	1"	2 1/2"	1.8	Nickel Chrome	**9400-11**
3/4" MPT BSP	7	5 1/2"	1"	2 1/2"	1.9	Nickel Chrome	**9400-12**
25mm/ISO FLG	24	9 1/4"	2 1/8"	5 1/8"	3.5	Nickel Chrome	**9400-13**
1" MPT FINE	24	9"	1 7/8"	5 1/8"	3.5	Nickel Chrome	**9400-14**
40mm/ISO FLG	44	7 1/2"	2 1/8"	10 1/4"	7.0	Nickel Chrome	**9400-15**
1 1/2" MPT FINE	44	7 1/4"	1 7/8"	10 1/4"	7.0	Nickel Chrome	**9400-16**
40mm/ISO FLG	55	9 1/4"	2 1/8"	10 1/4"	9.0	Nickel Chrome	**9400-17**

Replacement Elements

Flow CFM	Dimensions			Cat. #
	Inner Dimensions	Outer Dimensions	Height	
4.5	1 1/4"	2 1/4"	3"	**9400-18**
7	1 1/4"	2 1/4"	4"	**9400-19**
24	3"	4"	6"	**9400-20**
44	8"	9"	4 3/4"	**9400-21**
55	8"	9"	6"	**9400-22**



Don't see the right product for your application? Give us a call.
Our broad manufacturing capabilities and our extensive network of top-quality suppliers enable us to deliver many more products than we have space to represent in this catalog. Further, our commitment to maintaining the lowest pricing and the best service available can save you time and money. Just let us know your requirements. We will provide a prompt quotation on products tailored to your application.

Ovens

Terra Universal
700 N.Harbor Bl., Anaheim, CA 92805 USA • 714/526-0100

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High-Performance Pass-Through Vacuum/Nitrogen Oven

- **Heavy-duty construction allows efficient, high-temperature operation for heavy throughput**
- **Double doors facilitate easy pass-through operations**
- **Pre-heated gas manifold guarantees temperature uniformity during gas flow**
- **Door flanges hold circulating water for quick cooling during cycling operations**
- **Stainless steel, perforated 8" x 14" removable shelf allows easy insertion and removal of materials**
- **High-temperature cut-out ensures safe operation**

This Vacuum/Nitrogen oven features double doors for such pass-through operations as resistance and seam welding of hybrids and many other microelectronic packages.

The rugged ½"-thick stainless steel doors operate smoothly from both ends, and are designed to allow easy attachment to the left side of the Terra Series 300 or 400 stainless steel atmospheric chamber. Door flanges hold circulating water to speed up the cooling of the chamber during cycling operations; the oven can then remove the moisture completely prior to sealing operations. The high temperature cut-out provides protection against overheating for safe operation.

Optional Features

The flexible design of the oven allows it to accept a wide range of additional features, whether or not they're offered by Terra Universal, including vacuum pumps, oil mist eliminators, automatic doors, and temperature and vacuum controllers and recorders. Call us for a quotation when you have selected the components you need; we will deliver them as a complete turnkey system.

Note: These ovens require a support platform when mounted on a chamber; select a Terra stand with oven support.

Shown mounted to Series 300 Chamber

Specifications

Temperature range:	Up to 300°C continuous, 350°C intermittent
Degree of vacuum:	Up to 10^{-6} Torr and higher; helium mass spectrometer tight
Heat-up time:	25 minutes under vacuum, 35 minutes with atmospheric flow
Size of work zone:	11½" dia. by 14" long
Exterior cover:	Mild steel, blue hammertone enamel
Insulation:	2" of high temperature insulation—plus polished aluminum reflector
External connections:	Vacuum port–standard 1⅛" diameter port ISO-KF-40 Quick Clamp and Blanking Plate (3.81 cm diameter) Water inlet—¼" FPT Water drain—¼" FPT Gas inlet—¼" FPT (valved) Gas outlet—¼" FPT (valved)
Power requirements:	120VAC, 50-60 Hz, 3.6 kw 220VAC, 50-60 Hz, 3.6 kw
Water requirements:	¼ gpm, ¼ FPT
Gas flow:	Built-in provision
External dimensions:	19½"W x 17¾"D x 28¾"H
Instrumentation:	0-30" Rough Vacuum dial gauge, ⅛" NPT coupling for thermocouple vacuum gauge connection on pumping port neck. Time proportioning temperature controller.
Door swing (out):	13½"
Net weight:	150 lbs.
Shipping weight:	200 lbs.

	110VAC, 50/60Hz	220VAC, 50Hz
High-Performance Pass-Through Vacuum/Nitrogen Oven	Cat #	Cat#
Left Mount	**5401-00A**	**5401-00A-220**
Right Mount	**5401-12A**	**5401-12A-220**
Rotary Vane Vacuum Pump (See page 494)	**7901-00**	**7901-08**

CE

Modular Vacuum/Nitrogen Pass-Through Oven

- **Economical oven delivers wide temperature and vacuum range at an affordable price**
- **Modular design allows easy attachment to Terra Stainless Steel Atmospheric Chambers**
- **Double-door design enhances flexibility, allows pass-through operations**
- **All stainless steel construction is suitable for operations with corrosive fumes**
- **Tempered-glass window permits full viewing of contents**
- **Can be ordered to retrofit any Terra stainless steel atmospheric chamber**

This unit provides a compact, economical alternative to Terra's larger Vacuum/Nitrogen Oven for applications that don't require extremely high temperatures or vacuums; it is ideal for R&D, laboratory, and production operations. It interfaces with the Stainless Steel Atmospheric Chamber to deliver the heat and/or vacuum required in many manufacturing operations, including resistance and seam welding of hybrids and many other microelectronic packages.

This oven features a double-door design for pass-through operation. An adjustable thermostat with a calibrated indicator controls the contact heating elements which are clamped to the chamber's exterior walls. High heat-resistant silicon door and window gaskets provide effective sealing. Stainless steel construction guarantees noncontaminating operation and allows operations that involve corrosive fumes. Over 2" of fiberglass insulation and a slow leak rate ensure efficient operation. An 8" square tempered-glass window provides ample viewing of the internal chamber.

A 0-30" vacuum gauge and all necessary gas ports are located at the bottom of these pass-through ovens for easy connection to a vacuum pump. Temperature controls include an on/off switch, temperature gauge, and temperature controller. Dual metering valves provide fine adjustment of vacuum and bleed operations. Oven mounts securely to the Stainless Steel Atmospheric Chamber and requires no exterior support.

Specifications

Vacuum range:	Atmosphere to 10 microns, with adequate pump
Temperature range:	10°C to 149°C
Capacity:	.48 cu. ft.
Inside dimensions:	8"W x 13"D x 8"H

CE

Shown mounted on Series 300 Chamber

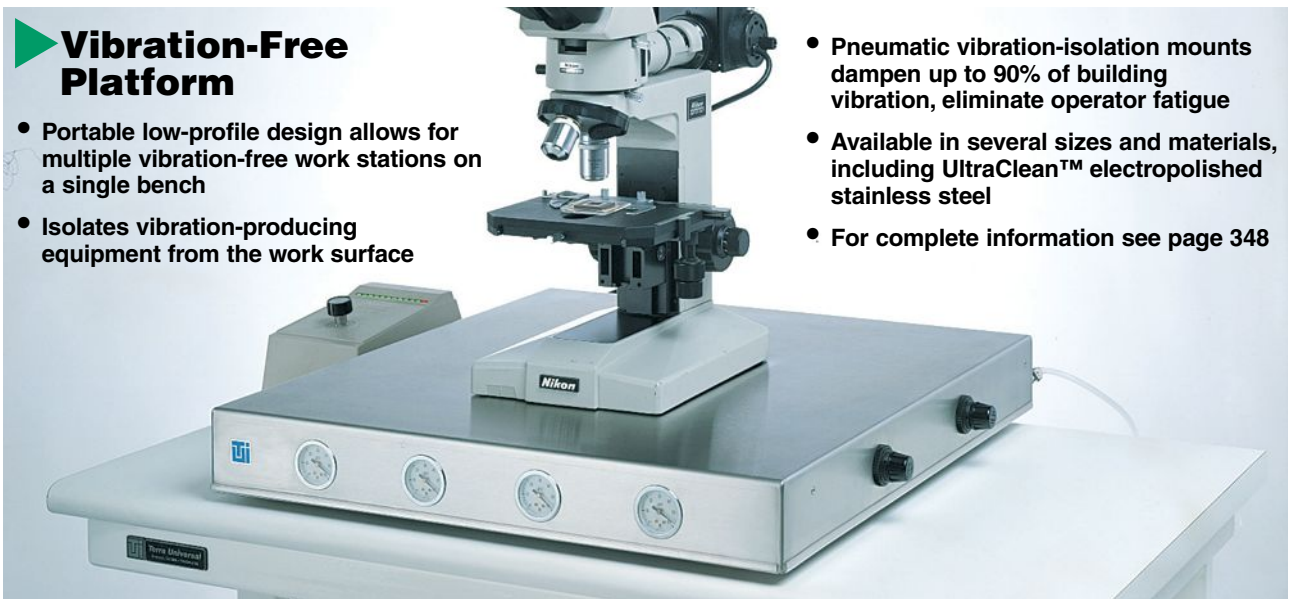
Outside dimensions:	15"W x 13"D x 14"H
Power requirements:	120VAC, 60 Hz, 4.6 amp., 550 watts or 220VAC, 50Hz
Shipping weight:	54 lbs.
Leak rate:	0.2 liters/24 hours
Pumping rate:	33.4 liters per minute, free air capacity, with appropriate pump

	110VAC, 50/60Hz Cat. #	220VAC, 50Hz Cat. #
Modular Vacuum Nitrogen Oven with Interface Attachment for Series 300 Chamber		
Left Mount	**9602-03A**	**9602-03A-220**
Right Mount	**9602-30A**	**9602-30A-220**

Note: The Modular Vacuum/Nitrogen Oven can be custom-ordered to retrofit any stainless steel atmospheric chamber. Contact Terra for ordering information. Please have available the overall dimensions of the appropriate endplate from your chamber, the exact locations of mounting hole, if any, and/or description of mounting hardware desired.

Vibration-Free Platform

- **Portable low-profile design allows for multiple vibration-free work stations on a single bench**
- **Isolates vibration-producing equipment from the work surface**
- **Pneumatic vibration-isolation mounts dampen up to 90% of building vibration, eliminate operator fatigue**
- **Available in several sizes and materials, including UltraClean™ electropolished stainless steel**
- **For complete information see page 348**



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Full View Vacuum/Nitrogen Oven

- **Stainless steel interior allows operations with corrosive fumes**
- **Low leak rate and over 2" of insulation ensure efficient operation**
- **Tempered glass window permits full viewing of contents**
- **Compact design occupies minimal space but offers roomy internal chamber**
- **Interchangeable gaskets allow a wide range of applications**

This oven is engineered to provide excellent vacuum and temperature performance for R & D, laboratory, and production operations over a long period of time...and at a very low price.

It features a stainless steel interior and painted exterior that make it suitable for work with a wide variety of materials, including corrosive vapors. Durable epoxy-polyester hybrid powder coating contributes longer life and lasting value.

It is ideal for use in manufacturing and testing operations (such as wafer and chip drying) that won't tolerate contamination. The walls contain over 2" of fiberglass insulation. An 8" square tempered-glass observation window provides a full view of the chamber. High heat-resistant silicone door and window gaskets provide effective sealing; you may also select Buna-N gaskets in applications that involve volatile hydrocarbons.

A 0-30" vacuum gauge allows for easy reading of the vacuum. An adjustable thermostat with a calibrated indicator controls the contact heating elements which are clamped to the chamber's exterior walls. An on/off switch with an indicator light is provided. Two metering valves provide fine adjustment of vacuum and bleed operations. A glass thermometer and two removable shelves are also included.

Specifications

Vacuum Range:	Atmosphere to 10 microns, with adequate pump
Temperature Range:	35°C to 200°C
Shelves:	2
Capacity:	.44 cu. ft.
Inside Dimensions:	8"W x 12"D x 8"H
Outside Dimensions:	13"W x 16"D x 18"H
Power Requirements:	120VAC, 50/60Hz 4.2 Amps, 500 Watts or 220/240 VAC, 50/60Hz, 2.1 Amps, 500 Watts
Shipping Weight:	46 lbs.
Leak Rate (typical):	3" Hg/ft.^{3}/24 hours
Pumping Rate (recommended):	60 liters per minute, free air capacity, with appropriate pump

	Cat. #
Full View Vacuum/Nitrogen Oven	
120VAC, 50/60 Hz	**5404-00**
220/240VAC, 50/60 Hz	**5404-00-220**

Buna-N Gasket

The Full-View Vacuum/Nitrogen Oven is equipped with a silicone gasket on a standard basis for high temperature operations. For volatile hydrocarbons, order this gasket.

Cat. #
5404-02

Modular Vacuum/Nitrogen Oven

This oven features the economy and performance of the Full-View Vacuum/Nitrogen Oven but offers a modular pass-through design that allows it to be used with Terra's Atmospheric Chamber and Control System. For a full description, see page 503.

Cat. #
9602-03

Large Capacity, Forced-Air
Multi-Purpose Ovens

- **P.I.D. temperature controls for stable heating to 220°C**
- **Unique turbo blower system creates true one-pass circulation pattern for optimal uniformity and fast recovery time**
- **Stainless steel chamber interior and shelves are rugged, noncontaminating**
- **Electronic digital timer features large, easy-to-read LED display**
- **Adjustable air intake and exhaust vents allow fresh intake air or closed recirculation**
- **Safety features include independent overtemperature protection and isolated heating elements**

These versatile multi-purpose ovens perform economical drying, curing, baking, and sterilizing of high-volume samples.

Optimal Uniformity, Fast Recovery Time

Their microprocessor controller achieves precise environmental control and maintains stable temperatures for optimal results. The unique turbo blower system creates a true one-pass circulation pattern that provides both exceptional temperature uniformity (± 1.8°C @ 100°C) and rapid heat recovery, without temperature overshoot.

Uniformity is enhanced by a horizontal airflow system, which offers a level of performance usually found only in more expensive ovens. Horizontal air flow creates optimum circulation when the oven shelves are fully loaded. Heated air is directed into the duct space and flows through horizontal slots and across the shelves. A slide-operated vent allows the user to adjust fresh air ventilation. This permits adjustment from continuous fresh air intake to closed recirculation.

No. 3700-86 (28 cubic foot capacity)

No. 3700-85 (14 cubic foot capacity)

Select between large-capacity (28.0 cubic foot) and medium-capacity (14.0 cubic foot) models. Both incorporate safety overtemperature protection, which operates independent from the microprocessor and controls the heating function if the main temperature set point is exceeded. Other standard features include a P.I.D. temperature control and an electronic digital timer, with large, easy-to-read LED display that indicates both temperature and time parameters. Comes with three 24" x 30" stainless steel shelves.

Specifications (see ordering chart for other data)

Temperature Range:	Ambient +5 to 220°C
Temperature Uniformity:	± 1.8°C @ 100°C
Control Sensitivity:	± 0.05°C
Heat Up Time to 150°C:	Fourteen (14) minutes
Recovery Time to 150°C:	Four (4) minutes - Door open 30 seconds
Electrical:	220/240VAC, 50/60 Hz
Control/displays:	Microprocessor/digital LED
Electronic Timer Range:	1 minute to 99 hours/59 minutes

Note: Temperature tests performed on unloaded oven.

Forced-Air Multi-Purpose Ovens

Dimensions: W x D x H Exterior	Dimensions: W x D x H Interior	Chamber Volume	Watts/Amps	Net Weight	Cat. #
36" x 32" x 47" 914 x 813 x 1194mm	31" x 25" x 31" 787 x 635 x 787mm	14.0 cu. ft. (394 liters)	3800W/16A	490 lbs/222.25kg	**3700-85**
36 x 32" x 78" 914 x 813 x 1981mm	31" x 25" x 62" 787 x 635 x 1575mm	28.0 cu. ft. (788 liters)	5200W/22A	550 lbs/249.5kg	**3700-86**

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Imperial V Mechanical Convection Ovens

Maximum Temperature: 270°C

- **Mechanical convection design ensures temperature uniformity and control**
- **Dependable hydraulic temperature controllers and backup thermostat provided on a standard basis**
- **Stainless steel interiors provide a clean, chemical-resistant, long-lasting heating environment**
- **Choose among three chamber sizes, from 2.5 to 4.4 cubic feet**
- **Comes with a 24-month warranty**
- **Mechanical convection models also available with microprocessor controls, see page 507 for full information**

Imperial V Mechanical Convection Ovens feature quality components and durable construction for dependable service.

Mechanical Convection Ensures Uniform Temperatures, Rapid Rise and Recovery Times

These ovens combine the dependability of hydraulic thermostat temperature control with the improved performance of mechanical convection. A blower gently circulates heated air throughout the chamber, improving temperature uniformity and control while reducing rise and recovery times. In the event of primary control failure, the backup thermostat maintains the temperature at a few degrees above the original setting. Individual indicator lights display which thermostat is controlling the oven temperature, and an LED display on the control panel indicates temperature.

The oven interior is 304 stainless steel with two chrome-plated shelves, and the exterior is enamel steel. All controls are mounted on a convenient bottom control panel that is recessed and sheltered from spills. All models are supplied with a 3-wire cord and plug and are available in three chamber sizes: 2.5, 3.5, or 4.4 cubic feet, with either 120V or 240V power.

Ordering Information: Imperial V Mechanical Convection Ovens

Voltage	Amps	Watts	Chamber Dimensions W x D x H in. (cms)	Overall Dimensions W x D x H in. (cms)	Volume Cubic Feet (ltrs)	Net Wt. lbs. (kgs)	Ship. Wt. lbs. (kgs)	Cat. #
120 240	10.8 5.4	1300	13 x 17 1/8 x 19 1/2 (32.5 x 42.8 x 48.7)	21 5/8 x 25 1/4 x 35 1/2 (55 x 64 x 90)	2.5 (70.8)	130 (59)	150 (68)	**3700-56** **3700-57**
120 240	15.8 7.9	1900	18 x 17 1/8 x 19 1/2 (46 x 42.8 x 50)	26 5/8 x 25 1/4 x 35 1/2 (68 x 68 x 90)	3.5 (99.1)	142 (64)	170 (77)	**3700-58** **3700-59**
120 240	15.8 7.9	1900	23 x 17 1/8 x 19 1/2 (57.5 x 42.8 x 50)	31 5/8 x 25 1/4 x 35 1/2 (80 x 64 x 90)	4.4 (124.6)	165 (75)	185 (84)	**3700-60** **3700-61**

	Rise Time Ambient to 200°C	Maximum Temp. °C	Control @ 100°C	Uniformity @ 100°C	Control @ 200°C	Uniformity @ 200°C
All Models:	60 minutes	270	± 1.0°C	± 1.5°C	± 1.0°C	± 2.0°C

Imperial V Microprocessor-Controlled Mechanical Convection Ovens

Maximum Temperature: 300°C

- **Microprocessor temperature control and mechanical convection provide unmatched accuracy, precision, and convenience**
- **Stainless steel interiors provide a clean, chemical-resistant, long-lasting heating environment**
- **Choose among three chamber sizes, from 2.5 to 4.4 cubic feet**
- **Comes with a 24-month warranty**
- **Optional timer and programmable controllers available for automatic temperature cycling (up to eight ramps and eight dwells)**

Imperial V Mechanical Convection Ovens with microprocessor temperature control and mechanical convection are designed for precise temperature requirements and automatic temperature cycling.

Microprocessor Technology Ensures Precise, Repeatable Results

All units come with a PID temperature control which ensures accurate temperature regulation; a digital set guarantees repeatable settings. The ovens come standard with a Watlow 965 controller and dual readouts that simultaneously indicate set temperature and measured temperature. A timer may be added to this standard controller, and a choice of two programmable controller options offer additional capabilities to store one program (with two ramps and two dwells) or four programs (with eight ramps and eight dwells).

A platinum RTD temperature sensor is positioned to respond instantly to the temperature of the oven contents, thereby ensuring that the value displayed on the LED is a true indication of the load temperature. An independent hydraulic thermostat maintains the temperature at a few degrees above the setpoint should the controller fail. A panel light indicates if the over-temperature thermostat is controlling the oven.

The oven interior is 304 stainless steel with two chrome-plated shelves, and the exterior is enamel steel. All controls are mounted on a convenient bottom control panel that is recessed and sheltered from spills. All models are supplied with a 3-wire cord and plug and are available in three chamber sizes: 2.5, 3.5, or 4.4 cubic feet, with either 120V or 240V power.

24-Hour Timers

(Not Used with Programmable Controllers)

	Cat. #
120VAC, 60Hz	**3700-53**
240VAC, 50Hz	**3700-54**
240VAC, 60Hz	**3700-55**

Programmable Controllers (include Timers)

Type	Timer Units	Cat. #
1 Program (2 ramps/2 dwells)	Mins.	**3700-49**
4 Programs (8 ramps/8 dwells) (Timer ramps in minutes and dwells in hours)	Mins.	**3700-51**
4 Programs (8 ramps/8 dwells) (Timer ramps in minutes and dwells in minutes)	Mins.	**3700-52**

Ordering Information: Imperial V Microprocessor-Controlled Mechanical Convection Ovens

Voltage	Amps	Watts	Chamber Dimensions W x D x H in. (cms)	Overall Dimensions W x D x H in. (cms)	Volume Cubic Feet (ltrs)	Net Wt. lbs. (kgs)	Ship. Wt. lbs. (kgs)	Cat. #
120 240	10.8 5.4	1300	13 x 17 1/8 x 19 1/2 (33 x 44 x 50)	21 5/8 x 25 1/4 x 35 1/2 (55 x 64 x 90)	2.5 (70.8)	125 (57)	150 (68)	**3700-43** **3700-44**
120 240	15.8 8.0	1900	18 x 17 1/8 x 19 1/2 (46 x 44 x 50)	26 5/8 x 25 1/4 x 35 1/2 (68 x 64 x 90)	3.5 (99)	155 (70)	170 (77)	**3700-45** **3700-46**
120 240	15.8 8.0	1900	23 x 17 1/8 x 19 1/2 (58 x 44 x 50)	31 5/8 x 25 1/4 x 35 1/2 (80 x 64 x 90)	4.4 (124.6)	165 (75)	180 (82)	**3700-47** **3700-48**

	Rise Time Ambient to 200°C	Maximum Temp. °C	Control @ 100°C	Uniformity @ 100°C	Control @ 200°C	Uniformity @ 200°C
All Models:	40 minutes	300	± 0.1°C	± 1.0°C	± 0.2°C	± 2.0°C

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Class 100 Cleanroom Ovens

Maximum Temperature: 250°C

- **Two designs available—one with and one without HEPA filters—to maintain Class 100 particle requirements**
- **4-program microprocessor controller**
- **24-month warranty**
- **Safety features protect samples against overheating, maintain even temperature in the event of microprocessor failure**

3700-70

These Cleanroom Ovens are designed specifically for cleanroom operation. Models without filters meet the requirements of Fed. Std. 209E for a Class 100 environment, and Ultra Clean® Ovens with HEPA filters exceed Class 100 conditions.

Microprocessor Temperature Control Ensures Safe Operation, Repeatable Results

Microprocessor-based temperature controls and mechanical convection air-flow design ensure unsurpassed operating characteristics. A platinum RTD temperature sensor responds instantly to the load temperature, so the display value is an accurate reflection of the temperature of the oven's contents. Digital controls guarantee repeatable conditions with every use.

A 4-segment controller offers one program with two ramps and two dwells (ramp from 0.01°C per minute and dwell from 0 to 9999 minutes). In case of primary control failure, an adjustable high limit safety thermostat will control the temperature to a few degrees above the original set point.

An indicator lamp alerts the user to any overtemperature condition.

All controls are mounted on a convenient drawer-style control panel, recessed and sheltered from spills, which allows easy access to internal parts.

Exclusive Air-Flow Engineering

These ovens feature an exclusive air-flow pattern that assures you of unsurpassed temperature control and uniformity and quick recovery times. A stainless steel blower, driven by a constant speed induction motor, circulates air throughout the chamber.

Heated air is gently forced up both sides of the work chamber. It exits through openings in the sidewall plenums where it travels over the load toward the oven center. Airflow is then directed downward through the center of the chamber for reheating and recycling.

Durable Construction Ensures Long, Reliable Service Life

Ultra Clean® Ovens are built to last. The attractive, white baked enamel finish and clean look of these units will add to the appearance of the most modern laboratory or production facility.

The interior walls are made of corrosion-resistant stainless steel. The bottom and sidewall plenums are also stainless steel. Four perforated stainless steel shelves adjustable on 1 3/4" centers are included with every unit. The oven utilizes delrin hinge pivots eliminating contamination due to metal contacting metal. Adjustable door hinge, positive lever-actuated door latch and silicone gasket assure an excellent seal between door and chamber.

Interior cleaning is a snap. Shelves, supports, and plenums are quickly removed and rounded interior corners speed the job along.

Exterior walls are constructed from cold rolled steel and reinforced at all stress points. They are then finished with an attractive, durable enamel.

Three inches of silica-based insulation, between the work chamber and exterior walls, help retain heat. Rigid backing prevents insulation from settling in the walls. The plug style door with stainless steel inner surface, one piece silicone gasket, and positive locking door latch, also prevent heat loss from the chamber. All these features add up to an oven with improved uniformity and control, lower operating costs, and minimal heat radiated to the surrounding environment. All models come equipped with 3 wire line cord and plug.

Additional standard features include an adjustable 2 inch diameter exhaust vent, a 1/8" NPT fitting for introducing inert gas or house air into the oven chamber, and fused electrical overload safeguards. A flowmeter and a 0.3 micron filter are included for purging with nitrogen only on units with HEPA filters.

Stainless Steel Clipboard

- **Stainless steel construction gives you a clipboard that's up to cleanroom standards**
- **12" x 9½" surface firmly holds writing paper in place**

What is there to say about a clipboard?

They're easy to overlook when you're setting up your cleanroom, yet they're an essential item when it comes time to update information.

This one is completely clean-room compatible. Stainless steel construction ensures a nonshedding, durable, conductive surface for cleanroom paper. Large 12" x 9½" surface and spring-loaded clip securely hold standard sized sheets.

	Cat. #
Stainless Steel	**1350-00**
Polypropylene	**1350-01**

Operating Specifications: Cleanroom Oven without Filters

Cat. #	Rise Time (Ambient to 200°C)	Load Rise Time* Temp. @ 150°C	Maximum Temp. °C	Control @ 100°C	Control @ 200°C	Uniformity @ 100°C	Uniformity @ 200°C
3700-12 3700-13 3700-14	22 minutes	8 minutes	250	± 0.1	± 0.2	± 1.0	± 1.5
3700-15 3700-16	18 minutes	4 minutes	250	± 0.1	± 0.2	± 1.0	± 1.5
3700-17 3700-18	20 minutes	7 minutes	250	± 0.1	± 0.2	± 1.0	± 1.5

** After oven temperature stabilized at 150°C, the oven was loaded with nine 4" wafer boats. Boats were evenly distributed in the work chamber. A thermocouple measured the wafer temperature in the center boat. Following values represent the time it took for the wafer temperature to reach 90% of set point. Note: Performance specifications were measured under controlled laboratory conditions. Your oven's performance may be slightly different, depending on the application.*

Ordering Information: Cleanroom Oven without Filters

Chamber Dimensions W x D x H (in.) (cms)	Overall Dimensions W x D x H (in.) (cms)	Volume (Cu. Ft.)	Net Wt. lbs. (kgs)	Ship. Wt. lbs. (kgs)	Watts	Amps	VAC 50/60Hz	Cat. #
13 x 18 x 19 1/2 (33.0 x 45.7 x 49.5)	21 5/8 x 24 1/4 x 35 (54.9 x 61.6 x 88.9)	2.6	180 (82)	205 (93)	1900	15.8 7.9	120 240	**3700-12** **3700-13**
					2100	10.1	208	**3700-14**
18 x 18 x 19 1/2 (45.7 x 45.7 x 49.5)	26 5/8 x 24 1/4 x 35 (67.6 x 61.6 x 88.9)	3.6	220 (100)	240 (109)	3100	12.9 14.9	240 208	**3700-15** **3700-16**
23 x 18 x 19 1/2 (58.4 x 45.7 x 49.5)	31 5/8 x 24 1/4 x 35 (80.3 x 61.6 x 88.9)	4.6	234 (106.4)	264 (120)	3100	12.9 14.9	240 208	**3700-17** **3700-18**

Operating Specifications: Cleanroom Oven with HEPA Filters

Cat. #	Rise Time (Ambient to 90°C)	Recovery Time* @ 90° C	Maximum Temperature	Control @ 90° C	Uniformity @ 90° C
3700-70 3700-71	11 minutes	22 seconds	250° C	± 0.2	± 1.5

** After 1 minute, 90° door opening. Note: Performance specifications were measured under controlled laboratory conditions. Your oven's performance may be slightly different, depending on the application.*

Ordering Information: Cleanroom Oven with HEPA Filters

Chamber Dimensions W x D x H (in.) (cms)	Overall Dimensions W x D x H (in.) (cms)	Volume (Cu. Ft.)	Net Wt. lbs. (kgs)	Ship. Wt. lbs. (kgs)	Watts	Amps	VAC 50/60Hz	With 4-segment Controller Cat. #
14 x 18 x 19 1/2 (35.6 x 45.7 x 49.5)	26 5/8 x 24 1/4 x 35 (67.6 x 61.6 x 88.9)	2.8	202 (91.8)	235 (106.8)	3100	12.9 14.9	240 208	**3700-70** **3700-71**

Stacking Racks

The Space Saver Stacking Racks allow two ovens of the same size to be stacked for safe operation. A fan removes heat generated from the bottom oven, preventing damage to or malfunction of the top unit. Racks are not available for ovens No. 3700-17 and No. 3700-18 or for HEPA-filtered Ultra Clean® Ovens. Operate on 120VAC, 50/60Hz.

	Cat. #
For Cleanroom Ovens No. 3700-12, 3700-13, 3700-14	**3700-19**
For Cleanroom Ovens No. 3700-15, 3700-16	**3700-20**

Replacement HEPA Filters For Ultra Clean® Ovens

Overall dimensions: 17"W x 3 1/4"D x 17"H
Weight: 14 lbs. net; 20 lbs. shipping

Cat. #
3700-72

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"Squaroid" Vacuum Ovens

Maximum Temperature: 220°C

- **Hydraulic thermostat controls temperatures up to 220°C**
- **Built-in high-limit thermostat guards against overheating**
- **Radiant warm-wall heating provides more even chamber temperatures**
- **Available in two chamber sizes**
- **Comes with 24-month warranty**
- **Available with dial thermometer or LED readout**

"Squaroid" Vacuum Ovens, available in two sizes, operate up to a maximum temperature of 220°C.

"Squaroid" Vacuum Ovens are available with a dial temperature readout in the oven chamber or an LED temperature readout on the oven control panel. Radiant warm wall heaters provide uniform heating while preserving usable chamber area. Temperature is controlled by a hydraulic thermostat, while a built-in high-limit thermostat prevents the oven from exceeding maximum temperature.

A silicone door gasket and positive latch door, with floating tempered glass, assure an excellent seal at all vacuum levels between 2" and nearly 30" Hg. A clear, polycarbonate safety shield protects door glass from damage. Vacuum line fittings accept ¼" I.D. vacuum tubing.

All vacuum ovens have a side-mounted control panel, with all controls in a single convenient location. The control thermostat has an indicator light showing when the heaters are energized. The power switch is a combination circuit breaker and indicator light.

The shelf assembly includes two aluminum shelves. The entire assembly is easily removed, simplifying cleaning of the stainless steel chamber. Three inches of glass wool insulation surround the working chamber, preventing heat loss. Exterior walls are made of heavy gauge steel, finished with a tough, baked enamel overcoat.

Note: Models 3700-35 and 3700-36 have top-mounted independent evacuation and venting vacuum fittings; all other models feature front-mounted three-way valve for evacuation, venting, and purging of inert gases (e.g. nitrogen or argon) with vacuum fittings on front of unit.

Ordering Information: Squaroid Vacuum Ovens

Chamber Dimensions W x D x H (in.)	Overall Dimensions W x D x H (in.)	Volume (Cu. Ft.)	Net Wt. lbs.	Ship. Wt. lbs.	Watts	Voltage*	With Dial Thermometer Cat. #	With LED Readout Cat. #
10 x 12 x 10	19 7/8 x 16 x 16 1/4	0.7	83	130	600	120	**3700-35**	**3700-80**
						240	**3700-36**	**3700-81**
14 x 20 x 14	25 x 25 x 22	2.3	150	295	1600	120	**3800-20**	**3700-82**
						240	**3800-21**	**3700-83**

**** All Models are 50/60 Hz***

Hi-Temp "Squaroid" Vacuum Ovens

Maximum Temperature: 300°C

- **Hydraulic thermostat controls temperatures up to 300°C**
- **Radiant warm-wall heating enhances temperature uniformity**
- **Externally isolated heaters maximize safety, chamber space**
- **Comes with 24-month warranty**

The Hi-Temp "Squaroid" Duo-Vac® Ovens feature the efficiency and convenience you expect in a high-temperature oven.

Radiant Warm-Wall Heating: Safe, Efficient, Convenient

Radiant warm-wall heating provides uniform heating and cooling and eliminates the hazards associated with open-wire heaters. Because the heaters are clamped to the outside of the oven chamber, these ovens also offer greater working space.

A hydraulic thermostat controls temperatures up to a maximum of 300°C. A programmable safety thermostat provides automatic temperature control back up in the event the primary thermostat fails. The dial thermometer located inside the chamber can be easily read through the tempered glass viewing window.

Top-Mounted Panel Places All Controls at Eye Level

Vacuum is precisely controlled to nearly 30" Hg. The door includes a tempered glass (borosilicate) window, secure latch and continuous gasket for a tight seal. Vacuum relief (vent) and control valves are located on the front of the unit; they connect to separate lines into the chamber to allow the introduction or air or inert gas if desired. The vacuum line fitting, located on the rear wall, requires ¼" OD copper tubing.

The chamber interior is stainless steel; the exterior is heavy gauge steel finished with baked polyester. Three inches of glass wool insulation ensure minimum heat loss from the chamber. The two-piece shelf assembly has two solid aluminum shelves, improving heat conduction to the samples.

Controls include the primary control and adjustable safety thermostats, vacuum relief and control valves, vacuum gauge (which reads up to 30" Hg), power switch and resettable circuit breaker.

Ordering Information: Hi-Temp Squaroid Vacuum Ovens

Chamber Dimensions W x D x H (in.) (cms)	Overall Dimensions W x D x H (in.) (cms)	Volume (Cu. Ft.)	Net Wt. lbs. (kgs)	Shipping Weight lbs. (kgs)	Watts	Amps 50/60Hz	VAC 50/60Hz	Cat. #
12 x 12 x 13½ (30.5 x 30.5 x 34.3)	20 x 27 x 18 (50.8 x 68.6 x 45.7)	1.1	150 (68)	200 (91)	1200	10.0 5.0	120 240	**3700-39 3700-40**
12 x 12 x 20 (30.5 x 30.5 x 50.8)	20 x 27 x 26 (50.8 x 68.6 x 66)	1.7	210 (95)	270 (122)	1400	12 6	120 240	**3700-41 3700-42**

Packaging and Handling

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DryPack® Packaging shown courtesy of Richmond Technology Inc.

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Model 635
Precision Vacu-Sealer

- **Ideal for cleanroom use!**
  - ✓ **No-maintenance Venturi vacuum uses no moving parts, generates no particulates**
  - ✓ **Isolated exhaust port prevents contamination of surrounding cleanroom**
  - ✓ **Clean exterior layout makes cleanroom prep fast and easy**
- **"No Pinch" Vacuum Jaw increases user safety, eliminates the need for complex bag stretchers**
- **First-of-its-kind LCD operator panel displays status of sealer at all times**
- **Digital timers can be set to 1/10 second for finer control and repeatability**
- **Safety features prevent operator injury resulting from jaw pressure or premature heating**
- **Exclusive, independent jaw system with optimal spacing eliminates bag waste**
- **Backed by a two-year warranty**

Ergo Machine Stand
See page 516 for ordering information

This Next-Generation Vacuum Sealer sets a new standard by which vacuum sealers will be measured.

This workhorse incorporates an exclusive "Smart Pad" control center for easy, efficient cycling. It includes 98 independent digital gas/vacuum cycle timers, multi cycle/reverse cycle, manual override by any timer, cycle counter, scheduled maintenance alarms, on-board electronic user and troubleshooting guides, and password-controlled lock-outs. The "soft touch" retractable nozzles, with Long Reach and High-Efficiency Orifice, simplify product loading/unloading, allowing hands-free operation in most cases and minimizing both contamination and seal imperfections. These features provide everything needed to meet GMP, ISO 9000, and operational flexibility requirements.

Clean, Reliable Operations

This unit is ideal for cleanroom sealing operations. Such features as a non-particulating Venturi vacuum system and isolated exhaust port prevent the introduction of contaminants into the cleanroom. Its foot pedal control allows "no touch" activation, and the retracting "Soft Touch" nozzle minimizes the need to handle a sample.

The Model 635 is engineered and manufactured for a long service life under the most demanding operating conditions. Its electronics are fully burn-in tested and matched to a rigid, welded steel case and the highest quality pneumatic components. This adds up to a tough machine that will perform for years, even in the harshest production environments.

Safety features include low pressure jaw closure, which precludes operator injury caused by pinching. Because jaws don't heat until completely closed, the operator is protected from burns. An emergency ESC key immediately aborts operation and opens jaws.

Other standard features include multiple operational mode presets, vacuum gauge, thermal overload protection, product support tray, and free technical phone

Why Choose Model 635?

Ergonomically Correct Operation: Retractable nozzle(s) reduce or eliminate product manipulation during sealing, increasing productivity and decreasing the risk of Cumulative Trauma Disorder (CTD).

Increased Productivity: The reversed vacuum/seal jaw design eliminates seal creases and hence the need for double bagging. Its hands-free operation allows the operator to prepare the next pouch while one is sealing.

Better Performance: Finer seal control is achieved through digital controls and high-accuracy heat and cool timers.

Longer Service Life: Robust design and construction withstand the worst shipping and handling shock and vibration.

Why Add Optional Temperature Control?

Repeatability: High-precision controls and sealing mechanisms create a perfect seal every time.

Validation: Temperature control is required in the Validation Process.

Enhanced Performance and Productivity: Heat control reduces material waste, minimizes wear on elements and Teflon, reduces downtime and maintenance costs, and eliminates warm-up cycles.

Why Choose Optional Digital or Pressure Regulated Vacuum Control?

Product Safety: Pressure-regulated vacuum control is necessary when packaging reels and other fragile or sharp objects.

Validation: In many cases, the Validation Process requires digital or pressure-regulated vacuum control.

Please contact your Terra representative for more information on these optional features.

support. See sidebar for optional Digital Temperature Control and Digital Gas Pressure Control, along with other available options.

Specifications

Seal Width:	¼" Standard
Dimensions:	Length = seal length + 5.5" x 9.5"W x 8.5"H
Vacuum Pressure:	Up to 26" Hg standard
Suction Flow:	Up to 1.4 CFM/nozzle standard (up to 4.8 CFM/nozzle available)
Air Requirements:	Up to 2.4 CFM standard @ 90 psi

See ordering chart for other specifications.

CE

Model 635 Sealers

Seal Length	Dimensions (W" x D" x H")	Ship Weight	Seal Width	110VAC 50/60Hz, 7A Cat. #	220VAC, 50Hz Cat. #
20"	26 x 10 x 8	38 lb	¼"	**4051-95**	**4051-95-220**
25"	31 x 10 x 8	45 lb	¼"	**4051-96**	**4051-96-220**
30"	36 x 10 x 8	46 lb	¼"	**4051-97**	**4051-97-220**
35"	41 x 10 x 8	50 lb	¼"	**4051-98**	**4051-98-220**

Replacement Parts

Seal Length	Heating Element Cat. #	Element Cover Set Cat. #	Pressure Bar Insert Cat. #
20"	**4051-32**	**4051-05**	**4051-07**
25"	**4051-49**	**4051-45**	**4051-47**
30"	**4051-57**	**4051-53**	**4051-74**
35"	**4051-60**	**4051-63**	**4051-65**

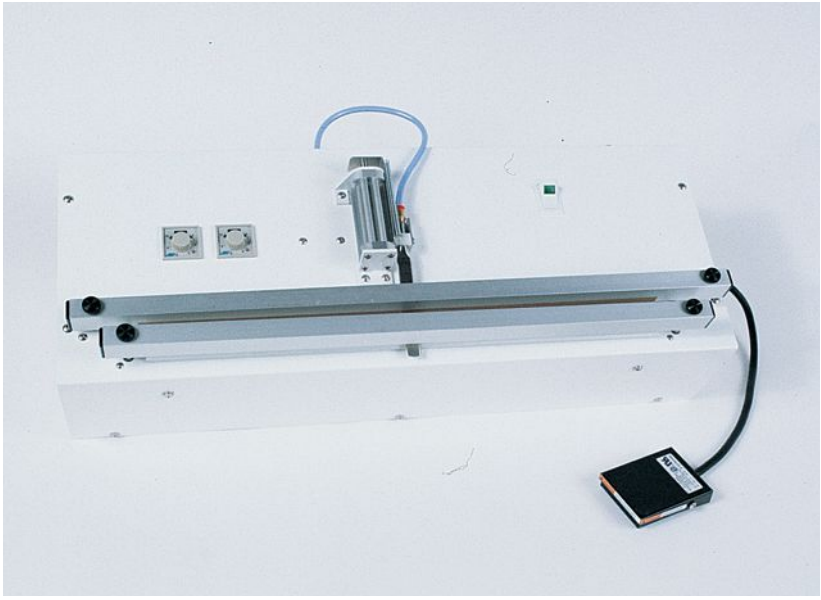
Model 235
Budget Vacu-Sealer

- **High-performance capabilities at low cost translate into unsurpassed value!**
- **Nonparticulating pump and tough paintlock/powdercoat finish reduce cleanroom prep**
- **Exclusive, independent jaw system eliminates bag waste, provides optimal seal time**
- **Foot switch vacuum/seal initiator allows hands-free operation**

The Model 235 Vacu-Sealer provides an economical solution to cleanroom packaging needs.

It provides ⅛"-wide thermal impulse seals up to 20" long in a wide variety of packaging materials. This machine's built-in features contribute to sealing ease and convenience. A quick-release seal jaw speeds maintenance. A retracting nozzle reduces operator training and cycle time. It includes a 10-second heat timer and a 60-second cool timer. An electronic foot switch vacuum/seal activator allows hands-free sealing.

Thermal overload protection and exhaust silencer are also standard features. The Model 235 is backed by a one-year limited warranty and free customer support.



Specifications

Dimensions:	25½"L x 10"W x 9"H
Seal Length:	20"
Seal Width:	⅛" Standard
Vacuum Pressure:	Up to 26" Hg
Suction Flow:	.85 CFM
Power Requirements:	120VAC, 3 Amps (220VAC optional)
Air Requirements:	1.75 CFM @ 80 psi
Approx. Weight:	25 lbs

	Cat#
Model 235 Vacu-Sealer	
120VAC, 50/60Hz	**4052-08**
220VAC, 50Hz	**4052-08-220**
Replacement 1/8" Heating Element	**4050-03**
Element Cover Set	**4051-05**
Pressure Bar Insert	**4051-07**

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Model 35: Cleanroom-Compatible Vacu-Sealer

- **Impulse heat vacuum seals sensitive microelectronic devices—without external vacuum pump**
- **Cleanroom-compatible design includes nonparticulating pump and isolated exhaust port**
- **Available with gas back-flush capability for moisture-free packaging**
- **Ideal for ESD-safe shipping (with proper packaging material)**
- **Foot-pedal ensures simple, hands-free operation**

This compact, quiet vacuum sealer can be used with or without vacuum and gas purging to provide safe packaging of sensitive microelectronic components. It features adjustable dwell time for heat and cool cycles. Vacuum sealing may be done manually or with a timer.

Model 35 also provides unsurpassed reliability. All models are hand-wired and individually tested to ensure a long service life, and all fasteners are sealed against loosening due to vibrations.

The Model 35 produces ¼"-wide band seals up to 25" long in a wide variety of packaging materials. This machine's built-in features contribute to sealing ease and convenience. Electronic timers are included for gas (10 seconds) and cool (60 seconds).

An electronic foot switch activator allows hands-free operation and can be used to extend or override vacuum timer. Other standard features include a jaw-closing/heat-only safety circuit; vacuum-seal sequence switch, seal only switch, and vacuum gauge. The Backflush model includes a gas-vacuum-seal sequence switch and gas pressure regulator and gauge.

CE

The Model 35 is backed by a two-year limited warranty.

Specifications

Dimensions:	Length = seal length + 5½" x 9½"W x 8½"H
Seal Length:	See ordering chart
Seal Width:	¼"
Vacuum Pressure:	Up to 26" Hg standard
Suction Flow:	Up to 4.8 CFM (1.4 standard)
Power Requirements:	110/220VAC, 50/60Hz, 7 Amps (110VAC. 20"W model)
Air Requirements:	2.4 CFM @ 80 psi standard
2 Year Limited Warranty	

Specifications			Model 35 Sealers		Model 35 Sealers with Gas Backflush		Replacement Parts			
			¼" Band Seal		¼" Band Seal					
Seal Length	Dimensions (W" x D" x H")	Weight (lbs.)	110VAC 50/60Hz Cat. #	220VAC 50Hz Cat. #	110VAC 50/60Hz Cat. #	220VAC 50Hz Cat. #	¼" Replacement Heating Element Cat. #	Feeder Tray Accessory Cat. #	Element Cover Set Cat. #	Pressure Bar Insert Cat. #
20"	26 x 10 x 8	30	**4050-00**	**4050-00-220**	**4051-91**	**4051-91-220**	**4051-32**	**4050-01**	**4051-05**	**4051-07**
25"	31 x 10 x 8	33	**4050-04**	**4050-04-220**	**4051-92**	**4051-92-220**	**4051-49**	**4051-42**	**4051-45**	**4051-47**
30"	36 x 10 x 8	37	**4050-08**	**4050-08-220**	**4051-93**	**4051-93-220**	**4051-57**	**4051-50**	**4051-53**	**4051-74**
35"	41 x 10 x 8	40	**4050-12**	**4050-12-220**	**4051-94**	**4051-94-220**	**4051-60**	**4051-61**	**4051-63**	**4051-65**

Ergonomic Machine Stand

- **Eliminates stooping and bending during sealing operations to increase worker comfort and productivity**
- **Fits any Accu-Seal Sealing Machine of the corresponding width**
- **Allows operational Accu-Sealer to rotate 180° for optimal versatility**

This modular stand creates a completely ergonomic sealing station that increases productivity and guards against operator injuries!

Rigid enough to support any of the Accu-Sealers on these pages, this stand is easy to adjust to accommodate operator heights and desired machine tilt. Includes casters for easy mobility.

For Sealer Width	Cat. #
20"	**4052-09**
25"	**4052-10**
30"	**4052-11**
35"	**4052-12**

Models 530 & 540
Validatable Accu-Sealers

- **Absolute process control for validation in a tabletop impulse sealer**
- **Ideal for medical pouch sealing**
- **Produces a durable 1/4" band seal**
- **Portable, light-weight design takes up little benchtop space**
- **Model 540 features build-in air compressor for plug'n seal performance**

These Validatable Accu-Sealers give you absolute process control for validation.

Model 530: Unsurpassed Uniformity

The new Model 530 Validatable Accu-Sealer provides uniform, reliable seals without the need for adjustment of machine settings in a production run. Its complete process control capabilities makes it ideal for medical pouch sealing and other critical applications. Since you have complete sealing process control, you can eliminate productions rejects and rework. You will also reduce maintenance downtime and spare parts inventory due to the extended life of the sealing head components.

Standard built-in features include pneumatic jaw pressure control, an electronic heat timer, and direct electronic digital controls over seal temperature and jaw release temperature. A support tray securely holds the packaging film, and an electronic foot switch activator allows hands-free operation for faster loading and increased throughput. The Tap-To-Start feature allows the operator more freedom to increase production: the operator initiates the sealing cycle by simply depressing the foot switch momentarily. This feature leaves the operator free to attend to other production activities until the sealing process is complete.

The portable design enhances application versatility. At 25 pounds, the Model 530 is a workhorse but needs only a 25" x 10" surface (for 20"-W seal).

Model 540: Built-In Compressor for Plug'n Seal Operation

Like the Model 530 above, this Validatable Accu-Sealer gives you Plug 'n Seal, validated performance. Its process control features make sealing fast and simple. By using the release temperature, rather than a simple timer, you are assured that each seal is exactly the same. Heat time and seal pressure controls guarantee that results are operator-independent.

In addition to the features listed above, the Model 540 adds a built-in compressor, and so requires no external compressed air supply.

Specifications

Dimensions:	Length = seal length + 5½" x 9½"W x 8½"H
Seal Length:	See ordering chart
Seal Width:	¼"
Power Requirements:	110/220VAC, 50/60Hz, 20 Amps (110VAC. 20"W model)
Air Requirements:	1 CFM @ 100 psi (Model 530 only)
2 Year Limited Warranty	

Model 530 Sealers

Seal Length	Dimensions (W" x D" x H")	Ship Weight	110VAC, 50/60Hz, 7A Cat. #	220VAC, 50Hz Cat. #
20"	26 x 10 x 8	34 lb	**4051-99**	**4051-99-220**
25"	31 x 10 x 8	39 lb	**4052-00**	**4052-00-220**
30"	36 x 10 x 8	40 lb	**4052-01**	**4052-01-220**
35"	41 x 10 x 8	49 lb	**4052-02**	**4052-02-220**

Note: All seal widths are ¼".

Model 540 Sealers

Seal Length	Dimensions (W" x D" x H")	Ship Weight	110VAC, 50/60Hz, 7A Cat. #	220VAC, 50Hz Cat. #
15"	21 x 10 x 8	37 lb	**4052-03**	**4052-03-220**
20"	26 x 10 x 8	42 lb	**4052-04**	**4052-04-220**
25"	31 x 10 x 8	43 lb	**4052-05**	**4052-05-220**

Note: All seal widths are ¼".

Replacement Parts: for Models 530 and 540 Validatable Accu-Sealers

Seal Length	¼" Heating Element Cat. #	Teflon Cover Set Cat. #	Pressure Bar Insert Cat. #
15"	**4050-21**	**4051-17**	**4051-19**
20"	**4051-32**	**4051-05**	**4051-07**
25"	**4051-49**	**4051-45**	**4051-47**
30"	**4051-57**	**4051-53**	**4051-74**
35"	**4051-60**	**4051-63**	**4051-65**

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General Purpose Nesting Tote Boxes

- **Nesting design features tapered sides**
- **Smooth sides allow easy cleaning**
- **Available in conductive and static-dissipative high-density polyethylene**

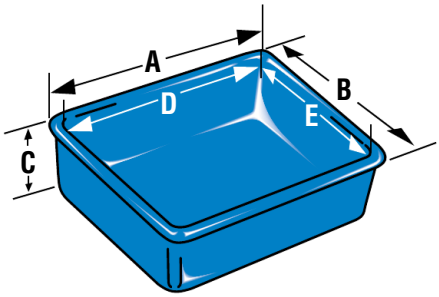
These boxes make use of a nesting design that saves space when empty boxes are stacked; optional lids let you stack them without crushing stored materials.

Like our other tote boxes, these units are available in two materials to satisfy your static requirements (see specifications page 519). Their smooth-sided construction makes cleaning easy.

Molded-in snaps are optional on Nesting Tote Boxes

How to Order Nesting Tote Boxes

1. Select the tote box for your application (notice that each size is available in either conductive or static-dissipative high-density polyethylene).



2. Select a corresponding snap-on lid (if desired). Be sure to order a lid of the appropriate material (conductive or static-dissipative).

Optional snaps are available at no extra cost; they let you attach labeling pouches for easy identification of stored materials. Specify snaps when ordering.

	Cat. #
Labeling Pouch 2 1/4" x 6 1/2" clear plastic	**6000-04**

Nesting Tote Boxes			Static-Dissipative Tote Boxes, Lids		Conductive Tote Boxes, Lids	
Overall Dimensions (A" x B" x C")	Inside Dimensions (D" x E")	Approx. Wt. Per Box (lbs.)	Static-Dissipative Tote Boxes Cat. #	Corresponding Snap-On Lids Cat. #	Conductive Tote Boxes Cat. #	Corresponding Snap-On Lids Cat. #
8 3/8 x 6 1/2 x 2	7 x 5	.31	**6002-54**	**6003-55**	**6003-05**	**6004-47**
8 3/8 x 6 3/8 x 3 1/4	6 1/2 x 4 1/2	.37	**6002-55**	**6003-55**	**6003-06**	**6004-49**
10 7/8 x 6 x 3 7/8	9 x 4	.37	**6002-61**	—	—	—
12 1/8 x 10 1/2 x 2 3/4	10 1/2 x 8 3/4	.76	**6002-64**	**6003-61**	**6003-15**	**6004-50**
15 1/2 x 12 5/8 x 3	13 x 10	.75	**6002-72**	—	**6003-23**	—

Utility Tote Boxes*			Static-Dissipative Tote Boxes, Lids		Conductive Tote Boxes, Lids	
Overall Dimensions (A" x B" x C")	Inside Dimensions (D" x E")	Approx. Wt. Per Box (lbs.)	Static-Dissipative Tote Boxes Cat. #	Corresponding Snap-On Lids Cat. #	Conductive Tote Boxes Cat. #	Corresponding Snap-On Lids Cat. #
15 1/4 x 7 1/2 x 11/2	14 1/8 x 6 1/2	.40	**6000-00**	**6000-03**	**6004-20**	**6004-23**
15 1/4 x 7 1/2 x 2	14 1/8 x 6 1/2	.53	**6000-01**	**6000-03**	**6004-21**	**6004-23**
15 1/4 x 7 1/2 x 4 3/4	14 1/8 x 6 1/2	.66	**6000-02**	**6000-03**	**6004-22**	**6004-23**

Used in Terra's Kiticcator storage system (see page 102).

Modular Stacking Tote Boxes

- **Divider grooves on 1¼" centers let you form storage compartments to fit parts of varying sizes**
- **Rigid-lip permits stacking without applying pressure to contents**
- **Snap-on lids hold material firmly in place, protect against contamination**
- **Choose among many dimensions**
- **Available in conductive and anti-static high-density polyethylene**
- **See ordering table, page 520**

These modular tote boxes and dividers let you form exactly the bin sizes you need for your stored materials. They can be stacked with or without snap-on lids—their rigid design won't put any weight on their contents.

They are vacuum-formed from sheets of high-density polyethylene. This material is impervious to oils, most chemicals, rot, solvents, and temperature extremes. Vacuum forming produces a stress-free container with maximum resistance to cracking from impacts and other environmental conditions.

Choose from a host of sizes and from two materials: black conductive boxes typically offer a surface resistivity between 10^3 and 10^5 ohms/square, and blue static-dissipative boxes provide a typical surface resistivity under 10^9 ohms/square (see specifications). Static-dissipative boxes meet the minimum static decay specifications per MIL-B-81705B and fall into Class 2 and Class 3 sensitivity levels defined in DOD Handbook 263.

See ordering table on page 520.

High-Density Polyethylene Boxes

Physical Property	(units)	Type Value Static-Dissipative	Type Value Conductive	Test Method
Specific Gravity	(g/cc)	0.96	1.06	ASTM D 792
Tensile Strength	(psi)	4100	3950	ASTM D 638
Elongation @ 72°F	(%)	>600%	50%	ASTM D 638
Flexural Modulus @ 72°F	(psi)	220,000	190,000	ASTM D 790
Hardness (Shore D)	—	70	70	ASTM D 785
Impact Strength @ 72°F Gardner Drop Weight	(in./lbs.)	>320 @ 0.125" thick	>320 @ 0.187" thick	—
Heat Deflection Temperature	(°F) @ 66 psi fiber stress	135	156	ASTM D 648
Brittleness Temp	(°F)	< –170		ASTM D 746
Sheet Sag During Thermoforming		Low	Low	—
Mold Shrinkage	(in./in.)	.02 –.04	.02 –.04	—
Surface Resistivity	(ohm/sq)	$< 10^9$	$< 10^5$	ASTM D 257
Volume Resistivity	(Ohm-Cm)	$\leq 10^7$		ASTM D-991
Static Decay @ 15% RH	(sec)	< 2.0	< 2.0	FTMS 101C, Method 4046
Contact Corrosivity	—	Non-Corrosive	Non-Corrosive	FTMS 101C, Method 3005
Thermoforming Temperature Range	Low (°F) High (°F)	280 350	280 350	Machine

Rigid lip lets you stack tote boxes without putting pressure on contents.

Standard molded-in snaps allow attachment of labeling pouches.

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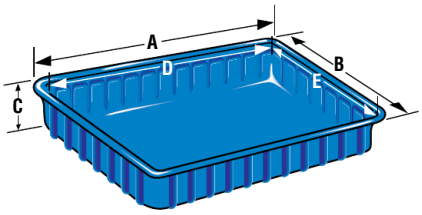
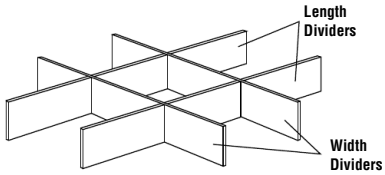
How to Order Modular Stacking Tote Boxes *(See description, page 519)*





1. Select the tote box for your application (notice that each size is available in either conductive or static-dissipative high-density polyethylene).
2. Select any corresponding dividers you require. "Length" dividers run the length of the tote box; "Width" dividers run the width. Dividers fit into the divider grooves on each tote box (on 1¼" centers) and interlock to form adjustable bin compartments of 1⅛" x 1⅛' or multiples thereof.

Specifications			Static-Dissipative Tote Boxes, Dividers, Lids						
Overall Dimens. (A" x B" x C")	Inside Dimens. (D" x E")	Approx. Wt. Per Box (lbs.)	Static-Dissipative Tote Boxes Cat. #	Corresponding Length Divider Cat. #	Max. No.	Corresponding Width Divider Cat. #	Max. No.	Divider Height (In.)	Corresponding Snap-On Lids Cat. #
11 x 8 1/4 x 2 1/2	9 x 6 1/4	.4	**6000-12**	**6008-07**	5	**6008-36**	7	1 1/2	**6007-00**
11 x 8 1/4 x 3 1/2	9 x 6 1/4	.4	**6000-13**	**6004-24**	5	**6004-42**	7	3 1/4	**6007-00**
11 x 8 1/4 x 5	9 x 6 1/4	.6	**6000-14**	**6008-09**	5	**6008-38**	7	4 1/2	**6007-00**
16 5/8 x 11 x 2 1/2	14 3/4 x 9	.8	**6000-18**	**6008-13**	7	**6008-42**	11	2 1/4	**6007-04**
16 5/8 x 11 x 3 1/2	14 3/4 x 9	.9	**6000-19**	**6008-14**	7	**6008-43**	11	3 1/4	**6007-04**
16 5/8 x 11 x 5	14 3/4 x 9	1.2	**6000-20**	**6008-15**	7	**6008-44**	11	4 1/2	**6007-04**
16 5/8 x 11 x 6	14 3/4 x 9	1.4	**6000-21**	**6008-16**	7	**6008-45**	11	5 3/4	**6007-04**
16 5/8 x 11 x 7	14 3/4 x 9	1.5	**6000-22**	**6008-17**	7	**6008-46**	11	6 1/2	**6007-04**
16 5/8 x 11 x 8	14 3/4 x 9	1.9	**6000-23**	**6008-17**	7	**6008-46**	11	6 1/2	**6007-04**
22 3/8 x 17 1/2 x 3	20 x 15	2.2	**6000-39**	**6008-33**	11	**6008-62**	15	2 1/4	**6007-19**
22 3/8 x 17 1/2 x 5	20 x 15	2.3	**6000-40**	**6008-34**	11	**6008-63**	15	4 1/2	**6007-19**
22 3/8 x 17 1/2 x 10	20 x 15	4.7	**6000-45**	**6009-28**	11	**6009-49**	15	9 3/4	**6007-19**
22 3/8 x 17 1/2 x 12	20 x 15	5.3	**6000-46**	**6009-29**	11	**6009-50**	15	11 3/4	**6007-19**
22 3/8 x 17 1/2 x 6	20 x 15	2.8	**6000-41**	**6008-35**	11	**6008-64**	15	5 3/4	**6007-19**
22 3/8 x 17 1/2 x 7	20 x 15	3.2	**6000-42**	**6009-25**	11	**6009-46**	15	6 1/2	**6007-19**
22 3/8 x 17 1/2 x 8	20 x 15	3.5	**6000-43**	**6009-26**	11	**6009-47**	15	7 3/4	**6007-19**
22 3/8 x 17 1/2 x 9	20 x 15	4.2	**6000-44**	**6009-27**	11	**6009-48**	15	8 7/8	**6007-19**

Specifications			Conductive Tote Boxes, Dividers, Lids						
Overall Dimens. (A" x B" x C")	Inside Dimens. (D" x E")	Approx. Wt. Per Box (lbs.)	Conductive Tote Boxes Cat. #	Corresponding Length Divider Cat. #	Max. No.	Corresponding Width Divider Cat. #	Max. No.	Divider Height (In.)	Corresponding Snap-On lids Cat. #
11 x 8 1/4 x 2 1/2	9 x 6 1/4	.4	**6000-58**	**6008-65**	5	**6008-95**	7	1 1/2	**6007-29**
11 x 8 1/4 x 5	9 x 6 1/4	.6	**6000-60**	**6008-67**	5	**6008-97**	7	4 1/2	**6007-29**
16 5/8 x 11x 2 1/2	14 3/4 x 9	.8	**6000-64**	**6008-71**	7	**6009-01**	11	2 1/4	**6007-33**
16 5/8 x 11x 3 1/2	14 3/4 x 9	.9	**6000-65**	**6008-72**	7	**6009-02**	11	3 1/4	**6007-33**
16 5/8 x 11x 5	14 3/4 x 9	1.2	**6000-66**	**6008-73**	7	**6009-03**	11	4 1/2	**6007-33**
22 3/8 x 17 1/2 x 3	20 x 15	2.2	**6000-85**	**6004-43**	11	**6004-44**	15	2 1/4	**6004-45**
22 3/8 x 17 1/2 x 6	20 x 15	2.8	**6000-87**	**6004-46**	11	**6009-23**	15	5 3/4	**6004-45**

Labeling Pouches

These 2 1/4" x 6 1/2" clear plastic pouches attach to the snaps provided on Stacking Tote Boxes. They allow easy identification of stored materials. **Note:** Stacking Tote Boxes can also be specified without snaps if no pouch is required.

Cat. #
6000-04

Material Handling and Packaging Products

The lines of products on the following pages are designed for special handling needs, particularly involving static-sensitive microelectronic parts.

Most of these products are available in either Benstat® or Bentron™, revolutionary plastics that provide unsurpassed static protective properties. Their injection-molded construction ensures superior consistency of wall thickness.

Benstat® employs an ionic exchange to accomplish static dissipation. The Benstat additives are chemically bonded with the molecular structure of the base polymer. This bonding produces an ionic exchange or ionic path through the entire volume of the material. The additives are at acceptable polymer levels so that they do not degrade the mechanical properties of the base resin. Benstat materials are permanently antistatic and do not depend on moisture for conductivity. Benstat is not affected by excessive handling or long-term storage and is acceptable for cleanroom applications.

Bentron™ incorporates a mixture of 40% conductive carbon particles or fibers into the plastic to produce the electrically conductive material.

All Benstat and Bentron materials qualify as electrostatic discharge protective per EIA 541, DOD Standard 1686A and DOD Handbook 263A. They further meet the decay rate provision of MIL B. 81705B.

Specifications:

Benstat®

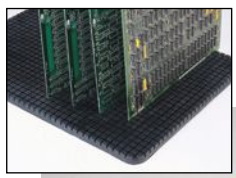
Surface Resistivity:	10^9 ohms/square cm
Volume Resistivity:	10^{10} ohms/cubic cm
Static Decay Rate:	5KV to 0 in less than 2 seconds

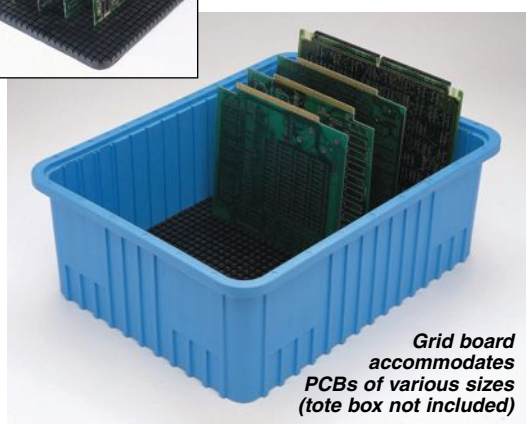
Bentron™

Surface Resistance:	10^3 to 10^6 ohms/square cm
Volume Resistance:	10^3 to 10^6 ohms/square cm
Static Decay Rate:	5KV to 0 in 200 nanoseconds

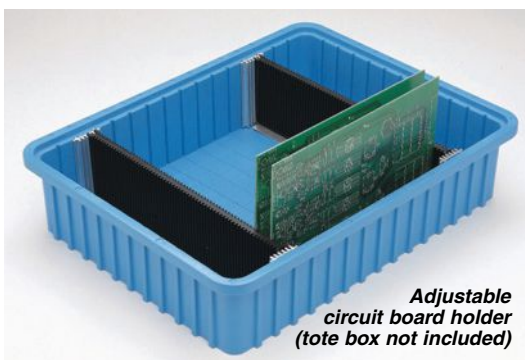
Grid Boards and Circuit Board Holders

- **Fit inside standard tote boxes to securely hold standard 0.062 and 0.093 PCB's**
- **Grid Board fits on bottom of tote; adjustable Circuit Board Holder runs along tote box width (order totes on next page)**





Grid board accommodates PCBs of various sizes (tote box not included)



Adjustable circuit board holder (tote box not included)

Adjustable Circuit Board Holders

Dimensions (L" x W" x H")	Max. No. of Slots	Carton Qty.	Weight (lbs)	Fits Tote Box (See pg. 522)	Blue ESD Cat#/Carton	Black ESD Cat#/Carton
8⅞ x 5¼	34	24	17	6300-04 6300-28	**6301-42**	**6301-43**
14⅞ x 4¼	60	24	40	6300-05 6300-29	**6301-44**	**6301-45**
14⅞ x 5¼	60	24	42	6300-08 6300-32	**6301-46**	**6301-47**
14⅞ x 9⅜	60	24	48	6300-10 6300-34	**6301-48**	**6301-49**

Note: Not available in natural standard grade material.

Grid Board Holders

Dimensions (L" x W" x H")	No. of Slots	Carton Qty.	Weight (lbs)	Fits Tote (L" x W")	Blue ESD Cat#/Carton	Black ESD Cat#/Carton
9 x 6⅜ x ⅝	12	96	58	9 3/16 x 6 3/16	**6301-36**	**6301-37**
14⅞ x 9 x ⅝	17	48	62	14⅞ x 9¼	**6301-38**	**6301-39**
20 x 14⅞ x ⅝	29	24	66	20⅝ x 15⅝	**6301-40**	**6301-41**

See page 937 for ordering information.

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Stackable Tote Boxes

- **Select durable Benstat® or Bentron™ static-protective materials**
- **Injection-molded construction ensures uniform wall thickness and optimal strength**
- **Customize your totes with dividers, snap-on lids and ticket holders**

Available in either Benstat® Blue or Bentron™ Black static-protective materials, these stackable tote boxes are injection molded for optimal strength and consistency of wall thickness.

All models can be ordered with dividers to form adjustable bin sizes. Optional snap-on covers are also available. Ticket holders allow easy labeling of stored parts.

Ticket Holders for all Tote Boxes:

Material Type	Dimensions (L" x H")	96 Pieces/Case Cat#/Case
Clear	4 x 8	**6301-34**
Anti-Static	4 x 8	**6301-32**
Clear	3 x 5	**6301-35**
Anti-Static	3 x 5	**6301-33**

Model No. 6300-24 Stackable Tote Boxes (call for a quotation on natural resin, non-ESD models

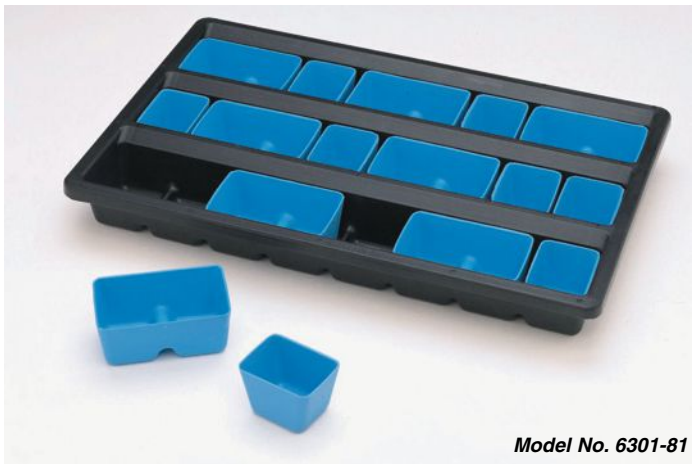
Model No. 6301-34 Ticket Holders

Benstat® Blue ESD Specifications			Static-Dissipative Tote Boxes, Dividers, Lids						
Overall Dimensions (L" x W" x H")	Inside Dimensions (L" x W" x H")	Wt. Per Box (approx.)	Static-Dissipative Tote Boxes Cat. #/Each	Corresponding Length Divider Cat. #/Each	Max. No.	Corresponding Width Divider Cat. #/Each	Max. No.	Divider Height (In.)	Corresponding Snap-On Lids Cat. #Each
10 7/8 x 8 1/4 x 3 1/2	9 3/16 x 6 9/16 x 3	1 lb.	**6300-00**	**6300-72**	5	**6301-02**	7	3	**6300-12**
10 7/8 x 8 1/4 x 6	9 3/16 x 6 9/16 x 5 1/2	1 lb.	**6300-01**	**6300-73**	5	**6301-03**	7	5 1/2	**6300-12**
16 1/2 x 10 7/8 x 3 1/2	14 7/8 x 9 1/4 x 3	2 lbs.	**6300-02**	**6300-74**	7	**6301-04**	11	3	**6300-14**
16 1/2 x 16 1/2 x 5	15 x 15 x 4 1/2	2 lbs.	**6300-03**	—	—	**6300-81**	11	4 1/2	**6300-15**
16 1/2 x 10 7/8 x 6	14 7/8 x 9 1/4 x 5 1/2	3 lbs.	**6300-04**	**6300-75**	7	**6301-05**	11	5 1/2	**6300-14**
16 1/2 x 10 7/8 x 8	14 7/8 x 9 1/4 x 7 1/2	3 lbs.	**6300-05**	**6300-76**	7	**6301-06**	11	7 1/2	**6300-14**
22 1/2 x 17 1/2 x 3	20 5/8 x 15 5/8 x 2 1/2	3 lbs.	**6300-06**	**6300-77**	11	**6301-07**	15	2 1/2	**6300-18**
22 1/2 x 17 1/2 x 5	20 5/8 x 15 5/8 x 4 1/2	3 lbs.	**6300-07**	**6300-78**	11	**6301-08**	15	4 1/2	**6300-18**
22 1/2 x 17 1/2 x 6	20 5/8 x 15 5/8 x 5 1/2	4 lbs.	**6300-08**	**6300-79**	11	**6301-09**	15	5 1/2	**6300-18**
22 1/2 x 17 1/2 x 8	20 5/8 x 15 5/8 x 7 1/2	4 lbs.	**6300-09**	**6300-80**	11	**6301-10**	15	7 1/2	**6300-18**
22 1/2 x 17 1/2 x 12	20 5/8 x 15 5/8 x 11 1/2	2 lbs.	**6300-10**	**6300-80**	11	—	—	7 1/2	**6300-18**
24 x 6 x 5	22 5/8 x 4 1/2 x 4 1/2	2 lbs.	**6300-11**	—	—	**6301-11**	17	4 1/2	**6300-23**

Bentron® Black ESD Specifications			Conductive Tote Boxes, Dividers, Lids						
Overall Dimensions (L" x W" x H")	Inside Dimensions (L" x W" x H")	Wt. Per Box (approx.)	Static-Dissipative Tote Boxes Cat. #/Each	Corresponding Length Divider Cat. #/Each	Max. No.	Corresponding Width Divider Cat. #/Each	Max. No.	Divider Height (In.)	Corresponding Snap-On Lids Cat. #/Each
10 7/8 x 8 1/4 x 3 1/2	9 3/16 x 6 9/16 x 3	1 lb.	**6300-24**	**6300-82**	5	**6301-12**	7	3	**6300-36**
10 7/8 x 8 1/4 x 6	9 3/16 x 6 9/16 x 5 1/2	1 lb.	**6300-25**	**6300-83**	5	**6301-13**	7	5 1/2	**6300-36**
16 1/2 x 10 7/8 x 3 1/2	14 7/8 x 9 1/4 x 3	2 lbs.	**6300-26**	**6300-84**	7	**6301-14**	11	3	**6300-38**
16 1/2 x 16 1/2 x 5	15 x 15 x 4 1/2	2 lbs.	**6300-27**	—	—	**6300-91**	11	4 1/2	**6300-39**
16 1/2 x 10 7/8 x 6	14 7/8 x 9 1/4 x 5 1/2	3 lbs.	**6300-28**	**6300-85**	7	**6301-15**	11	5 1/2	**6300-38**
16 1/2 x 10 7/8 x 8	14 7/8 x 9 1/4 x 7 1/2	3 lbs.	**6300-29**	**6300-86**	7	**6301-16**	11	7 1/2	**6300-38**
22 1/2 x 17 1/2 x 3	20 5/8 x 15 5/8 x 2 1/2	3 lbs.	**6300-30**	**6300-87**	11	**6301-17**	15	2 1/2	**6300-42**
22 1/2 x 17 1/2 x 5	20 5/8 x 15 5/8 x 4 1/2	3 lbs.	**6300-31**	**6300-88**	11	**6301-18**	15	4 1/2	**6300-42**
22 1/2 x 17 1/2 x 6	20 5/8 x 15 5/8 x 5 1/2	4 lbs.	**6300-32**	**6300-89**	11	**6301-19**	15	5 1/2	**6300-42**
22 1/2 x 17 1/2 x 8	20 5/8 x 15 5/8 x 7 1/2	4 lbs.	**6300-33**	**6300-90**	11	**6301-20**	15	7 1/2	**6300-42**
22 1/2 x 17 1/2 x 12	20 5/8 x 15 5/8 x 11 1/2	2 lbs.	**6300-34**	**6300-90**	11	—	—	7 1/2	**6300-42**
24 x 6 x 5	22 5/8 x 4 1/2 x 4 1/2	2 lbs.	**6300-35**	—	—	**6301-21**	17	4 1/2	**6300-47**

Note: "Max No." indicates the maximum number of dividers that will fit in the corresponding tote box.

Model No. 6301-80



Model No. 6301-81

Plastic Kitting Trays

- **Divided compartments and removable cups simplify kitting procedures**
- **Snap-on covers available**

Plastic Kitting Trays come in Benstat® Blue and Bentron™ Black static-protective materials. They feature individual compartments or removable cups for easy organization of components. The nine and twelve compartment trays have flat dividers for easy marking with pressure sensitive labels, and are stackable with one another and certain tote boxes for pre-sorting complete assemblies. The bin cup kitting tray is available with single or double cups and will accept 24 single cups or various combinations with double cups.

Kitting Trays

Color	Dimensions (L" x W" x H")	No. of comp.	Ctn. Qty.	Kitting Tray Cat#/Carton	Snap-On Cover Cat#/Carton
Blue ESD	15 1/8 x 9 5/8 x 1 3/4	24	24	**6301-80**	**6301-89**
Black ESD	15 1/8 x 9 5/8 x 1 3/4	24	24	**6301-81**	**6301-90**
Blue ESD	16 x 10 3/4 x 2 1/2	9	24	**6301-83**	**6301-92**
Black ESD	16 x 10 3/4 x 2 1/2	9	24	**6301-84**	**6301-93**
Blue ESD	16 x 10 3/4 x 2 1/2	12	24	**6301-86**	**6301-92**
Black ESD	16 x 10 3/4 x 2 1/2	12	24	**6301-87**	**6301-93**

Note: Kitting Trays and Cups are also available in natural standard grade material. Call for quote.

Cups for Kitting Trays

Dimensions (L" x W" x H")	Ctn. Qty.	Blue ESD Cat#/Carton	Black ESD Cat#/Carton
2 1/8 x 1 5/8 x 1 1/2	96	**6301-74**	**6301-75**
3 3/8 x 2 1/8 x 1 1/2	48	**6301-77**	**6301-78**

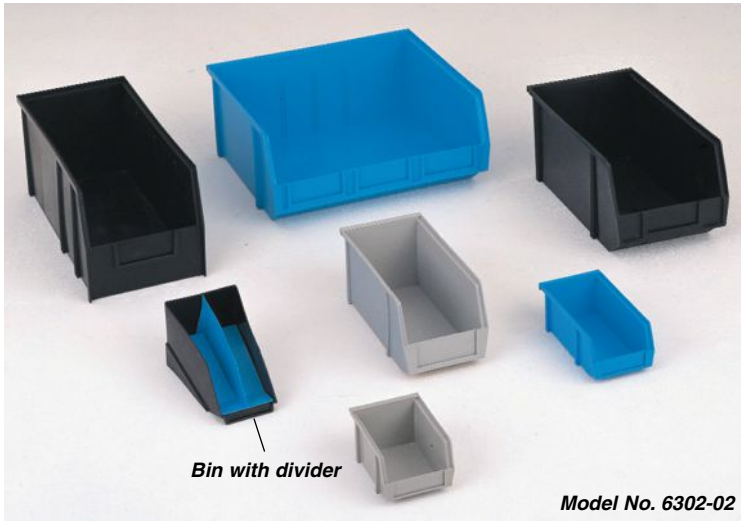
Stacking Bins

- **Injection molded for consistent wall thickness**
- **Select Benstat® Blue or Bentron™ Black static-protective material**

These bins are designed to stack or hang on a storage rack. Models with dividers include an insert that creates two equal-sized bins.

Stacking Bins

Dimensions (L" x W" x H")	Carton Qty.	Blue ESD Cat#/Carton	Black ESD Cat#/Carton
5 5/8 x 4 1/8 x 3	48	**6302-01**	**6302-02**
7 3/8 x 4 1/8 x 3	48	**6302-04**	**6302-05**
10 7/8 x 5 1/2 x 5	24	**6302-07**	**6302-08**
14 3/4 x 8 1/4 x 7	12	**6302-10**	**6302-11**
14 3/4 x 16 1/2 x 7	6	**6302-13**	**6302-14**
18 x 8 x 7 1/2	6	**6302-16**	**6302-17**



Bin with divider

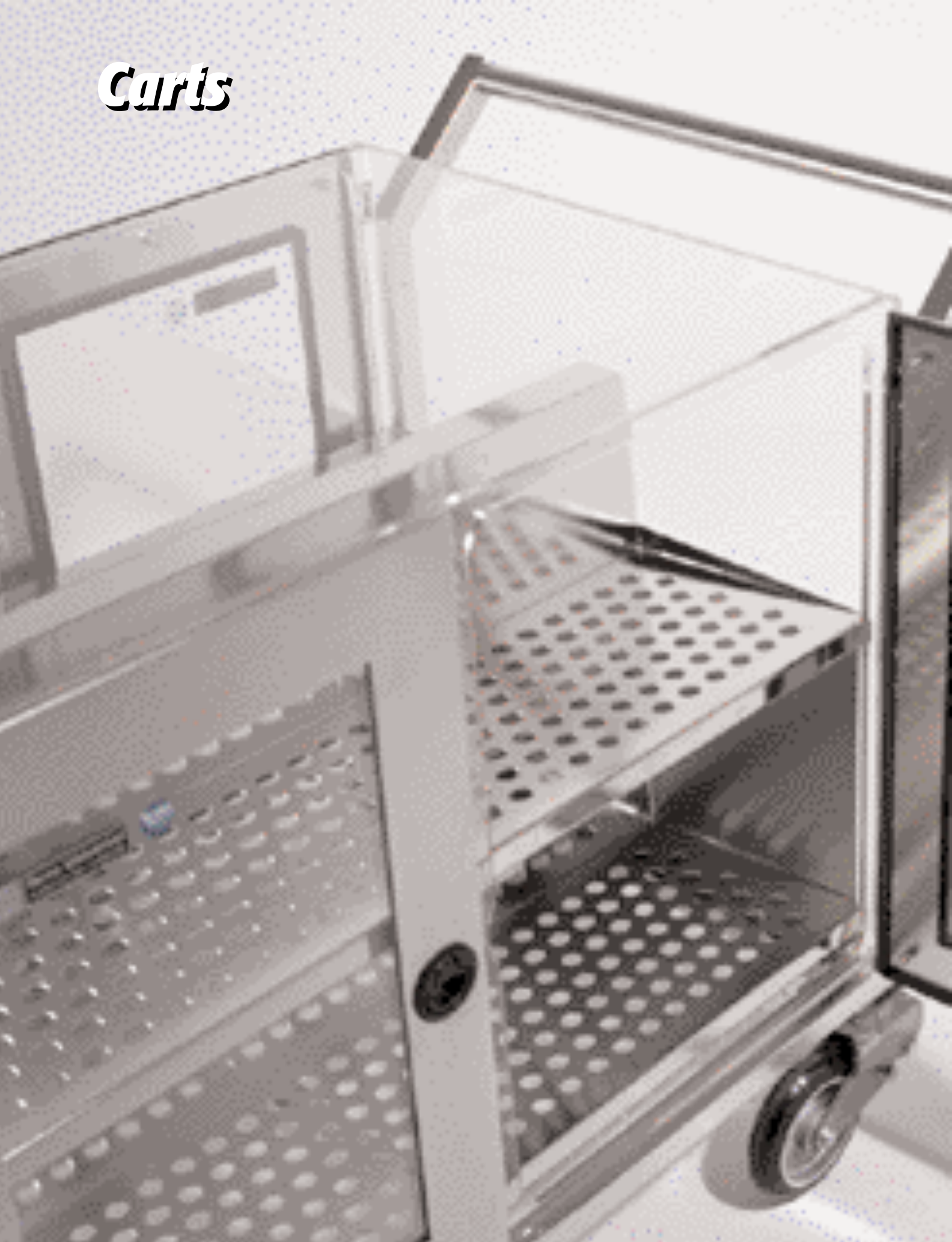
Model No. 6302-02

Note: Stacking Bins are also available in natural standard grade material. Call for quote.

Stacking Bin with Divider Option

Color	Dimensions (L" x W" x H")	Ctn. Qty.	Bin Cat#/Carton	Divider Cat#/Carton
Blue ESD	8 x 3 1/2 x 4 1/16	48	**6301-96**	**6301-98**
Black ESD	8 x 3 1/2 x 4 1/16	48	**6301-95**	**6301-99**

Carts



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Model Shown: No. 9600-14 Rod Shelf Cart

Model Shown: No. 3505-05 Perforated Shelf Cart

Also available with sealed, nitrogen-purged plastic shell to create a low-humidity transport and storage environment—see page 117

Wafer Box Carts

- **Certified Class 1 compatible by an independent test laboratory**
- **UltraClean™ electropolished stainless steel surfaces wipe down clean, without snagging wipers or sloughing particles**
- **Angled shelves position wafer boats securely against retaining rails**
- **Spring-loaded locking polyurethane casters ensure smooth rolling to protect delicate wafers during transit**
- **Standard sizes available for all lot box sizes, including 300mm wafers**

These ultra-clean carts are designed specifically for wafer boat transport. Rod shelf models feature ¼"-diameter rods welded on 2" centers. Perforated shelf models feature ½"-diameter cut-outs. Both designs optimize air flow-through and minimize the chance of particle accumulation.

CE

Wafer Box Carts

Shelf Type	Overall Dimensions (including Handle)	Wafer Box Capacity*			
		150mm	200mm	300mm	Cat. #
Rod	29.5"W x 16.1"D x 40"H	4	4	4	**9600-14**
Perforated	50.5"W x 26.5"D x 42.2"H	12	12	8	**3505-05**

Capacities based on the following Empak cassette models: P/N HA 150 (150mm), HA200 (200mm), HA300 (300mm)

Additional Wafer Carts - from InterMetro!
Solid and wire shelf carts - page 528
Polyolefin carts - page 530
Wafer transport carts - page 530

Cleanroom Utility Carts

- **Two- and three-shelf designs suit wide range of applications in and out of the cleanroom**
- **Patented split-sleeve construction lets you adjust shelf height at 1" increments**
- **Available with wire and solid shelves, in many materials, sizes and configurations**
- **Tough construction ensures years of service**
- **Polyolefin carts also available; see page 530**

These carts are available in two- and three-shelf designs. Select stainless steel solid shelves or a combination of chrome-plated wire and solid stainless steel.

Casters Ensure Smooth, Clean Rolling

Each cart comes complete with one-piece handles, donut bumpers, and one of several caster types. Smaller models 18" wide feature 4-inch standard-duty swivel casters. Intermediate sizes feature 5-inch swivel casters. Both of these caster types are made of resilient non-marking rubber treads that provide good floor protection and are rated for loads up to 125 pounds each. Larger carts use heavy-duty 5" polyurethane casters rated for 500-pound loads each; two casters on each cart include locking brakes (see ordering tables on the following pages).

Wire Shelves present a bright, sanitary appearance, minimize dust accumulation, and maximize visibility and air circulation.

Solid Shelves are ideal for transporting small materials. Their raised "ship's edges" lend added rigidity and protect against spills. Their 18-gauge steel edges also contribute to high strength without the need for heavy supporting bars.

See page 529 for information on Cleanroom Cart accessories.
See page 191 for specifications and ordering information on other casters.

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Series 100 Carts
These models include two stainless steel solid shelves. Stainless steel handles are provided. Either shelf can be placed at the top or bottom.

Series 200 Carts
These models include three stainless steel solid shelves and stainless steel handles.

Series 400 Carts
These models include two chrome wire shelves and one stainless steel solid shelf. Chrome handles are standard on all models. The solid shelf can be positioned at the top, middle, or bottom.

Series 500 Carts
These models include one chrome wire shelf and one stainless steel solid shelf, all with chrome handles. Either shelf can be placed at the top or bottom.

Series 600 Carts
These models include two wire shelves, chrome or stainless steel. The handle material matches the shelves.

Shown with optional bin

Series 700 Carts
These models include three wire shelves, in a choice of chrome or stainless steel. The handle material matches the shelves.

Ordering Information		Series 100		Series 200		Series 400		Series 500	
Dimensions W x L x H (inches)	Caster Dia.	Pkgd. Weight	Cat. #	Pkgd. Weight	Cat. #	Pkgd. Weight	Cat. #	Pkgd. Weight	Cat. #
18 x 24 x 38	4"	40 lbs.	**1401-23**	48 lbs.	**1401-44**	43 lbs.	**1401-54**	38 lbs.	**1402-29**
18 x 30 x 38	4"	45 lbs.	**1401-24**	53 lbs.	**1401-45**	47 lbs.	**1401-55**	40 lbs.	**1402-30**
18 x 36 x 38	4"	48 lbs.	**1401-25**	59 lbs.	**1401-46**	52 lbs.	**1401-56**	46 lbs.	**1402-31**
21 x 36 x 39	5"	54 lbs.	**1401-26**	66 lbs.	**1401-47**	59 lbs.	**1401-57**	51 lbs.	**1402-32**
24 x 36 x 39	5"	60 lbs.	**1401-27**	74 lbs.	**1401-48**	65 lbs.	**1401-58**	55 lbs.	**1402-33**

Series 600

Dimensions W x L x H (inches)	Caster Dia.	Packaged Weight	Chrome-Plated Wire Shelves Cat. #	Stainless Steel Wire Shelves Cat. #
18 x 24 x 38	4"	34 lbs.	**1402-38**	**1402-39**
18 x 30 x 38	4"	37 lbs.	**1402-40**	**1402-41**
18 x 36 x 38	4"	40 lbs. chrome / 37 lbs. SS	**1402-42**	**1402-43**
21 x 36 x 39	5"	44 lbs.	**1402-44**	**1402-45**
24 x 36 x 39	5"	47 lbs. chrome / 46 lbs. SS	**1402-46**	**1402-47**

Two wire shelves, chrome or stainless; handles match shelf material

Series 700

Dimensions W x L x H (inches)	Caster Dia.	Packaged Weight	Chrome-Plated Wire Shelves Cat. #	Stainless Steel Wire Shelves Cat. #
18 x 24 x 38	4"	39 lbs. chrome / 38 lbs. SS	**1402-55**	**1402-56**
18 x 30 x 38	4"	43 lbs. chrome / 42 lbs. SS	**1402-57**	**1402-58**
18 x 36 x 38	4"	47 lbs. chrome / 48 lbs. SS	**1402-59**	**1402-60**
21 x 36 x 39	5"	50 lbs.	**1402-61**	**1402-62**
24 x 36 x 39	5"	47 lbs. chrome / 57 lbs. SS	**1402-63**	**1402-64**

Three wire shelves, chrome or stainless; handles match shelf material

One-Inch Shelf Ledges
—for Wire Shelves Only

These ledges can be installed on shelf edges to keep items from protruding or falling off shelves. Select one ledge for each shelf side you wish to protect, in either stainless or chrome-plated steel.

1-Inch Shelf Ledges for Wire Shelves

For Shelf Length	Approx. Pkgd. Weight/1/2 Doz.	Chrome Cat. #	Stainless Steel Cat. #
14"	3 1/2 lbs.	**1302-32**	**1302-42**
18"	4 1/2 lbs.	**1302-33**	**1302-43**
21"	4 1/2 lbs.	**1302-34**	**1302-44**
24"	6 lbs.	**1302-35**	**1302-45**
30"	12 lbs.	**1302-36**	**1302-46**
36"	15 lbs.	**1302-37**	**1302-47**

Four-Inch Shelf Ledges
—For Wire or Solid Shelves

Like the units above, these ledges ensure the safety of items stored on shelves. Select one ledge for each shelf side you wish to protect, in either stainless or chrome-plated steel.

4-inch Shelf Ledges for Wire Shelves

For Shelf Length	Approx. Pkgd. Weight/1/2 Doz.	Chrome Cat. #	Stainless Steel Cat. #
14"	5 lbs.	**1302-82**	**1302-92**
18"	9 lbs.	**1302-83**	**1302-93**
21"	10 1/2 lbs.	**1302-84**	**1302-94**
24"	12 lbs.	**1302-85**	**1302-95**
30"	13 1/2 lbs.	**1302-86**	**1302-96**
36"	16 1/2 lbs.	**1302-87**	**1302-97**

4-inch Shelf Ledges for Solid Shelves

For Shelf Length	Approx. Pkgd. Weight/1/2 Doz.	Chrome Cat. #	Stainless Steel Cat. #
14"	7 1/2 lbs.	**1303-03**	**1303-12**
18"	9 lbs.	**1303-04**	**1303-13**
21"	10 1/2 lbs.	**1303-05**	**1303-14**
24"	12 lbs.	**1303-06**	**1303-15**
30"	13 1/2 lbs.	**1303-07**	**1303-16**
36"	16 1/2 lbs.	**1303-08**	**1303-17**

Series 500 Cart with 4-inch shelf ledges (top shelf) and 1-inch shelf ledges and 8-inch divider (bottom shelf)

Eight-Inch Shelf Dividers
—For Wire Shelves Only

Snaps into place to keep shelf contents orderly. Select chrome-plated or stainless steel.

8-Inch Shelf Divider for Wire Shelving

For Shelf Width	Chrome Cat. #	Stainless Steel Cat. #
18"	**1402-75**	**1402-76**
21"	**1402-77**	**1402-78**
24"	**1402-79**	**1402-80**

Adjustable Undershelf Drawer Slides
—For Wire Shelves Only

Create a convenient drawer system by combining a tote box and these slides. Two slides are required, and they can be spaced to fit any container width.

Drawer Slides for Wire Shelves

For Shelf Width	Approx. Pkgd. Weight	Cat. #
18"	1 lbs.	**1302-57**
21"	1 lbs.	**1302-58**
24"	1 lbs.	**1302-59**

Plastic Shelf Marker

Snaps over shelf edge to provide a means of identifying contents of shelf or shelf section. Made of gray molded plastic, each of these units holds a 1" x 4½" label.

Cat. #
1302-52

Other casters available!
Include polyurethane, vibration dampening high modulus, and all-polymer designs. ***See page 191.***

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Wafer Transport Cart

- **Electropolished 304 stainless steel ensures clean performance**
- **Inward pitch of rod-top shelf stabilizes wafer boats**
- **High-modulus casters dampen vibration, minimizing wafer chatter during transit**

This cart is designed specially for transporting delicate semiconductor wafers. Its 5"-diameter high-modulus casters provide smooth rolling on cleanroom floors. Two casters feature brakes for secure positioning. The angled rod-top shelf optimizes air flow, affords easy cleaning, and ensures secure wafer box positioning during transit. For ESD safety, add an optional aluminum split sleeve and drag cable. Shelf dimensions: 24" x 30". Approx. shipping weight: 40 lbs. Note: These casters are not recommended for over-the-road use or for wet or humid environments.

	Cat. #
Wafer Transport Cart	**2650-15**
Conductive Sleeves (pack of 4)	**1571-00**
Grounding Cable and Universal Bracket	**2650-11**

More wafer carts—see page 526

Polyolefin Utility Carts

- **Clean, durable shelves resist many chemicals, prevent spills**
- **Choice of 3 designs, 3 sizes and 3 colors**

These carts are fabricated of tough, chemical-resistant, high-density polyethylene, an extremely resilient polyolefin that provides excellent chemical resistance across a wide range of substances (including most acids and bases).

The top shelf features an integral one-piece handle with no mounting hardware to come loose or trap contaminants. Wrap-up rails make for safe transport of materials carried on top of the cart, and corners are rounded for easy cleaning. This shelf is tough enough to support heavy loads, yet it won't chip or dent as can some metals. The four posts are nickel-chrome plated steel; casters are 4" stem-mounted with soft rubber donut treads and Celcon bearings for smooth, quiet operation. Height: 33¼"; Capacity: 150 lbs.

Three-Shelf Cart (No. 1532-53)

Three-Sided Cart (No. 1532-22)

Cleanroom Polyolefin Carts

Type	Dimensions (W" x L")	Shipping Weight (lbs.)	Beige Cat. #	Blue Cat. #	Gray Cat. #
2-Shelf	18 x 28 21 1/2 x 33 3/4 27 x 39 1/2	27 1/2 34 1/2 40 1/2	**1532-08** **1532-46** **1532-09**	**1532-12** **1532-47** **1532-13**	**1532-44** **1532-49** **1532-45**
3-Shelf	18 x 28 21 1/2 x 33 3/4 27 x 39 1/2	33 43 52	**1532-10** **1532-52** **1532-11**	**1532-14** **1532-53** **1532-15**	**1532-50** **1532-55** **1532-51**
3-Shelf, 3-Sided Enclosure	18 x 28 21 1/2 x 33 3/4 27 x 39 1/2	42 1/2 50 1/2 53 1/2	— — —	**1532-22** **1532-26** **1532-30**	**1532-21** **1532-25** **1532-29**
3-Shelf, Enclosed Ends	18 x 28 21 1/2 x 33 3/4 27 x 39 1/2	39 49 3/4 50	— — —	**1532-34** **1532-38** **1532-42**	**1532-33** **1532-37** **1532-41**

Adjustable Tote Cart

- **Ideal system for storing and transporting divider boxes**
- **Telescoping frames allow proper adjustment of slides**
- **Casters available in resilient rubber or polyurethane**
- **Additional slides available**

This Adjustable Tote Cart is perfect for storing and transporting divider boxes. Telescoping frames allow for proper adjustment of slides, providing a safe and secure capture of totes. Each cart comes chrome plated and includes your choice of polyurethane or resilient rubber locking casters and three sets of slides which can be located at any area along the 63" post.

Additional slides are available (see ordering chart).

Adjustable Tote Cart (includes 3 sets of slides)

Dimensions W x L x H (inches)	Casters	Approx Package Weight	Carton Quantity	Cat. #
26 x 29.4 x 68	Resilient	54 lbs.	1	**2080-50**
26 x 29.4 x 68	Polyurethane	54 lbs.	1	**2080-51**

(Catalog number is for one slide only. Two slides are required per tote and are supplied in a carton of 6 slides)

	Cat. #
Additional Slides Includes one; two are required per tote box.	**2080-52**
End Straps (6 pieces)	**2080-53**
Tote Boxes	***see page 522***

Adjustable Tote Cart shown with 4 additional pair of slides and 7 divider boxes (see page 522, cat.# 6300-08)

Electronics Tray Carts

- **Saves time and money—one size and configuration accommodates many PCB and subassembly sizes**
- **Increases yields and throughput by reducing WIP handling damage**
- **Unique anti-tip design keeps contents secure**
- **Vibration-suppression casters offer a smooth ride for sensitive components**
- **Grounding cable and choice of dissipative or conductive trays ensure ESD safety**

These carts, made of lightweight stainless steel wires, provide the perfect solution for transporting PCBs and other subassemblies. Their versatile design allows one unit to accommodate PCBs of many different sizes, without the need to change or reconfigure trays.

Each cart features vibration-suppression casters to ensure a smooth ride. Two brake casters provide a braking option on inclined and uneven floors. Two stop bars (front and back) secure the trays during transit. Select either conductive or dissipative trays to meet ESD requirements. Dimensions: 28"W x 22"D x 63"H. Slide spacing: 1¾". Tray capacity: 30.

	Cat. #
Electronic Tray Cart	**2650-98**

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Cleanroom Computer Cart

- **A no-hassle, noncontaminating way to move your computer anywhere you need it!**
- **Easy-to-clean electropolished stainless steel surfaces meet the strictest particle standards**
- **Includes ergonomic slide-out keyboard tray, 24" x 36" perforated monitor platform, and CPU cradle**
- **Locking safety casters ensure smooth rolling**
- **Custom sizes and configuration available—just send us your specs!**

Terra's Cleanroom Computer Cart lets you reposition your computer anywhere in the cleanroom, cleanly and easily.

The sturdy 1" x 2" frame members support monitors up to 21". The monitor platform features ⅛"-diameter perforations. The retractable tray includes stainless steel bearings and accommodates all standard keyboard sizes. The CPU cradle is fabricated of ½"-diameter rods on one-inch centers and supports towers up to 10"W x 18"D x 20"H. Select cradle width for your computer.

Overall dimensions: 36"W x 24"D x 56.3"H (including casters).

Cat. #
9600-19

ULTRACLEAN PRODUCTS APPROVAL LABORATORY CERTIFIED FOR CLASS 1 CLEANROOM USE Dr. Philip R. Austin, P.E. Dr. Philip J. Austin, Ph.D. LIVONIA, MICHIGAN USA

CE

IPA Wetting Cart

- **Provides a handy supply of wipers pre-wetted with IPA (isopropyl alcohol)**
- **Electropolished stainless steel surfaces are noncontaminating and solvent compatible**
- **Wiper platform (positioned above IPA reservoir) includes ¼"-diameter perforations to allow wetting**
- **Double-wall construction for fire safety**
- **Butterfly access doors provide convenient dual-side access**

This cart's perforated platform suspends wipers above an IPA (isopropyl alcohol) reservoir for effective wetting. Its dual butterfly doors make it easy for cleanroom personnel to access wipers from either side.

Overall dimensions: 48"W x 24"D x 36"H. Comes equipped with 4" urethane locking casters that ensure easy handling.

Cat. #
9600-16

Butterfly doors afford dual-side access

DesiCarts™

Low Humidity Transport Carts

- **Low-humidity, contamination-free environment protects sensitive materials during process transfer**
- **Optional Quick-Connect fitting and Automatic RB® Valve facilitate dry gas purging**
- **Cushioned casters ensure smooth rolling over uneven surfaces**
- **Select acrylic or static-dissipative PVC enclosure**
- **Dozens of standard configurations for wafer boxes, flat panel displays, chemicals, pharmaceuticals, and other sensitive materials**

Please refer to page 116 for full specifications and ordering information!

CE

Adjustable Shelf DesiCart™ with Polyethylene Cart Frame

Adjustable Shelf DesiCart™ with Stainless Steel Cart Frame

DesiCart™ Mobile Work Station

Wafer Box DesiCart™

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Reticle Storage Cabinets

- Protects sensitive reticles and photomasks against contaminants
- Integral HEPA filter/fan module washes stored parts with particle-free air
- Electropolished stainless steel slide-out drawers on noncontaminating runners provide full access to every inch of storage space
- High-capacity configurations for vertical or horizontal reticle storage in all standard cassette sizes
- Locking casters allow safe, easy parts transfer
- All tray styles are compatible with Terra's Automated Stockers to allow cross-loading

Please refer to page 148 for complete specifications and ordering information!

Static-Dissipative PVC Eliminates Contamination Magnets

- *Surface resistivity of 10^7*
- *Resists acids and corrosive chemicals*
- *Eliminates particle attraction and build-up*
- *Renders nonconductive plastics obsolete*
- *See page 596 for full specifications and ordering information*

Unique slides provide high-density storage while affording convenient access

Several standard capacities, with static-dissipative or acrylic side panels

Vertical Storage Cabinet
Electropolished stainless steel trays hold reticles vertically. Transparent side panels made of acrylic or static-dissipative PVC. Model shown: No. 9130-03; Capacity: 450 cassettes for 6-inch reticles.

Horizontal Storage Cabinet
Precision-routed HDPE slides hold cassettes at a 2° angle from horizontal for secure positioning. Transparent side panels made of acrylic or static-dissipative PVC. Model shown: No. 3505-03; Capacity: 144 cassettes for 6-inch reticles.

PureFlow™ Laminar Flow Transport Cart

- Maintains a Class 1 particle-free storage environment to protect sensitive work-in-progress during transfer from one process to another
- A low-cost, versatile alternative to vacuum sealing, conveyor transport, and other transfer methods
- On-board rechargeable power cell ensures uninterrupted filter operation for up to 90 minutes
- Ergonomic designs are easy to maneuver through standard doorways, hallways
- Heavy-duty, cushioned casters ensure smooth, safe rolling over industrial floors
- PowerAlert! feature provides visible and audible reminder to reconnect AC power cord for recharging
- Optional ionizing equipment maintains a static-safe environment
- Materials and configurations for every requirement, from the world's leading manufacturer of cleanroom storage systems

Custom Configuration? No Problem!

Terra will meet your requirements for—

Special materials
Capacity
Product Fixtures
Temperature
Humidity

For complete specifications and ordering information, see page 176

Polymer PureFlow™
Rigid, reinforced acrylic enclosure combines strength and light weight for easy maneuverability. Perfect for wafer boxes up to 300mm. Polypropylene model also available for enhanced chemical compatibility

Many door configurations available

Stainless Steel PureFlow™
All-stainless steel construction ensures unsurpassed durability and cleanliness. Operates up to 90 minutes on fully charged power pack. Many sizes and configurations accommodate wafer boxes, totes, and other materials.

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A

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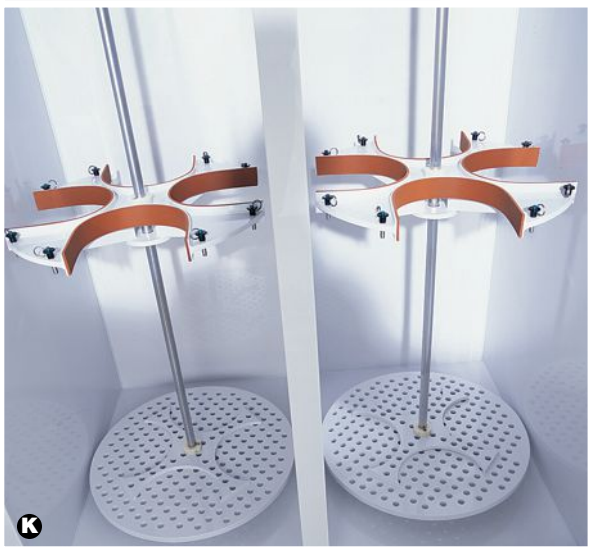
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L

Wafer Fab Tool Stockers

- **The perfect cabinets for wafer processing supplies, including quartzware, wafer cassettes, injectors, thermocouple rods, push rods, probe cards, and other tools**
- **Steel-reinforced polypropylene cabinets resist acids and other process chemicals**
- **Comprehensive range of standard sizes and convenient features, including slide-out drawers, adjustable shelves, pigeon holes, and special parts fixtures**
- **Nitrogen purging available for dry storage**
- **Heavy-duty 4"-diameter polyurethane-tread locking casters support fully loaded cabinets, allow easy transport across cleanroom flooring**

Please refer to page 160 for complete specifications and ordering information.

A. Tool Stocker with 4 drawers, adjustable shelves
B. Quartzware Stocker with drawers and shelving
C. Tool Stocker with 6 drawers, adjustable shelves, pigeon holes
D. Thermocouple Stocker
E. Tool Stocker with 4 drawers, adjustable shelves, pigeon holes
F. Screen Frame Stocker with vertical screen supports (several sizes available)
G. Security Cage Wafer Boat WIP Cabinet
H. Quartz Tube Stocker with holders for multi-diameter quartz tubes
I. Stainless Steel Wafer Box Stocker
J. Stainless Steel Injector Stocker
K. Quartz Tube Stocker with rotary holders
L. Tool Stocker with slide-out drawers

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A *Neoprene thermocouple rod supports*

B

C

Terra customizes carts to meet your requirements!

Wafer Fab Carts

- **A comprehensive range of specialized carts for wafer fab tools and supplies, including quartz tubes, probes, injectors, thermocouple rods, and supply bottles**
- **Electropolished stainless steel surfaces meet the most stringent cleanliness requirements**
- **Includes spring-loaded casters for cushioned, low-vibration rolling**

Put Terra's complete manufacturing capabilities to work in your wafer fab!

In addition to models shown here, carts can be specified in a variety of plastics, with specialized holding fixtures to safeguard your sensitive materials during process transfer.

A. Quartz Tube/Thermocouple Cart

Designed for 300mm-diameter quartz tubes up to 1500mm long. Includes receptacles for thermocouple rods and two compartments for tool storage. Made of acid-resistant polypropylene with a rigid steel support. Overall dimensions: 48"W x 24"D x 72"H (excluding handle).

Cat. #
9600-25

B. Quartz Tube Cart

Safely transports heavy quartz tubes nestled into a polypropylene retaining platform. Precision-routed cut-outs accommodate several diameters (150 mm, 200 mm and 300 mm). Includes flexible quartz tube restraints. Electropolished stainless steel exterior is easy to wipe down. 3"-diameter high density neoprene casters ensure smooth, clean rolling. Overall dimensions: 48"W x 24"D x 36"H (excluding handle)

Cat. #
9600-17

C. Injector Cart

Electropolished stainless steel cart features four 5.25" x 12.5" injector inserts. Overall dimensions: 21"W x 41.55"D x 25.68"H (excluding handle).

Cat. #
9600-26

D. Probe Equipment Cart
Includes three shelves with polyurethane rollers and retainers for abrasion-free placement of delicate probes and other fab equipment. Frame and drawer are electropolished stainless steel. Includes 4"-diameter high-density neoprene casters. Overall dimensions: 27"W x 24"D x 54"H (excluding handle).

Cat. #
9600-27

E. Laser Jig Cart
Electropolished stainless steel cabinet houses four drawers. Includes rod rail along top perimeter. Overall dimensions: 18"W x 28"D x 54"H (excluding handle)

Cat. #
9600-28

F. Bottle Cart
Electropolished stainless steel construction, clean casters, and ergonomic design make this cart ideal for safely transporting 5' process gas canisters. Includes retaining chain. Overall dimensions: 12.3"W x 31"D x 57"H.

Cat. #
9600-18

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Dead Man Chemical Safety Cart

- **"Dead Man" braking system prevents cart from rolling when unattended**
- **Accommodates 24 one-gallon chemical containers**
- **Polypropylene interior resists a wide range of acids and other process chemicals**
- **Protective stainless steel outer top and side coverings lend added stability, cleanliness**
- **Overflow reservoir safely contains drips and spills**

The Dead Man Chemical Safety Cart provides the ideal method for transporting chemical containers.

It features 24 slanted containment slots (twelve on each side), each of which securely holds a one-gallon chemical container. Spills drain into a reservoir that features a drain valve for easy emptying.

A brake release lever must be depressed to allow the cart to roll. The 4"-diameter urethane casters ensure easy maneuverability and stability. When unattended, the braking system locks the casters to prevent the possibility of a run-away cart and resulting chemical spill!

Overall dimensions: 28"W x 24"D x 47"H.

Cat. #
6017-73

Flammable Materials Cart

- **Provides safe transport of flammable materials in tanks up to 5 gallons**
- **Includes a 5-gallon spill containment area and on-board fire extinguisher**
- **Polypropylene interior with PVC access doors offers broad chemical compatibility**
- **Stainless steel exterior lends stability and allows easy clean-up**

This cart enables safe transport of two 5-gallon chemical storage containers. Its 4"-diameter urethane locking casters ensure clean, smooth rolling and easy maneuvering. The on-board fire extinguisher helps meet OSHA and other safety requirements.

Overall dimensions: 24"W x 36"L x 36"H.

Cat. #
7018-40

Chemical Safety Cabinet

- Electropolished stainless steel surfaces are noncontaminating, easy to wipe down
- Features three adjustable shelves to accommodate many container sizes
- Double-wall construction and dual exhaust flame-arresting shields meet OSHA/NFPA fire safety requirements
- Includes dual locking security doors and 4" heavy-duty urethane locking casters
- Overall Dimensions: 43"W x 18"D x 65"H

Please refer to page 159 for complete ordering information.

Bottle Safety Stocker

- Fabricated of electropolished stainless steel for optimal cleanliness
- Houses 24 perforated storage bays that cradle chemical bottles up to 7.2" in diameter (4 liters) at an ergonomically correct angle
- Self-closing locking access doors open a full 180° for safe loading/unloading and full access to storage area
- Double-wall construction and dual exhaust flame-arresting shields make this cabinet OSHA/NFPA compatible for fire safety
- Includes 4" heavy-duty urethane casters for easy transport
- Overall dimensions: 56"W x 24"D x 62"H

Please refer to page 159 for complete ordering information.

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Polypropylene Chemical Transport Carts

- **Safe, convenient transport of acids and other hazardous process chemicals**
- **Polypropylene construction provides broad chemical compatibility**
- **Three standard configurations accommodate most container sizes**
- **All feature recessed overflow reservoirs to safely contain spills**
- **Acid-resistant casters, with optional foot-operated floor-lock brakes, ensure smooth, spill-free rolling**

Acids and other hazardous chemical present special handling requirements. These carts meet them.

Built to Put Safety First!

Made of stress-relieved polypropylene, these carts resist the acids and corrosives used in wet processing applications. All three designs feature recessed receptacles that catch spills and drain into a containment reservoir, which includes a valve for easy emptying.

Acid-resistant neoprene swivel casters allow easy maneuvering in tight spaces to minimize the chance of spills. Select optional locking brake for safe positioning of the cart while not in transit.

Versatile Container Fixtures

Several fixture designs provide the optimal container configuration for your application. For applications with larger, heavier containers, carts are available with epoxy-finished steel frame to added support and rigidity. Bottles can be stored vertically or at an angle for more convenient access.

Terra also customizes these designs to meet any unique storage requirement—just fax us your specs!

A. All-polypropylene models feature removable 7" x 7" inserts that support one-gallon and four-liter bottles. Custom inserts can be specified for other container sizes. See order chart for bottle capacities.

Stainless Steel Chemical Transport Cart

- **An efficient method of transporting chemicals**
- **Fabricated of stainless steel with a chemical resistant drip tray**
- **4" urethane casters included (two with brakes)**

This efficient method of transporting chemicals safely and securely is fabricated of stainless steel with a chemical resistant polyethylene drip tray. Four-inch urethane locking casters are included, two with locking brakes.

ESD classified as non-conductive, this cart's 7.16" x 7.16" (184mm x 184mm) openings provide capacity for a total of eight 4-liter sized containers.

Dimensions	Weight	Cat. #
21" x 30"	37 lbs.	**2080-54**

B. Epoxy-finished steel frame provides sturdy support for heavy container loads. Includes two transparent PVC sliding doors.

C. Features 24 angled compartments (12 on each side) for safe storage of chemical bottles up to 7" in diameter. Includes epoxy-finished steel frame. Hinged top provides access to an additional compartment ideal for storage of gloves, safety glasses, and other small items.

Floor-Lock Brake
Easy to engage/disengage by means of a foot pedal.
Cat. #
3401-04

Polypropylene Chemical Transport Carts

Type (see photos)	Dimensions (W x D x H)	Compartment Sizes (inches)	No. of Compartments	Cat. #
A	16" x 24.25" x 36" 22.5" x 24.25" x 36"	7 x 7 7 x 7	12 18	**3401-00** **3401-01**
B	36" x 27" x 39"	2 @ 17 x 26.5 x 17 2 @ 17 x 26.5 x 14	4	**3401-30**
C	28" x 24.75" x 47"	24 @ 7 x 7 (for bottles) 1 @ 28 x 7 (for storage)	25	**3401-31**

Chemical-Resistant PureFlow™ Mobile Storage System

- **Incorporates fan unit with HEPA or ULPA filter to ensure particle-free storage of chemicals, wafers, pharmaceuticals, and other sensitive materials**
- **Includes on-board power cell for uninterrupted filter/fan operation while in transit**
- **Polypropylene shell with transparent PVC viewing window resists a wide range of process chemicals**
- **Other dimensions available; just let us know your specifications!**

For complete ordering information, refer to page 177.

Wet Processing and Cleaning

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Modular Wet Processing Station System Options	553
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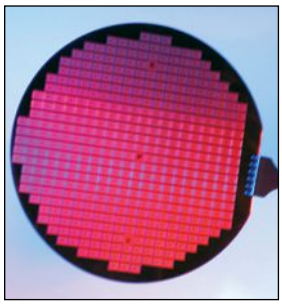


Wet Processing and Cleaning

Terra's modular designs guarantee maximum value and versatility in—

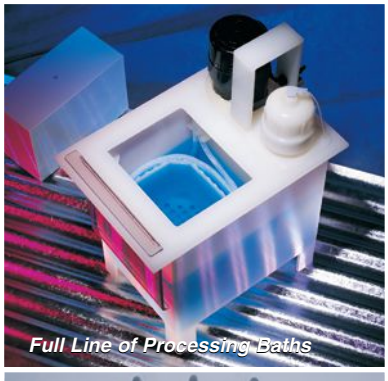
Cleaning **tools and parts used in chemical vapor deposition, photoresist developing, etching, diffusion and other wafer fab areas;**

Processing **wafers under the tightest standards for purity, consistency, and control.**

CE

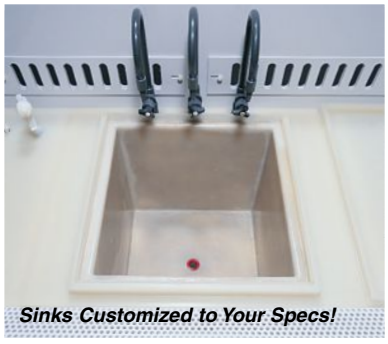
- **Value Engineering**
  Whichever stations you choose, you'll find flexible designs that let you specify the processing configuration for your application—at standard pricing. This modular approach takes the hassle and expense out of ordering!
- **V.I.M.: Vertically Integrated Manufacturing**
  As a manufacturer, Terra controls all aspects of the fabrication, from material specification to final cleaning & packaging. Your system is engineered as a system, from start to finish.
- **Complete Facility Integration**
  Terra's engineers and installation technicians work with yours to ensure full compatibility with on-demand centralized chemical delivery systems, fire and other safety programs, chemical and exhaust disposal systems, and other facility requirements.
- **Fire Detection/Suppression Systems**
  Specify the fire safety measures for your application: stainless steel construction; IR-based, dual-wavelength fire detection sensors; fire suppression systems (CO_2 or water), fire-activated exhaust dampers.
- **Robotic Transfer Mechanisms**
  Select rotary or linear systems for automatic wafer transfer and processing. End effectors and control systems are available for any application.
- **Final Cleanroom Cleaning, Packaging**
  On demand, final cleaning and packaging are performed to your specifications in Terra's on-site cleanroom (call for details).
- **Custom Work**
  Put Terra's comprehensive design and fabrication capabilities to work on your requirements!

Versatile Deck Configurations



Full Line of Processing Baths

PLC Controls



Sinks Customized to Your Specs!

Rotary and Linear Transfer Mechanisms

WET PROCESSING EQUIPMENT

Configure a System to Your Specs!

Modular Wet Processing Stations (pages 550 - 553) feature separate benches and filter/blower modules.

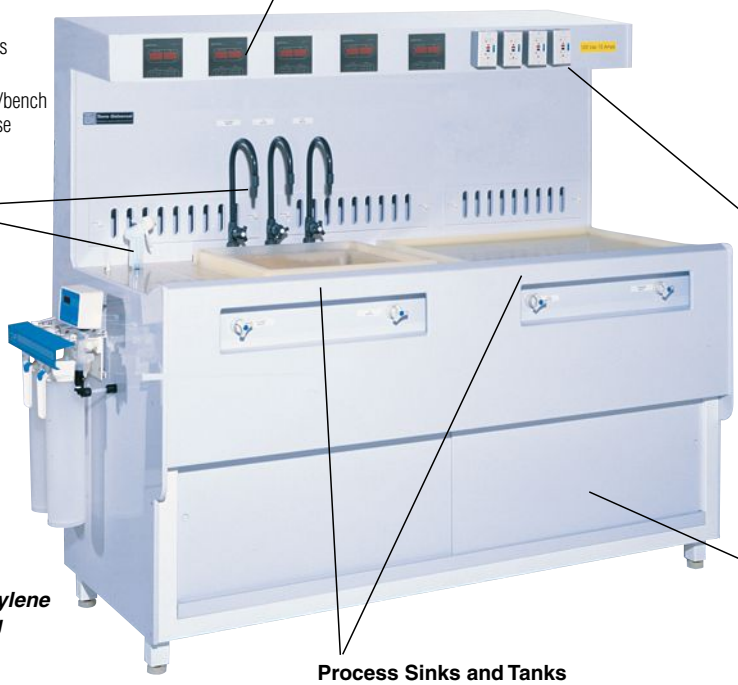
Wet Processing Cabinets (pages 548 - 549) integrate the wet bench and filter/blower housing in a single cabinet.

- Configure process baths in single or double row to suit your workflow
- Fits under Terra's Laminar Flow Station for versatile airflow control
- Bath controls can be isolated in overhead or side panel

- Fully integrated cabinet with convenient controls & air flow controls
- Stainless steel and polypropylene shell construction
- Versatile design accommodates most configurations

System Options

Refer to the following pages for ordering information on modules listed below, or call for special processing requirements. Whatever your configuration, Terra will deliver a complete turnkey system, ready for operation!



PLC and/or Dedicated Process Controls

Exhaust Removal
- Integral side and downdraft vents remove chemical vapors
- Exhaust flange on integral hood/bench cabinets accommodates in-house exhaust system (pg. 548)

Goosenecks, Aspirators, and Spray Guns
- Refer to pages 553-554

Chemical Storage and Transport
- Carts and cabinets on page 566

Model Shown: Polypropylene Modular Wet Processing Station—see page 552

Vertical Laminar Flow Hood
- HEPA/ULPA filters remove particles for clean processing
- Select integral hood/bench cabinets (pg. 548) or separate hood/bench modules (pg. 550)

Control Panels
- Easy-access, touch-screen control over automatic bath functions (heating, cooling, drain valves, etc.). Mounted on head case or rear panel of modular wet benches (pg. 551); on side panel of wet cabinet (pg. 548)

Power Receptacles

Robot Transfer System
- Rotary or linear motion (pg. 563)

Fire Detection/Suppression Systems
- Many configurations available to meet your safety requirements; see page 564

Storage Options
- Chemical storage area
- Carboys (collection/reclamation reservoirs) with easy-empty QuickConnect fittings

Plenum Options
- DI water flush option keeps main reservoir clean & dilutes chemical waste
- Plumbing to suit process chemicals

Process Sinks and Tanks
- Gravity and pneumatic drains
- Polypropylene, PVDF, quartz, and stainless steel
- Ultrasonic tanks
- Constant temperature, recirculating and overflow designs
- Refer to pages 556-562

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Wet Processing Cabinet

- **Incorporates all processing components into one self-contained, easy-to-clean system**
- **Isolated control panel allows safe, convenient operation of baths, rinsers, and other process modules**
- **Select all-polypropylene or stainless steel shell**
- **Standard system includes sliding access shield and fluorescent illuminator**
- **Custom engineered to meet specific application requirements!**

These self-contained Wet Processing Cabinets provide the perfect turnkey solution for a wide range of cleaning and processing requirements.

The standard models listed below include a reinforced cabinet of the specified size and material, a sliding access shield, and a fluorescent illuminator. A control panel to the right of the process deck provides safe, convenient access to all system controls (order processing sinks and baths separately). Support posts with polypropylene leveling feet provide stable positioning. Select optional 4"-diameter retractable casters for more convenient mobility.

You Specify the Process Workflow—Let Terra Take Care of the Rest!

Whatever your application, Terra engineers will work with yours to develop a deck configuration that's right for your process. One cabinet can house up to 14 separate processing baths, rinsers, and other process modules, which can be arranged in a single or double row. A raised lip surrounds the work area to prevent floor spills. A full-length plenum sink located under the work surface contains overflow for easy disposal, and an optional plenum flush quickly empties the plenum through a 2"-diameter drain valve.

Convenient front-panel valves control operation of nitrogen or auxiliary gas equipment, DI water, exhaust venting, and power. The control panel includes power on/off switch, a static pressure gauge (to monitor the exhaust flow), and a system fuse. A storage area below the deck holds collection tanks or reserve chemicals.

The optional Filter/Blower Module provides a vertical laminar flow of HEPA-filtered air for particle-sensitive applications. Exhaust fumes can be ducted through a 10"-diameter flange located on the top of the cabinet (see airflow illustration). Specify other desired flange diameter or location.

Polypropylene stations are ideal for acids and caustic chemistries (shown with optional gooseneck faucets, spray guns, casters and duplex power outlets)

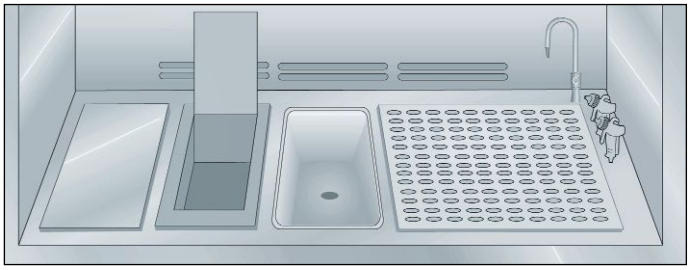
Fire-retardant polypropylene available!

Sample Configurations

With Integrated Filter/Blower Housing

Cleaning Metal Depositions

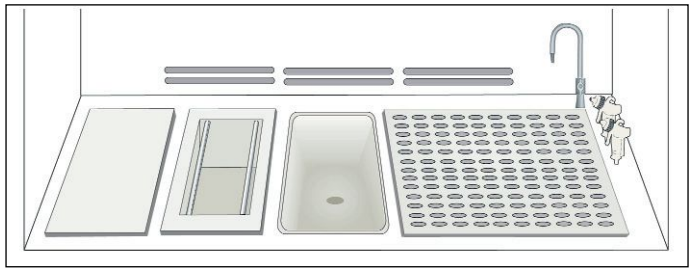
. . .from tubes, tools, and fixtures. Station design: Stainless Steel.



#1	#2	#3	#4 & #5
Stainless Steel Platform (Staging Area)	Ultrasonic Tank for IPA & Acetone clean *(see page 12)*	Stainless Steel Rinsing Tank with pneumatic drain valve *(see page 8)*	Perforated Stainless Steel Deck with DI water/N_2 spray guns & gooseneck; drains to carboy

Post-Diffusion Cleaning

. . .of thermocouple probes,quartz tubes, fixtures, and other parts. Station design: Polypropylene.



#1	#2	#3	#4 & #5
Polypropylene Platform (Staging Area)	Polypropylene Cleaning Tank (for DI water) with spray bar *(see page 8)*	Polypropylene Rinsing Tank with pneumatic drain valve *(see page 8)*	Perforated Polypropylene Deck with DI water/N_2 spray guns & gooseneck; drains to carboy

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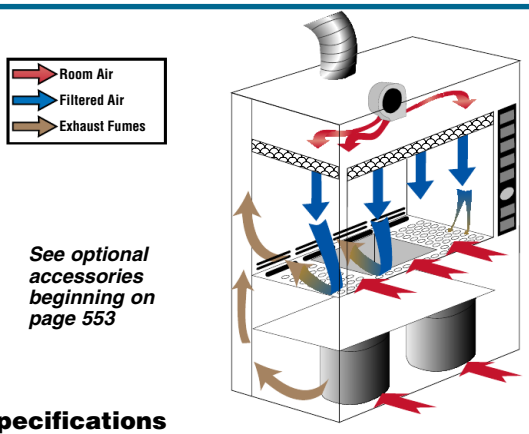
WET PROCESSING EQUIPMENT



See optional accessories beginning on page 553

Stainless steel processing cabinets are recommended for solvents and flammable chemicals (shown with optional casters and spray gun)

Specifications

Construction: All stress-relieved white polypropylene (½" thick) or all 304 stainless steel. Standard plumbing is PVC (specify stainless steel or other desired material).

Exhaust: Ducted through a standard 10"-diameter flange positioned at the top rear of the cabinet (see airflow illustration). Specify other desired flange diameter or location.

Storage Cabinet: 70" or 92"W x 42"D x 12"H; dual sliding doors.

Drain: 2" NPT female, located at bottom of sub-deck plenum.

Power: 120VAC, 60Hz or 220VAC, 50Hz, depending on component selection. Power outlets available for process equipment.

Illuminator: Fluorescent, 100 foot candles. Does not disturb air.

Controls: Instrument panel provides power switch, power indicating light, light switch, static pressure exhaust meter, and power fuse. Provisions are made for audible and visible pressure alarm, visible alarm silence, and for control of optional processing baths.

Dimensions: 84" or 108"W x 43"D x 72"H (nominal)

Filter/Fan Unit: Optional FFU generates 650 CFM of air at filter pressure drop from 0.350" to 0.795" W.G. at 90 FPM. Noise factor: 50 dBA. Filter type: 99.99% efficient HEPA. See page 208 for further information.

Ordering Information

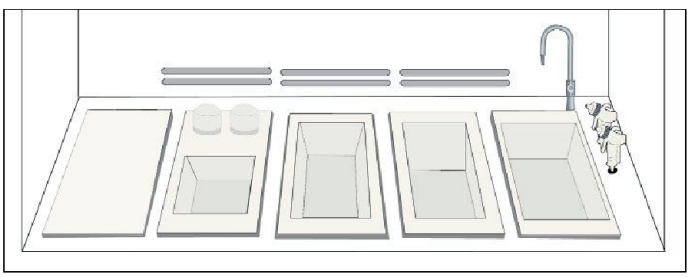
Specify the station of desired the size and material. Baths, sinks, faucets and other processing equipment are specified on the following pages.

Wet Processing Cabinets (standard height = 72")				Filter Blower Module		Plenum Flush	Ionizing Bar
Overall Width	Work Area Dimensions	Polypropylene	Stainless Steel	*Includes 99.99% efficient HEPA filter (nominal) 115VAC, 60Hz	230VAC, 50Hz	PVC with H_2O Nozzles	Refer to page 421
	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #	Cat. #
84"	72"W x 24"D	7018-00	7018-01	7018-04	7018-04-220	7018-50	6704-17
108"	96"W x 24"D	7018-02	7018-03	7018-05	7018-05-220	7018-51	

Note: All models listed above include an adjustable PVC sliding sash (to restrict airflow to the work area), a static pressure exhaust meter (to monitor the pressure differential in the exhaust line), and a fluorescent illuminator. All electronic controls are located on a vertical panel to the right of the work area (left side mounting may be specified at no extra charge). PLC controllers are also available; call for quotation.

Oxide Etching

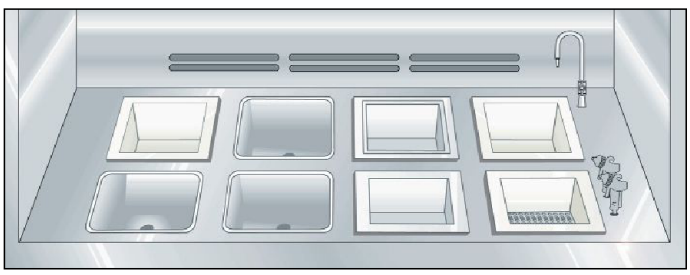
. . .of 8" wafers in standard cassettes. Station design: polypropylene.



#1 Solid Platform (Staging Area)
#2 F Series Filtered Bath (see page 11)
#3 DR Series Dump Rinser with Control (drains to reclamation carboy)
#4 DR Series #1 Dump Rinser with Control (see page 11)
#5 Polypro. Utility Sink #2 with Gooseneck & DI H_2O / N_2 spray guns (see page 8)

Solvent Cleaning

. . . with polypropylene, quartz and stainless steel baths heated to 60°C,



#1 Polypropylene Bath for Mask Cleaning
#3 Stainless Steel Bath for Acetone Cleaning
#5 Qa Quartz Bath for Organic Stripper
#7 Polypropylene Bath
#2 Stainless Steel Bath for IPA Cleaning
#4 Stainless Steel Bath for IPA Cleaning
#6 DR Series Dump Rinser
#8 Bottle Storage Polypropylene with Perforated Bottom

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Modular Wet Processing Station

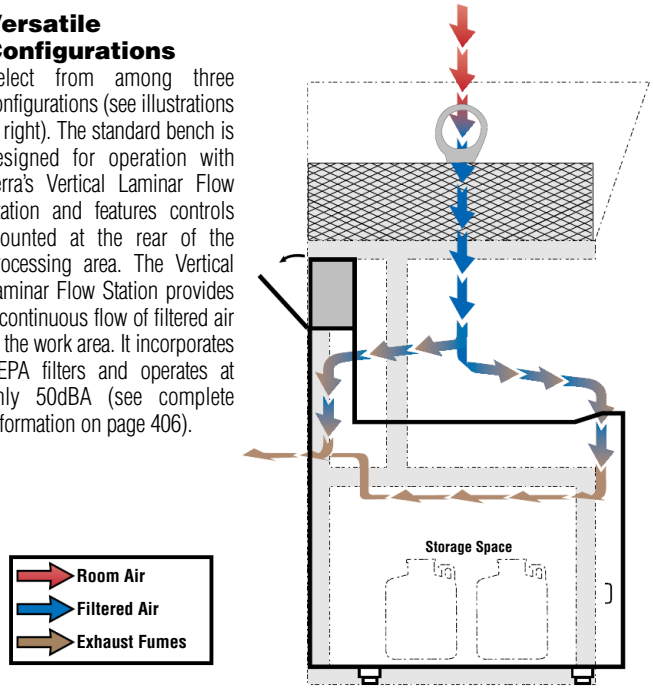
- **Economical turnkey solutions for a wide range of cleaning and processing requirements**
- **Versatile deck configurations accommodate up to 7 sinks, rinsers, and other processing modules (deeper decks available for up to 14 modules)**
- **Fits beneath Terra's Vertical Laminar Flow station to allow HEPA-filtered processing and exhaust ventilation**
- **Bi-directional exhaust system safely removes hazardous fumes**
- **Optional control modules isolate bath controls from the processing area**
- **Custom engineered to meet specific application requirements!**

Like Terra's Wet Processing Cabinets on the previous pages, these modular benches accommodate a complete line of baths, rinsers, cleaners, and other processing modules to suit your application.

All-polypropylene models are compatible with most acids and other process chemistries. Stainless steel models are suitable for solvent cleaning. Both standard systems include a raised lip to contain spills and a sub-deck plenum with a 2"-diameter drain valve for safe collection of overflow chemicals. An optional plenum flush feature lets you wash this sink with water as it drains.

Versatile Configurations

Select from among three configurations (see illustrations at right). The standard bench is designed for operation with Terra's Vertical Laminar Flow Station and features controls mounted at the rear of the processing area. The Vertical Laminar Flow Station provides a continuous flow of filtered air to the work area. It incorporates HEPA filters and operates at only 50dBA (see complete information on page 406).



Standard Wet Bench, shown with optional Vertical Laminar Flow Hood (see page 406)

WET PROCESSING EQUIPMENT

These modular, economical stations are configured to meet your processing requirements for bath layout, particle-free laminar flow, exhaust fume removal—even robotic transfer.

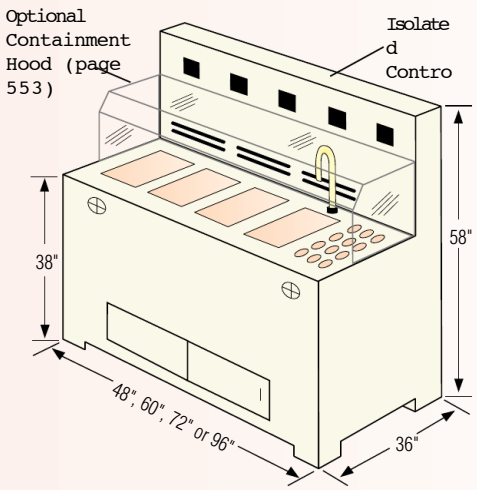
Like the models on the previous pages, these benches accommodate a complete line of baths, rinsers, cleaners, and other processing modules to suit your application. All polypropylene models are compatible with most acids and other process chemistries. Stainless steel models are suitable for solvent cleaning applications. Select among these standard configurations:

Standard Wet Bench
For use with Vertical Laminar Flow Hood

This economical design allows placement beneath a laminar flow hood, which provides a downward flow of HEPA-filtered air to prevent particulate contamination in the work area. A 10"-diameter flange is provided on the rear of the station for connection to your in-house ventilation system. A 2.5" raised lip surrounds the work area to prevent floor spills, and perforations along the front lip safely drain spills into the full-length plenum sink located under the work surface. An optional plenum flush quickly empties the plenum through a drain valve.

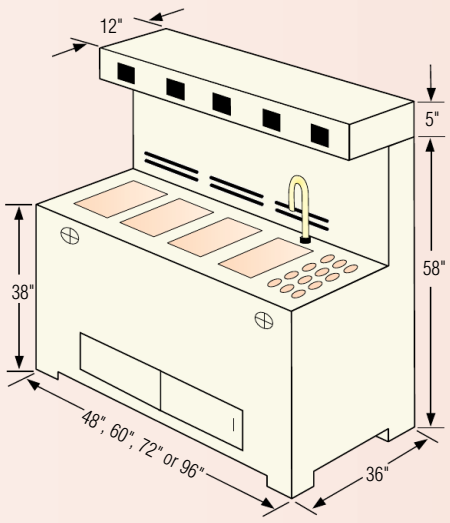
Convenient front-panel valves control operation of nitrogen or auxiliary gas equipment, DI water, exhaust venting, and power. A storage area below the deck holds collection tanks or reserve chemicals.

In this configuration, process bath controls are mounted at the rear of the station, immediately above air-flow control baffles. For additional safety, an optional vapor containment hood is installed over the work deck.



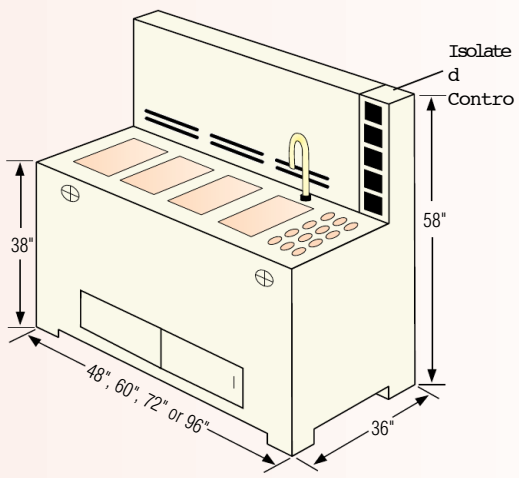
Standard Wet Bench
—with Overhead Control Case

As an alternative to a side control module, process bath controls are mounted inside an overhead control case. This configuration eliminates the need for operators to reach over baths in order to access controls.



Standard Wet Bench
—with Side Control Module
For use with Vertical Laminar Flow Hood

In many applications, safety dictates that process bath controls be isolated from the process baths. A side control module allows operators convenient access to all system controls without the need to reach over potentially hazardous process chemicals. The housing includes all electronics, and allows convenient service access from the right side of the unit.



WET PROCESSING EQUIPMENT

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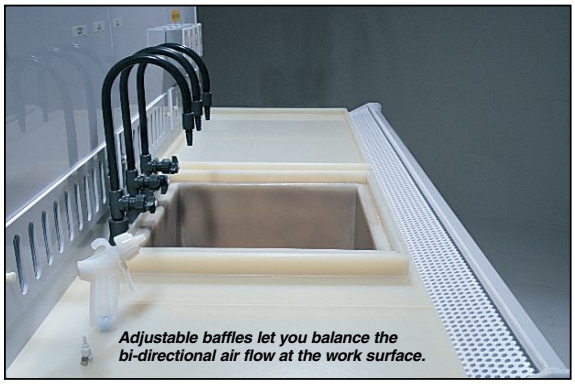
Polypropylene Acid/Base Etching Bench
Fire-retardant polypropylene available!

Stainless Steel Solvent Cleaning Bench



Adjustable baffles let you balance the bi-directional air flow at the work surface.

Adjustable baffles on the wet processing station let you balance this flow of air between the front and the rear of the processing deck, as your application requires. Opening them completely ventilates fumes away from the operator; closing them increases the force of the filtered-air curtain at the front of the station.

Whatever your application, Terra engineers with work with yours to develop a deck configuration that's right for your process. Baths, rinsers, and other process modules can be arranged in a single or double row; see the following pages for more application information.

Standard systems include a reinforced bench of the specified size and material, a storage cabinet, and a 10"-diameter exhaust flange. Polypropylene leveling feet are included; specify optional 4"-diameter retractable casters for easier positioning. Convenient front-panel valves control operation of nitrogen or auxiliary gas equipment, DI water, exhaust venting, and power (order separately).

Specifications

Construction: All stress-relieved white polypropylene (½" thick) or all 304 stainless steel. Standard plumbing is PVC (specify stainless steel or other desired material).

Exhaust: Ducted through a standard 10"-diameter flange positioned at the rear of the bench (see airflow illustration). Specify other desired flange diameter or location.

Storage Cabinet: 35"D x 12"H x 44", 56", 68" or 92"W; dual sliding polypropylene doors

Drain: 2" NPT female, located at bottom of sub-deck plenum chamber

Power: 120VAC, 60Hz or 220VAC, 50Hz. Power outlets available for process equipment.

Controls: Standard installation for process bath controls is at the rear of the wet station (select overhead or side control case as options).

Dimensions: 48", 60, 72" or 96"W x 36"D x 47"H (nominal)

Vertical Laminar Flow Station

Filter/Fan Unit: FFU generates 650 CFM of air. Blower is rated for continuous duty; furnished with overload protection. Noise factor: 50 dBA. Filter type: 99.99% efficient HEPA.
FFUs must be ordered separately; see page 406
52"W Hood - (1) 48" x 24" FFU
64"W Hood - (1) 36" x 24" and (1) 24" x 24" FFU
76"W Hood - (1) 48"W x 24" and (1) 24" x 24" FFU
100"W Hood - (2) 48"W x 24" FFU

Illuminator: Fluorescent, 100 foot candles. Does not disturb air flow.

Access Shields: Side shields made of acrylic; Optional counterweighted front shield can be raised and lowered for operator safety and control of laminar air flow

Ordering Information

Specify the station of desired the size and material. Baths, sinks, faucets and other processing equipment are specified on the following pages. Additional charges may apply for special plumbing materials or third-party certification. Deeper decks are available for double rows of process baths. Call to discuss your requirements with a Terra process engineer.

Modular Wet Processing Station*				Vertical Laminar Flow Hood			Plenum Flush	Ionizing Bar
Overall Width (nominal)	Work Area Dimensions	Polypropylene Cat. #	Stainless Steel Cat. #	Overall Width (nominal)	Requires 99.99% efficient HEPA filter(s)** 115VAC, 60Hz Cat. #	230VAC, 50Hz Cat. #	PVC with DI H_2O Nozzles Cat. #	Requires Hood Option See page 421 Cat. #
48"	36"W x 23"D	**2000-16**	**2001-04**	52"	**2001-30**	**2001-30-220**	**2001-34**	**1526-31**
60"	48"W x 23"D	**2000-17**	**2001-05**	64"	**2001-31**	**2001-31-220**	**2001-35**	**1526-32**
72"	60"W x 23"D	**2000-18**	**2001-06**	76"	**2001-32**	**2001-32-220**	**2001-36**	**1526-33**
96"	84"W x 23"D	**2000-19**	**2001-07**	100"	**2001-33**	**2001-33-220**	**2001-37**	**1526-35**

All models on this chart are designed for rear panel mounting of controllers (as shown in photo above). Call for a quotation on models with head case panel mounts.
****Order Filter/Fan Units with HEPA filters separately. See page 406***

Modular Wet Processing Station System Options

Overhead control panel eliminates the need to reach over process tanks.

Isolated Overhead Control Case

Isolated Overhead Control Case	
Bench Width	Cat. #
48"	**2001-38**
60"	**2001-39**
72"	**2001-40**
96"	**2001-41**

Isolated Overhead Control Case

The Overhead Control Configuration houses all controls in an isolated power case above the processing deck. Overhead placement prevents operators from inadvertently activating controls (a common problem in front-mount configurations) and also eliminates the need to reach across the deck, a potentially hazardous consequence of rear-panel mounting. A hinged top panels affords easy access to all electronics. Dimensions: 12"D x 5"H (other sizes available to accommodate larger controls).

Note: This configuration is not compatible with Vertical Laminar Flow Hoods. Controls can also be isolated on a Side Control Module; call to discuss your application requirements.

Containment hood collects and condenses vapors.

Containment Hood

Collects and condenses chemical vapors rising from the processing deck. Ideal for operations with rear-mount bath controls, since it shields an operator reaching over the deck to program a bath. Standard dimensions: 24"D x 18"H (see chart for width).

Contamination Hood			
Width	Static-Dissipative PVC Cat. #	Nondissipative PVC Cat. #	Polypropylene Cat. #
48"	**2001-42**	**2001-46**	**2001-50**
60"	**2001-43**	**2001-47**	**2001-51**
72"	**2001-44**	**2001-48**	**2001-52**
96"	**2001-45**	**2001-49**	**2001-53**

Process baths can be configured in a single or double row to accommodate workflow.

Custom Deck Configurations

Processing decks of standard Terra Wet Processing Stations are 23" deep. Standard decks can be also be customized to accommodate double-row configuration of large processing tanks, or to meet other special requirements for working height or controller position. Call to discuss your application!

Aspirator

Made of polypropylene, this Venturi-style aspirator features 3/4"NPT male threads that attach to Terra's standard gooseneck faucet to draw liquids through 3/8"-ID diameter tubing (not furnished). Includes 1/4"-ID x 4 3/4"L polyethylene discharge tube. Maximum vacuum is 28.5" (724mm) Hg; operates efficiently with water pressure as low as 7.5 psig (0.5 bar). Integral check valve eliminates vacuum loss after water is shut off. Ideal for cleaning up spills and for slow draining of process chemistries in a quartz bath.

Cat. #
7018-39

Glove Washer

This convenient rinsing station removes process chemicals from gloves and small parts. Faucet is chrome-plated. IR sensor allows hands-free activation. Also available in polypropylene, PVDF or other polymer. Order desired sink size and material separately (see page 556).

Cat. #
2001-60

Duplex Power Outlets

Includes wiring and installation of one UL-approved outlet box, in conformance with NEC specifications.

	Cat. #
110VAC, 50/60Hz	**6704-33**
220VAC, 50/60Hz	**6704-34**

Other Optional Accessories—

Casters — All-polymer construction for optimal chemical compatibility. Can be mounted on wet cabinets or wet stations.

Cat. #
1700-44

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Wet Processing Accessories

The products listed below can be used in a variety of wet processing applications, including Terra Universal's Wet Processing Station (see page 550 for information).

Gooseneck Liquid Dispensing Assemblies

These gooseneck assemblies prevent the problems of exterior corrosion caused by corrosive fumes or vapors. Their all-plastic construction eliminates contamination and corrosion that is common with brass, steel, aluminum and stainless steel in distilled, demineralized or deionized water.

The gooseneck assembly includes a ⅜" gooseneck tip with tapered tube connection, a ⅜" schedule 80 180° return bend threaded at both ends, a ⅜" NPT x ½" NPT base assembly with tailpiece and a ½" nut for fastening the assembly to the deck. The PVC gooseneck assembly can be used with four different valve assemblies. Refer to the table below to select the type of valve assembly you will need.

	Cat. #
Gooseneck Assembly PVC	
Installed	**9412-98**
Uninstalled	**9413-50**
Valve Assembly Type	
⅜" Threaded Omni Valve PVC	**9412-00**
⅜" Threaded Globe Valve PVC	**9412-01**
⅜" Threaded True Union Ball Valve PVC	**9412-03**
⅜" Threaded Needle Valve PVC	**9412-04**

Nitrogen/DI Water Spray Guns

- **Provides safe, convenient high-pressure dispensing of nitrogen or DI water**
- **Ideal for use in Terra's Wet Processing Station**

Standard cap color: natural. Nitrogen cap/nozzle prevents pressure build-up if outlet is blocked. Installation price includes installation in Terra's Wet Processing Station (including all necessary fittings and plumbing).

Specifications

Maximum Pressure:	75 PSIG (nitrogen spray gun); 80 PSIG (DI water spray gun)
Orifice:	3/16"
Connection:	1/4" female NPT
Filter:	0.5 µm PTFE membrane (nitrogen spray gun only)
Materials:	All wetted parts PFA, Teflon®, PTFE (and polyethylene on nitrogen spray gun only)

DI Water/Nitrogen Spray Guns

Description	Cap Color	Spray Gun Only Cat. #	Spray Gun Installed Cat. #
DI Water Spray Gun - ¼" FNPT Connection	Natural	**2002-22**	**2002-23**
Nitrogen Spray Gun - ¼" FNPT Connection	Natural	**2002-21**	**2002-24**

	Cat. #
Replacement 0.5 Micron Filter For Nitrogen Spray Gun	**2002-45**

Custom Applications

As a major manufacturer of wet benches, laminar flow hoods, chemical storage systems, and other processing equipment, Terra has the fabrication and engineering capabilities to modify any system to your unique requirements. Just give us your specs!

	Cat. #
Pictured at right:	
Vacuum Cleaning Station	**7018-07**
Overall dimensions: 60"W x 36"D x 84"H	
Pictured below:	
Low-Profile Wet Processing Station with Overhead Exhaust Transition	**7018-06**
Overall dimensions: 96"W x 36"D x 92"H (including exhaust)	
Corresponding Vertical Laminar Flow Hood	**1690-95**
Overall dimensions: 98.5"W x 28"D x 88"H. Includes static dissipative PVC side panels.	
Static-Dissipative PVC Rear Panel	**7018-58**
Required only if hood is not operated with a wet processing station.	
HEPA Filter/Fan Unit (requires two)	
Provides 650 CFM of HEPA-filtered air. Runs at 50dBA.	
110VAC, 60Hz	**6701-99**
220VAC, 50Hz	**6702-02**

Processing Tanks

See page 558 for programmable processing baths

- **Standard models available in polypropylene, PVDF and stainless steel**
- **Overflow rinsing tanks include serrated weir and dump drain with pneumatic valve**
- **Optional accessories include special-diameter drain valves, overtank spray bars, and nitrogen bubblers**
- **Custom sizes, materials and configurations are no problem—just give us your specs!**

Terra fabricates process vessels out of most plastics, as well as stainless steel.

Overflow tanks include a serrated weir that overflows liquid into a catch basin for recirculation into the main tank. A dump drain with pneumatic valve allows quick emptying into the plenum catch reservoir of the wet station. Models are available for standard wafer carrier sizes and include 1"-diameter tubing made of the specified material.

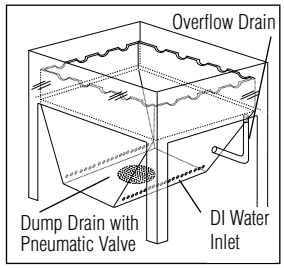
Sinks are available in three standard sizes and include a gravity drain (specify desired size). These sinks can be modified to meet your requirements—call to discuss your application with a Terra process engineer.

Spray bars, nitrogen bubblers and custom drains are available. Call for a quotation!

Polypropylene Overflow Rinsing Tank

Optional Features:

- **Special-Diameter Drain Valves**
- **Overtank Spray Bars**
- **Nitrogen Bubblers**



Overflow Rinsing Tanks*

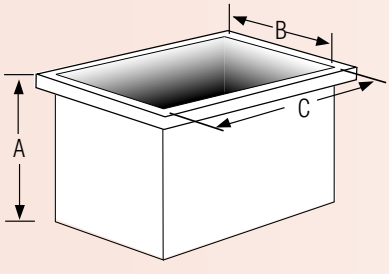
Capacity		Polypropylene Cat. #	PVDF Cat. #
Single Wafer Carrier	4"	7018-10	7018-16
	6"	7018-11	7018-17
	8"	7018-12	7018-18
Double Wafer Carrier	4"	7018-13	7018-19
	6"	7018-14	7018-20
	8"	7018-15	7018-21

**** Includes overflow weir, catch basin, and ¾" drain with pneumatic valve (see illustration). Price includes installation***

PVDF Sink with Optional Gooseneck Faucets

Sinks (specify desired drain size)	
Polypropylene Internal Dimensions	Cat. #
12" x 12" x 7½"D	7018-22
21" x 15¾" x 7½"D	7018-23
22" x 16" x 10½"D	7018-24
Stainless Steel* Internal Dimensions	Cat. #

**** Stainless Steel sinks feature rounded corners for easy installation. All prices include installation (plumbing of gravity drain is extra).***



Build Your Own Tank!

Simply fill in the requested information and contact a Terra sales representative for a detailed quotation.

1. **Internal Tank Dimensions:** A _____ B _____ C _____
2. **Specify the desired material:**
   ❒ PVDF ❒ Stainless Steel ❒ Polypropylene ❒ Other: _____
3. **What is your process chemistry?** _____
4. **Other Features:**

❒ Dump valve	❒ Lid	❒ PLC Control
❒ Fill sensor	❒ Submergible Ultra-Sonic Transducer	❒ Aspirator
❒ Overflow sensor	❒ Condensing coil	❒ Spray Bars
❒ Nitrogen bubbler	❒ Submergible heater	❒ Over Flow Catch Basin

Ultrasonic Tanks

- **Fabricated of 14 gauge, 316L stainless steel to ensure compatibility with solvents**
- **Interior features coved corners for easy cleaning**
- **Water cooling jacket controls tank temperature, keeping solvents safely below flashpoint**
- **Heater includes overtemperature protection for safety**
- **Class I, Division II models available for operation with explosive materials**
- **Pricing includes installation in any Terra wet processing or solvent cleaning bench**

These ultrasonic tanks meet key requirements for solvent and other cleaning operations: purity, consistency, and safety.

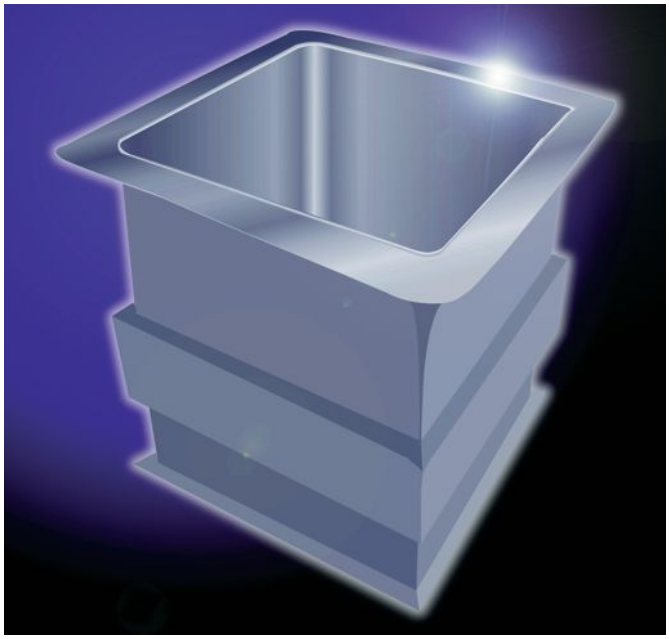
Ultrasonic cleaning: safe, effective and fast

Ultrasonic excitation boosts the speed and effectiveness of the solvent cleaning process, thereby lowering overall cost.

A solid state electronic generator converts standard electrical current into electrical energy of a higher frequency. A transducer then converts this energy into sound waves, causing vacuum cavities (cavitation bubbles) in the liquid as alternative positive and negative pressure areas are produced. The pressure exerted by the imploding bubbles accomplishes a scrubbing action, resulting in rapid, efficient and gentle cleaning.

The small size of the bubbles permits their penetration into areas inaccessible to sprays or brushes, making ultrasonics the perfect solution to cleaning interior spaces, blind holes, crevices, and other microelectronic features.

All models are fabricated of 14-gauge 316 electropolished stainless steel for optimal purity and durability. Coved corners facilitate easy cleaning, and a stainless steel drain port allows easy chemical disposal. The transducers are housed within a 304 stainless steel wrap with a #3 finish. A water cooling jacket controls tank temperatures to keep solvents below flashpoint. All ultrasonic tanks operate at 40 kHz.



A heating element provides up to 5000 Watts of heating power to enhance cleaning efficiency. An overtemperature protection safeguards heating operations.

Terra also offers Class I, Division II models which include a sealed transducer compartment with fittings for a nitrogen purge. (**Note:** Class I, Division II models are not available with heating capabilities.)

Cat. #

Optional Overflow Recirculation/Filtration Unit **3307-16**

Consists of a 10", 5-micron filter cartridge in a stainless steel filter housing to filter the cleaning solution. Recirculation is provided by a stainless steel pump with Teflon seals. A four-sided spill weir collects the overflow and removes all floating contamination.

Note: Overflow tanks are not heated. Not available for 12" x 12" x 10" tanks.

Ultrasonic Tanks **Prices include installation in specified Terra cleaning station. Other tank sizes are available; call for a quotation**

Specifications				Standard		Class I, Div II*	
Inside Tank Dimensions (inches)	Number of Generator(s)	Wattage Ultrasonic	Wattage Heat	120V Cat. #	240V Cat. #	120V Cat. #	240V II Cat. #
12 x 12 x 10	1	600	1200	**3307-00**	**3307-08**	**3307-04**	**3307-12**
16 x 22 x 16	1	1000	3000	**3307-01**	**3307-09**	**3307-05**	**3307-13**
18 x 18 x 16	2	1600	4000	**3307-02**	**3307-10**	**3307-06**	**3307-14**
18 x 26 x 18	2	2000	5000	**3307-03**	**3307-11**	**3307-07**	**3307-15**

**** Includes a sealed transducer compartment with fittings for a nitrogen purge. Heating is not available for Class I, Division II models.***

Other Ultrasonic Tanks Available!

The economical heated benchtop tanks pictured at right can be installed onto any Terra wet processing station.

These 40kHz models feature nominal tank capacities of 1.9, 5.6, or 11.2 gallons. Ultrasonic generators are separate from tanks, allow remote installation. Tanks are made of 316L heavy-gauge stainless steel.

See page 271 for complete specifications and ordering information.

Process Control, Safety, and Consistency

Terra's comprehensive range of constant-temperature baths, etching baths, dump risers, and other processing equipment is ideally suited for the high-purity requirements of the semiconductor industry. Microprocessor controls ensure the integrity of your operations.

The chart below indicates the baths best suited for common semiconductor operations. Once you select the equipment that meets your requirements, a Terra process engineer will help configure a turnkey solution.

Product Application Chart

Process, Commercial or Generic Name	Process	Chemical Composition	Concentration	Process Temperature (Typical)	Recommended Product	Page Number
Aqua Regia	Gold Etchant	Hydrochloric Acid (HCl) Nitric Acid (HNO_3)	75% 25%	90°	C Series	561
Buffered Oxide Etch (BOE)	Etch SiO_2	Ammonium Fluoride (NH_4F) Aqueous Hydrofluoric Acid (HF) Aqueous	40%	15-40°C Ambient	A Series RCe Series	562 562
CP8	Etch	Nitric Acid (HNO_3) Hydrofluoric Acid (HF)		Ambient	A Series	562
Etch (Indium) Molybdenum Platinum Nichrome	Etch	Hydrochloric Acid (HCl) Aqueous Nitric Acid (HNO_3)	37-38% 70-71%		Qa Series	560
Metal Etch	Etch A1, AlSi Al Si Cu	Phosphoric Acid (H_3PO_4) Acetic Acid (CH_3COOH) Nitric Acid (HNO_3)	85-87%	30-60°C	Qa Series	560
Nitride Etch	Etch	Phosphoric Acid (H_3PO_4) DI Water (H_2O)	85-87% 15-13%	150-185°C	Nb Series	561
Organic Stripper	Resist Removal	PRS-1000 S-43 Lozolin No Phenol-922	Full strength	Room temperature 120°C	C Series	561
Oxide Resist Strip	SiO_2 Resist Stripping	Sulfuric Acid (H_2SO_4) Ammonium Persulfate ($NH_4S_2O_2$)	95-96%		Qa Series	560
Phenolic Stripper	Resist Removal	J100 Bermar 712D R-10		95-100°C	C Series	561
Resist Series (Metalized)	Resist Removal	Chromic Sulfuric Acid (CrO_3+H_2SO_4)			A Series	562
R.C.A. Clean	Pre-Diffusion Cleans Quartzware	Step 1: Water Hydrogen Peroxide (H_2O_2) Ammonium Fluoride (NH_4CH) Step 2: DI Water (H_2O) Hydrogen Peroxide (H_2O_2) Hydrochloric Acid (HCl)	40%	75-85°C	Qa Series	560
Silicon Etch	Etch	Acetic Acid (CH_3COOH) Nitric Acid (HNO_3) Hydrofluoric Acid (HF)		Ambient	A Series	562
Sirtl Etch	Etch	Chromium Trioxide (CrO_3) DI Water (H_2O) Hydrofluoric Acid (HF)		Ambient	A Series	562
Slope Etch	Etch	Phosphoric Acid (H_3PO_4) Acetic Acid (CH_3COOH) Nitric Acid (HNO_3)		55°C	Qa Series	560
Standard Resist Strip (Do not use w/aluminum)	SiO_2 Resist Strip	Sulfuric Acid (H_2SO_4) Hydrogen Peroxide (H_2O_2)	95-96%	110-140°C	Qa Series	560
2:1 Etch	Etch	DI Water (H_2O) Hydrofluoric Acid (HF)		Ambient	A Series	562
Wafer Rinsing	Rinsing	DI Water (H_2O)	100%	Ambient	DR-Series	559

DR Series Wafer Dump Rinser

- **Natural polypropylene rinser tanks, DI manifold tubing, spray nozzles, and valves ensure compatibility with most process chemistries**
- **Dual overhead spray manifolds with low misting nozzles eliminate over-spray**
- **360° serrated overflow weir enhances particulate removal**
- **Large machined dump door accelerates dump time and eliminates particle entrapment**
- **Contoured vessel design reduces DI water consumption**
- **Comes complete with retractable PVC cover**

The DR Series Wafer Dump Rinser rinses silicone wafers and similar products free of acids, solvents, and other processing solutions. Because it uses less DI water than other models, it saves on both DI water consumption and disposal expenses.

Water is sprayed from two sources to ensure optimal rinsing: from spray nozzles located above the wafer cassette and from spray jets and a nitrogen bubbler located below the cassette. To ensure product purity, all components are made of natural polypropylene or PVDF, with no exposed metal. A clear PVC cover retracts out of the way when not in use.

The DR Series uses a microprocessor controller to provide versatile, repeatable processing (order below). This controller allows up to 99 programmable cycles, far more than most batch operations require. The membrane keypad resists most acids and solvents, and access coding enhances process security.

Specifications

Materials:	Natural polypropylene (tank, spray nozzles, dump door, DI manifold and valve); Teflon tubing harness; PVC cover (PVDF also available)
Electrical:	105 - 125 VAC, single phase, 24 amps, 50/60Hz (for controller use only)
DI Water Service:	25 psi (dynamic), 45 psi (all models)
Nitrogen Service:	50 - 60 psi (max) controller; 10 - 15 psi, nitrogen bubbler (all models)
Controller (order separately):	Multi-function microprocessor, membrane keypad. Includes end-of-cycle alarm (type C15sa)

The Right Way to Rinse — requires less DI water, less DI water disposal DI water, and less DI water disposal.

DR Series Dump Rinsers
(includes installation on specified Terra Wet Processing Station)

Capacity: Wafer Cassette	Cat. #
1 ea. 4" - 6"	**9502-30**
2 ea. 4"	**9502-31**
2 ea. 5"	**9502-32**
2 ea. 6"	**9502-33**
1 ea. 8"	**9502-34**

Options include PVDF construction, reclaim system, Teflon® spray nozzles, DI water manifold, or water/nitrogen valves.

Cat. #
Controller (Type C15sa; see chart on page 560) **7018-38**

Which Material is Best?

Polypropylene

- Economical plastic with broad chemical compatibility
- Ideal for wet processing station panels
- Loses some chemical resistance at high temperatures
- Suitable for HF and KOH processes

PVDF (polyvinyldilene fluoride)

- Broader range of chemical resistance than polypropylene
- Suitable for high process temperatures
- Ideal for HF and BOE processes at high temperatures

Quartz

- The preferred material for ultra-pure applications
- Provides greater uniformity in heat transfer than plastic baths—ideal for very tight temperature control
- Suitable for most chemicals (but not HF acid)
- Hard surfaces won't scuff, stain, or absorb impurities

PTFE (Teflon®)

- Resistant to an extremely wide range of chemicals
- Perfect for KOH and HF acid (which etch quartz)
- Softer than quartz, so care must be taken to avoid scuffing, staining

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Qa Series Quartz Constant-Temperature Bath

- **Ideal for etching, stripping and cleaning**
- **Ultra-pure, 99.995% contaminant-free processing vessel is ideal for critical chemistries**
- **Externally bonded 5-sided circuit heating element provides efficient, even heating for improved process yields**
- **Redundant safety features minimize potential damage caused by runaway temperatures**
- **Seamless, sloped run-off flange contributes to a longer vessel life**
- **Housing is flame-retardant, stress-relieved polypropylene (UL-94 V-O rated)**

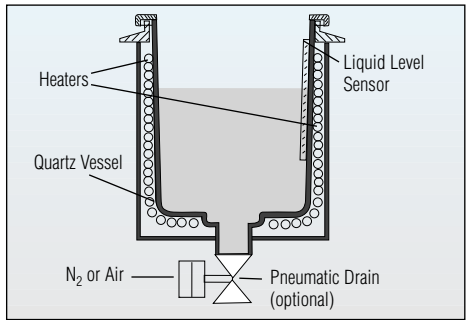
The Qa Series Constant-Temperature Bath provides unsurpassed temperature uniformity: ± 1°C in the 30 - 190°C temperature range. Because the grid heater is bonded to the outside and bottom of the pure virgin quartz vessel, it provides fast, even, efficient heating. The vessel is sealed into a protective polypropylene housing.

The result is a one-piece, seamless, leak-proof process vessel with no devitrification. The dramatically sloped run-off design diverts acids and other process liquids away from the flange. Safety features include an overtemperature thermocouple, failsafe power cut-off, with visible and audible alarms, liquid level sensor tube, and an ultra-reliable snap disk that cuts power if the temperature exceeds unsafe levels.

Specifications

Materials:	Internally flame-polished, virgin fused quartz, boron-free (process vessel); Flame-retardant polypropylene (housing)
Electrical:	208 - 240 VAC, single phase, 50/60Hz, 7 - 20 amps (depending on size)
Process Thermocouple:	J-type Teflon® encapsulated
Insulation:	High-density alumina silica fiber rated to 1260°C
Note:	Microprocessor controller is required for operation. See sidebar for capabilities listing.

Unsurpassed temperature uniformity in etching, stripping and cleaning operations using H_2SO_4, HCl and other chemistries



Qa Series Constant Temperature Baths are available in many sizes and configurations for operation with most wafer sizes. Options include a magnetic stirrer, gravity drain, aspirator (dilution) valve system, and quartz bubbler. Call to discuss your application with a Terra process engineer.

Microprocessor Control

These microcompressor controllers automate operation of the baths and rinsers described on these pages.

This chart below outlines these process capabilities. Call Terra for help in specifying the bath, controller, and mounting configuration that's ideal for your application.

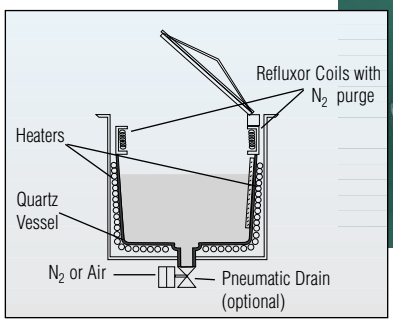
Processing Modules	Corresponding Controls x = Standard o = Optional											Heat / Cool
Qa Series	C1115aLLS	x		x	x				o			
C Series	C1115aLLS	x		x	x				o			
Nb Series	C1815aLSS	x		x	x				o		x	
F Series*	C21bLSS	o	o	x	x	x	x	o	x			
A Series*	C21bLSS	o	o	x	x	x		o	x			
Dr Series	C15sa			x	x				x	x		
Rce Series*	C21bLSS	x	x	x	x	x		x				

Options include pneumatic drain valve and magnetic stirrer; call Terra for details.
Power: 110VAC, 5 Amps—F, A, and RCe. 208VAC, 15 Amps—Qa, C, Nb, RCe (optional)
**** Selection of RCe module provides heating/cooling capabilities to the A or F Series modules. Models listed are polypropylene; PVDF also available.***

WET PROCESSING EQUIPMENT

C Series Stripper Bath

- **Ideal for etching, stripping and cleaning**
- **Seamless quartz vessel is 99.995% contaminant-free**
- **Externally bonded 5-sided circuit heating element provides efficient, even heating for improved process yields**
- **Redundant safety features minimize potential damage caused by runaway temperatures**
- **PVDF refluxor and hard-hinged cover improve condensation of chemical vapors for a cleaner, safer work environment**
- **Sloped run-off design diverts acid and other process liquids away from flange**



The C Series Constant-Temperature Bath offers the temperature uniformity and purity of the Qa Series baths, and adds a refluxor and hinged cover to condense chemical vapors. This feature makes it ideal for use with volatile and fuming solutions.

Its grid heater is bonded to the outside and bottom of the pure virgin quartz vessel, ensuring fast, even, efficient heating. The vessel is sealed into a protective polypropylene housing. The dramatically sloped "run-off" design diverts acids and other process liquids away from the flange. Safety features include an overtemperature thermocouple, failsafe power cut-off, with visible and audible alarms, liquid level sensor tube, and an ultra-reliable snap disk that cuts power if the temperature exceeds unsafe levels.

C Series Stripper Baths are available in many sizes and configurations for operation with most wafer sizes. Options include a magnetic stirrer, gravity drain, aspirator (dilution) valve system, and quartz bubbler. Call to discuss your application with a Terra process engineer.

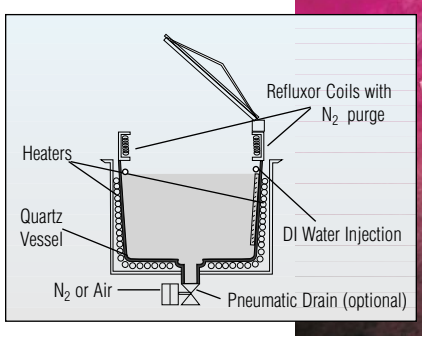
Ideal for wafer processing in such volatile and fuming solutions as J100, A30, R10, HCl - HNO_3 Burmar, Aqua Regia, and organic strippers

Specifications

Materials:	Internally flame-polished, virgin fused quartz, boron-free (process vessel); Flame-retardant polypropylene (housing)
Electrical:	208 - 240 VAC, single phase, 50/60Hz, 7 - 20 amps (depending on size)
Process Thermocouple:	J-type Teflon® encapsulated
Insulation:	High-density alumina silica fiber rated to 1260°C
Note:	Microprocessor controller is required for operation. See sidebar for capabilities listing.

Nb Series Silicon Nitride Etch Bath

- **Seamless-molded, flame-polished 99.995% pure quartz vessel—ideal for ultra-pure chemistries**
- **PVDF refluxor condenses chemical vapors before they can escape from the bath, making it perfect for low flash-point chemicals or high-temperature operations**
- **Remote metering and DI water injection system compensates for boil-off to maintain consistent chemistry temperature and acid/water ratio**
- **Includes etch-foil resistance heater and vapor thermocouple (for chemical boiling control)**
- **360° nitrogen-purged housing seal reduces acid penetration of heating element for extended service**



The Nb Series Silicon Nitride Etch Bath is ideal for etching silicon nitride layers in a heated process solution of phosphoric acid and DI water.

It heats the acid/water process solution to the process set point. Rather than injecting water once the set point is reached, it monitors the temperatures both of the solution and the vapor. As the process solution heats beyond its set point, DI water is injected into the process solution to replace water lost through vaporization. If either setting is not reached, as in the case of an open cover, an interlock prevents water injection.

Engineered to provide unparalleled process control, safety, and consistency in Silicon Nitride etching

This dual protection guards against bumping: layering the DI water on top of the acid. You benefit from excellent bath-to-batch consistency and a high degree of operator safety.

Nb Series Silicon Nitride/Oxide Etch Baths are available in many sizes and configurations for operation with most wafer sizes. Call to discuss your application with a Terra process engineer.

WET PROCESSING EQUIPMENT

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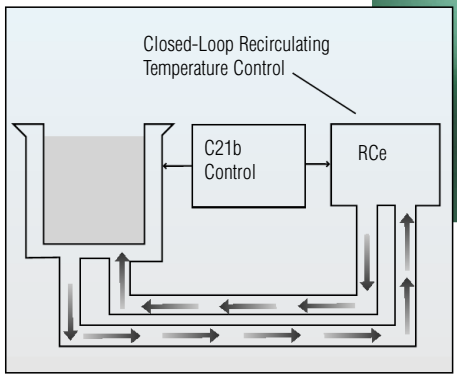
A Series Constant Temperature Bath

- **Precisely controlled low- or high-temperature processing (when used with RCe recirculating module)**
- **Natural polypropylene tank is ideal for etching, stripping, and developing with HF, KOH, CrO, and other chemistries (PVDF also available)**
- **Also functions as a stand-alone ambient-temperature bath**
- **Includes pneumatic drain, Teflon® magnetic stirrer, and clear PVC safety cover**



Operated in tandem with the RCe Circulator/Controller (see below), the A Series Constant Temperature Bath provides precise high- and low-temperature processing.

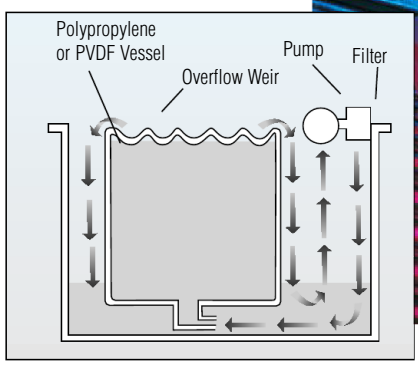
Standard models are made of natural polypropylene (bath and immersion coil) and operate in the 10 - 60°C range. PVDF models are also available for operation in the 10 - 140°C range. The integral magnetic stirrer enhances temperature control. A clear PVC safety cover reduces evaporation and enhances safety.

Temperature stability of ± 0.5°C when operated together with the RCe Recirculation Heater/Chiller and C21b Controller.

A Series Constant Temperature Baths are available in many sizes and configurations for operation with most wafer sizes. Call to discuss your application with a Terra process engineer.

F Series Subambient Filtered Etch Bath

- **Continuously filters process chemistry to increase purity and maximize product yield**
- **Reduced acid consumption generally pays for bath in three months**
- **Select semiconductor-grade natural polypropylene or PVDF seamless process tank**
- **360° serrated overflow weir enhances particulate removal**
- **Pump/filter assembly is easily removed for quick filter change**
- **Uniform flow return system ensures a consistent laminar flow across every wafer at every location—no eddies or dead spots**



Ensures purity of NH_4, HF, BOE, CH_3, COOH, and HNO_3 positive resist developer

This filtered bath is ideal for oxide etching and other processes using HF acid. Its recirculating system continuously filters the process chemistry to ensure purity and reduce consumption. Depending on 10" filter cartridge selected, these systems provide up to 0.2µ absolute filtration.

The process bath is made of virgin, natural polypropylene or PVDF. The bath includes a seal-less, nitrogen-purged process pump. A 360° weir minimizes particle entrapment. Use of the RCe Recirculating Module provides excellent temperature control between 18 and 40°C (see below).

F Series Constant Temperature Baths are available in many sizes and configurations for operation with most wafer sizes. Call to discuss your application with a Terra process engineer.

RCe Recirculating Heater/Chiller

Controls recirculating chilling and heating in A and F baths. Includes low-watt density heater for a long, reliable life and improved MTBF. Operates on CFC-free HCFC-22 coolant. Low-volume de-aerating reservoir lowers the cost of ownership through shorter fill-up and air-purge times. Available in several heating and cooling capacities, for either 120-2208VAC or 230VAC operation. Temperature range: 18 - 40°C. Call Terra for complete ordering information.

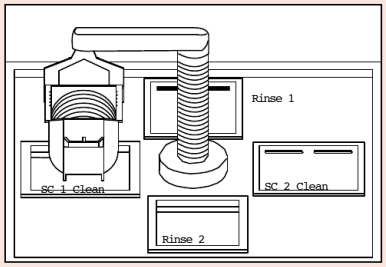
WET PROCESSING EQUIPMENT

Robotic Transfer—
Precise, Consistent Processing!

Terra manufactures Semiautomatic Wet Processing Stations with either rotary or linear transfer mechanisms. Once wafer cassettes are loaded onto the end-effector, these systems perform transfer and agitation functions safety, cleanly, and consistently—for process results you can count on!

Rotary Transfer Mechanism
Provides high-precision 360° motion. An 8-recipe keypad allows complete control over time, temperature, rinsing and agitation cycles. All deck-top components are sealed in a polypropylene housing that protects the robot mechanism against corrosive chemistries and ensures contamination-free operation. (Stainless steel models are also available for use with solvents.) This system is available with a wide range of end-effectors (gripper systems), in PVDF, stainless steel, quartz, Teflon, and polypropylene, to accommodate virtually all wafer cassette sizes. Choose among several control options, including a PLC and Graphical User Interface (GUI).

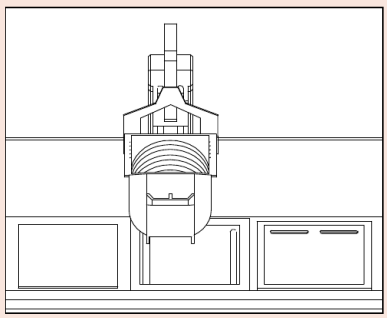
Let Terra engineer a system to your specs!



Pre-Diffusion Clean with Rotary Transfer

Linear Transport Mechanism
Available for acid or solvent processing, with labyrinth seals, this robotic system provides noncontaminating, two-axis transfer motion along the front or rear edge of Terra's Wet Processing Cabinets. Active and passive grippers are available, in a variety of materials, to fit most wafer cassettes (4", 5", 6", and 8"), as well as flat panel displays to 42".

Call Terra for information on a linear system for your application!



Oxide Etch with Linear Transfer

Polypropylene Work Station

- **All polypropylene construction for superb chemical resistance**
- **Ideal for use near wet processing operations**

This all-polypropylene work bench resists chemical spills, making it the perfect staging area for wet cleaning and processing operations. Reinforced design holds loads up to 200 pounds. Four sliding drawers hold handling tools, wipers, and other small items. Dimensions: 60"W x 30"D x 30"H (floor to top).

Cat. #
7018-41

Fire Detection System

- **Factory Mutual approved specifically for semiconductor wet bench electro-optical fire detection**
- **Multi-spectral IR flame detector detects all types of fires, even through gases and vapors**
- **Unique two-stage fire detection response issues warning alert and signals for suppression release and wet bench shut-down (suppression system optional)**
- **Acid-resistant polypropylene housing is ideal for installation in wet processing benches**

This multi-spectral electro-optical fire detector system senses all hydrocarbon and non-hydrocarbon fires, even through the gases and vapors found in chemical wet benches.

It uses multi-spectral Wide Band IR™ (1.2 - 3.5 micron bandwidth), Near Band IR™ (.7 to 1.1 micron bandwidth), and Visible Band (0.4 - 3.5 micron bandwidth) to see all fire types. The Wide Band IR allows the detector to see through acetone, smoke, chemical gasses and vapors.

Unique Two-Stage Fire Detection Response

The ALERT First Stage response initiates audible and visible signals, notifying the operator of an existing fire of 4kW or more. If the fire does not self-extinguish, the Second Stage ALARM activates and signals for immediate suppression release once the fire exceeds a threshold of 13 kW (the equivalent of an 8"-diameter polypropylene pool fire).

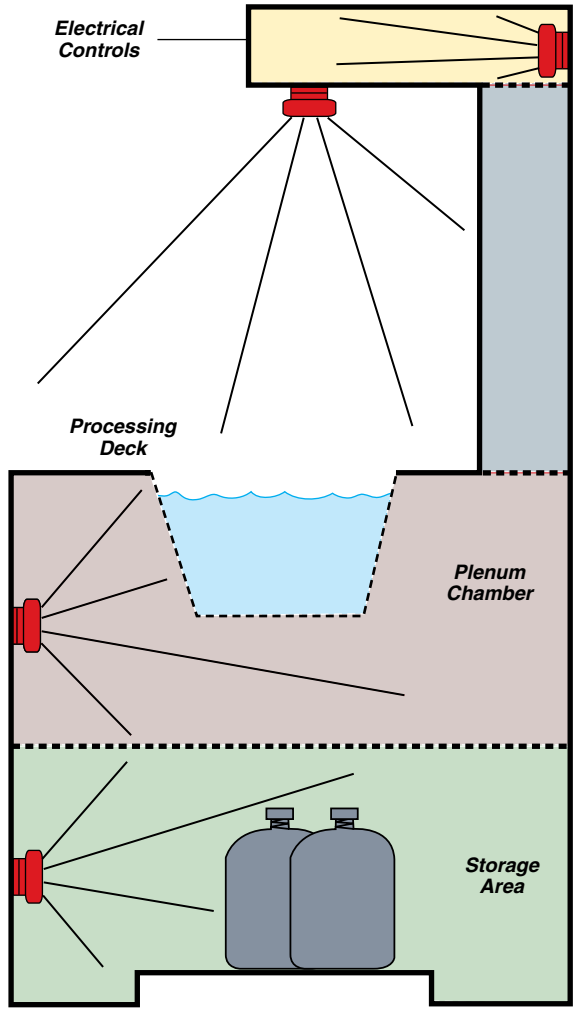
Each fire detector has an exceptionally wide, 120° field of view to provide optimal coverage of the fire-threat area. Detectors should be installed in adequate numbers and positions to ensure that any possible fire is in the field of view of at least one fire detector, unobstructed by plastic partitions.

Note: Fire suppression equipment must be ordered separately. Call to discuss your application. See application illustration for suggested configuration. Part numbers below include installation in specified Terra wet processing station.

	Cat. #
PLC Controller	**6704-25**
Multi-Spectral IR Sensor	**6704-26**

Several typically required.

See page 575 for more information.



Typical Detector Configuration: sensors mounted inside the control case, above the station deck, inside the plenum, and inside the storage area.

Remote Control Hot Plates

- **Ideal for wet processing applications**
- **Ceramic-coated steel top plate combines chemical resistance and physical strength**
- **Installed in recessed well so that top is flush with work desk**

These units feature a remote control unit, housed in a baked-on enamel steel case, that can be positioned up to five feet from the hot plate. They are ideal for deck-mounting in a Terra wet processing station.

The line cord is protected by a chemically resistant cover. The case is constructed of stainless steel for corrosion resistance. The top plate accommodates a ¼"-diameter dial or stem thermometer for easy temperature monitoring.

Remote Control Hot Plates

Heating Surface (W x D)	Overall Dimensions (W x D x H)	Electrical (50/60 Hz)	Top Plate Temp. Range	Shipping Weight	Cat. #
12" x 12"	12" x 12" x 6.13"	120VAC, 13.3A, 1600W	300 - 700°F	24.5 lbs.	**4000-99**
12" x 12"	12" x 12" x 6.13"	240VAC, 6.7A, 1600W	300 - 700°F	24.5 lbs.	**4001-01**
24" x 12"	24" x 12" x 6.13"	240VAC, 13.3A, 3200W	300 - 700°F	47.5 lbs.	**4001-02**

Solvent Spray Booth

CE

- **Ideal system for corrosive or flammable liquid applications**
- **Fabricated of stainless steel/safety glass for durability and safety**
- **Explosion-proof illuminator meets a broad range of locations as defined by the NEC**
- **Provides solvent cleaning/nitrogen drying through dual-service lines and convenient foot pedal**
- **Features split-sink for drainage and safe disposal of solvents**
- **Includes exhaust system for safe fume venting**
- **Safely stores chemicals in an enclosed cabinet environment**
- **Custom modifications available to meet your specific requirements**

Terra Universal's Solvent Spray Booth is an ideal system for cleaning operations in a variety of industries.

Safe, Convenient Operation

This booth's stainless steel construction resists a wide range of solvents, including lapping oils, alcohol, naphtha and toluene. A counterbalanced safety glass shield offers convenient access to the work area, and can be fixed in any desired position while at the same time protecting the operator's face.

The unit features a split-sink construction providing two separate work areas, one for solvent rinsing and the other for nitrogen or air drying. Dual stainless steel service lines allow connection to a liquid solvent and nitrogen/air source, which are dispensed by means of dual pneumatic foot pedals through nozzles located above the sink.

The split-sink located beneath the perforated work surface allows for drainage and safe disposal of solvents. This unit also includes an enclosed cabinet with 2.5-gallon polypropylene reservoirs providing safe and secure storage of chemicals.

Additional service lines can be installed to allow use of additional solvents. Plumbing is also available in other materials, including Teflon® and polypropylene allowing for safe operations with other chemicals.

The standard 100W incandescent hazardous-environment illuminator meets a broad range of locations as defined by the National Electrical Code (NEC): Class 1, Div. 1 and 2 (Groups C and D); Class II, Div. 1 and 2 (groups E and F); and Class III, Div. 1 and 2 (all groups). It is thus suitable for locations in which ignitable mixtures exist under normal conditions.

An additional feature of this system is a 10"-diameter duct on the rear of the panel, allowing for the safe venting of fumes from the work area.

Specifications

Construction: 304 stainless steel with safety glass side and front panels (other materials including polypropylene, available on a custom basis)

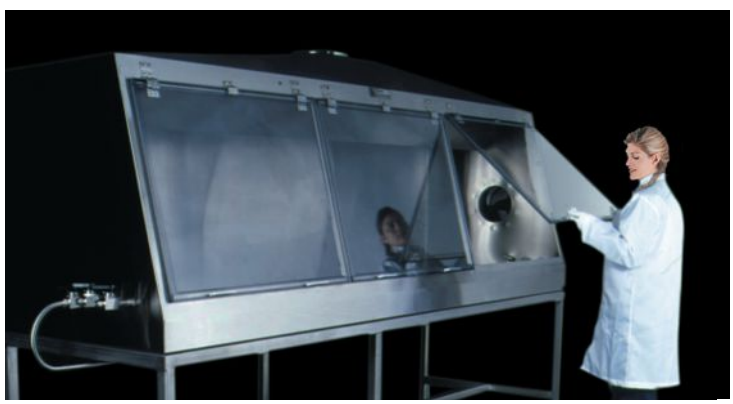
Dimensions:		
Overall:	48"W x 30"D x 71"H (custom sizes available)	
Work Area:	48"W x 30"D x 40"H	
Weight:	160 lbs.	
Utilities:		
Gas Line:	Quick connect/disconnect fitting for ¼" gas line	
Solvent Line:	¼" ID stainless steel	
		Cat. #
110VAC/60Hz		**1530-41**
220VAC/50Hz		**1530-42**

Precision Cleaning Station

Manufactured of stainless steel, this fully enclosed cleaning station features three swing-up front access windows, made of static-dissipative PVC, which allow easy loading and unloading of wafer spin rinsers, solvent washers, and other cleaning equipment.

Waste fluids drain through a perforated work surface into a reservoir for easy disposal. This station also includes a side fresh air intake flange and a top exhaust flange. Overall dimensions: 120"W x 36"D x 71"H. Custom sizes and configurations are available; just let us know your requirements!

Cat. #
7018-42



Chemical Storage and Transport

Enhanced Safety and Convenience

A. Chemical Transport Carts

These durable carts are fabricated of chemical-resistant polypropylene and feature secure holding bins for chemical bottles up to 7" in diameter. Drain openings collect spills into a valved containment area for safe, easy disposal. Removable inserts can be replaced with supports of various sizes to accommodate your chemical bottles. See page 542.

Cat. #
3401-01

B. "Dead Man" Cart

Terra Universal's "Dead Man" Cart features polypropylene construction and spill containment area, along with the "dead man" braking system to prevent the cart from rolling when not attended. The cart also has a protective stainless steel covering on the top and sides. Overall dimensions: 28"W x 24"D x 47"H. See page 540.

Cat. #
6017-73

C. Flammable Materials Cart

Designed for transporting flammable materials in tanks up to 5 gallons. Includes 5-gallon spill containment area, locking safety casters and fire extinguisher. Dimensions: 36"L x 24"W x 36"H. See page 540.

Cat. #
7018-40

D/E. Chemical Safety Cabinets

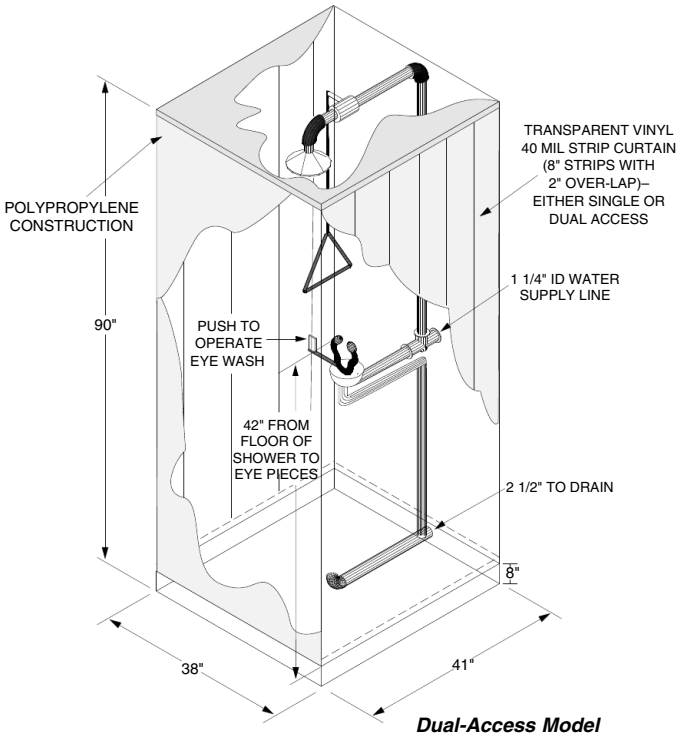
Made entirely of electropolished stainless steel, Terra's Chemical Safety Cabinets comply with OSHA/NFPA fire safety regulations. Dual locking doors provide security, and heavy-duty locking casters facilitate transport. Self-closing doors open 180° for safest possible access. See page 541

	Cat. #
D. Bottle Safety Stocker	**9600-23**
E. Chemical Safety Stocker	**6012-70**

Enclosed Safety Shower

- **Provides full-body shower and eye wash while protecting lab against water and chemical splashes**
- **Polypropylene enclosure resists most lab acids and corrosives**
- **Easy-parting transparent vinyl curtain allows fast, convenient access while shielding the external environment**
- **Immediate-response operation handles are easy to activate**
- **Pass-Through design available to accommodate multiple facilities**

Terra's safety shower combines easy, reliable operation with a fully enclosed design that enhances safety both inside and outside the shower area.



Dual-Access Model (with opposing strip curtains)

Specifications

Dimensions:	38"W x 41"D x 90"H
Construction:	
Outer Shell:	Welded 1/2" polypropylene shell with 40 mil transparent vinyl strip curtain on front (8"-wide strips with 2" overlap)
Nozzles:	10"-diameter ABS plastic overhead nozzle (5 3/4"-diameter flow pattern) with stainless steel pull handle; zinc-plated eye rinsers (8" center to center in 12"-diameter bowl) mounted 42" off floor, with zinc-plated push handle
Plumbing:	1 1/4" polypropylene pipe (supply line); 2 1/2" polypropylene drain line
Installation:	Requires 1 1/4" ID (male) water feed line connection and 2 1/2" ID (male) drain line connection

The polypropylene shell resists most laboratory acids and corrosives. By shielding the shower on three sides, it minimizes the chance of the water spray—or of harmful chemical splashes—affecting parts or personnel outside the shower. The vinyl strip curtain on the front is easily parted for quick entry into the enclosure. This design eliminates the tricky task of fumbling with a door latch in an emergency situation.

The pass-through design, which includes parting curtains on opposing sides, can be installed in a wall or hallway connecting two labs to allow fast, easy access from either facility.

All eye rinser hardware is zinc-plated. The standard overhead nozzle height is 78" off the shower floor; the eye rinsers are positioned 42" off the floor. The shower comes complete with PVC plumbing that connects to your in-house water supply by means of a 1 1/4" ID pipe fitting. The sloping bottom feeds into a 2 1/2" drain line.

	Single Access	Dual Access (Pass-Through)
	Cat. #	Cat. #
Safety Shower	**1530-50**	**1530-51**

Safety Equipment

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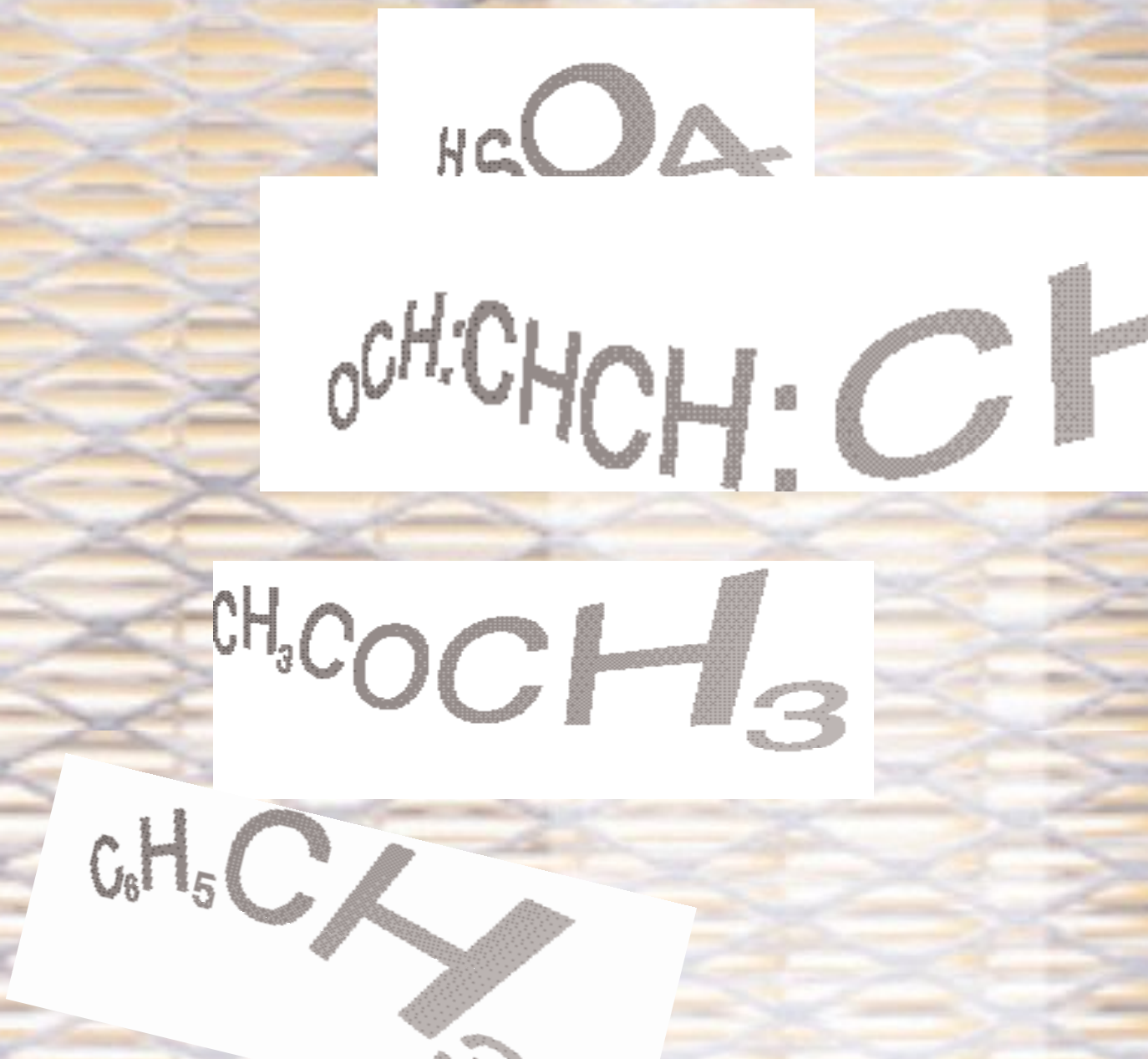
Chemical Safety Carts and Cabinets see page 566



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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Safety-Can Storage Cabinets

- **18-gauge double-wall insulating barriers**
- **Spill-catcher cabinet shelves**
- **Dual vents, with built-in flash arresters**
- **Shelves adjustable in 2¼-inch increments**
- **Manual doors, or self-closing doors with fusible link that closes at 160°F**
- **Centralized storage for flammable and corrosive liquids**
- **Conforms to safety requirements for diverse applications**

These safety storage cabinets can centralize and organize storage of flammable and corrosive liquids. With 20 models available, each featuring shelves adjustable in 2¼-inch increments, storage space can be maximized for any application.

All models provide thermal shielding through an 18-gauge, double-wall insulating barrier. All shelves, which are ribbed and can support up to 350 lbs., have built-in troughs to help contain spills. All wells are leak-proof and recessed two inches deep. Dual vents feature built-in flash arresters, and can pipe away hazardous vapors. The self-closing door option is actuated by a fusible link which automatically closes doors if temperature reaches 160°F.

No. 2820-08

No. 2800-00

Capacity (gal.)	Ext. Dimensions (in.)			Adj. Shelves	Approval Listing	Door Type	Shipping Weight	Cat#
	H	W	D					
30	44	43	18	1	FM, UL	2 door, manual	237	**2800-00**
30	44	43	18	1	FM	2 door, self closing	242	**2820-00**
30	44	43	18	1		4 door, manual	241	**2820-01**
45	65	43	18	2	FM, UL	2 door, manual	322	**2820-02**
45	65	43	18	2	FM	2 door, self closing	338	**2820-03**
45	65	43	18	2		4 door, manual	341	**2820-04**
60	65	34	34	2	FM	2 door, manual	406	**2820-05**
60	65	34	34	2	FM	2 door, self closing	416	**2820-06**
30	44	43	18	1	FM	sliding door, self closing	246	**2820-07**
45	65	43	18	2	FM	sliding door, self closing	237	**2820-08**

Undercounter Cabinets

These 22-gallon cabinets mount flush with other cabinetry, and provide vent openings in their back walls.

Capacity (gal.)	Ext. Dim. (in.)			Adjustable Shelves	Approval Listing	Door Type	Shipping Weight	Cat#
	H	W	D					
22	35	35	22	1	FM	2 Door, manual	204	**2820-13**
22	35	35	22	1	FM	2 Door, self closing	212	**2820-14**

Wall Mount/Bench Cabinets

Ideal for storing small containers, these cabinets have five adjustable shelves, and can store up to 20 gallons each.

Capacity (gal.)	Ext. Dim. (in.)			Adjustable Shelves	Approval Listing	Door Type	Shipping Weight	Cat#
	H	W	D					
20	44	43	12	5	N/A	2 Door, manual	221	**2820-15**
17	24	43	18	1	N/A	2 Door, manual	181	**2820-16**

Corrosives Storage

These four models of cabinet feature steel with a two-part enamel coating which has been tested successfully with widely used acids, caustics, and alkalines, such as hydrochloric acid 37%, sulfuric acid 33%, and sodium hydroxide. This surface will not allow absorption that could cause subsequent problems. The 22-gallon model is an Under-The-Counter (U-C) Cabinet, with polypropylene-lined bottom and top, and a ¾-inch tray top, which can completely contain a 5-pint spill. The other three models, which are floor-mounted, feature corrosive-resistant polyethylene trays, to contain spills, on the bottom and on the shelves.

Models shown: 2820-09; Front 2820-10; Rear

Capacity (gal.)	Ext. Dimensions (in.) H	W	D	Adjustable Shelves	Approval Listing	Door Type	Shipping Weight	Cat#
30	44	43	18	1	N/A	2 door, manual, steel	256	**2820-09**
45	65	43	18	2	N/A	2 door, manual, steel	328	**2820-10**
45	65	43	18	2	N/A	2 door, self closing, steel	344	**2820-11**
22(U-C)	35	35	22	1	N/A	2 door, manual, steel	210	**2820-12**

Polyethylene Acid Storage Cabinets

- **One-piece molded polyethylene body provides the maximum protection against chemicals and leaks**
- **Undercounter and countertop models available**
- **Both models include easy-clean slide-out spill trays**
- **Accepts padlock for added security**

These one-piece Polyethylene Acid Storage Cabinets provide the ideal storage solution for wet processing acids and other chemistries.

Undercounter Cabinet No. 2820-32

Undercounter Cabinet

This cabinet features two internal compartments, each with an adjustable poly shelf that helps organize and segregate incompatible liquids. Separate pull-out sumps underneath the cabinet capture incidental leaks. The cabinet top doubles as a handy work space. Two vent holes are included on the backside. The cabinet secures to the wall for stability and accepts a padlock. Capacity: (30) 1-liter bottles or a variety of containers.

Countertop Cabinet

The countertop model includes an easy-clean internal polyethylene spill tray to contain incidental leaks. A separate polyethylene tray slides out from under the cabinet and can be used as a handy work tray. The door can be hinged from either side for best countertop surface use. Capacity: (2) 4-liter bottles of acids or bases.

Countertop Cabinet No. 2820-31

Style	Overall Dimensions (W" x D" x H")	Door Type	Capacity	Adj. Shelves	Shipping Weight	Cat#
Countertop	14-¼ x 16-¼ x 19-½	Single	(2) 4-liter bottles	-	30 lbs. (14 kg)	**2820-31**
Undercounter	36 x 22-½ x 36	Double	(30) 1-liter bottles	2	120 lbs. (59 kg)	**2820-32**

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Toxic Gas Detector System

- **Complete, easy-to-use sampling and analysis system**
- **Detects and measures hazardous gases and vapors**
- **Certified by the Safety Equipment Institute (SEI)**
- **Ideal for monitoring performance of Terra Exhaust Purification Filters (see page 424)**
- **The most cost effective solution to air sampling and analysis**

This Toxic Gas Detector System is an ideal, easy-to-use method for day-to-day gas checking. It allows effective monitoring of exhaust purification filter efficiency. It also provides a valuable aid to QC in the lab, plant or office and spot testing for a wide variety of hazardous gases and vapors.

This low-cost, portable system consists of two components: detector tubes detect specific vapors; and a precision sampling pump draws an air sample through the detector tube. One sample is all that is needed for most analyses, compared to other devices that require that you keep track of multiple strokes and introduce the possibility of operator error.

More than 200 detector tubes are available to measure a wide variety of hazardous gases and vapors. Each is formulated with high purity reagents that absorb and react with the gas or vapor being measured. The reaction causes a colorimetric stain which corresponds in length to the concentration of the gas or vapor being measured. Four types of tubes provide the needed flexibility for different gases and sampling conditions.

1. Direct Reading Scale. In this type, the colorimetric stain varies in length proportional to the amount of gas or vapor being measured. The concentration is read directly off a scale etched on each tube.

2. Chart Comparison Tubes. This type works similar to the direct reading type above. A sample is taken and the stain length is compared to a printed concentration chart enclosed with each box of tubes.

3. Color Comparison Tubes. In this type, the intensity of color change, rather than the length of stain, is compared to a standard color chart.

4. Multi-Part Tube Sets. The multi-part tube sets use a pre-treat or primary reaction tube in addition to the detector tube. The "front-end" tube scrubs the sample air of either moisture or potentially interfering gases, which might otherwise cause erroneous results.

Operation is Simple

Only three easy steps are needed to operate the detector: first, you break off the tips of a fresh detector tube; second, you insert the tube, with arrow pointing toward the pump, into the pump's inlet; third, you pull out the pump handle to automatically lock, and the pump begins to draw a 100cc sample through the detector tube. A proprietary Sample Vue indicator shows when sampling is completed. More detailed information is on an instruction card enclosed with each pump and box of detector tubes. The precision sampling pump is certified by the Safety Equipment Institute (SEI).

Order pump kits and parts from the table at right and detector tubes from the table on the following pages.

Ordering Information

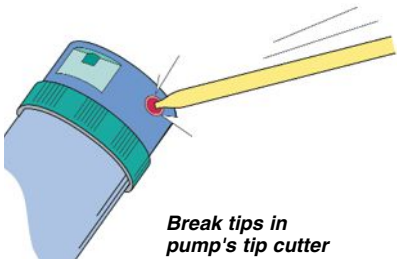
	Cat. #
Toxic Gas Detector Kit Includes pump, maintenance items and carrying case. Tubes not included.	**9002-00**
General Sampling Detector Kit Includes the Toxic Gas Detector Kit above plus a 10 meter extension hose and one box of tubes each for sampling Ammonia (50-900 PPM), Benzene (5-200 PPM), Carbon Dioxide (.05-1.0%), Carbon Monoxide (10-250 PPM), Hydrogen Sulfide (100-2000 PPM), Nitrogen Dioxide (0.5-30 PPM) and Sulfur Dioxide (20-300 PPM).	**9002-01**
Replacement Rubber Inlet Flange and Ring	**9002-02**
Replacement Lubricant	**9002-03**
5 Meter Extension Hose (with tube holder)	**9002-04**
10 Meter Extension Hose (with tube holder)	**9002-05**
Air Flow Indicator Kit (with aspirator bulb, case and one box of Air Flow Indicator Tubes)	**9002-06**

Detector Tube Ordering Information

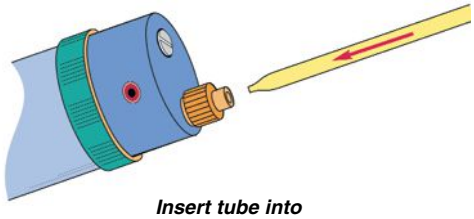
See chart on next two pages.

Notes:

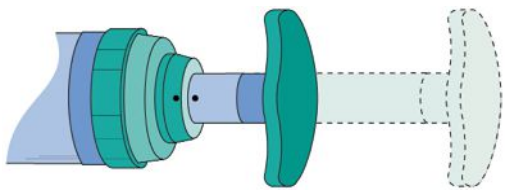
(1) Tubes are packed ten per box unless otherwise indicated.
(2) Measuring range is in parts per million unless otherwise indicated.
(3) Each tube tests for both NO (10-300 ppm) and NO_2 (1-40 ppm). Cat. No. 9003-88 is for air sampling, 9003-89 is for hot flue gases (with pre-treat tubes to dehumidify). Each box has tubes for 5 tests.



Break tips in pump's tip cutter



Insert tube into pump's sample inlet



Pull out the pump handle to draw a 100cc sample

Tube Ordering Information

Substance to be Measured	Measuring Range (PPM)	(See Notes on page 572) Cat. #
Acetaldehyde†	0.004-1%	9002-07
Acetaldehyde†	5-140	9002-08
Acetic Acid	1-50	9002-09
Acetone	0.1-5.0%	9002-10
Acetone†	0.01-4.0%	9002-11
Acetone	100-5000	9002-12
Acetylene	50-1000	9002-13
Acrolein	0.005-1.8%	9002-14
Acrylonitrile	0.1-3.5%	9002-15
Acrylonitrile	10-500	9002-16
Acrylonitrile*†	1-120	9002-17
Acrylonitrile	0.25-20	9002-18
Ammonia	0.5-10.0%	9002-20
Ammonia	50-900	9002-21
Ammonia	5-260	9002-22
Ammonia	0.2-20	9002-23
Ammonia	0.5-30%	9002-24
Ammonia	0.1-1.0%	9002-25
Aniline	1-30	9002-26
Arsine	5-160	9002-27
Benzene – in presence of gasoline and/or other aromatic hydrocarbons*	5-200	9002-29
Benzene	1-100	9002-30
Bromine	1-20	9002-31
Butadiene	0.03-2.6%	9002-32
Butadiene	30-600	9002-33
Butadiene	2.5-100	9002-34
n-Butane	0.05-0.6%	9002-35
2-Butanol	4-300	9002-37
Butyl acetate	15-400	9002-39
Butyl acrylate	5-60	9002-40
Carbon dioxide	100-7000	9002-42
Carbon dioxide	0.1-2.6%	9002-43
Carbon dioxide	0.05-1.0%	9002-45
Carbon dioxide	1.0-20.0%	9002-47
Carbon dioxide	5-50%	9002-48
Carbon disulfide*†	30-500	9002-49
Carbon monoxide	10-1000	9002-51
Carbon monoxide	10-250	9002-52
Carbon monoxide	0.1-2.0%	9002-53
Carbon monoxide	0.1-20%	9002-54
Carbon monoxide	10-1000	9002-55
Carbon monoxide – in presence of ethylene and nitrogen oxides	10-100	9002-56
Chloride Ion	10-2000	9002-61
Chloride Ion	5-200	9002-62
Chlorine	1-40	9002-63
Chlorine	0.1-10	9002-64
Chlorine	0.05-2	9002-65
Free residual chlorine	0.4-5	9002-66
Chlorine dioxide	1-20	9002-67
Chlorobenzene	5-140	9002-68
Chloroform*†	70-500	9002-69
Chloropicrin*†	0.1-15	9002-70
Chloroprene	0.5-32	9002-71
Copper Ion	1-100	9002-72
Cyanide Ion	.2-5	9002-74
Cyclohexane	0.01-0.6%	9002-75
Cyclohexanol	5-500	9002-76
Cyclohexanone	2-100	9002-77
o-Dichlorobenzene	5-100	9002-79
p-Dichlorobenzene	10-150	9002-80
1,1 Dichloroethane*†	10-160	9002-81
1,2 Dichloroethane*†	5-50	9002-82
1,2 Dichloroethylene*†	5-400	9002-84
Dichloromethane*†	30-1000	9002-85
1,3 Dichloropropane*†	10-500	9002-86
Diethyl ether	0.04-1.4%	9002-88
Diethyl ether	20-400	9002-89
Dimethyl ether	0.01-1.2%	9002-90
N,N-Dimethylacetamide	5-70	9002-91
N,N-Dimethyl formamid	1-30	9002-92
Epichlorohydrine*	5-50	9002-95
Ethyl acetate	0.1-5.0%	9002-98
Ethyl benzene	10-500	9003-02
Ethyl cellosolve	5-500	9003-03
Ethyl cellosolve acetate	5-150	9003-04
Ethylene	0.1-100	9003-06
Ethylene	20-1200	9003-07
Ethylene dibromide*†	1-50	9003-08
Ethylene glycol*	20-250 mg/m³	9003-09
Ethylene glycol	3-40 mg/m³	9003-10
Ethylene oxide	0.01-1.8% 1-4%	9003-11
Ethylene oxide	5-100	9003-12
Ethylene oxide	1-15	9003-13
Formaldehyde*	1-35	9003-14
Formaldehyde*†	20-1500	9003-15
Gasoline	0.05-0.6%	9003-19
General hydrocarbons	50-1400	9003-20
Hexane	0.05-0.6%	9003-22
n-Hexane*	50-1400	9003-23
Hydrazine	0.1-10	9003-24
Hydrogen*	0.05-0.8%	9003-25
Hydrogen chloride	20-1200	9003-26
Hydrogen chloride	0.4-40	9003-27
Hydrogen cyanide	0.01-3.0%	9003-28
Hydrogen cyanide†	0.5-100	9003-29
Hydrogen fluoride	1-30	9003-30
Hydrogen selenide	1-600	9003-31
Hydrogen sulfide	100-2000	9003-32
Hydrogen sulfide	1-60	9003-33
Hydrogen sulfide	0.2-6.0	9003-34
Hydrogen sulfide	0.05-1.2%	9003-35
Hydrogen sulfide	.75-150	9003-36
Hydrogen sulfide – in presence of sulfur dioxide	0.005-0.16%	9003-37
Hydrogen sulfide	0.1-4.0%	9003-39
Hydrogen sulfide	2-20%	9003-40
Hydrogen sulfide*	2.5-40%	9003-41
Inorganic gases, qualitative	—	9003-42
Iron ion	50-400	9003-43
Isoamyl acetate	10-400	9003-44
Isobutyl acetate	10-400	9003-47
Isobutyl alcohol	5-100	9003-49
Isopentyl alcohol	5-100	9003-50
Isopropyl acetate	20-1000	9003-52
Isopropyl alcohol	20-1200	9003-54
Mercaptans	0.5-10	9003-56
Mercury vapor	0.1-10 mg/m³	9003-57
Methyl alcohol	0.05-6.0%	9003-61
Methyl alcohol	20-1000	9003-62
Methyl amine	1-20	9003-63
Methyl bromide*†	10-500	9003-64
Methyl bromide*†	2.5-80	9003-65
Methyl bromide*	0.5-10	9003-66
Methyl chloroform*†	15-400	9003-68
Methyl cyclohexanol	5-200	9003-69
Methyl cyclohexanone	2-100	9003-70
Methyl ethyl ketone	0.01-1.4%	9003-72
Methyl ethyl ketone	20-1500	9003-73
Methyl iodide*†	5-40	9003-74
Methyl isobutyl ketone	0.01-0.6%	9003-75
Methyl isobutyl ketone	5-300	9003-76
Methyl mercaptan	5-140	9003-78
Methyl mercaptan	50-1000	9003-79
Methyl methacrylate	10-160	9003-80
Methyl styrene	10-500	9003-81
Monoethanol amine	0.5-50	9003-82
Nickel carbonyl	20-700	9003-84
Nitric acid vapor*	1-20	9003-85
Nitrogen dioxide	20-1000	9003-86
Nitrogen dioxide	0.5-30	9003-87
Nitrogen oxide and dioxide (see note 3)	NO 10-300	9003-88
Nitrogen oxide and dioxide (see note 3)	NO 1-40	9003-89
Nitrogen oxides*	20-250	9003-90
Nitrogen oxides	100-2500	9003-91
Nitrogen oxides†	0.5-30	9003-92
Organic compounds	5-2500	9003-93
Organic gases, qualitative	—	9003-94
Oxygen (flame req'd)*	2-24%	9003-95
Oxygen (no flame)*	2-24%	9003-96
Oxygen (non-heating)*	1.5-24%	9003-97
Ozone	0.05-3.0	9003-98
Ozone	50-1000	9003-99
Ozone	2.5-100	9004-00
Pentyl acetate	10-100	9004-02
Perchloroethylene*	5-300	9004-03
Phenol	0.5-25	9004-04
Phosgene†	0.1-20	9004-05
Phosphine	0.05-2.0	9004-06
Phosphine	20-700	9004-07

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Tube Ordering Information (cont.)

Substance to be Measured	Measuring Range (PPM)	(See Notes on page 572) Cat. #	Substance to be Measured	Measuring Range (PPM)	(See Notes on page 572) Cat. #	Substance to be Measured	Measuring Range (PPM)	(See Notes on page 572) Cat. #
Phosphine	0.25-10	**9004-08**	Sulfide ion	0.5-10	**9004-21**	Trichloroethylene	1-16	**9004-35**
Phosphine in acetylene	20-800	**9004-09**	Sulfur dioxide	0.1-3%	**9004-22**	Trichloroethylene†	5-300	**9004-36**
Phosphine in acetylene	5-90	**9004-10**	Sulfur dioxide	0.02-0.3%	**9004-23**	Triethylamine	1-20	**9004-37**
Propane	0.02-0.5%	**9004-11**	Sulfur dioxide – in flue gas	0.02-0.3%	**9004-24**	Trimethylamine	1-20	**9004-38**
Propylene	50-1000	**9004-14**	Sulfur dioxide	20-300	**9004-25**	Vinyl acetate	5-120	**9004-40**
Propylene oxide	0.05-5.0%	**9004-15**	Sulfur dioxide	1-60	**9004-26**	Vinyl chloride*	0.05-1%	**9004-41**
Salinity	0.01-0.8%	**9004-16**	Sulfur dioxide	0.25-10	**9004-27**	Vinyl chloride*†	5-500	**9004-42**
Silane	0.5-50	**9004-17**	Tetrachloroethylene†	1-10	**9004-29**	Vinyl chloride*	0.1-12	**9004-43**
Smoke tube (air flow indicator)	—	**9004-18**	Tetrahydrofuran	20-500	**9004-31**	Water vapor	1.7-33.8 mg/l	**9004-44**
Styrene	2.5-300	**9004-19**	Toluene*	10-500	**9004-32**	Water vapor	0.1-2.0 mg/l	**9004-45**
Sulfide ion	2-1000	**9004-20**	Toluene	2-100	**9004-33**			

**** Packed five tubes per box, or five tests per box for multi-part tube sets.***

† Tubes require refrigeration at 2°C to 10°C (35.6°F to 50°F) for storage.

Oxygen Deficiency Monitors

- **Ideal for use around nitrogen-purged desiccators and other process gases that could deplete oxygen levels**
- **Clearly audible alarm automatically warns of low oxygen level**
- **Large, easy-to-read LCD provides digital readout of oxygen concentration**
- **Compact, lightweight, easily portable unit can be worn on belt loop or shoulder strap**
- **Additional features include maintenance-free sensor, automatic monitoring of rechargeable batteries, intrinsically safe design**

These Oxygen Deficiency Monitors are designed to protect against oxygen deprivation. A large LCD digital readout clearly displays oxygen concentration at all times. A pulsating audible alarm automatically sounds if the oxygen level should fall below 19.5%. (Normal air contains 20.9% oxygen; oxygen levels below 19.5% by volume are considered unsafe.)

We offer two versions of the monitor. One model is equipped with a 16-foot spooled cable connecting the instrument to the sensor, making it ideal for testing manholes, tanks, bilges, silos, etc. The other model has the sensor at the end of a 3-foot coiled cable. In both models, the sensor attaches easily to the top of the unit for hands-free use. Both monitors can be fastened to your belt or worn over your shoulder (belt loop and shoulder strap provided). For remote sampling, or to check a confined space before entering, you can easily detach the sensor from the top of the unit.

Specifications

Detection principle:	Maintenance-free galvanic cell
Power source:	2 AA rechargeable NiCad batteries, included; remote charger also included
Operating time:	Up to 20 hours with full charge
Recharging time:	14 hours from fully discharged state
Measuring range	0-40 vol. %
Alarm:	Preset to 19.5%; pulsating audible tone
Indication accuracy:	± 3% of oxygen concentration
Response time:	2-4 seconds
Temperature range:	0°C to 45°C (32°F to 113°F)
Pressure range:	Up to 2 atm.
Low battery indicator:	Steady audible tone
Expected sensor life:	18-24 months
Warranty:	One year

Ordering Information: Oxygen Deficiency Monitor

Model	Dimensions H x W x D—in. (mm)	Weight oz. (g)	Charger VAC	Cat. #
With 3-foot coiled Sensor Cable	4.7 x 2.6 x 1.1 (120 x 66 x 29)	8.8 (250)	115	**1506-66**
			220	**1506-67**
With 16-foot non-coiled Sensor Cable	6.7 x 2.6 x 1.1 (170 x 66 x 29)	10.6 (300)	115	**1506-68**
			220	**1506-69**

		Cat. #
Replacement Parts	115 VAC Charger	**1506-64**
	220 VAC Charger	**1506-65**
	Sensor*	**1506-70**

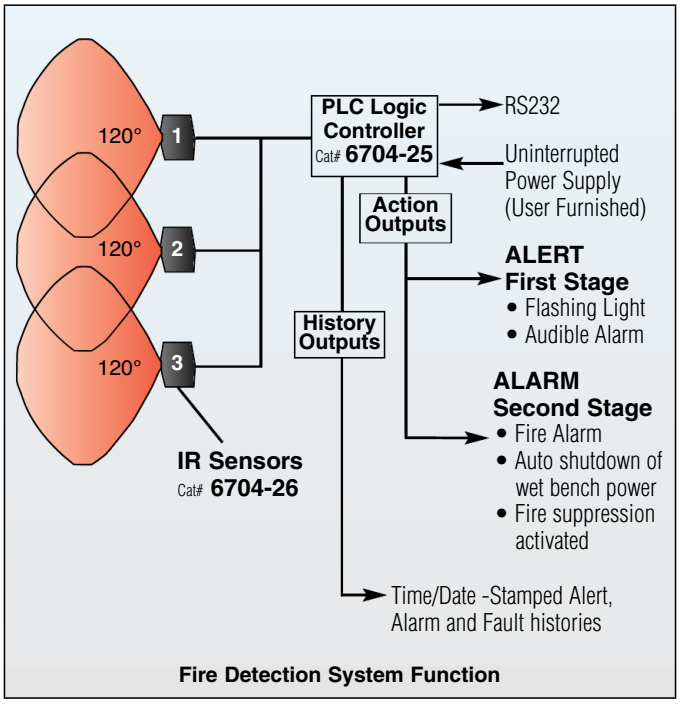
**** Replacement Sensor compatible with all models; comes in hermetically sealed package.***

Fire Detection System

- **Factory Mutual approved specifically for semiconductor wet bench electro-optical fire detection**
- **Multi-spectral IR flame detector detects all types of fires, even through gases and vapors**
- **Unique two-stage fire detection response issues warning alert and signals for suppression release and wet bench shut-down (suppression system optional)**
- **Acid-resistant polypropylene housing is ideal for installation in wet processing benches**

This multi-spectral electro-optical fire detector system senses all hydrocarbon and non-hydrocarbon fires, even through the gases and vapors found in chemical wet benches.

It uses multi-spectral Wide Band IR™ (1.2 - 3.5 micron bandwidth), Near Band IR™ (.7 to 1.1 micron bandwidth), and Visible Band (0.4 - 3.5 micron bandwidth) to see all fire types. The Wide Band IR allows the detector to see through acetone, smoke, chemical gasses and vapors.



Fire Detection System Function

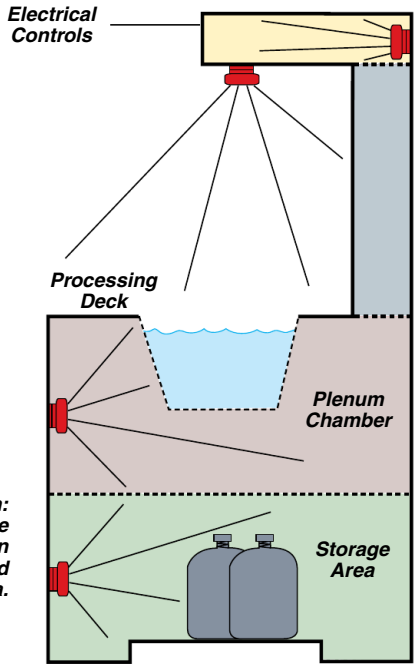
Unique Two-Stage Fire Detection Response

The ALERT First Stage response initiates audible and visible signals, notifying the operator of an existing fire of 4kW or more. When a fire with a heat energy output of 3kW (equivalent to a 4"-diameter polypropylene pool fire) is exceeded, the fire detector will record a time- and date-stamped FirePic™ digital fire signature. This numerical spectral evidence enables analysis of the probable cause of the fire event for use in preventing a subsequent, damaging fire.

In situations where the fire self-extinguishes without the release of a suppression agent, the in-process integrated circuit wafer batch can be successfully completed.

If the fire does not self-extinguish, the Second Stage ALARM activates and signals for immediate suppression release once the fire exceeds a threshold of 13 kW (the equivalent of an 8"-diameter polypropylene pool fire).

Each fire detector has an exceptionally wide, 120° field of view to provide optimal coverage of the fire-threat area. Detectors should be installed in adequate numbers and positions to ensure that any possible fire is in the field of view of at least one fire detector, unobstructed by plastic partitions.



Typical Detector Configuration: sensors mounted inside the control case, above the station deck, inside the plenum, and inside the storage area.

Note: Fire suppression equipment must be ordered separately. Call to discuss your application. See application illustration for suggested configuration. Part numbers below include installation in specified Terra wet processing station.

	Cat. #
PLC Controller	**6704-25**
Multi-Spectral IR Sensor	**6704-26**
Several typically required.	

Enclosed Safety Shower

- **Full-body shower and eye wash**
- **Polypropylene enclosure resists most acids and corrosives**
- **Easy-parting curtain allows fast, convenient access**
- **Immediate-response handles are easy to activate**

Refer to page 567 for complete ordering information

Measuring and Recording

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Hand-Held Laser Airborne Particle Counters

AC or Battery Operated

- **Lightweight and compact portability allows measuring in hard-to-reach areas**
- **Reliable solid-state laser sensor provides a long, trouble-free service life**
- **Isokinetic probe is built into processor housing**
- **Two available models, with sensitivity ranges of 0.3µm to 5µm or 0.5µm to 5µm**
- **Rechargeable internal battery enhances versatility of operation**

This compact, economical Laser Particle Counter allows convenient, accurate, and reliable airborne particle counting in a wide variety of critical applications. Though it is barely larger than a television's remote control, measuring 4 x 6.5 inches and weighing only 2 pounds, this counter has all the capabilities and features that you would expect from a full-size counter. Fully self-contained, this counter can be used either by itself, or with a remote printer or computer.

Convenient On-the-Spot Particle Detection!

Its easy portability and battery operation make it ideal for quick, on-the-spot measurements that you might not otherwise take the trouble to monitor, and for reaching places that a full-size counter cannot go: above work benches, under and behind equipment, and in hard-to-reach corners. With this counter, it becomes easy to follow a trail of airborne particulates, thus tracking critical contamination directly to its source.

The counters are also identical in operation. They have three program function menus: Display (DISP), for changing parameters or limits affecting the particle count, such as count alarm limits; Clock (CLK), for setting time limits, such as period and hold time; and Serial Input/Output (SIO), for setting computer interface requirements or for printing results.

Both models include an isokinetic probe, power supply, recharger stand, a purge filter assembly, calibration certificate and owner's manual.

Specifications

Size Channels:		
1506-48	ch 1	0.5 micron
	ch 2	Selectable—0.7, 1.0, 3.0, or 5.0
1506-49	ch 1	0.3 micron
	ch 2	Selectable—0.5, 1.0, 3.0, or 5.0
Coincidence Loss:		Less than 5% at 2,000,000 particles per cubic foot
Light Source:		Laser diode (30,000 hours mean time between failure)
Factory Calibration:		Mono-dispersed polystyrene latex spheres (NIST traceable)
Display:		Four-line liquid crystal
Outputs:		RS232C/RS485 for computer or printer
Location Labels:		100, appear on printout
Data Storage:		200 samples, rotating buffer
Sample time:		1 second to 24 hours
Hold Time:		1 second to 24 hours

CE

Count Alarms:	1 to 9,999,999 each channel
Concentration Mode:	1 second samples, 1 to 10 samples averaged, display updated every second; displays count per cubic feet or liter
Power:	5 watts, +10V (approx) (+6V with battery pack)
Battery:	rechargable Ni-Mh
Operating Time:	6-8 hours
Size:	4"W x 6.9" x 2.3"D (10.3cm x 17.5cm x 5.9cm)
Weight:	2.13 lbs. (0.97 kg)
Environment:	
Operating	55 to 84°F (12 to 29°C), 20-95% relative humidity, noncondensing
Storage	-40 to 160°F (-40 to 70°C), up to 98% relative humidity, noncondensing

Note: The rechargeable batteries typically allow operation for 6-8 hours between charges; the unit can also be operated directly from the AC power adapter. (Counters should be recalibrated about once a year.)

Hand-Held Laser Particle Counter	
Particle Size Ranges	Cat. #
0.5, 0.7, 1, 3, and 5µm and larger	**1506-48**
0.3, 0.5, 1, 3, and 5µm and larger	**1506-49**

Optional Accessories

	Cat. #
Carrying Case	**1506-54**
Recalibration (see note above)	**1509-00**
Temperature/Relative Humidity Sensor	**1507-94**
Battery-Operated External Printer (includes cable)	**1506-57**
Printer Paper (roll)	**1506-58**
Particle Vision® PortAll™ Software For retrieving data from counter memory into a PC via RS-232 cable and for controlling the counter via a PC.	**1506-51**

Hand-Held Particle Concentration Meter/ Particle Counter

- **Simple on/off operation**
- **Rugged design for field use**
- **One switch, one display, quick results**

This hand-held unit is available as a Particle Concentration Meter or as a Particle Counter. For either purpose it can be used to count particles larger than .5 microns or larger or .3 microns at a flow rate of 0.1 cfm. All you do is turn it on, check the display and turn it off. Walk around the room, scan a filter and watch the particle concentration change. Measuring filter effectiveness, checking cleanroom status and trouble-shooting contamination has never been this easy and fast.

Particle Concentration Meter Operation

When the Particle Concentration Meter is turned on, it samples air for six seconds before displaying the number of particles per cubic foot. Every six seconds the display is updated. Sampling air for six seconds at a flow rate of 0.1 cfm results in a sample size of 1/100th of a cubic foot of air. The particles in this sample are counted and multiplied by 100 to yield the number of particles per cubic foot. This method has the advantages of fast count results and direct readout of particle concentration.

Particle Counter Operation

When the Particle Counter is turned on, it immediately starts counting and the display is updated continuously as particles are detected. After counting for one minute, the Particle Counter holds the count on the display until power is turned off. This one-minute sample displays the number of particles in 0.1 cubic feet of air. Counting will begin again when the power is turned back on.

A Wide Variety of Applications

These counters have proven themselves in many settings. Medical industries can monitor their air filter systems for pathogen-sized particles. Filter manufacturers can test filter effectiveness. Cleanroom industries can perform quick status checks of cleanrooms. Heating, ventilation and air conditioning personnel can determine indoor air quality.

The counters are shipped with a power module for recharging the batteries and an accessory kit containing an isokinetic probe, a 115V power supply, and a .2 micron purge filter assembly. Both types of counters detect discrete particles using a laser-based sensor. Order the unit you need to count particles greater than .3 microns or .5 microns from the ordering table below.

Specifications

Size Channels	
1506-95 & 1506-97:	0.5 micron and larger
1506-96 & 1506-98:	0.3 micron and larger
Coincidence Loss:	Less than 5% at 2,000,000 particles per cubic foot
Light Source:	Laser diode (30,000 hours mean time between failure)
Display:	Seven-digit LED
Sample Time:	
1506-95 & 1506-96:	Six seconds, updates every six seconds
1506-97 & 1506-98:	One minute, then holds
Size:	3.9"W x 7.7"H x 1.6"D (10 x 19.7 x 4.4 cm)

Need it in a hurry?
Call a Terra sales representative right away for personal assistance in getting speedy delivery of the item you require. Our computerized inventory and shipping management system allows us to locate and track your order from the moment you place it.

Weight:	1.43 lbs. (0.65kg)
Power:	110 or 220 volt charger
Battery:	Six volt rechargeable NiMh; 8-hour fast recharge plus 14-hour trickle charge
Operating Time:	8 hours continuous
Environment	
Operating:	12°C to 41°C (55°F to 105°F); 20 to 95% relative humidity, noncondensing
Storage:	-40°C to 70°C (-40°F to 160°F); up to 98% relative humidity, noncondensing

Note: Both models below include an isoprobe, power supply, purge filter and calibration certificate. Counters should be recalibrated about once a year; see ordering information.

Hand-Held Particle Concentration Meter/Particle Counter

Particle Sensitivity	Particle Concentration Meter Cat. #	Particle Counter Cat. #
≥ 0.5 µm	**1506-95**	**1506-97**
≥ 0.3 µm	**1506-96**	**1506-98**

Options

	Cat.#
Display Particles/Liter	**1506-99**
Recalibration (see note above)	**1509-00**

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Portable Airborne Particle Counter

AC or Battery Operated

- **Features particle sensitivity down to 0.3 or 0.5 microns at 0.1 CFM flow rate**
- **Select between two display modes: cumulative count (total particles) or differential count (particles in each size range)**
- **Standard models feature two particle size channels; up to six channels available**
- **Models with built-in printer document particle counts in each size range**
- **Rechargeable battery ensures true portability**
- **Includes beeper alarm to allow audible detection of particles**

This airborne particle counter provides a portable solution to all your particle monitoring problems.

Multiple Sizes Ranges and Display Modes

All models count particles in multiple size ranges simultaneously. Select the number of size channels to suit your application requirements. Count data are displayed on the front LED display, and an optional built-in printer provides paper documentation.

For maximum flexibility, four modes have been incorporated to provide quick answers to measurement questions or to allow unattended operation. The manual mode completes one count cycle then turns the air pump off to prolong battery life. Automatic mode repeats the count cycle for the number of cycles programmed to allow unattended monitoring. Concentration mode gives a quick estimate (within seconds) of the particle concentration. Beep mode provides one beep after the count exceeds a selected limit, which is handy for isolating sources of particle contamination such as leaks in filter banks.

Specifications

Size Channels:	Refer to ordering chart
Coincidence Loss:	Less than 5% at 2,000,000 particles per cubic foot
Light Source:	Laser diode (30,000 hours mean time between failures)
Factory Calibration:	Mono-dispersed polystyrene latex spheres (NIST traceable)
Display:	Seven-digit LED
Output:	RS-232C/RS485 for computer, built in printer
Sample Time:	1 second to 24 hours
Hold Time:	1 second to 24 hours
Concentration Mode:	1 second samples, 1 to 10 samples averaged, display updated every second; displays count per cubic foot or liter
Count Alarms:	1 to 9,999,999 counts each channel
Data Storage:	400 samples, rotating buffer
Location Labels:	250, appear on printout
Size:	6.7"W x 4.5"H x 11.7"D
Weight:	6.8 pounds (3.1 kg)
Power:	5 watts, +10V (approx.) (+6 with battery pack)
Battery Type:	Rechargeable Ni-Mh
Operating Time:	4 hours with printing, 8 hours without printing

Environment:

Operating:	12°C to 41°C (55°F to 105°F) 20% to 95% relative humidity, noncondensing
Storage:	-40°C to 70°C (-40°F to 160°F) up to 98% relative humidity, noncondensing

CE

Portable Airborne Laser Particle Counter

Particle Size Ranges (microns)	With built-in printer Cat.#	Without built-in printer Cat.#
0.5, 5.0	**1506-43**	**1506-90**
0.5, 0.7, 1.0, 5.0	**1507-11**	**1507-14**
0.5, 0.7, 1.0, 2.0, 5.0	**1507-12**	**1507-15**
0.5, 0.7, 1.0, 2.0, 3.0, 5.0	**1507-13**	**1507-16**
0.3, 0.5	**1506-44**	**1506-91**
0.3, 0.5, 1.0, 5.0	**1507-17**	**1507-02**
0.3, 0.5, 0.7, 1.0, 5.0	**1507-18**	**1507-03**
0.3, 0.5, 0.7, 1.0, 2.0, 5.0	**1507-19**	**1507-04**

Note: Counter comes with two isokinetic probes (one hand-held with tubing and one direct mount), a purge filter for maintenance, two rolls of printer paper (for models with built-in printer), calibration certificate, and owner's manual.

Optional Features

	Cat. #
Particle Vision® PortAll™ Software For retrieving data from counter memory into a PC via an RS-232 cable and for controlling the counter with a PC.	**1506-51**
Relative Humidity/Temperature Sensor RH Range: 10-90% (accuracy: ± 3%); Temp. Range: 0-100°F (accuracy: ± 3°F)	**1506-52**
Printer Paper	**1507-01**

Airborne Particle Counter

For Detecting Particles to 0.1 Micron

- **Features particle sensitivity down to 0.1, 0.3 or 0.5 microns at 1.0 CFM flow rate**
- **Available with two, four, five, or six particle size channels**
- **Performs Fed-Std-209E calculations on all size channels simultaneously**
- **Sample time is selectable from one second to 24 hours**
- **Includes memory for 400 count cycles of data**
- **Built-in printer creates records of counts in several formats**
- **Includes beeper alarm for easy audible detection of particles throughout your facility**

These reliable, easy-to-operate instruments provide the sensitivity to monitor particle counts down to 0.1 microns, enabling you to verify even the most rigorous cleanliness requirements. Multiple size channels give you flexibility to monitor at several particle diameters, using the same particle counter.

A quiet, carbon-free pump provides steady vacuum power at 1.0 CFM for rapid sample times. The built-in printer option prints as you work, or you can also "smart" print stored count data as counts-per-cubic foot, total counts, or Fed-Std-209E calculations. Data can be stored with numerical location labels (0 - 999).

The bright LED display makes reading the data easy and error-free. The display shows particle counts in either cumulative or differential modes, as well as the values from the optional probes for humidity, temperature and air velocity. All operational features are accessed from a simple, well organized front panel. A programming feature includes the storage of sampling parameters for each location.

These features make this the perfect instrument for monitoring cleanroom cleanliness or performing cleanroom certifications.

Specifications

Size Channels:	Refer to ordering chart
Flow Rate:	1.0 cfm (28.3 lpm)
Flow Control:	Electronic meter with rear-panel adjustment
Light Source:	HeNe laser (0.1 sensitivity models); Laser diode, 30,000 hours MTBF (0.3 and 0.5 sensitivity models)
Vacuum Pump:	Carbon-free, non-contaminating reciprocating pump
Zero Count:	Less than one count every 5 minutes
Display:	Red LED, 7 digits
Outputs:	Built-in printer; RS232/RS485 Serial Interface
Sample/Hold Time:	1 second to 24 hours
Alarm Counts:	0 to 9,999,999
Location Labels:	0 to 999, numeric
Count Data:	Total counts, counts/ft^3, counts/m^3
Coincidence Loss:	Less than 5% at 40,000 particles/ft^3
FS209E Calculations:	Mean of averages, standard deviation, standard error, UCL
Auto CDA Purge:	Purge solenoid activated by connection to CDA (0.1 sensitivity models only)
Data Storage:	400 sample points
Power:	115 VAC; 110 watts
Environment:	
Operating:	55 to 84°F (12 to 29°C); 20 - 95%RH, noncondensing
Storage:	-10 to 160°F (-23 to 70°C); Up to 98%RH, noncondensing

Accessories Included:	Isokinetic probe with tripod; Purge Filter; Printer Paper; AC Cord; Operator's Manual	
Physical:	*0.1 sensitivity models*	*0.3/0.5 sensitivity models*
Size:	13.5"W x 22"D x 7"H	11.2"W x 18"D x 6.0"H
Weight:	42 lbs.	24 lbs.

CE

Airborne Laser Particle Counter

Particle Size Ranges (microns)	With built-in printer Cat.#	Without built-in printer Cat.#
0.1, 0.2, 0.3 0.5, 0.7, 1.0	**1506-86**	**1506-87**
0.3, 0.5	**1506-93**	**1506-94**
0.3, 0.5, 1.0, 5.0	**1506-77**	**1506-81**
0.3, 0.5, 1.0, 5.0, 10.0	**1506-78**	**1506-82**
0.3, 0.5, 1.0, 3.0, 5.0, 10.0	**1506-79**	**1506-83**
0.5, 5.0	**1506-80**	**1506-92**
0.5, 1.0, 5.0, 10.0	**1506-71**	**1506-74**
0.5, 1.0, 2.0, 5.0, 10.0	**1506-72**	**1506-75**
0.5, 1.0, 2.0, 3.0, 5.0, 10.0	**1506-73**	**1506-76**

Note: Shipped with an isokinetic probe (with tripod), a purge filter assembly, two rolls of printer paper (for models with built-in printer), a power cord, owner's manual, and calibration certificate.

Optional Features

	Cat. #
Particle Vision® PortAll™ Software For retrieving data from counter memory into a PC via an RS-232 cable and for controlling the counter with a PC.	**1506-51**
Relative Humidity/Temperature Sensor RH Range: 10-90% (accuracy: ± 3%); Temp. Range: 0-100°F (accuracy: ± 3°F)	**1506-52**
Air Velocity Probe 0 to 200fpm, includes cable.	**1506-33**
Printer Paper	**1507-01**

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CompuFlow® ThermoAnemometer Kit

(For use with MicroPrinter™)

- **Measures velocity, volume, temperature, and humidity without changing probes**
- **Faster key response, longer battery life, and simpler operation than comparable models**
- **Microprinter provides hard-copy records of air velocity and temperature tests**
- **Compact size and digital readout allow easy monitoring of toxic fume flow**
- **Averaging capability simplifies comprehensive testing**
- **Telescoping probe lets you take readings in hard-to-reach areas**

The Deluxe ThermoAnemometer provides all the features necessary for easy monitoring of both low-velocity air flows and air temperatures in cleanrooms or in a variety of work stations.

Advanced Features Simplify Monitoring

Unlike many other, less advanced units, this microprocessor-based device provides an automatic averaging feature, saving you time and tedious hand calculations. All readings are stored in memory, so you don't need to keep count or repeat readings; after the required number of readings, the system automatically presents the average at the push of a button. When air fluctuates or pulses, the CompuFlow® ThermoAnemometer senses each fluctuation and provides the user with a rolling, time-weighted average. You can also "freeze" all readings on the digital display by using the HOLD/PRINT button—and avoid "swinging needle" fluctuations and guesswork that often lead to inaccuracy.

Readouts are indicated on the scale of your choice: temperatures in degrees F or C, air velocities in meters/second or feet/minute. A telescoping probe lets you take readings in hard-to-reach areas without disturbing the air pattern—an ideal feature for monitoring the flow of hazardous vapors under a fume hood. **Note:** Probe must be held perpendicular to the airflow.

MicroPrinter™ Provides Hard Documentation

The system microprinter provides instant documentation of any desired reading. Each reading is printed on demand in English or metric units as they appear on the display. The readings are numbered for easy reference, and the average is also printed at the touch of the HOLD/PRINT function button. This feature greatly reduces the time necessary to take air flow and temperature readings.

Specifications

Air Velocity

Range:	30 - 9999 ft/min (0.1 - 50 m/s)
Accuracy:	± 3% of reading or ± 3 ft/min, whichever is greater
Resolution:	1 ft/min under 500 ft/min (0.01 m/s under 5.00 m/s); 5 ft/min at 500 ft/min (0.01 m/s at and over 5.00 m/s)

Volumetric

Range:	Actual range is a function of max. velocity and duct size
Accuracy:	± 3% of reading
Duct dimension:	1 to 250 in increments of 0.1 inches (1 to 635 cm in increments of 0.1 cm)

Temperature

Range:	0 - 140°F (-17 to 60°C)
Accuracy:	± 0.5°F (± 0.3°C)
Resolution:	0.1°F (0.1°C)

Relative Humidity

Range:	0 - 95% RH
Accuracy:	± 3% RH
Resolution:	0.1% RH

Wet Bulb Temperature

Range:	40 to 140°F (5 to 60°C)
Resolution:	0.1°F (0.1°C)

Dew Point Temperature

Range:	5 to 120°F (-15 to 49°C)
Resolution:	0.1°F (0.1°C)
Data Storage Range:	Up to 1871 samples, up to 285 test IDs
Dimensions:	3.8" x 7.5" x 2.35" (9.65 x 19 x 6cm)
Probe Dimensions:	43.5"L (110 cm) w/ handle x 0.276" (7mm) tip x 0.395" (10mm) base
Weight:	1.9 lbs. (0.86 kg)
Display:	Primary: 4-digit LCD, 0.6" (15mm) digit height Secondary: 3.5-digit LCD, 0.3" (8mm) digit height
Power Source:	Four C-size batteries (included)
Battery Life:	24 hours average

	110VAC Cat. #	220VAC Cat. #
CompuFlow® ThermoAnemometer Kit	**3302-00**	**3302-00-220***

Comes complete with an articulated telescopic probe, 4 C-size batteries, battery eliminator, owner's manual, carrying case, calibration data sheet, and a one-year limited warranty.

**** 220VAC model uses metric measurements and includes a 220VAC battery eliminator.***

MicroPrinter™ **3302-01**
Thermal serial dot matrix, with printing speed of approx. 0.8 lines/sec. External dimensions: 5.3" x 4" x 1.4". Weight: 14 oz. Temperature Range: 32 - 104°F. Humidity Range: 30 - 80%RH. Interface type: Serial (Baud rate 1200). Comes with paper, rechargeable batteries, battery eliminator, and owner's manual.

Soft Carrying Case **3302-07**
For MicroPrinter™.

CompuDat® Software **3302-22**
Downloads data from CompuFlow® for analysis on any Windows-based PC. Includes disks and computer cable.

Air Velocity Meter

- **Intrinsically safe instrument measures air velocities from 0 - 2000 feet/minute**
- **Compact size and digital readout allow easy monitoring of fume hoods, laminar flow stations, cleanroom ceiling filters, and other ventilation systems**
- **Telescoping 3" probe lets you take readings in restricted or hard-to-reach areas**

This Air Velocity Meter is ideal for monitoring low-velocity air flows in cleanrooms or in a variety of laminar flow hoods and other work stations. It gives you reliability and performance at a price you'd expect to pay for less sophisticated analog meters.

Its telescoping probe lets you take readings in hard-to-reach areas without disturbing air patterns, an ideal feature for monitoring air flows under hoods. Operates on four AA-size alkaline batteries (included).

Specifications

Range:	0 - 2000 feet/minute (0 - 10 meters per second)
Accuracy:	5.0% of reading or ± 5 fpm (± 0.025 m/s) whichever is greater (rated for range of 25 - 2000 fpm)
Operating Temperature:	32 to 122°F (0 to 50°C)
Meter Dimensions:	5.2" x 2.75" x 1.3" (132 x 70 x 33mm)
Probe Dimensions:	Extends to 3.1" (79mm); diameter: 0.25" (6.4mm)
Display:	Digital; 4½ digits, 0.4" (10mm) high
Power:	Four AA-size alkaline batteries (included)
Battery Life:	Min. 20 hours at 100 fpm (0.5 m/s) using alkaline batteries
Safety Rating:	U.L. listed intrinsically safe for use in hazardous locations for Divisions 1 and 2 in Class I, Groups C and D; Class II Groups E, F and G; and Class III when used with alkaline batteries.

Air Velocity Meter

	Cat. #
English Units	**3302-20**
Metric Units	**3302-21**

Toxic Gas Detector System

- **Complete, easy-to-use sampling and analysis system**
- **Detects and measures hazardous gases and vapors**
- **Ideal for monitoring performance of Exhaust Purification Filters (see page 424)**
- **The most cost-effective solution to air sampling and analysis**

This Toxic Gas Detector System is an ideal, easy-to-use method for day-to-day gas checking. It allows effective monitoring of exhaust purification filter efficiency. It also provides a valuable aid to QC in the lab, plant or office and spot testing for a wide variety of hazardous gases and vapors.

This low-cost, portable system consists of two components: detector tubes detect specific vapors; and a precision sampling pump draws an air sample through the detector tube. One sample is all that is needed for most analysis, compared to other devices that require that you keep track of multiple strokes and introduce the possibility of operator error.

More than 200 detector tubes are available to measure a wide variety of hazardous gases and vapors. Each is formulated with high purity reagents that absorb and react with the gas or vapor being measured. The reaction causes a colorimetric stain which corresponds in length to the concentration of the gas or vapor being measured.

Ordering Information

Toxic Gas Detector Kit — Cat. # **9002-00**
Includes pump, maintenance items and carrying case. Tubes not included.

Other Detector Tubes Available! Refer to page 573 for complete ordering information

General Sampling Detector Kit — Cat. # **9002-01**
Includes the Toxic Gas Detector Kit above plus a 10 meter extension hose and one box of tubes each for sampling Ammonia (50-900 PPM), Benzene (5-200 PPM), Carbon Dioxide (.05-1.0%), Carbon Monoxide (10-250 PPM), Hydrogen Sulfide (100-2000 PPM), Nitrogen Dioxide (0.5-30 PPM) and Sulfur Dioxide (20-300 PPM).

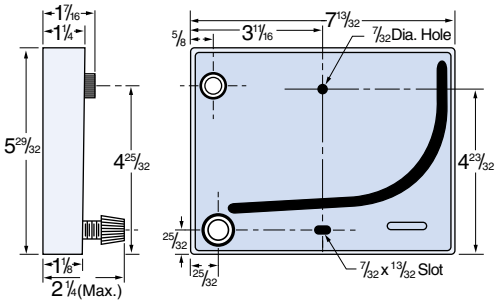
TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Air Filter Gauge

- **Manometer-type gauge measures pressure differentials across a cleanroom's air filter to ensure correct filter operation**
- **Incorporates a curved, inclined-vertical tube for wide pressure range and more increments at low readings**
- **Provides measurements above and below atmospheric as well as of differential pressure**
- **Accurate to within ±3% of full scale**
- **Easy to install**

This Air Filter Gauge helps you ensure the correct operation of air filters and thus helps maintain the standards you require for your cleanroom.

It provides an accurate reading (in inches of water column) of pressure differentials across a filter. By comparing the resistance pressure with manufacturer's recommended values, you can determine when a filter needs servicing or replacement before air leakage or contamination occurs. This gauge also helps you ensure that filters are properly installed; it should indicate an initial reading in conformance with the manufacturer's data.



Its construction is simple yet rugged. The one-piece, noncontaminating, virtually indestructible molded white styrene-acrylonitrile housing holds the indicating tube and fluid wells, shock mounted glass level vial, zero adjust plunger, and leak-proof "O" ring seals. The front panel features molded ABS knobs. The aluminum scale is epoxy coated. Moderate overpressures are accommodated by an overflow tank.

For normal stationary installation, simply mount the gauge on any vertical surface with the two mounting screws provided. A built-in spirit level simplifies leveling before mounting screws are tightened. Fill the reservoir, adjust the fluid level to zero, connect the tubing, and the gauge is ready for operation.

Specifications

Range:	0-3 inches water column
Fluid Requirements:	Uses .826 sp. gr. (red oil)
Weight:	10.5oz.

	Cat.#
Air Filter Gauge	**1500-09**

Selecting the Proper Air Filter and Air Filter Gauge*

Air Filters are incorporated into the ventilation system of a cleanroom to remove an extremely wide variety of contaminants from the air, including particles smaller than a micron (.000039"). Because variables involved in such ventilation systems vary radically—depending on the exact cleanliness standard, size of facility, rate of ventilation and many other factors—filter selection must be made by a qualified engineer in cooperation with the filter manufacturer.

Once a filtering system has been selected, one problem remains: how to judge when the filter has reached its effective lifespan. Because of the wide variation in the types and concentrations of contaminants in the air being filtered, length of service and visual inspections are an unreliable guideline. The most widely used method of determining when a filter needs to be serviced or replaced is to measure the pressure drop across the filter by means of an air filter gauge.

The Function of an Air Filter Gauge

An Air Filter Gauge measures pressure drops across the filter in order to determine whether or not the filter is operating within its design range of effective use. This is not the same as measuring filtering efficiency. Filter efficiency has to do with the ability of the filter to remove particulate matter from the air stream, and is generally measured in precisely controlled tests that vary according to the type of filter.

One method is to compare the weight of a carefully compounded dust mixture trapped in the filter with the weight of the dust released. Another method, originated by the NBS/NIST, compares the opacity of the dust collected on filter paper from two air samples of equal flow rate, one of which is filtered air. The efficiency of the filter is thus evaluated on the basis of the dust spots. A third method measures a resistance of DOP (Dioctyl-phthalate) smoke, a homogeneous aerosol of 0.3 micron size, to test a special class of high efficiency filter.

Although efficiency tests vary, the operating life of a filter is always determined by the amount of particulate dust it can hold, which in turn is related to the resistance across the filter that develops as more and more particles accumulate. An air filter gauge, by sensing the differential in static pressure across an air filter, thus permits the air filter to be used to its maximum dust-holding capacity as determined by the filter manufacturer. And by indicating when a filter needs servicing, an air filter gauge can avoid excessive resistance that could disturb the balance of the system, increase air leakage and, for some types of filter, begin to pass contaminants.

Recommended Resistances for Air Filters

All filter manufacturers supply technical data which indicate the initial resistance in inches of water column for the filter at its rated air flow, and a recommended resistance at which point the filter should be replaced or serviced. These values vary according to the type of filter. For most filters used in a cleanroom environment, however, the range between initial and replacement resistance is typically between .01 and .1" WC.

During air filter installation, air filter gauges hence provide the additional function of ensuring proper installation and proper air-flow design. The gauge should indicate a pressure resistance in conformance with the manufacturer's recommendations. If pressure is too low, the filter may be handling less than the rated air volume due to open bypasses or improper air balancing, incorrect installation or air leaks. If pressure is too high after initial assembly, the filter may be incorrectly installed or the system may be handling more than the rated air volume.

*Source: Dwyer Control & Gauges

MAGNEHELIC® and PHOTOHELIC® Differential Pressure Gauges

- **Measure and control both positive and negative low air or gas pressures**
- **Provide an ideal way of monitoring and controlling the positive pressure differential required for cleanrooms**
- **Enable you to meet FED STD 209E regarding cleanroom pressure**
- **MAGNEHELIC® principle ensures wear-free accuracy within 2% of full scale**
- **Resists shock and vibration**
- **Available in a number of pressure gauges to suit a wide range of applications, such as gauging air filters, monitoring air conditioning systems, and measuring static air pressure and air vehicles**

If your facility incorporates a laminar flow cleanroom, these MAGNEHELIC® and PHOTOHELIC® differential pressure gauges can help you maintain the positive pressure necessary to block inrushing contaminants that can damage sensitive materials and operations. In doing so, they also help to meet the requirements and recommendations set forth in FED STD 209E which specifies that a minimum positive pressure of 0.05" of water differential be maintained between the cleanroom and adjacent areas.

Chatterless, Wear-Free Accuracy

These gauges incorporate an exclusive MAGNEHELIC® Principle that eliminates wear, backlash, and hysteresis. The result is a remarkably high standard of accurate, dependable gauge performance at a modest price.

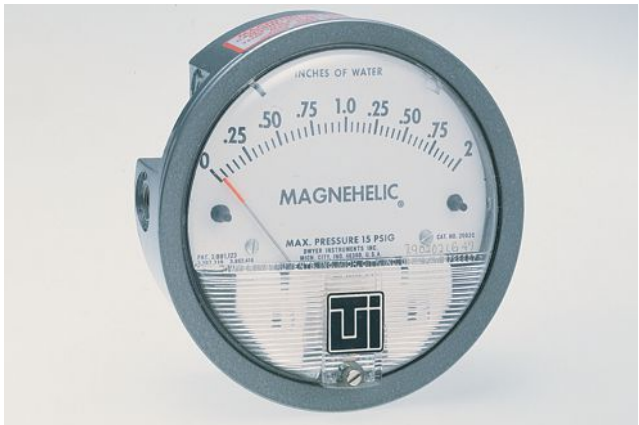
This MAGNEHELIC® Principle is a method of transmitting the effects of changes in air pressure from a diaphragm to an indicating pointer—by means of magnetic linkage and without the use of gears or other direct mechanical linkages. This system avoids wear and physical contact, which might destroy the accuracy and sensitivity of the instrument. It delivers accuracy to within 2% of full scale.

This principle offers numerous advantages over other gauges. Because it uses no fluid, it eliminates evaporation, freezing, or toxicity problems. It also ensures inertia-free, drift-free pointer movement and offers unusually high resistance to shock and vibration. These gauges are also unharmed by pressure surges up to 15 psig and by ambient temperature fluctuations between 20 and 140 degrees F.

Both MAGNEHELIC® and PHOTOHELIC® Gauges feature easy-to-read 4" dials that quickly provide gas pressures—positive, negative or differential. Because operation does not depend on gravity, you can either face- or flush-mount them in any position. Gauges can also be mounted on panels either inside or outside of the cleanroom; if mounted inside, the low pressure ports of the room pressure gauges can be connected together, and a single tube routed to outside the room.

PHOTOHELIC® Pressure Control

PHOTOHELIC® models combine the MAGNEHELIC® gauge with a precise pressure switch that lets you control low and high gas pressures. Knob controls adjust dual set points, which allow for variable deadband control. These set points contain photocells that actuate DPDT relays when room pressures reach a preset upper or lower limit, and they can be set up to control corrective damper action. As the room pressure changes in response to damper motion, and the indicator returns to the null band, damper motion is halted.



Versatile Applications

Use the MAGNEHELIC® Gauges (range of .25-4.0" WC) to determine positive pressure differentials between the cleanroom and adjacent areas. MAGNEHELIC® Gauges can also be used to measure pressure drops across pre-filters and absolute filters.

A PHOTOHELIC® Gauge/Switch can also be used to control makeup or exhaust air dampers in order to maintain the room pressure within prescribed limits. All gauges can be mounted on a control panel. Gauge calibration is accomplished between room readings. In this application the PHOTOHELIC® Gauge serves as the "master" gauge.

These units can also be used to check air filters, to sense static pressure or to measure air velocity and volume.

MAGNEHELIC® Gauges

Pressure Range (inches WC)	Weight	Cat. #
0-0.5	1 lb. 2 ozs.	**2625-08**
0-1.0	1 lb. 2 ozs.	**2625-09**
0-2.0	1 lb. 2 ozs.	**2625-10**
0-3.0	1 lb. 2 ozs.	**2625-11**
0-4.0	1 lb. 2 ozs.	**2625-12**

PHOTOHELIC® Gauges

Pressure Range (inches WC)	Weight	Cat. #
0-0.5	4 lbs.	**2625-13**
0-1.0	4 lbs.	**2625-14**
0-2.0	4 lbs.	**2625-15**
0-3.0	4 lbs.	**2625-16**
0-4.0	4 lbs.	**2625-17**

PHOTOHELIC® Gauges

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

AirGard® Air Velocity Monitor

- **Provides constant reading of air velocity for easy monitoring of cleanroom performance**
- **Audible and visual alarms let you know when air speed falls below 90 fpm (or other critical velocity)**
- **Flush mounts to Terra Modular Cleanroom control panel, laminar flow hoods, and other enclosures**
- **Easy to field calibrate**

This flush-mount air velocity monitor allows you to monitor the vertical speed of air inside a cleanroom, hood or other enclosure.

Its dual setpoint capability enables you to determine critical high/low air speed thresholds. When the air speed exceeds the "safe" range, the AirGard® issues audible and visual alarms to alert you to a clogged filter or other problem. Price includes installation in specified cleanroom or hood. Includes relay output, remote alarm, high flow alarm disable, and emergency purge.

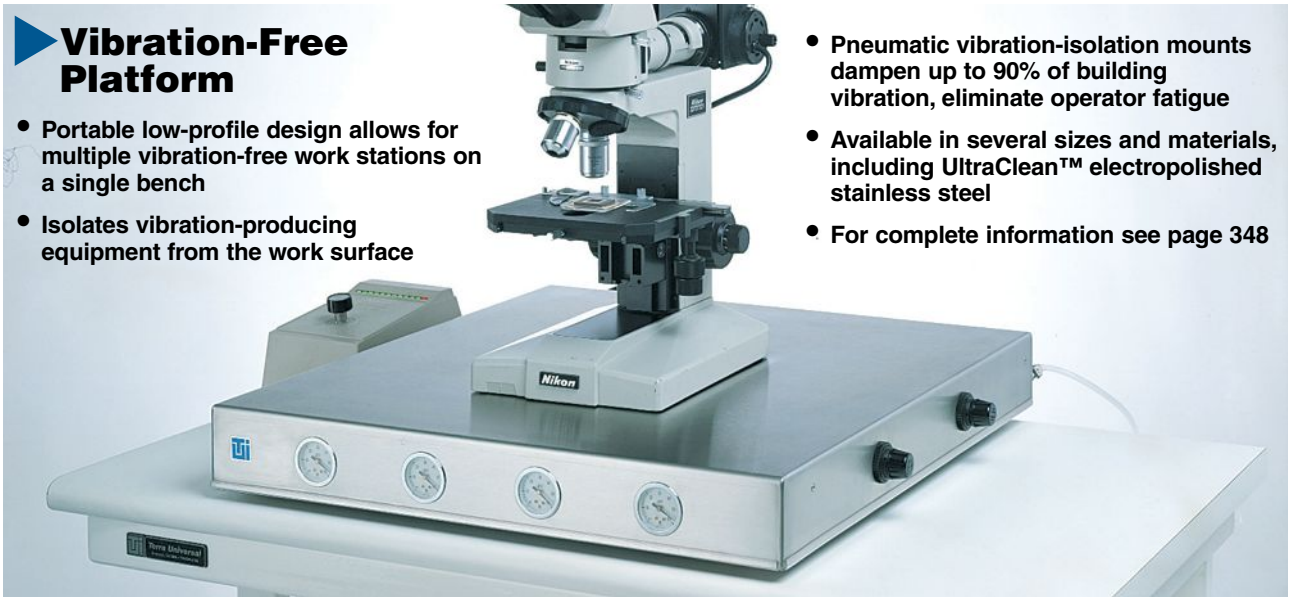
Specifications

Dimensions:	5.25"L x 3.0"W x 0.625"D (face plate) 3.0"L x 2.0"W x 0.5"D (rear enclosure)
Display/Alarm Range:	50 - 250 fpm (0.25 - 1.27 m/s)
Alarm Delays:	User configurable through menu
Units:	English and Metric (user-selectable)
Visual Display:	Analog bargraph: Red zone - alarm Yellow zone - marginal Green zone - normal Jumbo LEDs (digital LCD can be enabled)
Alarm Indications:	Jumbo red LED and audible alarm (85 dB @ 4")
Calibration:	2-point field calibration
Accuracy:	± 10% or 10 fpm, whichever is greater
Storage Temperature:	-40 to +150°F (-40 to +65°C)
Operating Temperature:	55 to 86°F (13 to 30°C)
Power Requirements:	9-30V AC/DC

AirGard®	110VAC/60Hz Cat. #	220VAC/50Hz Cat.
Uninstalled	**4952-40**	**4952-40-220**
Installed (specify Terra enclosure)	**6704-65**	**6704-65-220**

Vibration-Free Platform

- **Portable low-profile design allows for multiple vibration-free work stations on a single bench**
- **Isolates vibration-producing equipment from the work surface**
- **Pneumatic vibration-isolation mounts dampen up to 90% of building vibration, eliminate operator fatigue**
- **Available in several sizes and materials, including UltraClean™ electropolished stainless steel**
- **For complete information see page 348**



CFM Master II
Digital CFM Airflow Meter

- **Simultaneously displays air flow and temperature readings for convenient HVAC and cleanroom filter monitoring**
- **One-piece design allows easy single-hand use in hard-to-reach locations**
- **Displays air velocity in FPM, MPH, KPM, Knots, MPS, and CFM**
- **Switches °F and °C scales**
- **Data Hold function is perfect for measuring transient or difficult-to-view conditions**
- **Includes MIN/MAX and multi-point averages**
- **Precision fan bearings ensure long, no-maintenance service life**
- **RS232 output permits computer storage and analysis of data**

This portable, once-piece digital air flow meter is the ideal service tool for HVAC and airflow technicians. It also allows easy monitoring of vertical laminar air flow inside a cleanroom.

Versatile Scale Options and Control Features

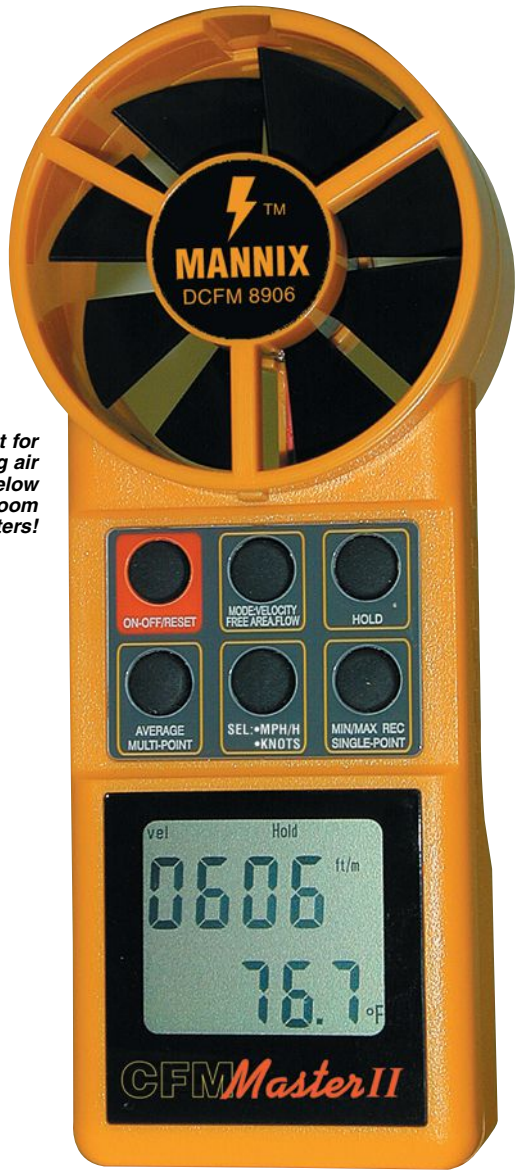
The CFM Master II provides simultaneous display of air velocity and temperature in an easy-to-read LCD screen. It provides minimum and maximum values and measurement of up to eight multi-point readings. The data hold function is ideal for transient readings, and the auto power off function conserves battery life.

Air velocity readings are displayed in any of the common scales in use: FPM, MPH, KPM, Knots, MPS and CFM. Temperature scale switches between °F and °C.

This unit includes one 9-volt battery, a hard case and an RS232 serial output.

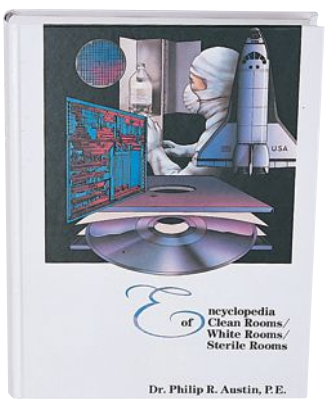
Specifications

Air Flow:	125 to 5900 FPM
Resolution:	0.1
Accuracy:	± 3% (125 to 5900 FPM / 0.8 to 25 MPS)
Temperature:	± 1°F (+14 to 133°F); ± .6°C (-10 to 50°C)
Battery:	9V (included)
Battery Life:	100 Hrs
Display:	LCD
Max. Reading:	9999
Auto Power Off:	20 Minutes
RS232 Output:	Format TXXX.XF, VXXXXFTM/TXXX.XC, VXXXM
Weight:	0.48 lbs.
Dimensions:	7"L x 2.5"W x 1.75"D



Perfect for monitoring air velocity below cleanroom ceiling filters!

CFM Master II Digital CFM Airflow Meter Cat. # **5401-16**



Encyclopedia of Clean Rooms/ White Rooms/Sterile Rooms

Dr. Philip R. Austin, P.E. 1,000 pp., 3rd ed.

This indispensable reference book covers every aspect of contamination control in cleanrooms, biotech rooms, and aseptic areas. The book provides thousands of vital facts and figures and discusses all types of clean facilities in terms of design, construction, operation, and management. Topics include Class 500,000 through cleaner than Class 1 cleanrooms; bio-clean rooms; sterile rooms; the latest laser monitoring techniques; major governmental standards and specifications; air, fluid, and gas filtration; air showers, air locks and pass-thru; employee training; vertical and horizontal laminar flow facilities; cleanroom laundries; personnel and equipment; and contaminant emissions.

Cat. # **5012-01**

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Portable Temperature/Humidity Recorder

- **Digital readout indicates temperature (-10 to 40°C) or humidity (0 to 100% RH)**
- **Miniaturized chart recorder documents temperature and humidity levels**
- **Compact sensor probe allows humidity measurements in cramped, hard-to-reach spaces**
- **Portable design maximizes versatility**

Critical temperature and humidity requirements demand accurate and reliable monitoring equipment. This Portable Temperature/Humidity Recorder offers the precision and dependability called for in microelectronics manufacturing and other cleanroom applications—at an affordable price.

Continuous Monitoring/Recording

An LED digital display switches from temperature to humidity readouts at the press of a button and delivers resolution of 0.1% RH/0.1 degree C. As it does, the 60mm chart recorder provides ongoing hard documentation of both temperature and humidity conditions. A single roll of chart paper records data for as long as 40 days, relieving operators of the need for frequent paper changes.

This unit makes both temperature and humidity measurements with the high accuracy you would expect in much larger, more expensive recorders. Yet because of its compact, portable design, you can easily move it throughout a manufacturing facility—wherever temperature and humidity measurements are critical. Or, you can permanently install it for long-term continuous monitoring.

Versatile Sensor Probe for Precise Measurements

The Sensor Probe allows you to monitor a precise location that conventional sensors may not be able to reach. For example, you can easily monitor conditions inside a storage enclosure (such as a Terra desiccator or stocker) or determine the temperature and humidity in cramped areas of a cleanroom or assembly station. This probe is completely noncontaminating and interfaces with the recording unit by means of a simple connection.

Specifications

Measuring Range (standard scale):	
Humidity:	0 to 100% RH
Temperature:	-10 to 40°C or +10 to 110°F
Indicating Accuracy (with sensor combined):	
Humidity:	± 3% RH
Temperature:	± 0.3°C
Power Supply:	110V, 50 or 60Hz
Power Consumption:	About 6VAC
Weight:	About 3.2 Kg
Recording System:	Dot printing type (temperature and humidity, 1 point each)
Recording Accuracy:	±1.0% of input span
Dot Printing Interval:	12 sec. (50Hz), 10 sec. (60Hz)
Chart Speed:	10mm/h

Chart:	Folded chart paper having an effective recording width of 60mm and a total length of 10m
Digital Display Resolution:	Humidity: 0.1% RH, Temp.: 0.1°C
Indication:	LED digital indication, 3½ digits. Temperature/humidity selector switch.

Portable Temperature/Humidity Recorder

Power	Temperature Scale -10 to 40°C Cat.#	Temperature Scale +10 to 110°F Cat.#
110VAC	**1401-00**	**1401-21**
220VAC	**1401-40**	**1401-41**

General Sensor Probe **1401-01**
(Ideal for most applications)

Replacement Chart Paper **1401-20**
Roll allows approximately 40 days of continuous recording

Our Measuring and Recording Products Don't End Here!

Terra manufactures measuring and recording solutions for all of its work stations and mini-environments.

Call a Terra representative for more information!

Trace Oxygen Analyzer
Perfect for high-precision oxygen detection inside a glove box or other enclosure.
See page 476.

DewWatch™ Hygrometer
Monitors dew point inside glove boxes and controls purge of dry nitrogen. ***See page 474.***

Analog Multi-Channel Chart Recorders

- **Single pen or 1-, 2-, 3-, or 6-point recording**
- **Highly reliable and vibration-proof**
- **Potentiometric and self-balancing**
- **Removable chart drive modules ensure easy chart paper changes, easy calibration**

These Analog Multi-Channel Chart Recorders are among the toughest, most compact in the industry today, and are ideal for use in Terra stockers, desiccators, or for recording conditions simultaneously in several cleanroom locations.

Select among 1-, 2-, 3-, or 6-point dotting models using multicolored ink. The dotting tips are non-clogging and non-blotting, and are a snap to change.

The entire recording mechanism slides easily out of the front of this panel-mount unit, making the change of the non-threading chart paper easy and sure, and providing quick access to the zero, span, and gain adjustment controls.

The components of these recorders have been carefully chosen to ensure the most maintenance-free and reliable units possible, from the enclosed balancing slide potentiometer (which uses conductive plastics) to the oil-less plastic bearing. The case is constructed of rugged steel plating; the door is of die-cast aluminum. Measuring only 200mm deep by 92mm wide and 138mm high, these recorders make the best use of valuable panel space and can be mounted on inclines up to 19.5° from vertical; conforms to DIN standards.

Overall Dimensions 96mm W x 214mm D x 144mm H

Case Dimensions 92mm W x 200mm D x 138mm H

Specifications

Standard scale:	0-100˚C
Scale length:	60mm
Indicating accuracy:	± 1.0% of input span
Balancing speed:	2.0 sec. at 50Hz; 1.6 sec. at 60Hz
Chart speed:	10mm/hour
Standard dotting interval:	12 sec. at 50Hz; 10 sec. at 60Hz
Chart paper:	Fanfold type, effective width 60mm (total width 73mm) length 10 meters
Weight:	About 2.5Kg
Input:	Select mV, mA, thermocouple or resistance thermometer
Recording system:	Dotting type, direct dotting with various colors 1 point: Red 2 points: Red and Blue 3 points: Red, Blue, and Green 6 points: Red, Blue, Green, Pink, Purple, and Orange

Analog Multi-Channel Chart Recorders		Cat. #
	6 point	**1401-14**
	3 point	**1402-90**
	2 point	**1402-91**
	1 point	**1402-92**

Dial Humidity Indicators
(Hygrometer and Hygro Thermometer)

- **Tested and calibrated to ensure ± 3% RH accuracy in 20 - 85% RH range**
- **Durable metal 4¾"-diameter case is ideal for panel mounting inside a cleanroom or other controlled environment**
- **Available with dual-scale (°F/°C) thermometer**

These low-cost, rugged, reliable meters are ideal for temperature and humidity monitoring. Expansion and contraction of a moisture sensing element is transmitted to a meter to show humidity in the 20 - 85% RH range. Temperature is displayed on a dual scale (No. 1600-24).

Hygro Thermometer Cat. # 1600-24
Weight: 15 oz.

Hygrometer Cat. # 1600-22
Weight: 7.3 oz.

TempTrace Temperature Recorders

These self-contained, easy-to-use recorders provide a permanent record of temperatures, using a precise, spiral-wound bi-metallic strip transducer. All models include an on/off switch, locking door and built-in slot for an optional tie-down cable and lock. All include one "AA" battery, pen, starter box of 60 charts and manual. All come standard with one-point NIST traceable Certificate of Calibration.

TempTrace Temperature Recorders		Chart Paper
Temp. Range	Recording Time	Cat. #
-20 to +120°F	7 Day	**4801-52**
-20 to +120°F	24 Hour	**4801-53**
-30 to +50°C	7 Day	**4801-03**
0 to 100°F	7 Day	**4801-54**

	Cat. #
Red Pens (6 pack)	**4801-20**

NIST-Traceable Certificate of Calibration
(All models ship with 1-point certificate)

	Cat. #
1-point	**4801-21**
3-point	**4801-22**

Specifications

Pen Accuracy:	± 2% full scale
Power Supply:	One "AA" alkaline battery
Average Response Time:	11 min. to move 63% of scale
Chart Size:	4" Diameter
Dimensions:	7" x 5.5" x 2.5" (18cm x 14cm x 6.5cm)
Weight:	1 lb., 1 oz. (480g)

CE

Temperature, Humidity and Dew Point Recorder

User-selectable microprocessor lets you determine scale ranges and recording times (1, 7, or 31 day). Charts are 8" diameter. Temperature sensor: thermistor. Humidity sensor: fast-film capacitor. Includes audio/visual high and low alarms. Comes standard with 1-point NIST-traceable Certificate of Calibration, two pens, one box of charts, one AC adapter, and manual.

CE
220VAC Model

Specifications

Temp. Ranges:	-20 to +120°F, +40 to +110°F, -20 to +50°C and +5 to +40°C
Temp. Accuracy:	± 1.8°F (± 1.0°C)
Humidity Range:	0 - 95% RH (non-condensing)
Humidity Accuracy:	± 2% from 0 - 90% @ 73°F
Dew Point Range:	-22 to 122°F, 30 to 50°C
Dew Point Accuracy:	± 3.6°F (± 2°C)
Display Resolution:	1°F (1°C), 1% RH
Response Time:	Temp: 30 sec., RH: 20 sec. (for 63% step change @ 1 CFM)
Power Supply:	120VAC or 220VAC adapter
Dimensions:	10.5" x 13.2" x 2.8" (27cm x 33cm x 7cm)
Weight:	7 lbs. (3.2g), with batteries

Chart Paper for the Temp/Humidity/Dew Point Recorder

Temp Range	Recording Time	Cat. #
-20 to +120 F	24-hour	**4801-33**
-20 to +120F	7-day	**4801-34**
-20 to +120 F	31-day	**4801-56**
-20 to +50 C	24-hour	**4801-57**
-20 to +50 C	7-day	**4801-58**
-20 to +50 C	31-day	**4801-59**
+40 to +110 F	24-hour	**4801-35**
+40 to +110 F	7-day	**4801-36**
+5 to +40 C	24-hour	**4801-60**
+5 to +40 C	7-day	**4801-61**

	Cat. #
Temperature, Humidity, Dew Point Recorder	
110VAC	**4801-32**
220VAC (CE marked)	**4801-32-220**
Calibration Kit (Allows user calibration of all variables)	**4801-37**
NIST-Traceable Certificate of Calibration (3-point) (All models ship with 1-point certificate)	**4801-22**
10-Foot Extension Cable (for probe)	**4801-39**
Replacement Pen Pack (3 red and 3 blue)	**4801-40**

Chart Recorder
Temperature & Humidity Value Line

This temperature/humidity recorder provides an accurate record at a reasonable price. It provides a continuous 24-hour record of temperature and humidity on a 4" (10.2 cm) diameter chart. The recorder features highly accurate quartz chart movement, a precise bi-metal strip transducer for temperature sensing, and a cellulose acetate-butyrate humidity sensor.

A single "AA" battery provides power for an entire year. Features a corrosion-resistant, high-impact plastic case with on/off switch, external battery access, and pen cap storage. Includes two pens, one "AA" alkaline battery, one box of 60 charts, external product I.D. tag, and instruction manual.

	Cat. #
THV Chart Recorder	
24-hour	**4801-50**
7 day	**4801-51**
Chart Paper	
24-hour	**4801-16**
7 day	**4801-06**
Replacement Pen Pack (3 red & 3 blue)	**4801-40**

Specifications

Temperature Range:	0 to +100°F
Humidity Range:	20 - 70% RH
Ambient Operating Temperature:	-22 to +122°F (-30 to +50°C)
Temperature Sensor:	Precise, spiral-wound bi-metallic strip transducer
Humidity Sensor:	Cellulose acetate-butyrate
Accuracy:	± 2% full scale (temp); ± 5% (humidity)
Average Response Time:	11 minutes to move 63% of full scale in air moving 5 ft/second
Recording Time:	24-hour or 7-Day
Chart Size:	4" Diameter (10.2 cm)
Power Supply:	One "AA" alkaline battery, up to 1 year average life
Weight:	1 lb. (454g)
Dimensions:	6.25" x 6" x 3.5" (16cm x 15cm x 9cm)

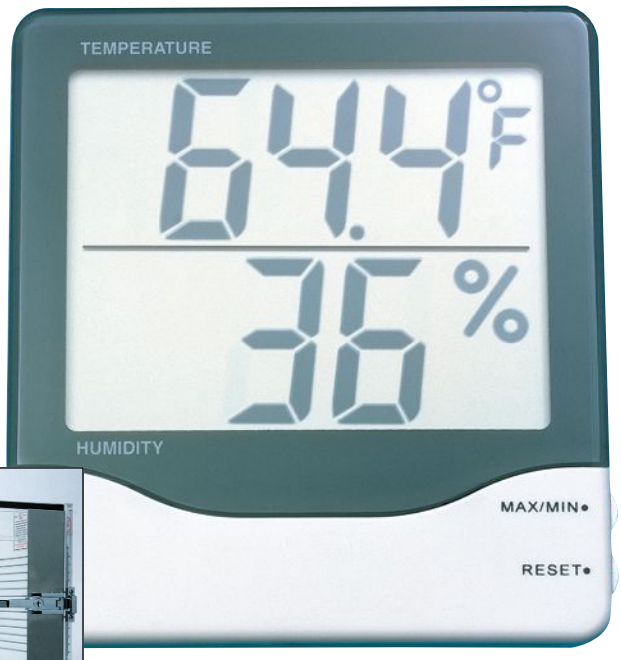
NIST-Traceable Certificate of Calibration
Must be specified with order of THV Recorder.

	Cat. #
1-point	**4801-21**
3-point	**4801-22**

Large Display Hygro-Thermometer

- **Versatile instrument simultaneously displays humidity and temperature inside an enclosure**
- **Large LCD display (80mm x 62mm) makes this unit easy to read**
- **°C and °F switchable**
- **Auto power off function conserves battery**

Terra's hygro-thermometer offers simultaneous display of temperature and humidity in a large LCD readout (80mm x 62mm). Other features include two-key operation (min./max. and reset), low battery indicator, °C and °F switchability, and memory for high and low temperature/humidity. It can be supplied with mounting brackets for easy installation inside a desiccator, dry box, or other enclosure. "AAA" battery included.



Specifications:

Measuring Range:	
Temperature:	10°C to 60°C (14°F to 140°F)
Humidity:	10 to 99% accuracy
Dimensions:	4"W x 0.75"D x 4.25"H (without mounting bracket)
Accuracy:	
Temperature:	± 1°C (-10°C to 50°C), ± 1°F (14°F to 140°F)
Humidity:	± 5% (0°C to 50°C, 32°F to 122°F)
Weight:	0.3 lbs.
Low Battery Indicator	
Features for hanging and standing	

Perfect for monitoring % RH inside Terra desiccator or glove box.

	Cat.#
Without Mounting Bracket	**5401-21**
With Mounting Bracket (for installation in desiccator or other enclosure)	**5401-15**

Digital Psychrometer

- **Extremely accurate memory (min./max.)**
- **Easy to read LCD displays temperature (°C and °F switchable), humidity, wet bulb and dew point**
- **Electronically calculates wet bulb in 5 seconds**
- **Also includes auto power off and data hold functions**

The microprocessor-based design of the Digital Psychrometer utilizes an electronic capacitance type polymer film sensor, with an easy-to-read LCD screen. It measures and displays humidity, temperature (in °C/°F), wet bulb (electronically calculated in 5 seconds), and dew point. The data hold function is ideal for highly transient conditions.

Ideal for chemical, pharmaceutical, microelectronics, textile and many other laboratory applications.

Fast Response, High Accuracy!

Displays—
Humidity
Temperature
Wet bulb
Dew point

Specifications:

Power:	Two AAA alkaline batteries (included)
Temperature:	± 1°C (all temperature ranges)
Humidity:	± 5% @ 25°C from 10% to 90% RH
Measuring Range:	-20°C to 50°C (-4°F to 122°F)
Weight:	0.3 lbs.

	Cat. #
Digital Psychrometer	**5401-17**

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Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Gun-Style Infrared Thermometer
With Laser Sighting

- **Non-contact IR temperature sensing system won't disturb delicate samples**
- **Laser sighting system simplifies operation, ensures accurate readings**
- **Backlighted display for easy viewing**
- **Features 8:1 optical resolution**

This gun-style Infrared Thermometer offers convenient, high-precision operation in many high-technology applications.

Its IR sensing system provides non-contact temperature measurement for safer, more accurate results. Because the sensing element never contacts the sample, it doesn't alter the temperature it measures and won't damage or contaminate delicate samples. Its ultra-fast response time of 500 milliseconds captures temperatures of transient conditions. A data hold function allows easy reading of fluctuating temperatures.

Operates on a single 9V battery (included). An auto power off feature conserves battery life. Also includes a soft case and lanyard.

Specifications

Temperature Rage:	0° to 788°F (-20° to 420°C)
Emmisivity:	0.95 (fixed)
Accuracy:	± 2°C (± 3.5°F) from -20° to 100°C (0° to 212°F); ± 3°C (± 5.4°F) from 101° to 420°C (213° to 788°F); ± 2% of reading
Response Time:	500 m/sec
Dimensions:	6.7" x 1.7" x 1.6" (170 x 44 x 40mm)
Weight:	0.32 lbs. (140g)

Gun-Style Infrared Thermometer Cat. # **5401-18**

Infrared Thermometer
with Laser Sighting

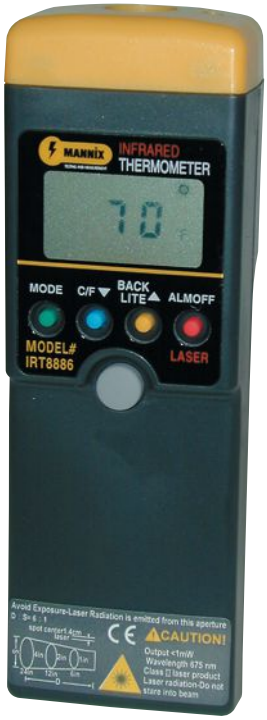
- **Pocket-sized instrument is perfect for spot temperature readings of delicate or hard-to-reach samples**
- **Laser sighting system takes pinpoint measurements**
- **Data Hold function allows convenient monitoring of fluctuating or hard-to-reach conditions**
- **°F / °C selectable**

Like the model above, this thermometer provides fast-response, noncontact measurement of temperatures on a variety of surfaces too delicate for conventional thermometers. An audible alarm signals that a reading has been taken, and a backlighted LCD display allows easy viewing.

It includes Data Hold, MIN/MAX and Delta T/Avg. features, and stored readings in 9-point memory. Operates on a single 9-V battery (included) and features a low-battery indicator.

Specifications

Temperature Rage:	0° to 600°F (-20° to 315°C)
Emmisivity:	0.3 to 1.0
Accuracy:	± 2°C (± 3.5°F); ± 2% of reading
Dimensions:	6.14" x 1.3" x 2.07" (156 x 33 x 53mm)
Weight:	0.36 lbs. (180g)



Infrared Thermometer Cat. # **5401-19**

RH/Temperature Indicator

- **± 1% RH (0-90%), ± 2% (90-100%)**
- **Measures temperature from -40 to + 212˚ F (up to 356˚F for short periods)**
- **Calculates dewpoint, wet bulb temperature, absolute humidity and mixing ratio**
- **Serves as an easy-to-use field calibrator**
- **Data collection capability, with serial line download to PC**

This hand-held indicator can be used for spot checking humidity and temperature in cleanrooms, HVAC systems, storage enclosures, and environmentally sensitive areas.

In addition to displaying %RH and temperature readings, it also calculates dewpoint and wet bulb temperature, absolute humidity, and mixing ratio, freeing you from awkward conversion tables and complex calculations. The indicator features an easy-to-read two-line liquid crystal display, with metric and non-metric readout.

The Temperature/Humidity Probe features a stainless steel head made to withstand rough handling. The probe's long shaft is perfect for cramped, inaccessible spaces. The HUMICAP® sensor provides high accuracy, excellent long-term stability, and negligible hysteresis. It is insensitive to dust, particulates and most chemicals.

This easy-to-use instrument offers fast response time, high measurement accuracy, excellent stability, and a wide measurement range, making it ideal for field calibration and other demanding applications.

Specifications Indicator:

Accuracy (@ +20˚C):	±1 %RH; ± 0.1˚C
Resolution:	0.1 %RH; 0.1˚C
Power Supply:	4 batteries, type AA (LR 6)
Battery Life:	72 hours continuous use
Operating Temperature:	-4 to +140˚F (-20 to +60˚C)
Display:	Two-line LCD
Housing Material:	ABS plastic
Dimensions:	80mm x 37mm x 200mm
Weight:	300 g (including batteries)

Temperature/Humidity Probe:

Measurement Range :	0 to 100 %RH non-condensing
	-40 to +100˚C continuous
	-40 to +180˚C short-term

Accuracy (@+20˚C):	
Humidity:	± 1% RH (from 0 to 90%RH); ± 2%RH (from 90 to 100% RH) when properly calibrated
Temperature:	± 0.2˚C
Stability:	Better than 1% per year (typical)
Response Time:	15 seconds (90%RH at +20˚C)
Temperature Sensor:	IEC 751 ⅓ class B-RTD P+1000
Operating Temperature:	-20 to +60˚C
Dimensions:	38mm x 30mm x 440mm
Cable Length:	150mm; extended spiral cable
Weight:	450 g

	Cat. #
RH/Temperature Indicator (Includes temperature/humidity probe)	**3710-04**
NIST Certificate of Calibration For #3710-04 (must be specified when indicator is ordered)	**3710-06**
Carrying Case	**3710-05**

Oxygen Deficiency Monitors

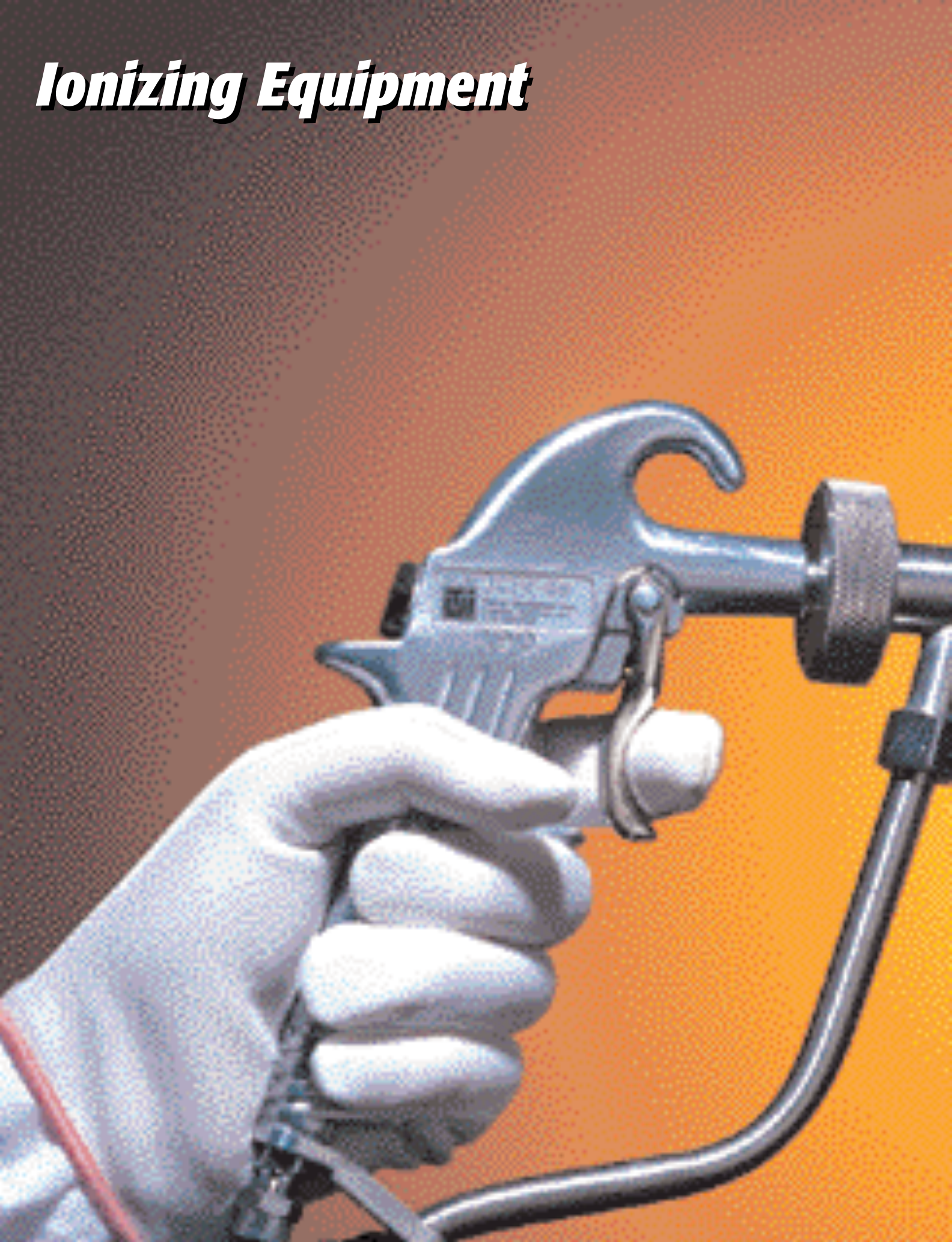
- **Ideal for use around nitrogen-purged desiccators and other process gases that could deplete oxygen levels**
- **Clearly audible alarm automatically warns of low oxygen level**
- **Large, easy-to-read LCD provides digital readout of oxygen concentration**
- **Compact, lightweight, easily portable unit can be worn on belt loop or shoulder strap**
- **Additional features include maintenance-free sensor, automatic monitoring of rechargeable batteries, intrinsically safe design**

See page 574 for full specifications.

Ordering Information: Oxygen Deficiency Monitor

Model	Dimensions H x W x D—in. (mm)	Weight oz. (g)	Charger VAC	Cat. #
With 3-foot coiled Sensor Cable	4.7 x 2.6 x 1.1 (120 x 66 x 29)	8.8 (250)	115	**1506-66**
			220	**1506-67**
With 16-foot non-coiled Sensor Cable	6.7 x 2.6 x 1.1 (170 x 66 x 29)	10.6 (300)	115	**1506-68**
			220	**1506-69**

Ionizing Equipment



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Static-Dissipative PVC Plating

- **Revolutionary Static-Dissipative PVC Plating renders acrylic-made products obsolete for any static- or particle-sensitive application**
- **Chemically embedded dissipative layers maintain a surface resistivity of about 10^7 ohms/square, even under real-world abuse**
- **Ideal for cleanroom use—effective static dissipation helps control particulate contamination by eliminating static attraction**
- **Transparent material allows complete visibility**
- **Also resists a wide range of corrosive chemicals and will not outgas**

This revolutionary material offers a new alternative to standard methods of static control in the cleanroom, lab, and other industrial environments. Like acrylic, it can be easily worked and offers great visibility, yet it also resists a wide range of chemicals (see chart). It is completely noncontaminating, and so can be safely used in the cleanest work environments.

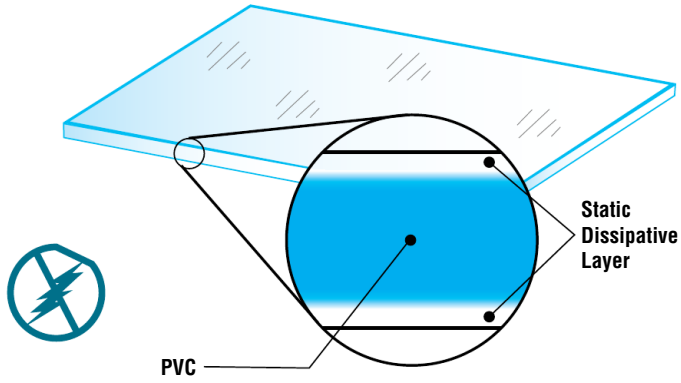
The solvent of the static-dissipative dielectric coating melts the plating and mixes with the coating material so that the mixture adheres to the plate top. Both materials are mingled in the coating process. The coated material has great adhesion power and never comes off. The electrical characteristics are not affected by rubbing, and the transparency remains unchanged for long periods with little or no fogging.

Characteristics

Static-dissipative PVC features surface resistance between 10^6 and 10^8 ohms/square—much less than that of other treated plastics. Tests show that when 10KV is applied to the surface, electrostatic potential remains less than 15V, and static decay time is less than 1 second. And because this plating offers such effective static dissipation, it will not attract dust or other contaminating particles that could damage sensitive microelectronic components.

In a test conducted in accordance with ASTM D 257, both colorless and colored transparent plating sheets were subjected to a relative humidity of 20-80% at 10°C to 30°C and the samples exhibited almost no change in physical characteristics. The surface resistivity remained greater than 10^7 ohms/square.

This plating is also durable. It features superb resistance to UV radiation; tests have indicated almost no loss of static protection after 500 hours of continuous exposure to a fadeometer. In temperature tests, it maintained its dissipative properties after 50 cycles of temperature fluctuations from -20°C to 60°C. It is also completely noncombustible.



Accept no substitute!
Unlike inferior products with spray-on coatings, Terra's Static-Dissipative PVC features chemically embedded dissipative layers for durable, reliable performance.

It also offers all of the chemical-resistance of standard PVC plating. It remains unaffected by a wide range of chemical solutions (see chart). In the case of mixed chemicals, resistance can vary widely depending on the exact mix. Be sure to perform a test prior to using any new chemical solutions or mixtures.

Applications

This plating allows easy cutting, bending, welding, and adhesive joining, and is therefore ideal in many situations for which no suitable material currently exists. Just consider these possible applications:

In integrated circuit containers: Static-Dissipative PVC Plating can be used in…

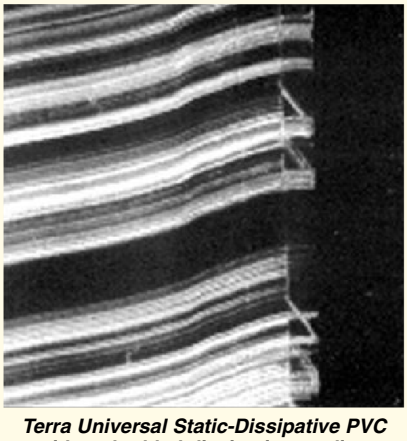
- Desiccators
- Silicon wafer boats
- Transparent trays
- Universal Hoods
- Glove Boxes
- IC storage containers
- IC chips and IC card boxes (PE, PET)
- Transparent magazine rails

In the cleanroom: Static-Dissipative PVC Plating can be used in…

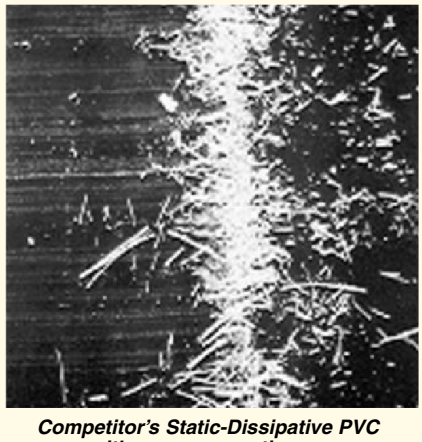
- Cleanroom partitions
- Equipment covers
- Door and wall linings
- Fluorescent lamp louvers
- Cleanroom benches
- Chamber inspection windows
- Curtains
- Pass-through and tunnel coating

The Razor Scrape Test

Terra Static-Dissipative PVC **vs.** **The Competition**



Terra Universal Static-Dissipative PVC with embedded dissipative media—minimal particle shedding.



Competitor's Static-Dissipative PVC with spray-on coatings—extensive particle shedding.

STATIC CONTROL PRODUCTS

Electrical Properties

Characteristic	Unit	Transparent Static-Dissipative PVC	Rigid PVC Plate	Testing Method
Surface Resistivity	Ω/□	$10^{6\sim8}$	10^{16} max.	ASTM D-257/JIS K 6911
Volume Resistivity	Ω•cm	$10^{17\sim18}$	10^{18} max.	ASTM D-257/JIS K 7194
Saturated Charge Voltage	V	Less than 10	3,000	*
Half Life	—	Momentary	Long	*

Measured with a static-honest meter (20°C, 60% RH)
Applied voltage 10,000V
Applied voltage • material distance 20mm
Detected voltage • material distance 15mm

Chemical Resistance

Chemicals		Time Immersed	Colorless Transparent Static-Dissipative PVC: Appearance 3 days	Appearance 30 days	Antistatic Characteristics 3 days	Antistatic Characteristics 30 days
Acid and Alkaline	Hydrochloric acid	36%	○	○ (Reddish)	○	○
		20%	○	○	○	○
	Sulfuric acid	97%	△(Blackish)	x (Black)	○	○
		60%	○	○	○	○
	Nitric acid	60%	○	○ (Greenish)	○	△
		40%	○	○	○	○
	Phosphoric acid	85%	○	○	○	○
	Acetic acid	95%	○	○	○	○
	Fluoric acid	46%	△(Light green)	△(Greenish)	○	x
		10%	○	○	○	○
	Hydrogen peroxide	10%	○	△(Powdering)	○	○
	Sodium hydroxide	50%	○	○	○	○
	Ammonia aqueous solution	25%	○	○	○	○
Organic Solvents	Methanol	100%	○	○	○	○
	Ethanol	100%	○	○	○	○
	Isopropanol	100%	○	○	○	○
	Butanol	100%	○	○	○	○
	Ethylene glycol	100%	○	○	○	○
	Gasoline	100%	○	○	○	○
	Kerosene	100%	○	○	○	○
	Benzene	100%	○	○	○	○
Others	Salt water	30%	○	○	○	○
	Ammonium fluoride	50%	○	○	○	○
	Potassium chloride	10%	○	○	○	○
	Mild detergent	10%	○	○	○	○
	Water	100%	○	○	○	○

○ Unaffected; △ Changed slightly; **x** not recommended

Tests conducted on 3 mil, 6 mil and 10 mil material. Immersion temp. 25°C.

See next page for ordering information.

General Physical Properties

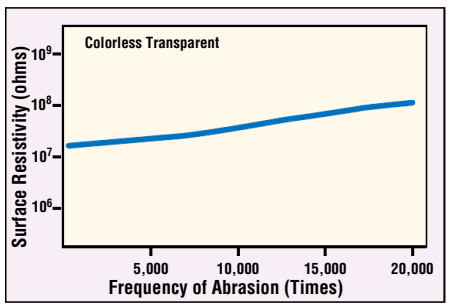
	Property	Unit	Transparent Static-Dissipative PVC	Testing Method
Physical Properties	Specific gravity	—	1.4	JIS K 7112
	Rockwell	M scale	76	JIS K 7202
		R scale	122	
	Surface hardness	Pencil hardness	H	JIS K 5400
Mechanical Properties	Tensile yield strength	MPa	74	JIS K 7162-1B/50
	Flexural strength	MPa	98	JIS K 7171
	Flexural modulus	MPa	3400	JIS K 7171
	Charpy impact strength	KJ/m²	2.3	JIS K 711-1ePA
Thermal Properties	Deflection temperature	°C/1.8MPa	65	JIS K 7191
	Coefficient of thermal expansion	10^{-5}/°C	7	JIS K 7197
	Thermal conductivity	W/m • K	0.18	Laser Flash Method
	Specific heat	J/g • K	1.11	—
	Flammability	—	Self extinguishing	JIS K 6911
Water absorption		%	0.02	JIS K 7209

The values shown above are measurements of 5.0mm thick plating and represent the standard, but not guaranteed values. Temperature 23°C.

Abrasion Resistance

The effect of surface abrasion is very small and produces almost no change in the material's antistatic characteristics.

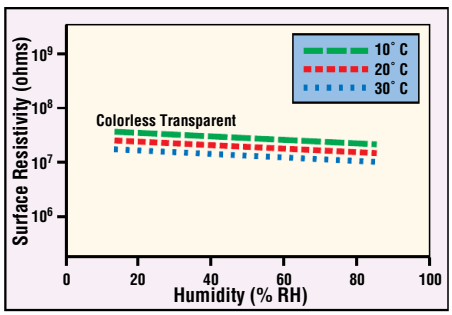
Testing conditions; Scrubbing with nylon fabric at a load of 500 grams
Testing method; ASTM D 257 (20°C 60% RH)



Temperature and Humidity Effects

Even when temperature or humidity vary, this material's antistatic properties exhibit almost no change, and this excellent feature is stable over the long term.

Testing method; ASTM D 257



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Ordering Information

The table at right indicates varying thicknesses for a transparent, colorless, standard sheet size of 4' x 8'—other sizes are available on a custom basis. Both surfaces of the sheet are covered with masking paper for protection during shipping, and one or more sheets are packed per carton and then in a wooden crate. Refer to appendix for additional cleaning and shipping instructions.

This material is subject to frequent price fluctuations. Contact a Terra sales representative for current pricing, or visit us online at www.TerraUniversal.com.

Static-Dissipative PVC Sheets

Thickness (Sheets are 4' x 8')	Clear Cat. #
3 mm (.118")	**8600-03**
4 mm (.157")	**8600-04**
6 mm (.236")	**8600-06**
10 mm (.394")	**8600-10**

Flexible Static-Dissipative PVC

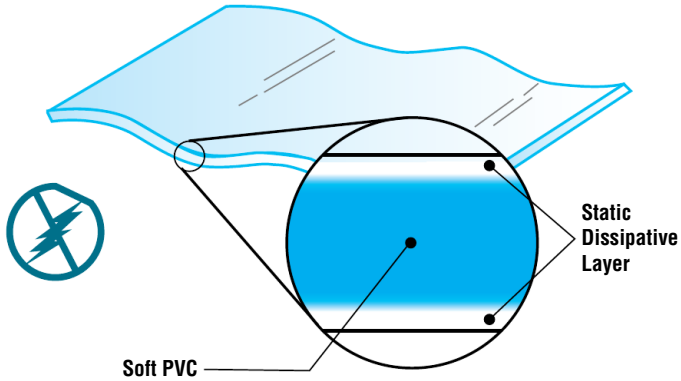
- **Soft plating offers all the ESD protection of standard Static-Dissipative PVC**
- **Transparent characteristics permit full visibility**
- **PVC properties allow easy bonding by high-frequency heat welding**
- **Advanced bonding techniques assure long-lasting static dissipation without outgassing**
- **Static-Dissipation aids in contamination control**

Like the standard Static-Dissipative PVC Plating, this material provides excellent static protection, yet its flexibility makes it ideal for many applications for which standard plating would be unsuitable. It features a surface resistivity between 10^7 and 10^8 ohms/square. Surface potential is no more than 100V, and half decay time is no more than one second (with a 10 KV charge).

Tests show that Flexible Static-Dissipative PVC maintains these properties under rugged conditions. Resistivity and decay times remain unchanged after a 500-hour Fadeometer test—corresponding to 10 years of UV radiation from a standard 40w fluorescent lamp at 5 cm. Static dissipative performance is not affected by low humidity or by contact with water and a wide range of other chemicals. This material is also completely noncombustible.

Characteristics of Static-Dissipative Soft PVC Plating

Properties	Items	Unit	Standard Value	Test Method
General	Specific Gravity		1.31	ASTM D-792
	Tensile Strength	psi	985-1130	ASTM D-638
	Elongation at Break	%	250-275	ASTM D-638
	Heat Deflection Temperature @ 264 psi, annealed	°F	95	ASTM D-648
Optical	Transmittance	%	92	ASTM D-1003
	Haze	%	2.1	ASTM D-1003
Flame Retardant	Flammability		Self-extinguishing	ASTM D-1003



Construction of Flexible Static-Dissipative PVC.

Specifications

Thickness: 0.3mm
Width: 53.9"
Length/Roll: 98'
Color: Clear transparent

See description of standard Static-Dissipative PVC Plating for other specifications regarding static characteristics.

Typical Applications:

- Dust shield for sensitive materials
- Portable Cleanroom
- Cleanroom Curtains
- Shield for Laminar Flow Station
- SMIF stations
- Cleanroom Windows

This material is subject to frequent price fluctuations. Contact a Terra sales representative for current pricing, or visit us online at www.TerraUniversal.com.

Cat. #

Flexible Static-Dissipative PVC
Clear **4401-00**

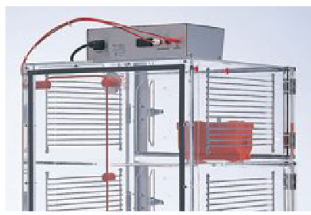
Note: The values to the left represent the standard but not the guaranteed values.

Our Static-Control Products Don't End Here!

Terra manufactures static-control solutions for all of its work stations and mini-environments. Call a Terra representative for more information on safeguarding your ESD-sensitive devices!

GroundWatch™ Ground Continuity Indicator
See page 141

Automatic IonWatch™ Ionizing Power Supply
See pages 141, 421



Ionizing Nozzles, Installed in Desiccator
See page 140

Local Area Ionizing Blower

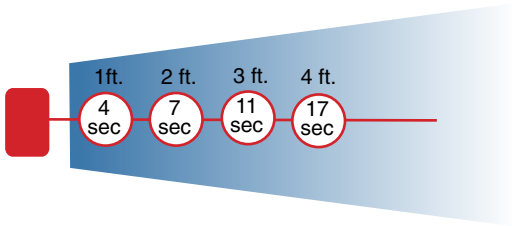
- **IsoStat® technology ensures intrinsically balanced ion emission for safe, reliable static control**
- **Low-voltage operation and shielded emitter points protect against high electrostatic fields**
- **No calibration required**
- **Ideal for work benches, glove boxes, and other enclosures**

Using patented IsoStat technology, this Ionizing Blower provides safe, effective static neutralization inside a glove box or similar enclosure, as well as on cleanroom workbenches.

Designed for overhead mounting or benchtop placement, this unit projects a balanced stream of positive ions for neutralization of static charges throughout a restricted area—without taking up valuable work space. Its steady-state DC ion emission enables fast discharge with low airflow, minimizing disruption of processing operations. Emitter points are electrostatically shielded to eliminate field-induced charge.

120 VAC model

230 VAC model



Discharge Time: ± 1,000 volts to 100 volts
Testing was performed with a charged plate monitor in accordance with Ionization Standard ANSI EOS/ESD S3.1-1991 of the ESD Association

Patented IsoStat® Technology: Intrinsically Balanced Ion Stream

The patented IsoStat technology guarantees intrinsically balanced ionization and eliminates complicated feedback circuits, making this the most reliable ionizer available.

It never needs calibration and requires very little maintenance. By isolating the ionizer's emitter points from ground, IsoStat technology ensures equal numbers of positive and negative ions to better protect sensitive products.

Note: Power to the Ionizing Blower comes from a transformer; select desired voltage.

Specifications

Dimensions:	5.3"H x 5.0"W x 2.3"D (13.3 x 12.7 x 5.7 cm) 6"H x 5.8"W (15.2 x 14.7 cm) with bracket
Input:	24 VAC, 6 watts (order transformer separately)
Power Indicator:	Green incandescent power switch
Ion Emission:	IsoStat technology (steady-state DC)
Emitter Points:	Tungsten alloy; internally shielded; 5-year life
Air Flow:	240 FPM measured at 1' (30.5 cm), directly in front of grill; 40 CFM
Ozone:	< 0.005 ppm (24-hour accumulation)
Mounting:	Gimbaled bracket/stand with ¼" mounting hole
Ion Balance:	Better than ± 20 V at 12" (31 cm)
Weight:	32 oz. (907 g)
Warranty:	2-year limited warranty

	Cat. #
Local Area Ionizing Blower	**2005-12**

Transformer
24 VAC, 0.45 A output. Weight: 9.5 oz. (269 g). 2.4"H x 2.2"W x 1.6"D (6.1 x 5.6 x 4.1 cm)

	Cat. #
For 120 VAC, 50/60 Hz, 16 W	**2005-03**
For 230 VAC, 50/60 Hz	**2005-04**

Refer to page 484 for information on installation inside a Terra glove box or other enclosure.

Point-of-Use Ionizing Blower

- **Provides pinpoint neutralizing coverage in confined spaces, including cleanroom processing equipment and enclosures**
- **IsoStat® technology guarantees an intrinsically balanced ion source that never needs calibration**
- **Low-voltage (24 VAC) output and shielded emitter points results in safe operation without high electrostatic fields**

Like the Ionizing Blower listed above, this small, versatile ionizing blower provides safe, effective static neutralization. Its small size makes it ideal for use in confined spaces and enclosures that would otherwise be difficult to neutralize. Its cleanroom-compatible design is noncontaminating and minimizes disruption of laminar flow. The 24 V UL-listed wall transformer can power up to four blowers daisy-chained together with telephone-style cable and connectors (230 V model handles up to three blowers). Air Flow: 300 fpm measured at 12"; 22 CFM. Dimensions: 3.2"H x 2.6"W x 1.9"D. Weight: 16 oz.

		Cat. #
Point-of-Use Ionizing Blower		**2005-13**
Transformer	110VAC, 50/60 Hz	**2005-09**
	230 VAC, 50 Hz	**2005-10**

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Ionizing AeroBar®

- **Provides a continuous stream of static-neutralizing ions to protect sensitive materials against ESD**
- **Attaches to cleanroom ceiling T-grid without disrupting the laminar flow in the cleanroom**
- **Patented IsoStat® technology guarantees intrinsically balanced ionization**
- **Requires no calibration—automatically maintains ion balance of ± 50 volts**

The Ionizing AeroBar® generates a balanced stream of positive and negative ions to neutralize surface static charges, safeguarding ESD-sensitive materials.

Patented IsoStat technology makes it one of the most reliable ionizers available. It emits equal numbers of positive and negative ions and requires no calibration or adjustments. Steady-state DC ion emission provides effective discharge, and mounting beneath ceiling filter/fan units ensures even distribution throughout the area below.

Discharge times directly under the AeroBar average 28 seconds (from ± 1,000 volts to 100 volts, measured in a 4-foot laminar flow hood in accordance with Ionization Standard ANSI ESO/ESD S3.1-1991 of the ESD Association). Two-year limited warranty.

Perfect for cleanroom ceiling mounting—
See page 209.

Specifications

Input:	24 VAC, from wall transformer
Power Indicator:	Green LED
Ion Emission:	Steady-state DC, 15 micro-amps maximum output current
Emitter Points:	Replaceable machined titanium, 3-year estimated life (field replaceable)
Air flow:	60 fpm (.045 m/s) minimum required at bar for proper operation
Dimensions:	2.1"H x 1.2"W x 11"L, 22"L, 44"L, or 64"L
Weight:	35.2 oz. (1 kg)

Ionizing AeroBar®	
11"L with 2 emitters	**2005-05**
22"L with 4 emitters	**2005-06**
44"L with 8 emitters	**2005-07**
64"L with 12 emitters	**2005-08**

		Cat. #
Transformers:	110VAC, 50/60Hz	**2005-09**
	220VAC, 50/60Hz	**2005-10**

Full-Coverage Ionizing Blower

- **Provides efficient electrostatic protection over a wide area**
- **IsoStat® steady-state DC ionization technology ensures an intrinsically balanced ionizing blower that never needs calibration**
- **Integral two-speed fan distributes ions evenly under varying operating conditions**
- **Ideal for use above cleanroom work benches and other ESD-sensitive locations**
- **Shielded emitter points result in extremely low EMI emissions**

Using patented IsoStat® technology, this Full-Coverage Ionizing Blower guarantees consistent static control coverage for the workbench.

Its overhead mounting system doesn't compromise valuable space on the workbench and allows complete 3-dimensional neutralization of static charges. The blower's steady-state DC ion emission enables fast discharge with low airflow, providing a more comfortable work environment for operators. Emitter points are placed behind the fan to eliminate field-induced charges and to ensure a homogeneous mixture of ionized air. Open-cell foam filters on the fan intakes protect the internal components from environmental contamination.

Specifications

Ion Balance:	Better than ± 20 V at 24" (622 cm) at high fan speed
Discharge Time:	Approx. 8 seconds directly under each of the fanstacks at 24" (62 cm) at high fan speed
Ion Emission:	IsoStat technology (steady-state DC)
Emitter Points:	0.012" diameter tungsten wire, internally shielded, 2-year life
Air Flow Volume:	112 CFM per fan, free-air typical
Air Filters:	Replaceable open-cell foam
Coverage Area:	2' x 3', typical, directly under blower
Audible Noise:	High fan speed: 58 dB
Input Power:	100 - 240 VAC, 50/60 Hz, 30 watts max.
Controls:	Power/fan speed rocker switch; High/Off/Low settings
Indicators:	Power on; green LED
Chassis:	Aluminum with epoxy-polyester powder coat
Mounting:	Four 1⅛" S-hooks provided
Dimensions:	36"L x 6"W x 4"H (91.44 x 15.4 x 10.16 cm)
Weight:	8 lbs.

	Cat. #
Full-Coverage Ionization Blower Operates on 100-240VAC	**2005-11**

Charged Plate Monitor

- **Accurately tests and calibrates any type of ionization equipment**
- **Features user-selected charging levels (1 or 5 kV) and stop levels (50, 100 or 500 V), allowing you to test ionizer discharge time at a variety of settings**
- **Displays floating offset voltage, peak voltage swing, and long-term average balance**
- **Displays high and low ion levels or lets you view ionizer balance in real-time**
- **Unique LED bar graph provides easy visualization of positive and negative voltage swings**
- **Analog output signals to a chart recorder or other device for hard copy documentation**

This Charged Plate Monitor (CPM) is an easy-to-use, self-contained instrument for testing ionizer performance.

Unique Charging Method Ensures High Accuracy

It ensures high accuracy through a unique method of charging the isolated plate. It utilizes a top-mounted, stainless steel plate monitored by an internal electrostatic field meter. The plate is charged by a solenoid-actuated contact, then isolated from the rest of the instrument during the measurement process.

This method eliminates the need for an internal high-voltage relay as well as the inaccuracies caused by poor isolation and stray capacitance. Using this method without ionization, a charge of 1,000 volts decays to 100 volts in 12 to 14 hours—the lowest rate of charge leakage on any CPM available. The monitor's chopper-stabilized circuitry optimizes the accuracy in ionized environments.

To measure long-term average balance, the voltage plate is set to zero and allowed to float. The voltage then swings positive and negative as the electrostatic field fluctuates and ions arrive at the plate.

The CPM's peak voltage mode records and displays peak voltage swing levels, while an LED bar display clearly indicates the swing of pulsing ionization systems. To measure discharge time, the plate can be charged to 1,000 or 5,000 volts of either polarity, set to one of several stop times, and timed with an internal timer.

The CPM makes all measurements described in Ionization Standard ANSI EOS/ESD S3.1-1991 of the ESD Association.

Specifications

Charged Plate

Isolation:	Self-discharge <10% in 5 minutes with 40% relative humidity and ambient ionization levels <200 ions/cc
Capacitance:	20 pf ± 2 pf. No circuitry is attached to the plate, resulting in zero stray capacitance.
Charging:	Internal power supplies for each polarity, current limited by 1 Gw resistor
Voltage Measurement:	Non-contacting electrostatic field meter
Dimensions:	6" x 6" (15.2 x 15.2 cm), isolated by Teflon® insulators

Plate Voltage Function

Controls:	TRACK monitors actual plate voltage; +PEAK/-PEAK monitors peak plate voltage; OFFSET monitors long-term average balance.
Display:	4½ digits, 0.4" (1 cm) digit height, least significant digit indicates 1 V
Accuracy:	± 2% chopper stabilization (accuracy unaffected by air ionization)

Plate Charging Function

Controls:	LEVEL switch selects either 1 or 5 kV charging voltage; ZERO switch grounds the isolated plate; ZERO SET used with the ZERO switch sets the plate voltage to zero; two CHARGE switches connect the positive and negative internal charging source to the isolated plate.

Balance Meter Function

Controls:	Full-scale level can be set to 50, 100, or 250 V for each polarity.
Display:	10-segment LED bar graph for each polarity, separate LED indicates over-range.

Discharge Timer Function

Controls:	STOP LEVEL can be set to 50, 100, or 500 V for both polarities. TIMER RESET sets timer to zero.
Display:	5½ digits, 0.4" (1 cm) digit height, least significant digit indicates 0.1 seconds.
Accuracy:	Crystal controlled

General

Input:	120VAC + 10%; 50 or 60 Hz; 25 watts; fuse-protected; or 230 V available
Recorder Output:	0 to 10 V available at rear panel BNC connector, corresponding to plate polarity; connects to a variety of external recorders.
Dimensions:	6"H x 9"W x 10"D (15.2 x 22.9 x 25.4 cm)
Weight:	7.5 lbs. (3.4 kg)
Warranty:	Two year limited warranty

		Cat. #
Charged Plate Monitor	120 VAC, 50/60 Hz	**2005-14**
	230 VAC, 50 Hz	**2005-14-220**

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Cleanroom Ionizing Air Gun

- **Safely neutralizes surfaces with pinpoint accuracy**
- **Removes surface contaminants**
- **Features durable, noncontaminating, noncorrosive construction for cleanroom use**
- **Employs balanced, lightweight design and 100 megohm resistor for maximum operator safety and convenience**
- **Select model with 0.45 µm disk filter for optimal cleanliness**

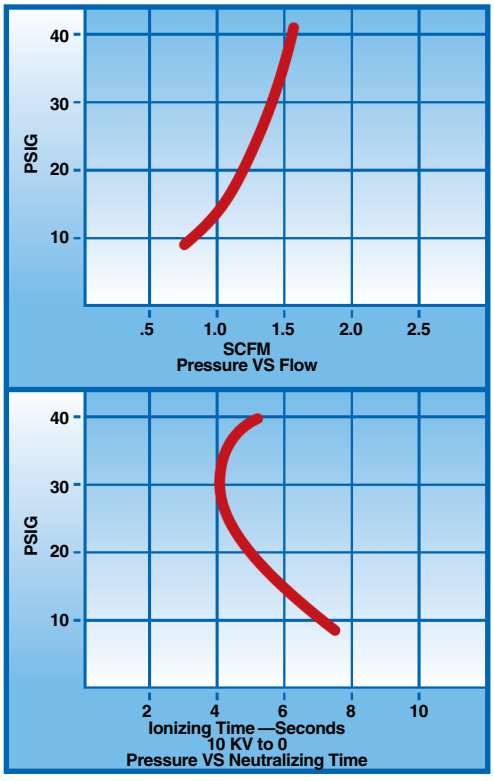
This Ionizing Air Gun is designed and manufactured to meet stringent cleanroom operating standards. It emits a stream of ions to safely neutralize static sensitive parts. It is ideal for use with nonconductive, static-generating materials, which cannot be neutralized through grounding. As it neutralizes charges, it also removes small contaminants that can damage sensitive parts.

Cleanroom Design

The gun uses either filtered air or nitrogen. Because it operates optimally at only 12-15 psi, with current draw of less than 0.3 amps, it offers economy as well as reliability. The nozzle assembly is a specially designed housing that accepts a variety of highly effective disposable filters (see description on following page) that remove air-borne particles as small as 0.45 microns; it is thus suitable for the Class 100 environment. An unfiltered model is also available.

Durable, Safe Construction

The gun's cast aluminum construction and satin nickel finish guarantee a long operational life. Particle generation during operation is virtually zero. The housing containing the filter and ionizing point is constructed of stainless steel and molded Teflon parts. The unique design eliminates any chance of contaminants passing through the housing, and "O" rings prevent any particles from by-passing the filter. Filter replacement is quick, easy, and requires no tools.



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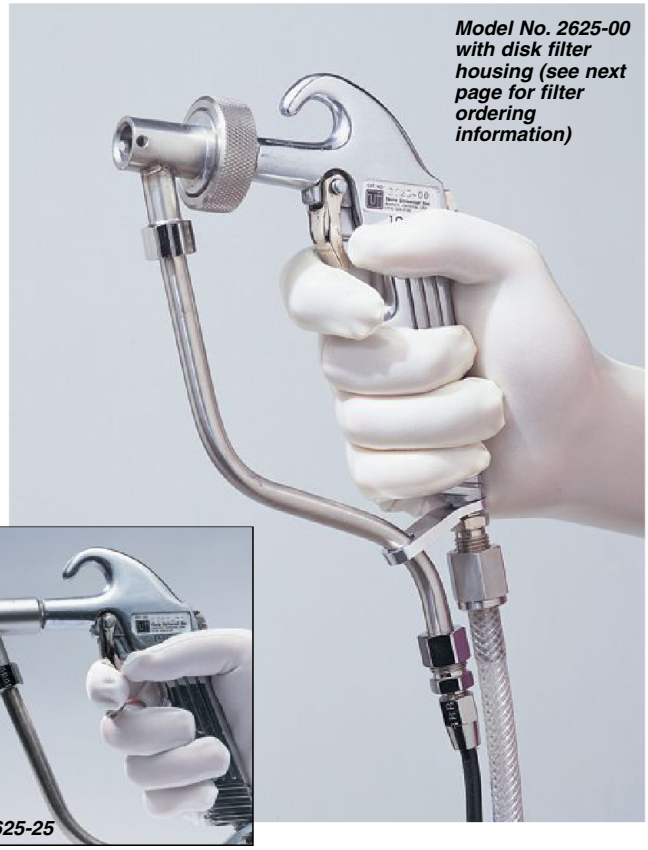


Model No. 2625-00 with disk filter housing (see next page for filter ordering information)

No. 2625-25

During operation, a Teflon insulator support positions the stainless steel ionizing point directly in the center of the air or nitrogen stream. This precision lets you neutralize and remove contaminants from very small devices and within cracks and other surface details that other ionizing guns can't reach.

A stainless steel grounding wire connects directly to the power unit (sold separately) to assure 100% grounding. The gun also incorporates a 100 megohm resistor with Teflon shielding that protects the operator from electrical shock—even in the case of accidental contact with the ionizing point. For enhanced operator mobility, each gun is also equipped with an 8-foot specially shielded cable, which features a positive stainless steel lock for connection to the power unit. These guns are also fully shielded against RFI generation. A bracket lets you hang the unit at a convenient location at the work station.

The Cleanroom Ionizing Air Gun requires a power source (Cat. No. 1600-09).

Specifications (see curves at left)

Ozone Production:	Non-detectable
Weight:	
Basic Gun:	13 oz.
Gun with power lead assembly:	21 oz.
Power Unit:	5 lbs.
Voltage Requirement:	120V, 60Hz or 220V, 50Hz, single phase (see power supply on next page)
Current Draw:	0.3 A
Power Lead:	8 ft., shielded and grounded
Normal Operating Pressure:	12-15 psi

	Cat. #
Cleanroom Ionizing Air Gun	
with Filter Housing	**2625-00**
without Filter Housing	**2625-25**

Order filters and power supply on next page.

Accessories

Power Unit

This 110/220VAC, 50/60 Hz, single-phase power unit can operate either one or two Ionizing Air Guns.

Weight: 5 lbs.
Current Draw: 0.3 amps.

	Cat. #
110VAC, 50/60Hz	**1600-09**
220VAC, 50Hz	**1600-09-220**

GN Metricel Disk Filters

These filters provide excellent general purpose filtration of air-borne particles 0.45 microns or larger. They comply with government requirements for coliform level determination. Case of 100.

Cat. # / Case
2625-02

PTFE Disk Filters

These filters feature one-micron pore size and a laminated polypropylene web support for extra durability. Compatible with a wide variety of chemicals, PTFE filters can be used in environments that might corrode other disk filters. They also resist air temperatures up to 49°C (up to 100°C in aqueous solutions after pre-wetting). Naturally hydrophobic, they also provide excellent water separation. Case of 100.

Cat. # / Case
2625-03

Static Dissipative Table Top Mat

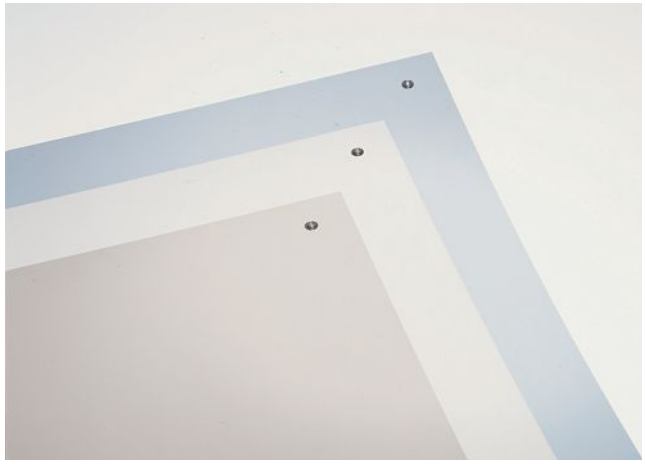
- **Dissipates static charges on table tops**
- **Resists heat and chemicals**
- **Ideal for cleanroom use**
- **Two 7mm male snaps, adhesive strip backing standard**

This Static Dissipative Table Top Mat has the conductive material integrated into its surface, making it safe for cleanroom use without the problem of particulate shedding. The flame-retardant surface will not melt or burn and resists hot solder and soldering iron tips.

This Table Top Mat features a static-free work surface with surface resistivity of 10^6 to 10^9 ohms per square. The mat is cleanroom admissible and is available in a white, blue or beige finish. Adhesive strip backing for mounting the mat to a table top is standard; optional 7mm Stacking Plug accepts wrist strap banana-plugs or alligator clips. Two 7mm male snaps are provided for grounding.

Static Dissipative Table Top Mats Specifications

Surface resistivity:	10^6-10^9 Ohms/Square
Decay rate (Method 4046):	<0.05 sec.
Chemical resistance:	Resistant to most chemicals including ketones, alcohols, solder flux, and chlorinated solvents
Grounding provisions:	Two 7mm male snaps
Thickness:	.060"



Static Dissipative Table Top Mats

Size	Color	Cat. #/Sheet	Size	Color	Cat. #/Sheet
30 x 60	Beige	**2640-00**	30 x 72	Beige	**2646-00**
30 x 60	Blue	**2641-00**	30 x 72	Blue	**2647-00**
30 x 60	White	**2642-00**	30 x 72	White	**2648-00**
36 x 60	Beige	**2643-00**	36 x 72	Beige	**2649-00**
36 x 60	Blue	**2644-00**	36 x 72	Blue	**2650-00**
36 x 60	White	**2645-00**	36 x 72	White	**2651-00**

Cat. #
7mm Stacking Plug to Accommodate Wrist Straps **2640-03**

Nitrogen and Dry Gas Generators

- **Provide a pure, reliable source of clean, dry air or nitrogen for use in ionizing guns, storage enclosures and processing equipment**
- **Models available to meet wide range of flow and purity requirements**
- **Eliminates reliance on bottled gases**

Dry Gas Generator
—see page 478

Dryex™ Gas Dryer
—see page 479

Nitrogen Generator
—see page 480

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Conductive Wrist Straps: Vital ESD Protection!

As microelectronic components have become smaller and more sophisticated, the danger of their being damaged by electrostatic discharge (ESD) has become proportionally greater. Even very small charges—so small that an operator may not even notice them!—can seriously degrade or destroy many static-sensitive devices.

Making sure that operators are electrically discharged before they begin handling and assembly procedures isn't enough to assure product safety. Even the slightest movements, such as shifting in a seat, can cause the regeneration of potentially disastrous charges. As a result, it has become crucial to provide proper grounding for operators at every manufacturing and packaging stage.

Conductive wrist straps provide the most reliable, economical safeguard against this regeneration of electrostatic charge. Because they maintain a continuous path to ground, they should be an integral part of the microelectronics work station. Terra offers a complete line to suit applications in even the cleanest environment.

Twist-O-Flex® Metal Wrist Straps

- **Virtually indestructible Speidel® metal band is clean, durable and comfortable—designed not to pinch or pull hair!**
- **Superior contact with skin enhances static charge removal**
- **Non-flaking or scratching laminated insulator on all external surfaces protects wearers against electrical hazards**

These wrist straps feature the famous Speidel® Twist-O-Flex® band for optimal comfort, cleanliness, and durability. This metal band is long-wearing, easy to clean, and offers superior skin contact for reliable removal of static charges. It is easy to adjust to any wrist size, so you don't need to stock multiple sizes. Its medical-grade stainless steel interior expansion band will not cause allergic skin reactions for most people. Outside surfaces are laminated to protect wearers against electrical shock.

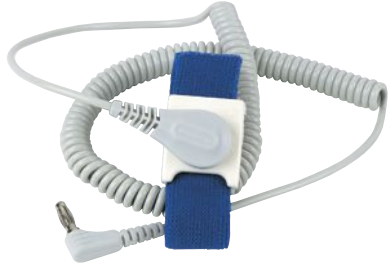
Comes with a banana jack for easy connection of the 6-foot coiled grounding cable to your in-house ground; an alligator clip is also included. Select model with 4mm or 7mm snap for connecting the wrist strap to the grounding cable. Shipping Weight: 0.20 lbs.

	Cat. #
With 4mm snap	**1801-54**
With 7mm snap	**1801-55**

Wrist Strap Kits
With Right-Angle Connector

- **Extra-wide, soft elastic material features silver-impregnated nylon knitted on interior for superior conductivity**
- **Non-allergenic stainless steel prevents allergic reactions**
- **Patented buckle* facilitates easy adjustment to fit any size wrist, eliminating the need to stock multiple models**

This wrist strap features an extra-wide elastic band for optimal wearer comfort. This adjustable, non-slip material can be fitted to any size, allowing you to stock only one size for all personnel. Its non-sloughing design makes it safe for a wide range of microelectronics and semiconductor applications.



The coiled cord includes a 90° angle banana plug for easy connection to an in-house ground and includes an alligator clip. Select model with 6 or 12-foot cord. Strap color is blue. Shipping Weight: 0.20 lbs.

* Patent 4,662,695.

	Cat. #
With 6-foot cord	**1801-58**
With 12-foot cord	**1801-59**

Economy Wrist Straps

- **Cam-lock buckle adjusts easily to any size wrist for one-size-fits-all economy**
- **Elastic, silver-impregnated nylon inner material is highly conductive**
- **Comes with a 5-foot coiled cord with banana connector and additional alligator clip**

These straps feature an adjustable, non-slip inner material that can be fitted to any wrist size. They come with a banana jack for easy connection of the 5-foot coiled grounding cable to your in-house ground; an alligator clip is also included. Select model with 4mm or 7mm snap for connecting the wrist strap to the grounding cable. Color and style may vary. Shipping Weight: 0.30 lbs.

	Cat. #
With 4mm snap	**1801-56**
With 7mm snap	**1801-57**

Why Use Two 2-Meg Resistor Heel Grounders?

Terra highly recommends that personnel in static-sensitive areas wear two heel straps, one on each foot, to increase the integrity of the body-to-ground connection. Wearing a foot grounder on each foot ensures contact with ground via the ESD floor, even when one foot is lifted. This will more reliably remove static charges generated by human movement and more reliably protect ESDS devices.

For enhanced safety from accidental contact with equipment line voltage, we recommend using foot grounders with 2 megohm resistors. Underwriters Laboratories and OSHA recommend a minimum of 1 megohm resistance-to-ground (RTG) in order to limit electrical current exposure to a maximum of 0.00025 amperes. When an operator has both feet on the floor, with each foot grounder having a 1 megohm resistor in series with the ground path, then the operator's combined RTG, in parallel, is only ½ megohm. That is, his equivalent resistance is halved and he is at risk of exposure to 0.00050 amperes in case of contact with 250 VAC line voltage.

By wearing two foot grounders, each with a 2 megohm resistor in series to ground, operators comply with the UL and OSHA recommendations at all times. The operator's RTG is 2 megohms when one foot only is grounded, and he meets the minimum recommended resistance of 1 megohm RTG when both feet are grounded.

All our foot grounders with resistors have been tested by Underwriters Laboratory and are UL listed.

D-Ring System Foot Grounders

Toe-Grounding System

- **The most rugged, longest-lasting heel grounder in the world!**
- **Elastic D-ring comfort system provides maximum ankle comfort and ensures fit of cup to shoe**
- **Hermetically sealed external molded 2-Meg resistor is more durable than sewn-in resistors**

This foot grounder combines all of our premium features in a single, high-value unit. Its cross-linked, 1.5"-wide tire-grade rubber heel cap ensures complete charge dissipation and provides two wear surfaces for greater durability and double the service life of other heel cups.

The elastic D-ring comfort system provides maximum ankle comfort and allows for flex during walking. The 30"-long nylon/polyester grounding tab with eight conductive strands is ideal for boots. Internal reinforced, nonmarring scrim layer eliminates tearing. The rugged molded exterior withstands physical shock and resistor bypass due to moisture. Sole: 1.50"W (heel), 1.25"W (toe). Shipping Weight: 0.20 lbs.

Cat. #
1801-50

3-Layer Blue Non-Marring Foot Grounders

Heel-Grounding System

- **D-ring fastening system provides maximum ankle comfort, ensures snug fit of cup to shoe**
- **Non-marring exterior is ideal for cleanroom applications**
- **Hermetically sealed external molded 2-Meg resistor is rugged and safe, more durable than sewn-in resistors**

This heel-grounding system incorporates all of our advanced features plus a non-marring exterior that won't scuff cleanroom floors. Its elastic D-ring comfort system flexes for more comfortable ankle motion.

The externally molded 2-Meg resistor works when wet. Three-layer blue dissipative rubber heel cup is highly abrasion resistant and ensures complete static dissipation.

Nylon/polyester gray-resistant grounding tab with eight conductive strands dissipates charge quickly and provides excellent electrical interface with worker. Sole: 1.50 wide. Shipping Weight: 0.10 lbs

Cat. #
1801-51

Elasticized Ankle Strap

Heel Grounding System

- **Provides two wide-wear surfaces at an economy price**
- **Includes a 2-Meg flexible resistor**
- **30"-long nylon/polyester grounding tab**

This economy heel grounder includes advanced performance features of our premium models. Its cross-linked, tire-grade rubber provides two wear surfaces for longer service life. The elasticized hook/loop ankle strap flexes for comfortable wear and includes a non-marring interior. A 2-Meg flexible resistor is included. Shipping Weight: 0.10 lbs.

Cat. #
1801-52

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Combination Tester
For Wrist Straps or Foot Grounders

- **Dual test circuits allow versatile testing of footwear or wrist straps**
- **Test results appear on easy-to-read LED display**
- **Convenient, touchpad operation**
- **Red light and audible alarm indicate if circuit resistance is too high or low**

This economical, versatile Combo Tester lets you verify the integrity of wrist straps and foot grounders with a single instrument.

To activate, the user simply touches the front panel. Auto-ranging circuitry automatically selects the proper test range, and clear test results appear on a large LED display. Its battery-powered operation makes it convenient to install at any location. Includes a low-battery indicator. Wrist strap range: 750 kilohms to 100 megohms. Footwear range: 750 kilohms to 100 megohms. Shipping weight: 15 lbs.

Cat. #
1801-67

Wrist Strap Touch Tester

- **Touch-type, on-demand tester is ideal for testing wrist straps and smocks**
- **Quick and easy installation and grounding of both wrist straps and table mats**
- **Highly reliable resistance testing—tests the entire circuit including the wrist strap, cord, and skin contact**

This Touch Tester provides a fast, convenient way to verify the correct function of grounding wrist straps, smock and table mats.

It is easy to install and connects to utility ground when plugged in. Because it tests the entire grounding circuit, it eliminates the need for any additional test equipment. No other grounds are needed; it acts as common grounding point for the entire work surface. Range: 750 kilohms to 10 megohms. Power: 120VAC, 50/60 Hz. Shipping weight: 0.70 lbs.

Cat. #
1801-66

Dual-Operator & Work Station Monitor

- **Allows convenient, continuous wrist strap monitoring of two operators**
- **Wave distortion detection technology ensures the integrity of your static-control program**
- **Mounting system keeps monitor off the benchtop to conserve valuable working space**
- **Also monitors grounding mats**

This workstation continuously monitors two operators and the work surface to ensure that sensitive materials are protected against electrostatic charges.

Continuous monitoring ensures a static-safe environment throughout the manufacturing operation and eliminates the inconvenience and disruption of periodic testing. This unit uses wave distortion detection technology, which monitors current/voltage phase shifts and provides true, 100% continuous monitoring. It includes two banana plugs that allow easy connection of wrist straps or static mats; two remote jacks are included. A mounting bracket allows mounting the unit at eye level, off the work surface. Use with mat types T2, Z2, L, G2, or any mat that has a conductive layer. Work surface limits: 500 megohms. Power requirement: 120VAC, 50/60Hz. Shipping weight: 1 lb.

Cat. #
1801-65

Resistance and Resistivity Measurements: Meeting Test Standards

Before specifying a resistance/resistivity meter for your application, it's helpful to understand the standards these meters should meet.

Resistance characterization of material or finished product is a primary requirement in the static-control industry to define the static-dissipative characteristics of ESD-safe material and products. It is also used wherever the conductive or insulative properties of materials are required.

Test standards used to describe the resistance characterization of material define specific electrode configurations. ASTM D 257 is the test standard that applies to measurement of surface and volume resistivity of insulative material using either parallel bar or concentric ring electrodes. ESD Association Standards S11.11 and S11.12 define a specific D 257 concentric ring electrode configuration to measure surface and volume resistance of dissipative planar material. ASTM D 991 utilizes a 4-pole measurement fixture for measuring bulk resistance of conductive material. ESD Association standards specify a five-point, 2.5"-diameter probe with conductive rubber electrode for measuring point-to-point resistance and resistance-to-ground of ESD-protective work surfaces, floors and seating. ASTM F 150 and NFPA 99 specify a similar probe.

Terra's line of resistance/resistivity probes and test fixtures is designed to meet these requirements. The probes incorporate electrode dimensions that enable the user to convert a surface resistance measurement of surface resistivity by multiplying the reading by 10.

CE

Autoranging Resistance Indicator

- **Ideal for measuring surface resistance and resistance-to-ground (RTG) on conductive mats, chairs, bench surfaces, packing material and other ESD-safe surfaces**
- **Incorporates parallel bar resistivity electrodes**
- **Conforms to test requirements specified in ASTM D 257, EIA-541, NFPA 99, EOS/ESD-4, DAD standards and ASTM F 150 where a 10-volt excitation voltage may be used (with optional resistance probe below).**
- **Delivers 10% measurement accuracy**
- **Compact and low cost**

This precision, easy-to-use instrument incorporates features found only in more expensive units. Twelve LEDs indicate the conductive (green), static-dissipative (yellow) and insulative (red) ranges in one-decade steps from $<10^3$ to $>10^{12}$ Ohms.

Accuracy is ± 10% of the mean value, with changeover points of ± ½ decade on a logarithmic scale. Measurements in the conductive range are made at 10 volts, and all remaining measurements are made at 100 volts.

Auxiliary input jacks enable this resistance indicator to be used for measuring RTG, point-to-point, and surface and volume resistance utilizing optional probes and fixtures. The internal electrodes are disconnected when external ones are attached.

Specifications

Resistance Range:	$<10^3$ to $>10^{12}$ Ohms
Surface Resistivity Range:	$<10^3$ to $>10^{12}$ Ohms/sq.
Range Selection:	Autoranging
Accuracy:	± 10% of mean value
Open Circuit Test Voltage:	10 Volts @ $<10^5$ Ohms 100 Volts @ $>10^6$ Ohms
Dimensions:	5.0" x 2.5" x 1.1" (13 x 6.5 x 2.8cm)
Weight:	8.3 oz. (.23 kg)
Electrode Resistance:	2.5" (6.25cm) parallel chrome bars
Electrode Resistivity:	2.5" (6.25cm) parallel chrome bars
Electrode External:	VE & Sense jacks

Cat.
Autoranging Resistance Indicator **3100-20**
Comes complete with 9-volt battery, RTG cable and vinyl case.

Resistance Measuring Kit
A low-cost alternative for measuring surface resistance, point-to-point and point-to-ground resistance. Includes No. 3100-20 above, in addition to two No. 3100-13 probes (see below), a utility wiring verifier, and ground plane, housed in a molded carrying case. Comes with a Certificate of Calibration and CE Compliance.

Cat. #
3100-21

Surface Resistance Probe

- **Specifically developed to meet EOS/ESD Std. 4, NFPA 99 and ASTM F 150 requirements**
- **Ideal for measuring the resistance of static-dissipative surfaces, such as floors, work surfaces and mats**
- **Operates with a wide range of ohmmeters, including Auto Ranging Resistance indicator No. 3100-20**

Specifications

Dimensions:	2.75" diameter x 5.375" height
Weight:	5 lbs.
Electrode:	2.5" dia., carbon load silicon rubber R contact <30 ohms (Pv = 8 ohms/cm) Hardness: 65 durometer

Cat. #
Surface Resistance Probe **3100-13**

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Static Meter

- **Chopper stabilized sensor produces accurate readings in the ± 20kV range @ 1 inch**
- **Operates in ionized air as well as normal environments**
- **Features easy-to-read 3½-digit LCD readout**
- **LED voltage range indicators provide increased measurement accuracy**
- **Distance ranging lights**
- **MEASURE / HOLD function simplifies reading of fluctuating conditions**
- **Includes recorder output jack for documentation of readings**

This lightweight, precision Static Meter features a chopper stabilized sensor for long-term, accurate measurements in both normal and ionized environments.

The measurement range is from 0 to ± 20 kV at a meter-to-object distance of one inch. A 3½-digit LCD meter provides 100-volt resolution, polarity indication and low battery warning.

The Meter uses LED ranging lights for increased measurement accuracy. A locking push button MEASURE / HOLD switch enables the user to take measurements and then hold the reading, a very useful feature when performing electrostatic experiments. A user-adjustable zero control increases the instrument's versatility.

This Static Meter is housed in a compact, conductive case and incorporates a ¼" male snap that accepts most wrist strap grounding cords. Also includes a 10-foot cord with removable alligator clip and a vinyl carrying case. Operates on a single 9-volt battery (included).

Specifications

Sensor:	Vibrating Reed
Display:	3½-digit LCD
Sample Rate:	3 samples/second
Resolution:	10 V
Accuracy:	± 1%
Linearity:	± 1%
Overscale:	1-.--
Recorder Out:	2.5mm jack
Recorder Signal:	10 mV/kV
Power:	9 V Battery (40 hour typical life)
Ground Connection:	¼" male snap, with 10' cord

Operating Environ.:	0 - 50°C / 0 - 85% RH
Calibration:	NIST Certified: ± 1.0/5.0 kV ± 2%; 12" x 12" target plate
Dimensions:	4.2" x 2.4" x 0.9"
Weight:	5 oz.
Warranty:	One Year

Static Meter Cat. # **3100-06**

Charged Plate Detector
(for use with Static Meter)

- **Allows fast, easy monitoring and balancing of ionizers in desiccators, work stations and other equipment**
- **Converts the Static Meter above into a portable charged plate monitor with 20pf capacitance**
- **Operates in conjunction with the Static Meter (#3100-06) for portable operation throughout your facility**
- **Also performs a variety of other static checks, including measurement of charges generated by movement of cleanroom materials and personnel**

This Charged Plate Detector is designed to slip over the Static Meter (#3100-06) to provide a low cost, accurate check of ionizing equipment performance.

It provides a quick, easy way not only to check whether an ionizer is operational, but also to determine the ionizer output balance. When attached, the Detector increases the measurement sensitivity by a factor of 10, providing one-volt resolution. A banana jack input is provided to allow connection to a variety of accessories such as wrist straps, charged plates, and Faraday cups. The wrist strap connection allows the user to measure directly the voltage generated by the movement of personnel. The charged plate and Faraday Cup configurations provide a simple means for indicating the charge generation characteristics of different types of material and objects.

Charged Plate Detector Cat. # **3100-15**
(Does not include Static Meter, charged plate, or other accessories)

Ground Strap Tester

- **Performs precision ground-strap resistance measurements, automatic upper/lower resistance tests**
- **Ideal for both wrist straps and heel straps**
- **Fail-safe design features automatic self-check**
- **Includes PASS/FAIL indicators, visible/audible alarms**
- **Complies with EOS/ESD and NAVSEA Standards**

This precision Ground Strap Tester automatically measures the resistance of ground straps and clearly indicates whether or not the resistance is within the specified limits.

For ESD applications where the required strap resistance is 1 megohm, the tester uses a lower limit of 750 kilohms and upper limits of either 1.25 megohms (for the strap only) or 10 megohms (for the strap and the wearer). A two-position switch enables the user to select either the STRAP ONLY mode or the STRAP PLUS WEARER mode.

The Ground Strap Tester incorporates both visual and audible indicators and a unique fail-safe design with automatic self-check. Each time the tester is operated, the FAIL audio/visual indicators are momentarily activated prior to the actual test, ensuring that both the FAIL and PASS modes are working. When a defective strap is tested, the FAIL Red LED indicator will flash continuously and the audible alarm will continue to sound. When a good strap is tested, the FAIL Red LED will flash and the audible alarm will sound for approximately one half second; the PASS Green LED indicator will then light and remain lit for as long as the TEST button is depressed.

This tester is AC-operated and contains an automatic power supply monitor that warns of a malfunction; a transformer coupling achieves AC isolation. The grounded AC power supply enables heel straps attached to personnel to be tested without any additional connections when used in conjunction with grounded floor systems. Three input connectors accommodate most types of ground straps: a banana jack and both .25" and .375" snaps. Testers can be wall or bench mounted.

Specifications

Resistance Threshold Limits:

ESD (1 megohm nominal resistance)

Lower Limit:	750 kilohms ± 2%
Upper Limit:	STRAP ONLY: 1.25 megohms ± 2%
	STRAP & WEARER: 10 megohms ± 10%

Indicators

FAIL:	Flashing Red LED/pulsating audible alarm
PASS:	Continuous Green LED
Input Connectors:	Standard Banana Jack, .25" Snap, .375" Snap
Applicable Spec:	EOS/ESD Assoc. Std. DS1-3/85
Power:	
110/220 VAC, 50/60 Hz	
Fuse:	3AG ¼ Amp
Line Cord:	3 cond., 8 ft
Dimensions:	
Case:	ABS Plastic
Size:	4"L x 4"W x 2"D
Weight:	1.25 lbs.
Warranty:	Ninety (90) days

ESD Ground Strap Tester	Cat.#
120VAC/60Hz	**3100-16**
220VAC/50Hz	**3100-18**

Portable Ground Strap Tester

- **Incorporates upper and lower resistance tests**
- **Displays PASS/FAIL information on easy-to-read LED**
- **Provides an audible "Out of Spec" alarm**

This Ground Strap Tester provides an inexpensive method for guaranteeing the integrity of wrist straps. This compact, automatic test unit checks the specified resistance limits of all types of wrist straps and other similar personnel grounding devices. A single banana-jack input connector accommodates industry-standard wrist straps. A belt clip is included; the case is made of tough ABS plastic.

Dual Upper Limits for Flexible Applications

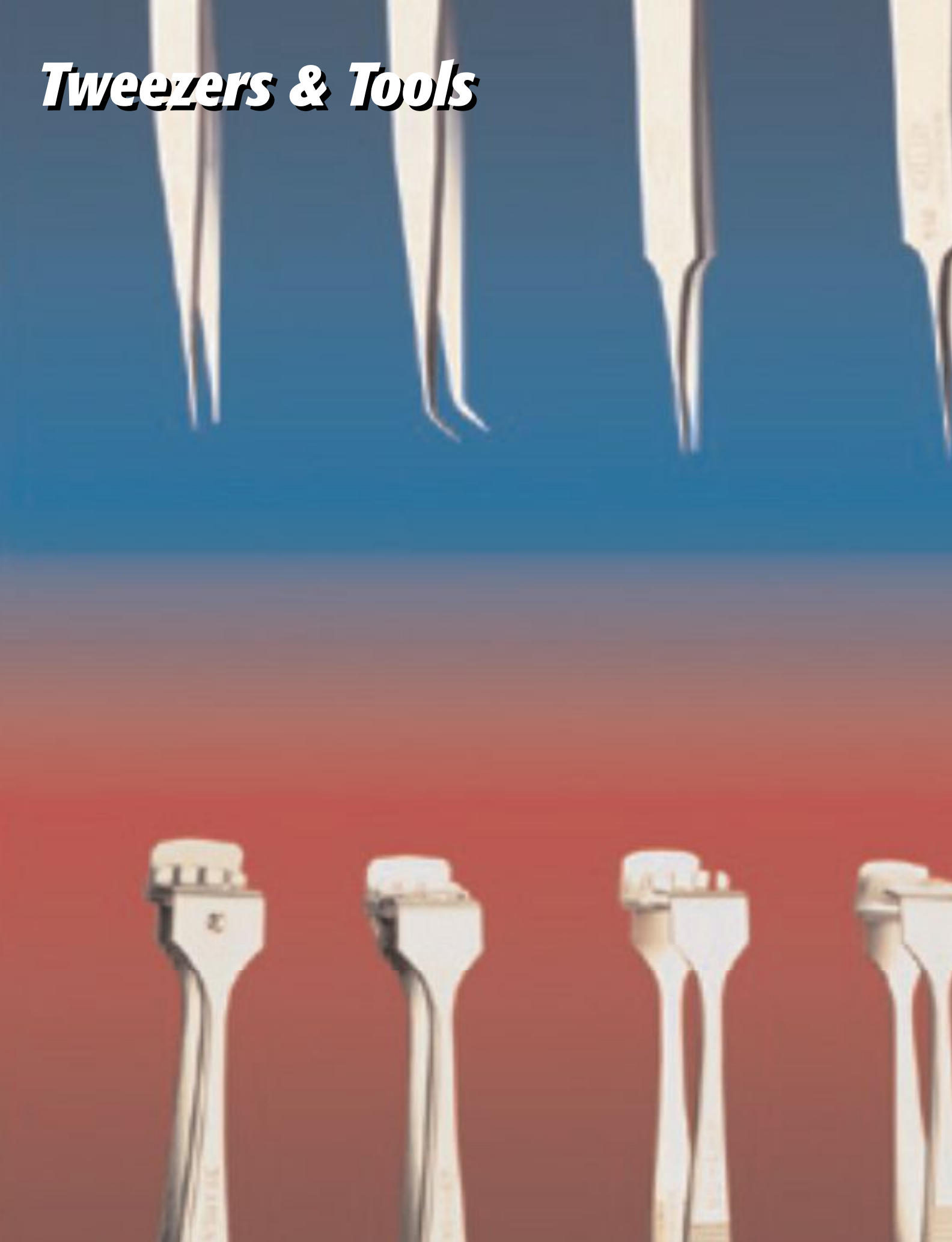
The tester compares the measurement to preset lower (750 kilohms) and upper (1.25 or 10 megohms) resistance levels. A two-position switch located on the front panel enables the user to select either upper limit; use the 10 megohm limit for checking the condition of the wrist strap while on the wearer's wrist, or the 1.25 megohm upper limit for checking the wrist strap alone.

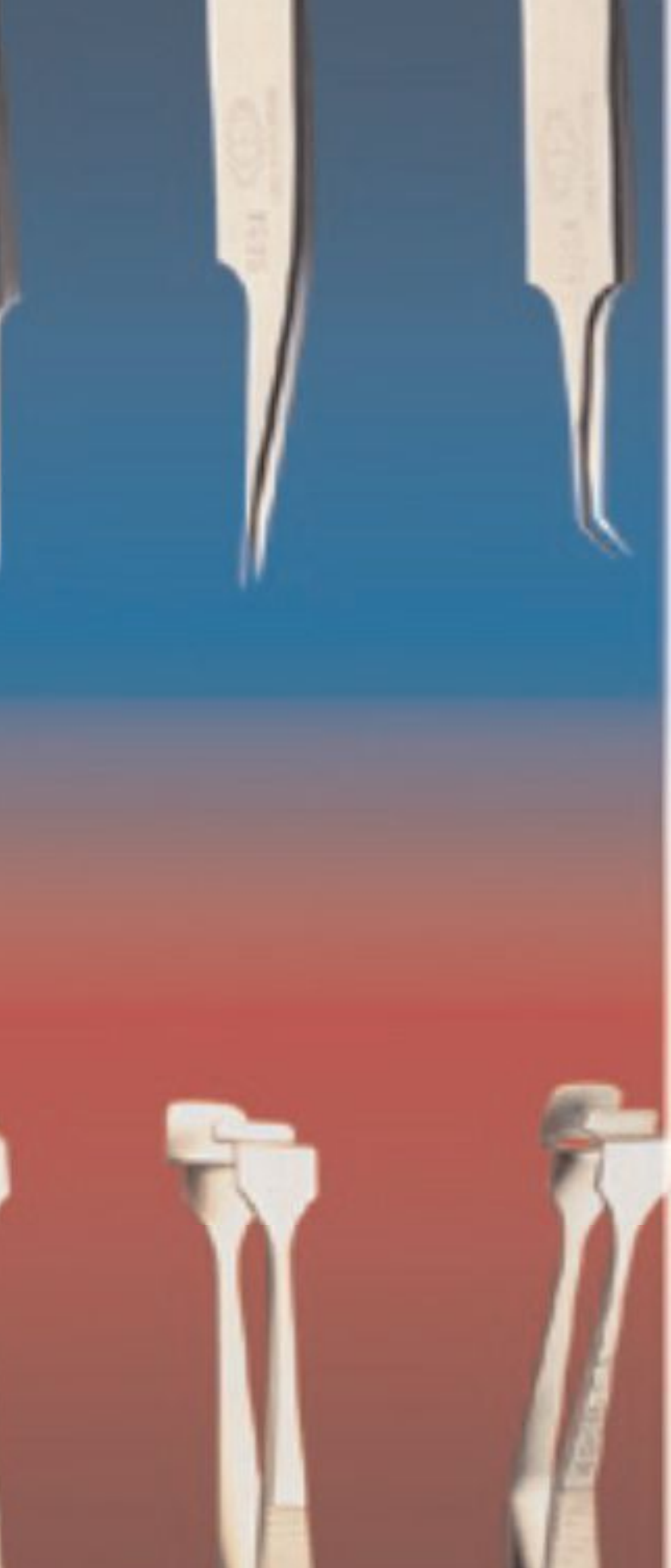
The tester incorporates both visual and audible PASS/FAIL indicators and a unique fail-safe design with automatic self-check. Each time the tester is operated, the FAIL audio/visual indicators are momentarily activated prior to the actual test, ensuring that both the FAIL and PASS modes function properly. When a defective strap is tested, the red FAIL LED indicator and audible alarm are indicated.

The circuits and displays used are part of an efficient (low current) circuit design that enables the unit to operate from a single 9-volt alkaline battery for a period in excess of two years under normal use. The unit also contains a battery test circuit that continuously monitors the condition of the battery and warns the operator when it must be replaced. Complies with requirements of EOS/ESD Assoc. STD DS -1 3/85.

Wrist Strap Tester	Cat. #
Size: 3.75"L x 2.25"W x 1"H	**3100-07**
Weight: 5 oz.	

Tweezers & Tools





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Six-Star Tweezer Program

Because different applications require different degrees of precision, we offer a Six-Star Tweezer Program that lets you select the perfect balance of quality and economy. Choose from six tiers of precision tweezers designed for a broad range of microelectronics applications.

Our finest quality ***Six-Star Cobaltima®*** line is perfect for applications in the microelectronics and semiconductor industries, where high-precision is demanded. The tweezers are made entirely from a new steel extruded alloy containing 40% Cobalt, which is the key to tip hardness and longevity. These tweezers are not corrosive, non-magnetic, and resistant to fatigue, with an unmatched durability. They are the thinnest, lightest, and strongest tweezer to be found. Cobaltima tweezers have a 1 mm body thickness.

Our premium quality ***Five-Star Altima®*** line is manufactured of Super Neverust® super antimagnetic, anti-acid stainless steel with micro-high precision tips. These tweezers are ideal for microelectronics assembly, high-power stereo microscope usage, and a variety of other applications.

Both the Six-Star Cobaltima® and the Five-Star Altima® line feature No Glare™ Satin Finish points and Airflow™ finger grooves.

The ***Four-Star Optima®*** ultra-high precision line is ideal for aerospace microelectronics, biotechnology and medical applications. They are constructed of Super Neverust® super antimagnetic, anti-acid steel.

Our superior quality ***Three-Star Excelta®*** line is ideal for the computer and microelectronics industries. These tweezers are perfect for close-tolerance work in electronics and SMD production and testing. Constructed of premium antimagnetic, anti-acid Neverust® steel.

The high quality ***Two-Star Precista®*** tweezers are perfect for semiconductor electronics applications that require both durable and precise processing tools.

Standard quality ***Selecta™*** tweezers are ideal for general consumer electronics work.

All Precista® and Selecta™ are constructed of antimagnetic, anti-acid stainless steel.

Excelta® Processing Tools

- **Complete line of precision tweezers for a wide range of microelectronics applications**
- **Choose from hundreds of tweezers designed specifically for SMD applications, others suitable for laboratory and general-purpose use**

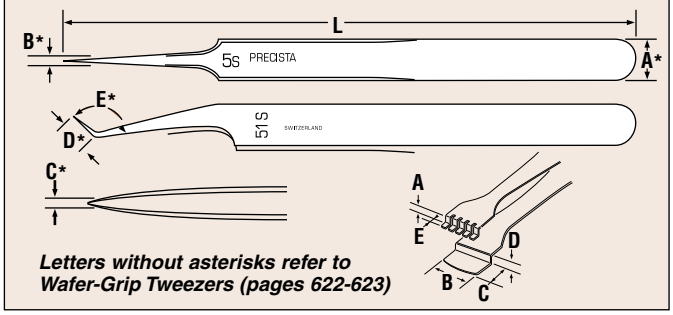
Standard package for tweezers is 12 pieces. Please order in lots of twelve whenever possible.

Teflon coating is available for many of the tweezers offered (flat-tip tweezers only). Choose between full-length coating or coating 1/5 inch from the tip. Specify tweezer desired and add to unit price. Must be ordered in lots of 12.

	Full length Cat. #	1.5 inch from tip Cat. #
1.5 mil coating	**9301-38**	**9305-20**
3 mil coating	**9301-39**	**9305-21**
5 mil coating	**9301-40**	**9305-22**

- **For scalpels and spatulas, see page 626**
- **For Excelta's Roto-Pic® System for handling chips and wafers, see page 625**

DIMENSIONAL DRAWINGS



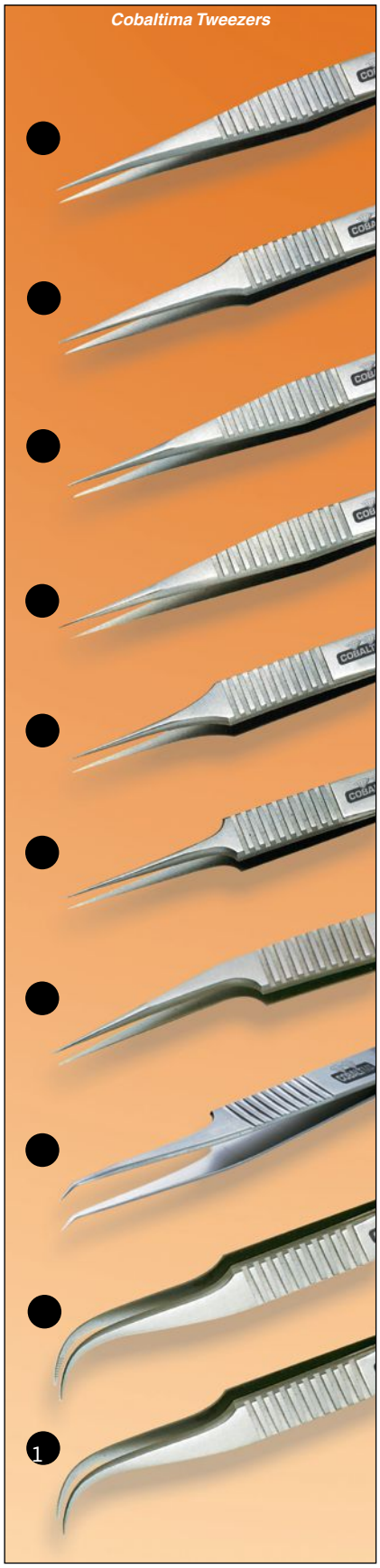
Letters without asterisks refer to Wafer-Grip Tweezers (pages 622-623)

Cleanroom Cutters with Tungsten Carbide Implants™

These stainless steel cutters are the next generation in cleanroom cutters. With Hardness of Implant cutting edges of 70/71 RC, jaw hardness of 54-56 RC, and double stainless steel leaf springs, these cutters will outlast conventional cutters up to 3 times, will not rust, and will ease operator fatigue. ESD safe grips.

Type		Cat. # 9310-63 Fine Long Tip Relieved Head	Cat. # 9310-64 Oblique Tip Angled Head	Cat. # 9310-65 Oblique Tip Angled Head	Cat. # 9310-66 Tapered Head Diagonal	Cat. # 9310-67 Fine Tip Relieved Head
DIMENSIONS	A	.800 in./20 mm	.800 in./20 mm	.800 in./20 mm	.510 in./13 mm	.647 in./16.5 mm
	B	.275 in./7 mm	.275 in./7 mm	.275 in./7 mm	.275 in./7 mm	.275 in./7 mm
	C	.197 in./5 mm	.248 in./6.3 mm	.248 in./6.3 mm	.240 in./6 mm	.252 in./6.4 mm
	D	.025 in./.65 mm	.012 in./.3 mm	.012 in./.3 mm	.030 in./.75 mm	.101 in./.25 mm
	E	—	65°	55°	—	—

Cobaltima® (Six-Star) and Altima® (Five-Star) Tweezers



1 Super Micro-High Precision Tweezer
Straight tips.

				Cat. #
L	4.50 in.	115.0 mm		
A*	.3930	10.00		
B*	.0059	0.15	**Cobaltima**	**9310-09**
C*	.0031	0.08	**Altima**	**9310-19**

2 Super Micro-High Precision Tweezer
Tapered tips.

				Cat. #
L	4.75 in.	120.0 mm		
A*	.3930	10.00		
B*	.0098	0.25	**Cobaltima**	**9310-10**
C*	.0039	0.10	**Altima**	**9310-20**

3 Super Micro-High Precision Tweezer
Straight fine tips.

				Cat. #
L	4.25 in.	110.0 mm		
A*	.3550	9.00		
B*	.0031	0.08	**Cobaltima**	**9310-11**
C*	.0016	0.04	**Altima**	**9310-21**

4 Super Micro-High Precision Tweezer
Straight fine tips.

				Cat. #
L	4.75 in.	120.0 mm		
A*	.3930	10.00		
B*	.0031	0.08	**Cobaltima**	**9310-12**
C*	.0016	0.04	**Altima**	**9310-22**

5 Super Micro-High Precision Tweezer
Fine tapered tips.

				Cat. #
L	4.25 in.	110.0 mm		
A*	.3750	9.50		
B*	.0024	0.06	**Cobaltima**	**9310-13**
C*	.0008	0.02	**Altima**	**9310-23**

6 Super Micro-High Precision Tweezer
Super fine tapered tips.

				Cat. #
L	4.25 in.	110.0 mm		
A*	.3930	10.00		
B*	.0020	0.05	**Cobaltima**	**9310-14**
C*	.0004	0.01	**Altima**	**9310-24**

7 Super Micro-High Precision Tweezer
Offset tips.

				Cat. #
L	4.50 in.	115.0 mm		
A*	.3930	10.00		
B*	.0024	0.06	**Cobaltima**	**9310-15**
C*	.0008	0.02	**Altima**	**9310-25**

8 Super Micro-High Precision Tweezer
Oblique angle for die attach in semiconductor industry. Great visibility.

				Cat. #
L	4.50 in.	115.0 mm		
A*	.3550	9.00		
B*	.0030	0.08		
C*	.0015	0.04		
D*	.2150	5.50	**Cobaltima**	**9310-16**
E*	45°		**Altima**	**9310-26**

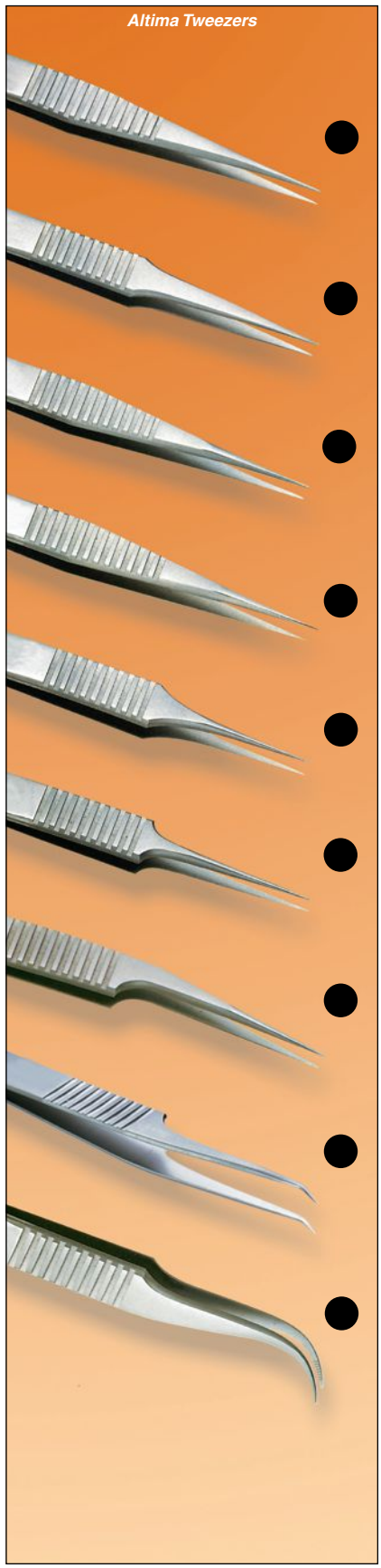
9 Super Micro-High Precision Tweezer
Curved fine points.

				Cat. #
L	4.50 in.	115.0 mm		
A*	.3930	10.00		
B*	.0027	0.07	**Cobaltima**	**9310-17**
C*	.0012	0.03	**Altima**	**9310-27**

10 Super Micro-High Precision Tweezer
Curved fine serrated points.

				Cat. #
L	4.50 in.	115.0 mm		
A*	.3930	10.00		
B*	.0027	0.07	**Cobaltima**	**9310-18**
C*	.0012	0.03	**Altima**	—

**** See dimensional sketch, page 612***



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Optima® (Four-Star) and Excelta® (Three-Star) Tweezers

- **Ultra high precision quality Optima line ideal for military and aerospace electronics**
- **Superior quality Excelta® line ideal for computer and microelectronics**
- **All Optima and Excelta tweezers constructed of premium anti-magnetic, anti-acid Neverust® steel**

1 **Fine Straight Precision Point Tweezer**
A slender tweezer for delicate operations such as bending and handling of fine wires and components.

L	4.5 in.	115.0 mm		
A*	.393	10.0		Cat. #
B*	.015	0.4	**Optima**	**9301-45**
C*	.015	0.4	**Excelta**	**9301-46**

2 **Medium Tapered Precision Point Tweezer**
Used for bending and handling of fine wires and components.

L	4.75 in.	120.0 mm		
A*	.393	10.0		Cat. #
B*	.019	0.5	**Optima**	**9301-47**
C*	.019	0.5	**Excelta**	**9301-48**

3 **Round Tip Tweezer**
Flat rounded tips are ideal for holding various micro-components.

L	4.75 in.	120.0 mm		
A*	.393	10.0		Cat. #
B*	.063	1.6	**Optima**	**9301-49**
C*	.015	0.4	Excelta	**9300-17**

4 **Straight Precision Point Tweezer**
Ideal for use in microelectronic assembly.

L	4.75 in.	120.0 mm		
A*	.375	9.5		Cat. #
B*	.011	0.3	**Optima**	**9301-50**
C*	.015	0.4	**Excelta**	**9301-51**

5 **Straight Point Tweezer**
Same as above, except longer..

L	4.25 in.	110.0 mm		
A*	.375	9.5		Cat. #
B*	.011	0.3	**Optima**	**9301-52**
C*	.015	0.4	**Excelta**	**9300-07**

6 **Tapered Fine Precision Point Tweezer**
Excellent for dense access areas in microelectronic assembly.

L	4.25 in.	110.0 mm		
A*	.375	9.5		Cat. #
B*	.011	0.3	**Optima**	**9301-53**
C*	.011	0.3	**Excelta**	**9300-01**

7 **Tapered Micro-Fine Precision Point Tweezer**
For die attaching and wire bonding in microelectronic assembly.

L	4.25 in.	110.0 mm		
A*	.375	9.5		Cat. #
B*	.011	0.3	**Optima**	**9301-54**
C*	.011	0.3	**Excelta**	**9300-02**

8 **Angled Precision Point Tweezer**
Offset angle provides easy access, good visibility.

L	4.5 in.	115.0 mm		
A*	.360	9.0		
B*	.011	0.3		Cat. #
C*	.019	0.5	**Optima**	**9301-55**
E*	10°		**Excelta**	**9300-04**

9 **Angled Precision Point Tweezer**
For a variety of applications such as manipulating small components.

L	4.5 in.	115.0 mm		
A*	.393	10.0		
B*	.011	0.3		
C*	.019	0.5		Cat. #
D*	.512	13.0	**Optima**	**9301-56**
E*	75°		**Excelta**	**9302-65**

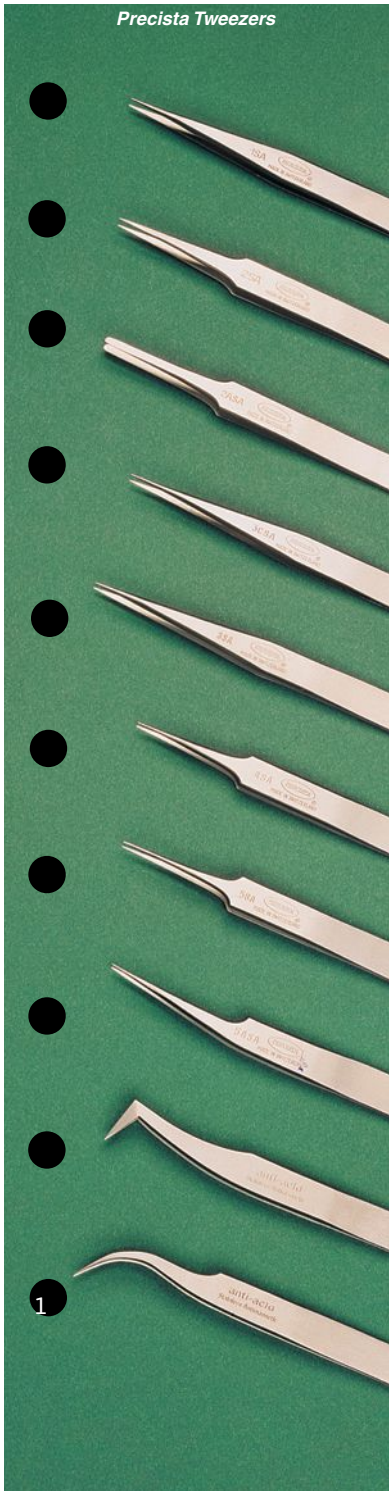
10 **Curved Tip Precision Tweezer**
Curved tip allows maximum visibility in magnified applications.

L	4.5 in.	115.0 mm		
A*	.393	10.0		
B*	.011	0.3		Cat. #
C*	.016	0.4	**Optima**	**9301-58**
E*	45°		**Excelta**	**9300-05**

** See dimensional sketch, page 612*

Precista® (Two-Star) and Selecta™ (One-Star) Tweezers

- **Choose from two tiers of precision tweezers designed for a broad range of microelectronics applications**
- **Precision quality Precista® line ideal for semi-conductor electronics**
- **Standard quality Selecta™ line ideal for consumer electronics**
- **All Precista and Selecta tweezers constructed of anti-magnetic, anti-acid stainless steel**



1 **Fine Straight Precision Point Tweezer**
A slender tweezer for delicate operations such as bending and handling of fine wires and components.

L	4.5 in.	115.0 mm		
A*	.393	10.0		Cat. #
B*	.015	0.4	**Precista**	**9301-59**
C*	.015	0.4	**Selecta**	**9301-60**

2 **Medium Tapered Precision Point Tweezer**
Used for bending and handling of fine wires and components.

L	4.75 in.	120.0 mm		
A*	.393	10.0		Cat. #
B*	.019	0.5	**Precista**	**9301-61**
C*	.019	0.5	**Selecta**	**9301-62**

3 **Round Tip Tweezer**
Flat rounded tips are ideal for holding various micro-components.

L	4.75 in.	120.0 mm		
A*	.393	10.0		Cat. #
B*	.063	1.6	**Precista**	**9301-63**
C*	.015	0.4	**Selecta**	**9301-64**

4 **Straight Precision Point Tweezer**
Ideal for use in microelectronic assembly.

L	4.25 in.	110.0 mm		
A*	.375	9.5		Cat. #
B*	.011	0.3	**Precista**	**9301-65**
C*	.015	0.4	**Selecta**	**9301-66**

5 **Straight Point Tweezer**
Same as above, except longer.

L	4.75 in.	120.0 mm		
A*	.375	9.5		Cat. #
B*	.011	0.3	**Precista**	**9301-67**
C*	.015	0.4	**Selecta**	**9301-68**

6 **Tapered Fine Precision Point Tweezer**
Excellent for dense access areas in microelectronic assembly.

L	4.25 in.	110.0 mm		
A*	.375	9.5		Cat. #
B*	.011	0.3	**Precista**	**9301-69**
C*	.011	0.3	**Selecta**	**9301-70**

7 **Tapered Micro-Fine Precision Point Tweezer**
For die attaching and wire bonding in microelectronic assembly.

L	4.25 in.	110.0 mm		
A*	.375	9.5		Cat. #
B*	.011	0.3	**Precista**	**9301-71**
C*	.011	0.3	**Selecta**	**9301-72**

8 **Angled Precision Point Tweezer**
Offset angle provides easy access, good visibility.

L	4.5 in.	115.0 mm		
A*	.360	9.0		Cat. #
B*	.011	0.3	**Precista**	**9301-73**
C*	.019	0.5	**Selecta**	**9301-74**
E*	10°			

9 **Angled Precision Point Tweezer**
For a variety of applications such as manipulating minute components.

L	4.5 in.	115.0 mm		
A*	.393	10.0		
B*	.011	0.3		Cat. #
C*	.019	0.5	**Precista**	**9301-75**
D*	.512	13.0	**Selecta**	**9302-76**
E*	75°			

10 **Curved Tip Precision Tweezer**
Curved tip allows maximum visibility in magnified applications.

L	4.5 in.	115.0 mm		
A*	.393	10.0		Cat. #
B*	.011	0.3	**Precista**	**9301-77**
C*	.016	0.4	**Selecta**	**9301-78**
E*	45°			

** See dimensional sketch, page 612*

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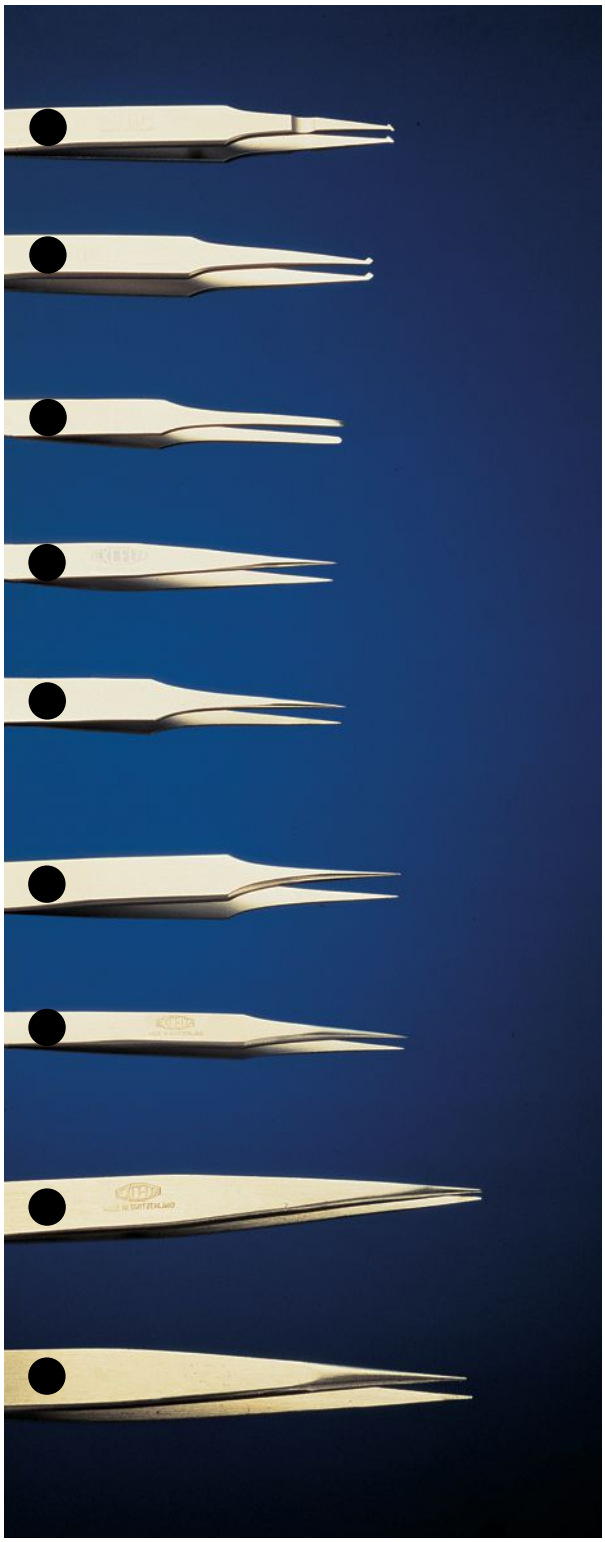
800 S. Raymond Ave., Fullerton, CA 92831 CA

SMD Tweezers *(Excelta® Three-Star Line)*

Construction materials vary by tweezer model; available materials include stainless steel Aisi 440, carbon steel, premium anti-magnetic anti-acid Neverust® steel, Aisi 304, and non-magnetic nickel alloy.



1 **Chip Handling Tweezer**
For handling chips or miniature components. Allows easy manipulation of the chips, and the 45° angled head prevents operator fatigue. Features an anti-crush device to reduce chip breakage. Length: 4.5 in. (115 mm).

		Premium	Cat. #
		Neverust® Steel	**9302-41**

2 **Chip Handling Tweezer**
Similar to the tweezer above, except the head construction is sturdier. Length: 4.5 in. (115 mm).

		Premium	Cat. #
		Neverust® Steel	**9302-42**

3 **"Micromette" Round Tip Tweezer**
The flat, round tips make this tweezer excellent for handling various micro-components.

			Premium	Cat. #
L	2.75 in.	70.0 mm		
A*	.275	7.0		
B*	.060	1.5		
C*	.019	0.5	Neverust® Steel	**9302-43**

4 **"Micromette" Straight Precision Point Tweezer with Fine Tip**
Designed for microelectronic assembly.

				Cat. #
L	2.75 in.	70.0 mm		
A*	.315	8.0		
B*	.011	0.3		
C*	.019	0.5	Stainless Steel	**9302-44**

5 **"Micromette" Tapered Fine Precision Point Tweezer with Extra Fine Tip**
A uniquely designed tweezer: Its length, combined with its long tapered shank and finely honed points, makes it suitable for handling extremely fine parts.

				Cat. #
L	2.75 in.	70.0 mm		
A*	.275	7.0		
B*	.060	1.5		
C*	.011	0.3	Stainless Steel	**9302-45**

6 **"Micromette" Tapered Fine Precision Point Tweezer with Medium Fine Tip**
Excellent for dense access areas in microelectronic assembly.

				Cat. #
L	3.5 in.	90.0 mm		
A*	.375	9.5		
B*	.007	0.2		
C*	.015	0.4	Stainless Steel	**9302-46**

7 **"Micromette" Tapered Fine Precision Point Tweezer with Micro Fine Tip**
For die attaching or wire bonding in microelectronic assembly.

				Cat. #
L	3.25 in.	85.0 mm		
A*	.215	5.5		
B*	.011	0.3		
C*	.019	0.5	Stainless Steel	**9302-47**

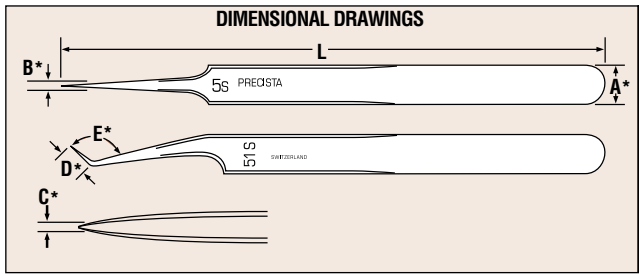
8 **Straight Precision Point Nickel Alloy Tweezer**
Very slender tweezer for delicate applications. Designed for bending and handling very fine wires and components. Made of non-magnetic, non-scratching nickel alloy.

			Cat. #
L	4.75 in.	120.0 mm	
A*	.393	10.0	
B*	.015	0.4	
C*	.023	0.6	**9302-48**

9 **Straight Precision Point Nickel Alloy Tweezer**
Very popular style for use in microelectronic assembly. Made of non-magnetic, non-scratching nickel alloy.

				Cat. #
L	4.75 in.	120.0 mm		
A*	.375	9.5		
B*	.011	0.3		
C*	.018	0.5		**9302-49**

** See dimensional sketch, page 617*



1 **Oblique Angle Precision Point Tweezer**
Oblique angle offers maximum surface clearance, optimum visibility.

				Cat. #
L	4.25 in.	110.0 mm		
A*	.355	9.0		
B*	.011	0.3		
C*	.015	0.4		
D*	.215	5.5		
E*	45°		Stainless Steel	**9302-51**

2 **Tapered Fine Precision Point Tweezer**
Excellent for dense access areas in microelectronic assembly.

				Cat. #
L	4.25 in.	110.0 mm		
A*	.375	9.5	Carbon Steel	**9302-52**
B*	.011	0.3	Stainless Steel	**9302-54**
C*	.011	0.3	Premium Neverust® Steel	**9300-01**

3 **Tapered Micro-Fine Precision Point Tweezer**
For die attaching and wire bonding in microelectronic assembly.

				Cat. #
L	4.25 in.	110.0 mm		
A*	.375	9.5	Carbon Steel	**9302-55**
B*	.011	0.3	Stainless Steel	**9302-57**
C*	.011	0.3	Premium Neverust® Steel	**9300-02**

4 **Angled Precision Point Tweezer**
Offset angle offers easy access and is designed for good visibility.

				Cat. #
L	4.5 in.	115.0 mm		
A*	.360	9.0		
B*	.011	0.3		
C*	.019	0.5	Stainless Steel	**9302-59**
E*	10°		Premium Neverust® Steel	**9300-04**

5 **Oblique Angle Precision Tip Tweezer**
Bent tips allow maximum visibility for magnified applications.

				Cat. #
L	4.25 in.	110.0 mm		
A*	.355	9.0		
B*	.011	0.3		
C*	.016	0.4		
D*	.215	5.5		
E*	45°		Premium Neverust® Steel	**9301-57**

6 **Oblique Angle Precision Tip Tweezer**
Useful for a wide range of applications, especially in the semiconductor industry. Circumvented tips allow greater visibility under a microscope.

				Cat. #
L	4.5 in.	115.0 mm		
A*	.375	9.5		
B*	.011	0.3		
C*	.019	0.5		
D*	.215	5.5		
E*	45°		Premium Neverust® Steel	**9302-63**

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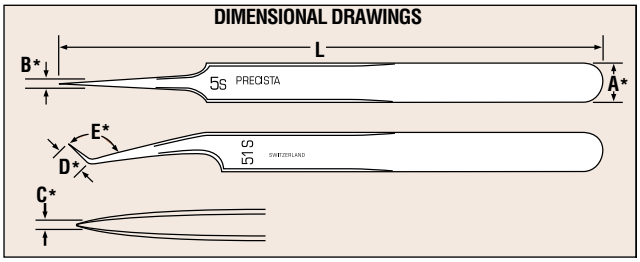
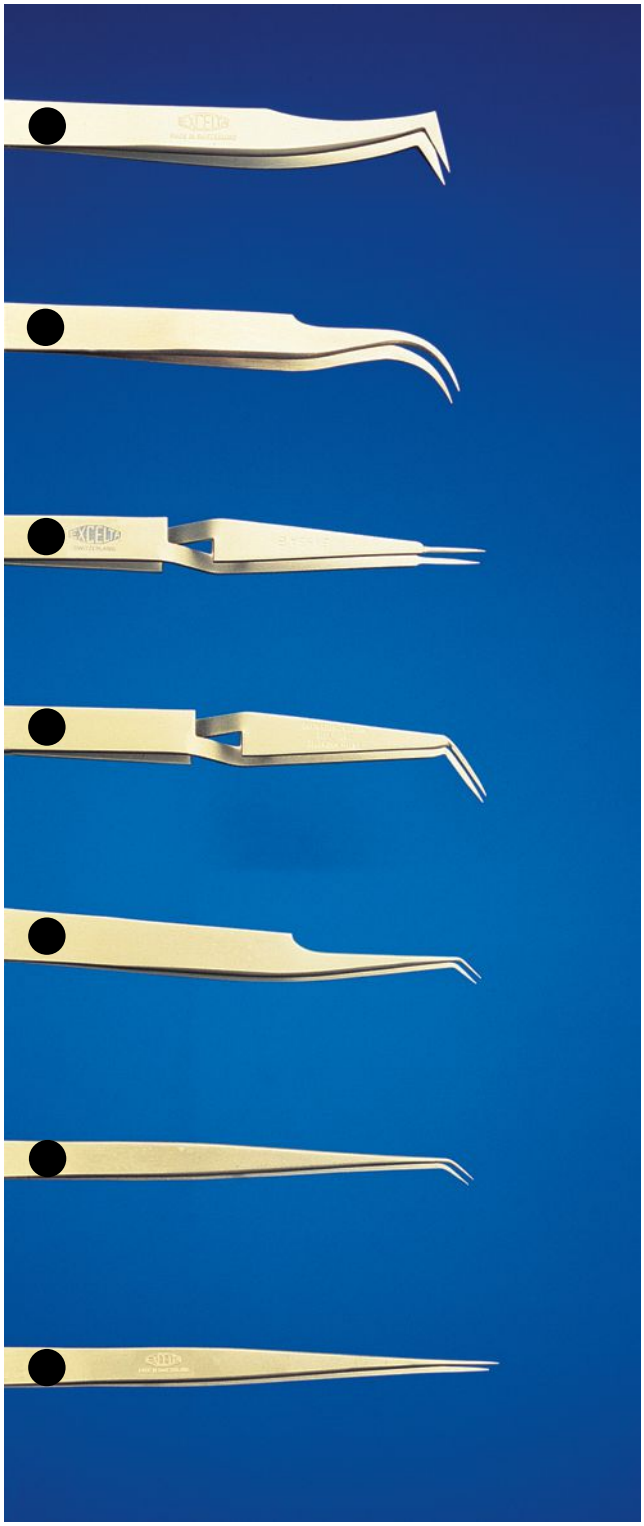
DIMENSIONAL DRAWINGS





1 **Angled Precision Point Tweezer**
For a range of applications such as manipulating minute components.

L	4.5 in.	115.0 mm		
A*	.393	10.0		
B*	.011	0.3		Cat. #
C*	.019	0.5	Carbon Steel	**9302-64**
D*	.512	13.0	Stainless Steel	**9300-06**
E*	75°		Premium Neverust® Steel	**9302-65**

2 **Curved Tip Precision Tweezer**
Curved tip allows maximum visibility under magnified applications.

L	4.5 in.	115.0 mm		
A*	.393	10.0		Cat. #
B*	.011	0.3	Carbon Steel	**9302-66**
C*	.016	0.4	Stainless Steel	**9302-68**
E*	45°		Premium Neverust® Steel	**9300-05**

3 **Reverse Action Straight Precision Point Tweezer**
Designed to insert or extract very fine silicon chips from chip trays.

L	5.0 in.	127.0 mm		
A*	.335	8.5		
B*	.019	0.5		Cat. #
C*	.027	0.7	Premium Neverust® Steel	**9302-69**

4 **Reverse Action Oblique Angle Precision Point Tweezer**
Same as above, except for the 45° angle, which enhances visibility.

L	4.75 in.	120.0 mm		
A*	.335	8.5		
B*	.019	0.5		
C*	.027	0.7		
D*	.433	11.0		Cat. #
E*	45°		Premium Neverust® Steel	**9302-70**

5 **Oblique Angle Precision Point Tweezer**
Ideal for a variety of applications, especially in the semiconductor industry.

L	4.5 in.	115.0 mm		
A*	.355	9.0		
B*	.011	0.3		
C*	.016	0.4		Cat. #
D*	.215	5.5	Stainless Steel	**9302-71**
E*	45°		Premium Neverust® Steel	**9302-72**

6 **Extra-Long Oblique Angle Precision Point Tweezer**
Extra length improves operator safety. Also useful in dense or confined areas.

L	5.5 in.	140.0 mm		
A*	.275	7.0		
B*	.011	0.3		
C*	.019	0.5		Cat. #
D*	.215	5.5	Stainless Steel	**9302-73**
E*	45°		Premium Neverust® Steel	**9302-74**

7 **Long Narrow Straight Precision Point Tweezer**
Extra length increases safety for operator working near high temperatures.

L	5.5 in.	140.0 mm		
A*	.275	7.0		Cat. #
B*	.007	0.2	Stainless Steel	**9302-75**
C*	.019	0.5	Premium Neverust® Steel	**9302-76**

**** See dimensional sketch above***

Broad Tip Tweezers

Available in a variety of different tips for specialized applications.

1 **Round Tip Tweezer**
Flat rounded tips are ideal for holding various micro-components.

				Cat. #
L	4.75 in.	120.0 mm		
A*	.393	10.0	Carbon Steel	**9303-28**
B*	.063	1.6	Stainless Steel	**9303-30**
C*	.015	0.4	Premium Neverust® Steel	**9300-17**
			Nickel Alloy	**9303-32**

2 **Curved Round Tip Nickel Alloy Tweezer**
For handling wafers. The angle eases loading of boats, wafer trays.

			Cat. #
L	4.5 in.	115.0 mm	
A*	.393	10.0	
B*	.060	1.5	
C*	.019	0.5	
E*	60°		**9303-33**

3 **Offset Round Tip Neverust® Steel Tweezer**
Flat, rounded tips with a 45° offset angle, allowing good surface clearance.

			Cat. #
L	4.5 in.	115.0 mm	
A*	.393	10.0	
B*	.063	1.6	
C*	.015	0.4	
D*	.235	6.0	
E*	45°		**9303-34**

4 **Round Tip Carbon Steel Tweezer with Nickel Plating**
Smooth inside tips will not break or scratch fragile surfaces.

			Cat. #
L	4.75 in.	120.0 mm	
A*	.393	10.0	
B*	.138	3.5	
C*	.027	0.7	**9303-35**

5 **Extra-Wide Round Tip Carbon Steel Tweezer with Nickel Plating**
Same as above, but tip width is greater.

			Cat. #
L	4.75 in.	120.0 mm	
A*	.393	10.0	
B*	.235	6.0	
C*	.027	0.7	**9303-36**

6 **Broad Tip Carbon Steel Tweezer with Nickel Plating**
Useful for straightening component leads or wire.

			Cat. #
L	4.25 in.	110.0 mm	
A*	.433	11.0	
B*	.197	5.0	
C*	.039	1.0	
D*	.532	13.5	**9303-37**

7 **Round Tip Anti-Crush Neverust® Steel Tweezer**
With flat, rounded tips for handling various micro-components and an anti-crush device to prevent damage to delicate components.

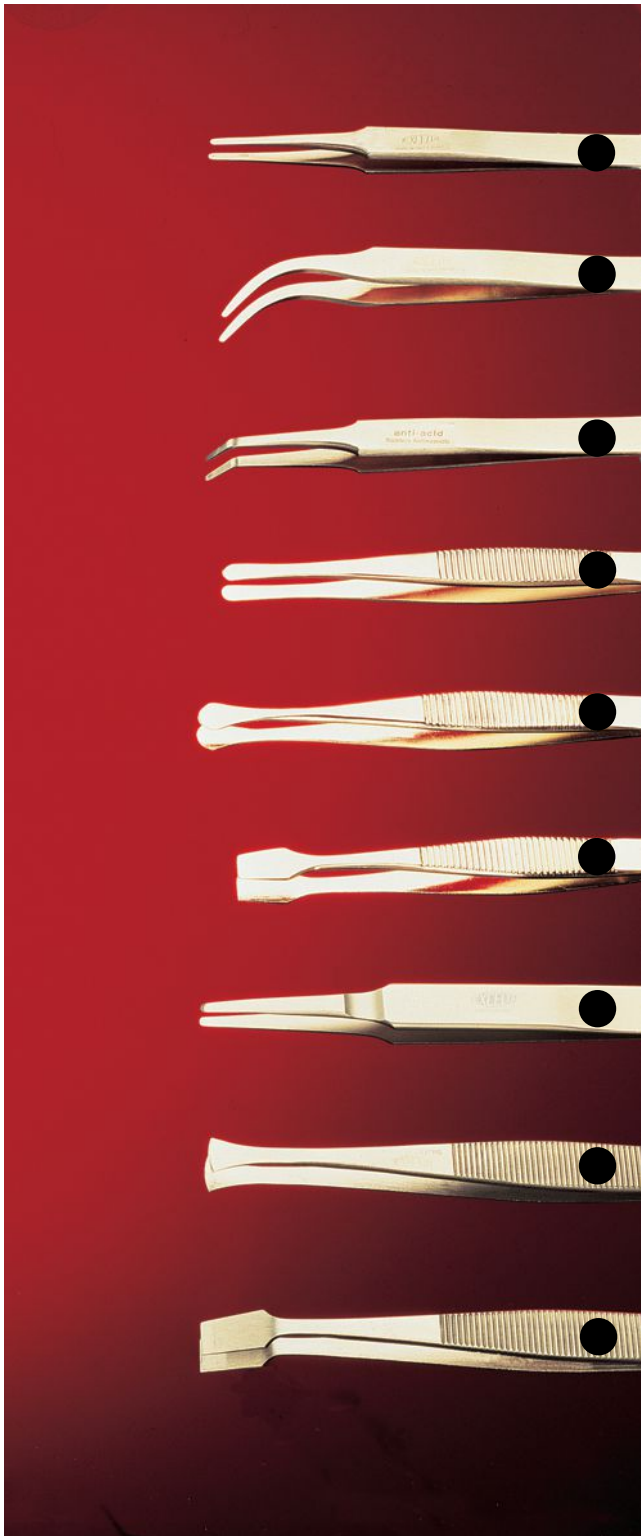
			Cat. #
L	4.75 in.	120.0 mm	
A*	.393	10.0	
B*	.063	1.6	
C*	.015	0.4	**9303-38**

8 **Semi-Precision Broad Tip Neverust® Steel Tweezer**
Ideal for handling delicate electronic parts.

			Cat. #
L	4.75 in.	120.0 mm	
A*	.393	10.0	
B*	.027	0.7	
C*	.257	6.5	**9303-39**

9 **Offset Broad Tip Neverust® Steel Tweezer**
Similar to tweezer above, with an offset angle on the tips. Useful for picking up parts from flat surfaces.

			Cat. #
L	4.75 in.	120.0 mm	
A*	.393	10.0	
B*	.039	1.0	
C*	.257	6.5	
D*	.472	12.0	
E*	45°		**9303-40**



** See dimensional sketch, page 618*

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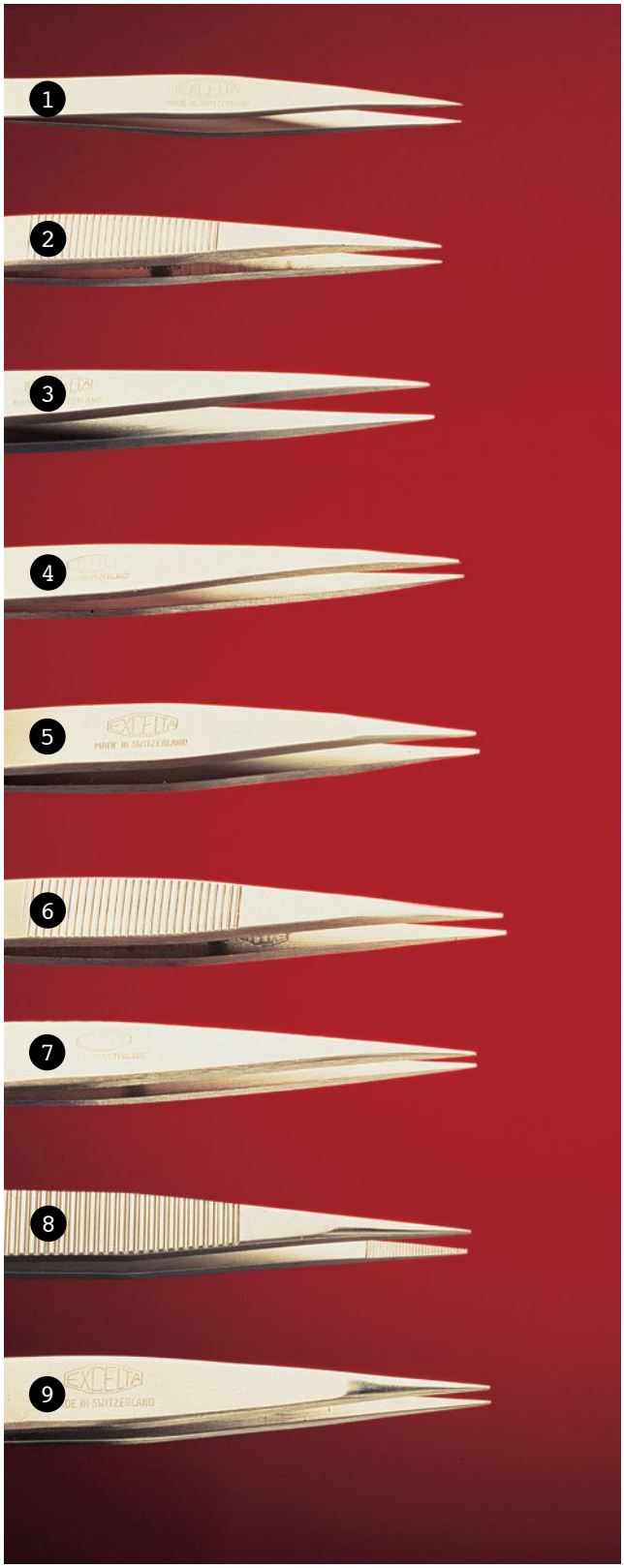
Precision Point Tweezers

A full line of tweezers with a wide range of electronics applications. All tweezers available in carbon steel, with various models available in nickel alloy, anti-magnetic anti-acid stainless steel, or premium anti-magnetic Neverust® steel.



1 **Fine Straight Precision Point Tweezer**
A general purpose electronic assembly tweezer. Its light touch spring tension reduces operator fatigue.

				Cat. #
L	3.5 in.	90.0 mm		
A*	.296	7.5	Carbon Steel	**9302-84**
B*	.015	0.4	Stainless Steel	**9302-85**
C*	.027	0.7	Premium Neverust® Steel	**9300-11**

2 **Fine Straight Precision Point Tweezer**
With sturdy tips for precision bending and handling of very fine wires and components. Also features finger serrations.

				Cat. #
L	4.25 in.	110.0 mm		
A*	.355	9.0	Carbon Steel	**9302-86**
B*	.015	0.4	Stainless Steel	**9302-87**
C*	.027	0.7	Premium Neverust® Steel	**9300-13**

3 **Fine Straight Precision Point Tweezer**
With sturdy tips for precision bending and handling of very fine wires and components.

				Cat. #
L	4.5 in.	115.0 mm		
A*	.375	9.5		
B*	.019	0.5		
C*	.023	0.6	Carbon Steel	**9302-89**

4 **Fine Straight Precision Point Tweezer**
A general purpose electronic assembly tweezer. Its light touch spring tension reduces operator fatigue.

				Cat. #
L	4.75 in.	120.0 mm		
A*	.375	9.5		
B*	.019	0.5	Carbon Steel	**9302-90**
C*	.023	0.6	Premium Neverust® Steel	**9302-91**

5 **Fine Straight Precision Point Tweezer**
A sturdy, general purpose electronic assembly tweezer.

				Cat. #
L	4.5 in.	115.0 mm		
A*	.393	10.0		
B*	.019	0.5	Carbon Steel	**9302-92**
C*	.027	0.7	Premium Neverust® Steel	**9302-93**

6 **Fine Straight Precision Point Tweezer**
Same as above, but with finger serrations for additional gripping surface.

				Cat. #
L	4.75 in.	120.0 mm		
A*	.355	9.0		
B*	.019	0.5	Carbon Steel	**9302-94**
C*	.027	0.7	Premium Neverust® Steel	**9302-95**

7 **Fine Straight Precision Point Tweezer**
A sturdy, general purpose electronic assembly tweezer.

				Cat. #
L	4.25 in.	110.0 mm		
A*	.355	9.0		
B*	.019	0.5	Carbon Steel	**9302-96**
C*	.027	0.7	Premium Neverust® Steel	**9302-97**

8 **Fine Straight Precision Point Tweezer**
A sturdy, general purpose electronic assembly tweezer with inside tip serrations for positive gripping surface.

				Cat. #
L	4.75 in.	120.0 mm		
A*	.355	9.0		
B*	.019	0.5	Carbon Steel	**9302-98**
C*	.027	0.7	Premium Neverust® Steel	**9302-99**

9 **Fine Straight Precision Point Tweezer**
A sturdy, general purpose electronic assembly tweezer with radiused inside edges to reduce nicking and marring of delicate items.

				Cat. #
L	4.5 in.	115.0 mm		
A*	.375	9.5		
B*	.019	0.5	Carbon Steel	**9303-00**
C*	.027	0.7	Premium Neverust® Steel	**9303-01**

** See dimensional sketch, page 618*

1 **Fine Straight Precision Point Tweezer**
A very slender tweezer for delicate operations. Designed for bending and handling very fine wires and components.

				Cat. #
L	4.5 in.	115.0 mm		
A*	.375	9.5	Carbon Steel	**9303-02**
B*	.015	0.4	Stainless Steel	**9303-04**
C*	.015	0.4	Premium Neverust® Steel	**9303-05**

2 **Medium Tapered Precision Point Tweezer**
Used for bending and handling of very fine wires and components.

				Cat. #
L	4.75 in.	120.0 mm		
A*	.393	10.0	Carbon Steel	**9303-06**
B*	.019	0.5	Stainless Steel	**9303-07**
C*	.019	0.5	Premium Neverust® Steel	**9303-08**

3 **Straight Precision Point Tweezer**
Very popular for use in microelectronic assembly.

				Cat. #
L	4.75 in.	120.0 mm		
A*	.375	9.5	Carbon Steel	**9303-09**
B*	.011	0.3	Stainless Steel	**9303-10**
C*	.015	0.4	Premium Neverust® Steel	**9301-51**

4 **Straight Point Tweezer**
Same as above, except shorter.

				Cat. #
L	4.25 in.	110.0 mm	Carbon Steel	**9303-12**
A*	.375	9.5	Nickel Alloy	**9303-14**
B*	.011	0.3	Stainless Steel	**9303-15**
C*	.015	0.4	Premium Neverust® Steel	**9300-07**

5 **Curved Point Precision Tweezer**
Curved tip allows maximum visibility under magnified applications.

				Cat. #
L	4.5 in.	115.0 mm		
A*	.393	10.0		
B*	.011	0.3		
C*	.015	0.4	Carbon Steel	**9303-18**
E*	45°		Stainless Steel	**9303-19**

6 **Curved Point Precision Tweezer**
Curved tip allows maximum visibility under magnified applications. Inside tip serrations provide extra gripping surface.

				Cat. #
L	4.5 in.	115.0 mm		
A*	.393	10.0		
B*	.011	0.3		
C*	.015	0.4	Carbon Steel	**9303-20**
E*	45°		Stainless Steel	**9303-21**

7 **Straight Precision Point Tweezer**
General assembly tweezer with fine points. Useful when handling fine wires or components.

				Cat. #
L	4.75 in.	120.0 mm		
A*	.393	10.0		
B*	.019	0.5	Carbon Steel	**9303-22**
C*	.019	0.5	Stainless Steel	**9303-23**

8 **Straight Precision Point Tweezer**
General purpose precision tweezer.

				Cat. #
L	4.5 in.	115.0 mm		
A*	.375	9.5		
B*	.015	0.4	Carbon Steel	**9303-24**
C*	.019	0.5	Stainless Steel	**9303-25**

9 **Straight Fine Precision Point Tweezer**
General purpose assembly tweezer with fine points.

				Cat. #
L	4.75 in.	120.0 mm		
A*	.393	10.0		
B*	.015	0.4	Carbon Steel	**9303-26**
C*	.015	0.4	Stainless Steel	**9303-27**

**** See dimensional sketch, page 618***

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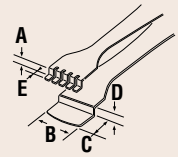
Wafer Grip Tweezers

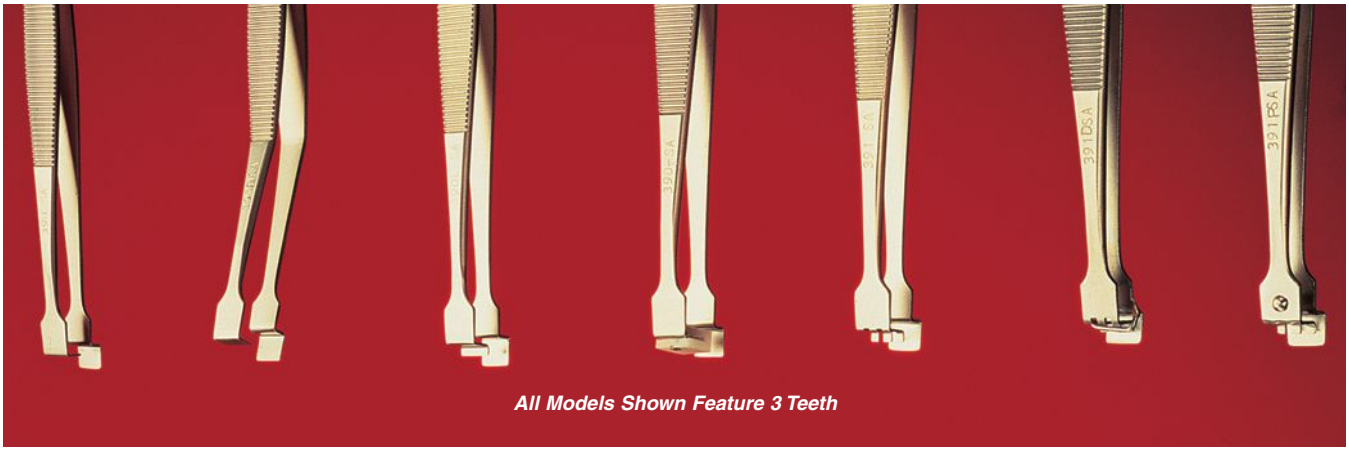
Special engaging stop prevents chipping silicon and gallium wafers. Special sharpened blade allows easy pickup of wafers. All tweezers made of premium anti-magnetic, anti-acid Neverust® steel.

Tweezer Types

BH = Bent Handles
L = Lip Type Blade
T = Hard Teflon Tips
W = Wire Type Maximum Opening Stop (MOS)
P = Pin Type MOS and Non-Penetrating Wafer Stop

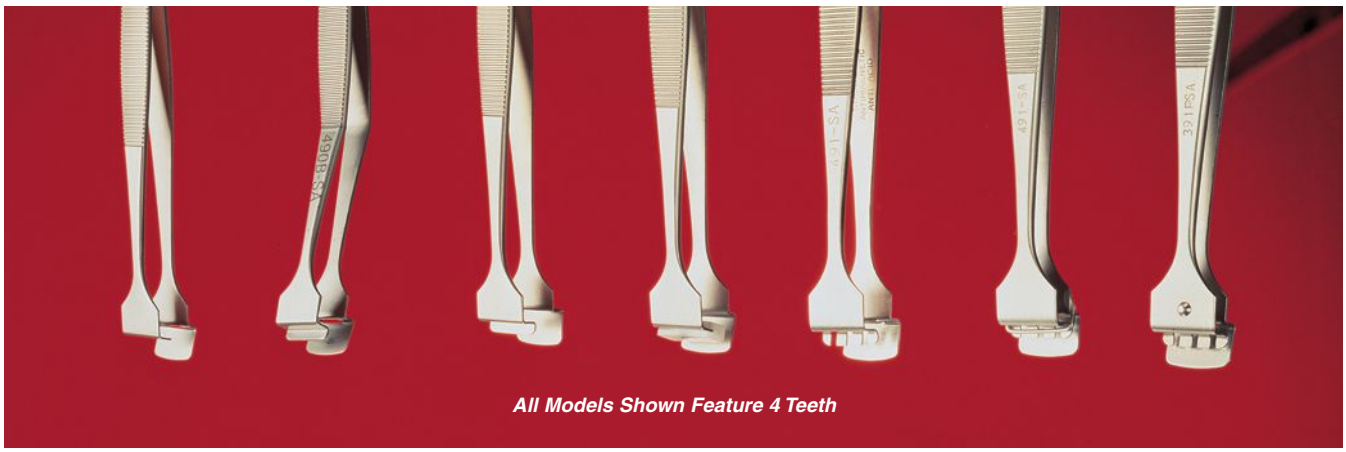
DIMENSIONAL DRAWING





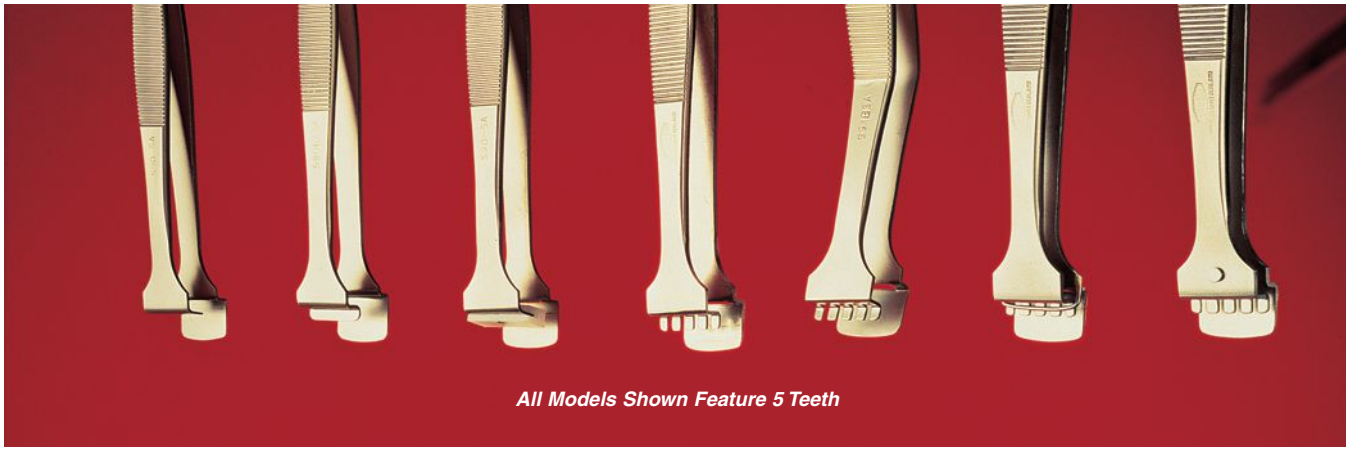
All Models Shown Feature 3 Teeth

Type key above		Cat. # 9303-93 Standard	Cat. # 9303-94 Type BH	Cat. # 9303-95 Type L	Cat. # 9303-96 Type T	Cat. # 9303-97 Standard	Cat. # 9303-98 Type W	Cat. # 9303-99 Type P
DIMENSIONS	A	.157 in./4.0 mm	.157 in./4.0 mm	.157 in./4.0 mm	.285 in./7.2 mm	.157 in./4.0 mm	.157 in./4.0 mm	.157 in./4.0 mm
	B	.257 in./6.5 mm	.257 in./6.5 mm	.257 in./6.5 mm	.257 in./6.5 mm	.257 in./6.5 mm	.257 in./6.5 mm	.257 in./6.5 mm
	C	.197 in./5.0 mm	.197 in./5.0 mm	.197 in./5.0 mm	.197 in./5.0 mm	.197 in./5.0 mm	.197 in./5.0 mm	.197 in./5.0 mm
	D	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm
	E	—	—	.060 in./1.5 mm	—	.060 in./1.5 mm	.060 in./1.5 mm	.060 in./1.5 mm



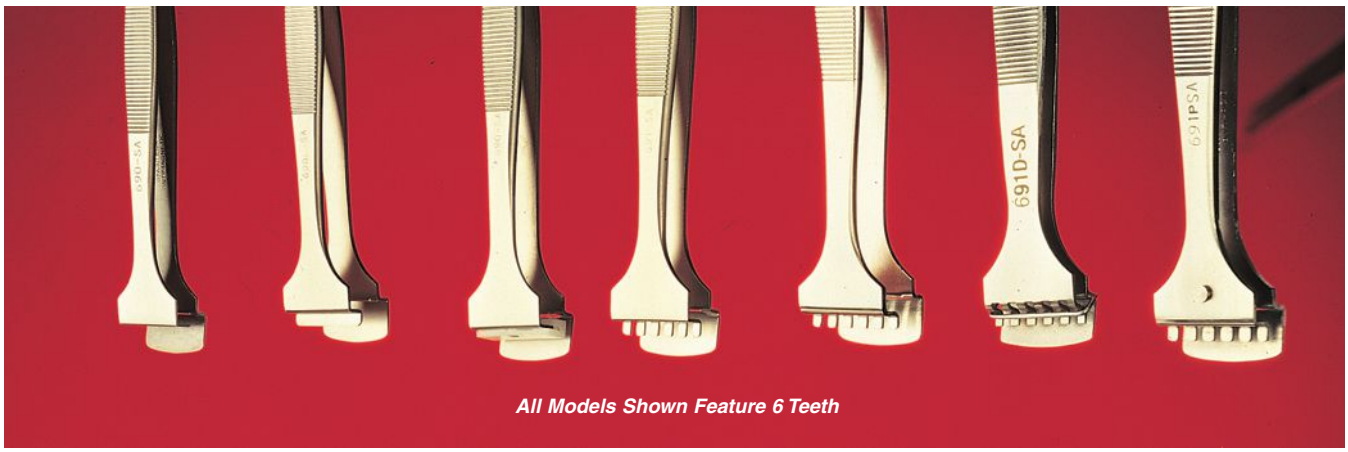
All Models Shown Feature 4 Teeth

Type key above		Cat. # 9300-21 Standard	Cat. # 9304-00 Type BH	Cat. # 9300-22 Type L	Cat. # 9304-01 Type T	Cat. # 9304-02 Standard	Cat. # 9304-03 Type W	Cat. # 9304-04 Type P
DIMENSIONS	A	.157 in./4.0 mm	.157 in./4.0 mm	.157 in./4.0 mm	.157 in./4.0 mm	.157 in./4.0 mm	.157 in./4.0 mm	.157 in./4.0 mm
	B	.472 in./12.0 mm	.472 in./12.0 mm	.472 in./12.0 mm	.472 in./12.0 mm	.472 in./12.0 mm	.472 in./12.0 mm	.472 in./12.0 mm
	C	.275 in./7.0 mm	.275 in./7.0 mm	.275 in./7.0 mm	.275 in./7.0 mm	.275 in./7.0 mm	.275 in./7.0 mm	.275 in./7.0 mm
	D	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm
	E	—	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm	.138 in./3.5 mm



All Models Shown Feature 5 Teeth

Type key above		Cat. # 9304-05	Cat. # 9304-06	Cat. # 9304-07	Cat. # 9300-23	Cat. # 9304-08	Cat. # 9304-09	Cat. # 9304-10
		Standard	Type L	Type T	Standard	Type BH	Type W	Type P
DIMENSIONS	A	.157 in./4.0 mm	.180 in./4.5 mm	.257 in./6.5 mm	.188 in./3.0 mm	.118 in./3.0 mm	.118 in./3.0 mm	.118 in./3.0 mm
	B	.638 in./16.2 mm	.638 in./16.2 mm	.638 in./16.2 mm	.638 in./16.2 mm	.638 in./16.2 mm	.638 in./16.2 mm	.638 in./16.2 mm
	C	.355 in./9.0 mm	.355 in./9.0 mm	.355 in./9.0 mm	.354 in./9.0 mm	.354 in./9.0 mm	.354 in./9.0 mm	.354 in./9.0 mm
	D	.106 in./2.7 mm	.106 in./2.7 mm	.106 in./2.7 mm	.106 in./2.7 mm	.106 in./2.7 mm	.106 in./2.7 mm	.106 in./2.7 mm
	E	—	.089 in./2.3 mm	—	.089 in./2.3 mm	.089 in./2.3 mm	.089 in./2.3 mm	.089 in./2.3 mm



All Models Shown Feature 6 Teeth

Type key above		Cat. # 9304-11	Cat. # 9304-12	Cat. # 9304-13	Cat. # 9300-24	Cat. # 9304-14	Cat. # 9304-15	Cat. # 9304-16
		Standard	Type L	Type T	Standard	Type BH	Type W	Type P
DIMENSIONS	A	.150 in./3.8 mm	.140 in./3.5 mm	.257 in./6.5 mm	.118 in./3.0 mm	.118 in./3.0 mm	.118 in./3.0 mm	.118 in./3.0 mm
	B	.780 in./19.8 mm	.780 in./19.8 mm	.780 in./19.8 mm	.780 in./19.8 mm	.780 in./19.8 mm	.780 in./19.8 mm	.780 in./19.8 mm
	C	.355 in./9.0 mm	.355 in./9.0 mm	.355 in./9.0 mm	.355 in./9.0 mm	.355 in./9.0 mm	.355 in./9.0 mm	.355 in./9.0 mm
	D	.106 in./2.7 mm	.106 in./2.7 mm	.106 in./2.7 mm	.106 in./2.7 mm	.106 in./2.7 mm	.106 in./2.7 mm	.106 in./2.7 mm
	E	—	.089 in./2.3 mm	—	.089 in./2.3 mm	.089 in./2.3 mm	.089 in./2.3 mm	.089 in./2.3 mm

		Cat. # 9310-08
		Standard 8-teeth for 300 mm Wafers
DIMENSIONS	A	.150 in./3.8 mm
	B	1.120 in./28.5 mm
	C	.450 in./11.5 mm
	D	—
	E	.085 in./2.15 mm.

The perfect tweezer for 300 mm wafers.

TERRA UNIVERSAL.COM
Critical Environment Solutions
800 S. Raymond Ave., Fullerton, CA 92831 CA

Replacement Tip Kit

Ceramica™ Fine Precision Zirconia Ceramic Tip Tweezers
With New Replaceable Tips

- **Six times harder than stainless steel, twice as hard as carbon steel**
- **Replaceable tips screw on to stainless body; extend tweezer life**
- **ESD-safe without carbon or metal additives**
- **Chemically inert and cleanroom-compatible**
- **Resists temperatures to 1,500°C**

These lightweight ceramic-tip tweezers combine unsurpassed durability with static safety for critical handling applications.

They hold their tip geometry better than any metal tweezers. Solder will not adhere to their completely nonmagnetic surface, and they are microwave sterilizable. The ceramic tips do not slough or outgas and act as thermal insulators, making these tweezers ideal for soldering. Replacement tip kits come with 2 tips, 4 screws, 4 washers and a screwdriver.

Ceramica™ Zirconia Replaceable Ceramic Tip Tweezers

Tip Color	Surface Resistivity	Overall Length Inch	Overall Length mm	Tip Dimension Inch	Tip Dimension mm	Cat. #
White	$10^{13}\Omega^2$	4 1/4	110	.016 x .012	0.4 x 0.3	**9310-03**
		4 3/4	120	.016 x .012	0.4 x 0.3	**9310-04**
		5 1/2	140	.016 x .012	0.4 x 0.3	**9310-05**
Brown	$10^{10}\Omega^2$	4 1/4	110	.016 x .012	0.4 x 0.3	**9310-00**
		4 3/4	120	.016 x .012	0.4 x 0.3	**9310-01**
		5 1/2	140	.016 x .012	0.4 x 0.3	**9310-02**

Replacement Tips Kit, Brown Static Dissipative **9310-06**
Replacement Tips Kit, White Heat Resistant **9310-07**

Excelta Ceramic Tip Tweezers

These fine ceramic tip tweezers are just like the tweezers above, but they do not have replaceable tips.

1 **Ceramic Tips on a Reverse Action Body**
This tweezer will hold parts without any hand pressure. Great for holding parts when soldering.

	Cat. #
Reverse Action Ceramic Tweezer	**9310-50**

2 **Ceramic Tips on an Ergonomic Body**
This tweezer design will help reduce the "pinch point" that can be the result of using a standard style tweezer.

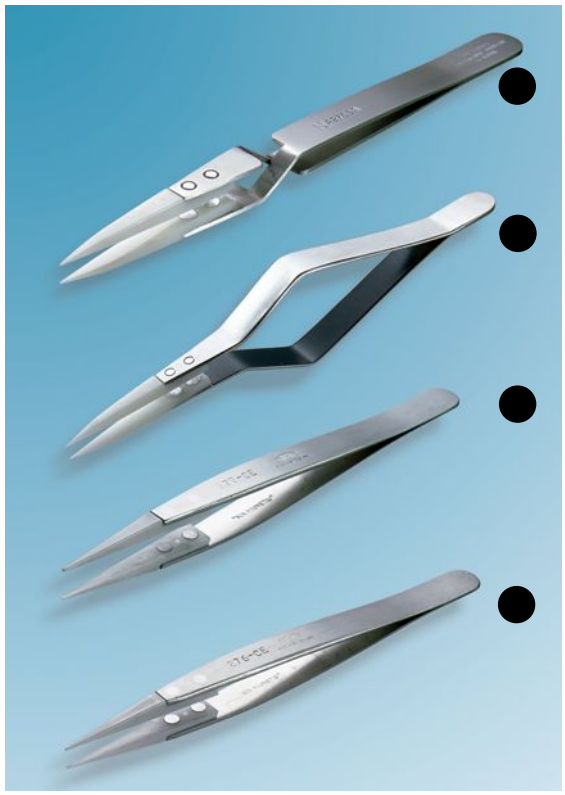
	Cat. #
Ergonomic Ceramic Tip Tweezer	**9310-51**

3 **Fine Tip Ceramic Tweezer**
The 1 mm tip helps make this tweezer extra strong for general electronic assembly.

	Cat. #
Fine 1 mm Ceramic Tip Tweezer	**9310-52**

4 **Very Fine Tip Ceramic Tweezer**
The very fine 0.5 mm tip makes this tweezer ideal for access in confined areas.

	Cat. #
Very Fine 0.5 mm Ceramic Tip Tweezer	**9310-53**



Roto-Pic® System

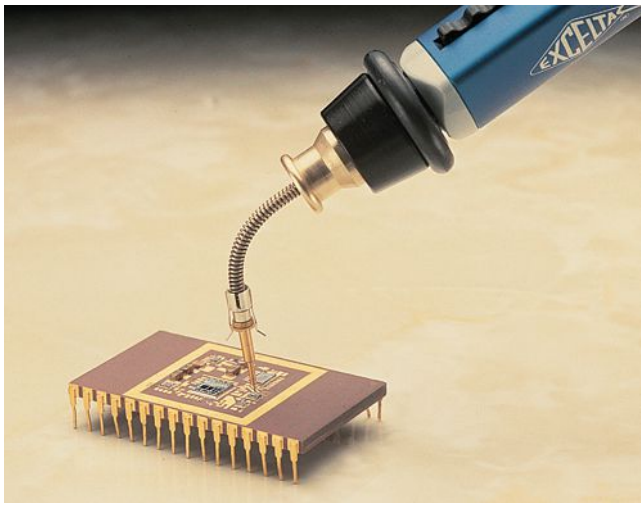
For Hybrid Assembly and Wafer Fabrication

The most revolutionary vacuum pickup available: designed to reduce manual handling of both chips and wafers. Roto-Pic® has a smooth, positive hold-and-release slide bar that allows operator to lift finger without dropping object being handled.

Round nose wheel rotates 360° so that chip can be picked up and aligned with ease.

Easily replaceable tips come in various sizes. Silicone rubber cups can be inserted on Roto-Pic for pickup and manipulation. Wafers can be picked up on coated back side without any apparent contamination. Roto-Pic is so versatile that it can pick up from trays, as well as boats.

Complete package comes with hand piece (No. 9301-02), vacuum pump (No. 7903-00), 3-foot plastic hose (No. 9301-04), 5 wafer-handling tip assemblies (No. 9301-05, kit), 5 probes (No. 9301-12, kit), and 5 die-attaching tip assemblies (No. 9301-18, kit).



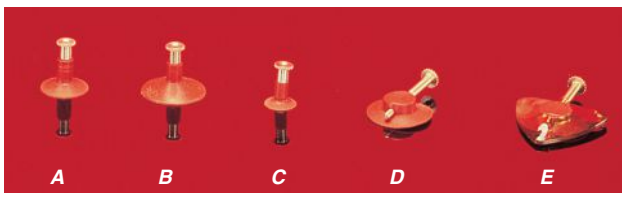
	Cat. #
Roto-Pic Complete Package	**9301-00**

Roto-Pic® Basic Kit

Basic Kit comes with hand piece (No. 9301-02), vacuum pump (No. 7903-00), and 3-foot plastic hose (No. 9301-4). Order hand piece and hose separately for use with in-house vacuum supply.

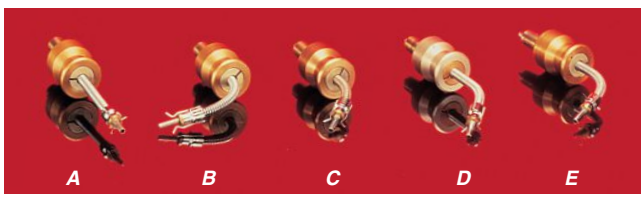
	Cat. #
Hand Piece	**9301-02**
Vacuum Pump (see page 496)	**7903-00**
3 Ft. Plastic Hose	**9301-04**
Basic Kit (1 ea. of above)	**9305-23**

Wafer-Handling Tip Assemblies



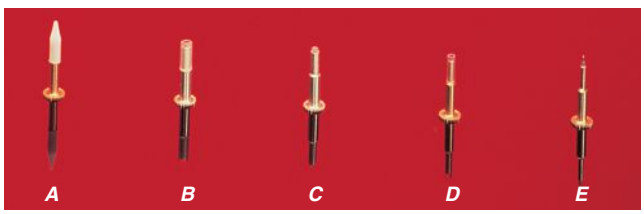
	Cat. #
A. 3/8" Cup	**9301-07**
B. 1/2" Cup	**9301-08**
C. 1/4" Cup	**9301-06**
D. Circo-vac	**9301-09**
E. Verto-Vac w/ High Temp. Support	**9301-10**
Complete Kit (1 ea. of above)	**9301-05**

Probes



	Cat. #
A. 180° Straight	**9301-13**
B. 90° Angle	**9301-14**
C. 60° Angle	**9301-15**
D. 45° Angle	**9301-16**
E. 45° Angle (Short)	**9301-17**
Complete Kit (1 ea. of above)	**9301-12**

Die-Attaching Tip Assemblies



	Cat. #
A. .004" I.D.	**9301-19**
B. .055" I.D.	**9301-23**
C. .006" I.D.	**9301-20**
D. .012" I.D.	**9301-21**
E. .035" I.D.	**9301-22**
Complete Kit (1 ea. of above)	**9301-18**

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800 S. Raymond Ave., Fullerton, CA 92831 CA

Scalpel Handles and Blades

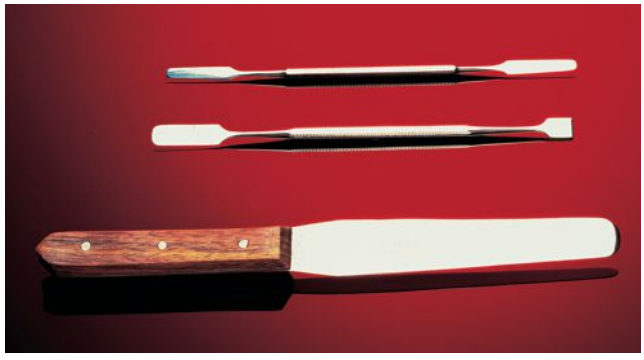
- **Handle and blades made of surgical stainless steel**
- **Standard generic blade shapes**
- **Automatic blade remover helps avoid injury**

	Cat. #
5" Stainless Steel Handle	**9304-54**
Automatic Blade Remover	**9310-62**
Blades	Cat. #
No. 10	**9310-58**
No. 11	**9310-59**
No. 12	**9310-60**
No. 15	**9310-61**

Mixing Spatulas

These polished stainless steel spatulas are designed for applying or scraping potting compound or wax, or for mixing epoxy. Both models have a straight blade 1⅛ inches long.

	Cat. #
Mixing Spatula 6¼" Overall Length	**9304-58**
Mixing Spatula 7⅛" Overall Length	**9304-59**
Mixing Spatula with Wood Handle Overall Length 8½". Polished stainless steel blade is 4¾" long and 13/16" wide.	**9304-60**



Mini-Oilers/Micro-Spatulas

Available in four different models (four different tip sizes), with colored plastic handles for easy identification. Overall size: 2½ inches.

Tip Size	Color	Cat. #
.010"	Black	**9304-61**
.015"	Blue	**9304-62**
.020"	Green	**9304-63**
.025"	Red	**9304-64**

Series 1000 AutoFunction™ Dispenser

- **Built-in peristaltic pump head provides precise control over amount, speed and duration of liquid dispensing**
- **Microprocessor lets you program and save all operating functions—volume, tubing size, speed, ramp time, direction, delay and number of doses**
- **Can be operated in manual or automatic modes**
- **Optional foot switch allows hands-free operation in manual mode**
- **Easy to set-up and operate**
- **Accommodates many tubing sizes and operates without contaminating liquid samples**

The programmable AutoFunction™ Dispenser provides precise dispensing of low- to medium-viscosity fluids. Its automatic capabilities and highly accurate, variable-speed peristaltic pumping system make it ideal for chemical dosing, solvent transfer, titration, container filling/emptying, and other applications calling for precise, repeatable dispensing. Its microprocessor-based controls allow you to determine all of the variables commonly involved in high-precision chemical dosing.

Specifications

Dimensions:	13⅜"W x 7½"D x 6"H	
Weight:	15.5 lbs.	
Power Requirements:	110/220VAC, 50/60Hz (selectable)	
Flow Rates:	Tube ID (mm/in.)	Flow Rate (ml/min.)
(with tube size indicated, based on speed range of 22 - 200 RPM)	0.8/0.03	1.32 to 12.0
	1.6/0.06	4.62 to 42.0
	3.1/0.12	17.6 to 160
	6.4/0.25	61.6 to 560
	7.9/0.31	83.6 to 760

	Cat. #
Series 1000 AutoFunction™ Dispenser	**1200-78**
Foot Switch	**1200-79**

Automatic Dispenser

- **Precise, consistent deposits during die bonding, photoresist coating, and other operations**
- **Consistent, highly repeatable results within extremely close tolerances**
- **Ideal for dot or strip dispensing**
- **Handles wide range of viscosities, including epoxies, solder pastes, solder flux, adhesives or cement, protective coatings, and lubricants**
- **Complete system comes ready to use**

This Automatic Dispenser administers fluids with a wide range of viscosities—from watery liquids to thick paste materials. It is designed to ensure precise deposits of epoxies and other materials within an extremely close tolerance, without dripping between cycles. This precision and reliability helps you to reduce rejects and waste during die bonding, photoresist coating, and a variety of other related processes.

The unit incorporates a foot pedal for easy dispensing. The control features an adjustable venturi vacuum and analog gauge, a solid state digital timer, and an enhanced solenoid for instant on/off response. Comes complete with air output fittings, quick connect, one 3cc barrel and barrel adapter assembly (or other size specified), one 18, 20, 21, 22, 23, 25, and 30 gauge stainless steel dispensing tip, a foot pedal with 8-foot cord, and an input voltage cord set.

Specifications

Dimensions:	11"W x 6½"D x 3"H
Weight:	5 lbs., 7 oz.
Air Inlet Pressure:	80 - 100 PSI
Air Outlet Pressure:	1 - 100 PSI
Power:	115VAC, 50/60Hz; 7 Watts
Mode:	Manual or automatic cycling (control by foot pedal)
Timing Range:	0.01 - 1.0 seconds
Time Tolerance:	± 0.1%
Foot Pedal Voltage:	24 VDC
Foot Pedal Cord Length:	8 feet

Automatic Dispenser — Cat. # **1200-00**

Economy Dispenser

- **Economical unit allows complete operator control of deposits**
- **Foot pedal provides instant ON/OFF output control**
- **Operates with wide range of materials, from liquids to pastes**
- **Vacuum back-up helps regulate dispensing of low-viscosity materials**
- **Complete system comes ready to use**

Like the Automatic Dispenser, this unit uses a low-cost design that places dispensing rate and spot size under operator control.

By adjusting the pressure regulator and switching pressure on and off (by means of the foot pedal), an operator can "eyeball" dispenser output to achieve the desired results.

Vacuum System Simplifies Operation with Liquids

This unit includes a vacuum back-pressure function to enhance system effectiveness with low-viscosity fluids. By adjusting the vacuum pressure, you can counteract the force of gravity to assure even, controlled dispensing of liquids.

The Series 200 comes complete with foot pedal with 8-foot cord, an input voltage cord set, air pressure regulator and gauge, vacuum air connection line with quick connect/disconnect fitting (to allow connection to supply line); one 3cc barrel and barrel adapter assembly (or other size specified), and one 18, 20, 21, 22, 23, 25, and 30 gauge stainless steel dispensing tip.

Specifications

Dimensions:	7½"W x 6½"D x 3"H
Weight:	4 lbs., 3 oz.
Air Inlet Pressure:	80 - 100 PSI
Air Outlet Pressure:	1 - 100 PSI
Power:	115VAC, 50/60Hz; 7 Watts
Foot Pedal Voltage:	24 VDC
Foot Pedal Cord Length:	8 feet

Economy Dispenser — Cat. # **1200-17**

Dispenser - Pic

- **Features all capabilities of the Automatic Dispenser (No. 1200-00)**
- **Provides consistent, repeatable results independent of operator**
- **Ideal for surface mount applications, R&D work, PC board repair and prototyping, as well as application of liquids and pastes of any viscosity**
- **Complete system comes ready to use**

The Dispenser-Pic accurately dispenses materials with a wide range of viscosities to meet very close tolerances.

Its adjustable dispensing time feature and barrel vacuum control provide consistent results batch after batch, with materials of varying viscosities—from watery liquids to thick pastes. The air-pressure dispensing system is turned on and off by a foot pedal. The automatic timer can be used for precisely controlled depositions over intermittent or extended periods; or, the timer can be overridden to allow manual "eyeball" deposition.

Vacuum Pick-Up Extends System Performance

In addition, this dispenser features a built-in vacuum pick-up system that allows you to pick and place small components at precise locations.

Complete ready-to-use system includes controller, two adjustable venturi vacuum adjustments (for dispenser and for pick-up tool), a pressure regulator and analog gauge, a solid state digital timer, and an enhanced solenoid for instant on/off response. Includes air output fittings, quick connect, one 3cc barrel adapter assembly (or other size specified), one 18, 20, 21, 22, 23, 25, and 30 gauge stainless steel dispensing tip, a foot pedal with 8-foot cord, a vacuum pick-up tool with two angled tips and five cups, and an input voltage cord set.

Specifications

Dimensions:	11"W x 6½"D x 3"H
Weight:	5 lbs., 7 oz.
Air Inlet Pressure:	80 - 100 PSI
Air Outlet Pressure:	1 - 100 PSI
Power:	115VAC, 50/60Hz; 7 Watts
Mode:	Manual or automatic cycling (control by foot pedal)
Timing Range:	0.01 - 1.0 seconds
Time Tolerance:	± 0.1%
Foot Pedal Voltage:	24 VDC
Foot Pedal Cord Length:	8 feet

Series 600 Dispenser - Pic — Cat. # **1200-18**

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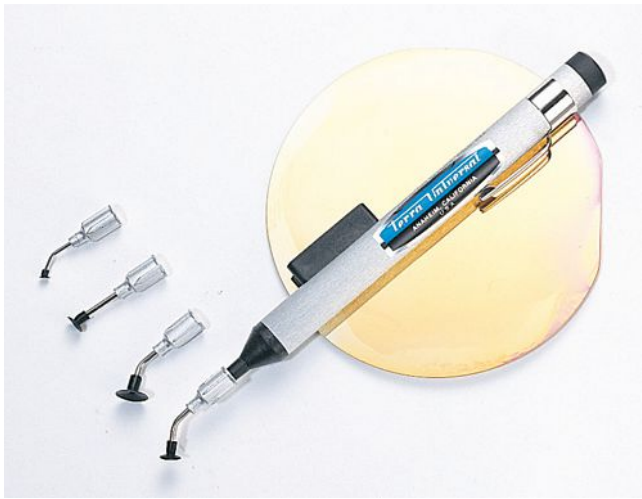
Pen-Vac™

- **Lifts objects weighing up to 100 grams**
- **Features a totally self-contained vacuum source—no external power supply needed**
- **Compact design and light weight make it convenient to use anywhere you need vacuum pick-up**
- **Built-in storage compartment holds extra vacuum tips and cups**
- **Interchangeable vacuum cups are available in several sizes, materials**



A Vacuum Pick-Up in Your Pocket!

The convenient, economical Pen-Vac™ is ideal for applications throughout the microelectronics manufacturing lab.

It generates its own vacuum supply—no batteries or other power source is required. Various sizes of vacuum probes are available to accommodate a wide variety of part sizes (see ordering table below).

Dimensions (Body):	5 3/4" L x 1/2"dia; includes storage area
Weight:	Less than 1.25 oz.
Pick-Up Probes:	1/2" tips, straight and angled.
Materials of Construction:	Brushed aluminum body; stainless steel probe needle on aluminum hub. Vacuum cups in several materials (see ordering table)

Pen-Vac™ Kits

Each of the kits below includes a vacuum pen with 4 probes and cups: 3 angled (1/8", 1/4" and 3/8" cups) and 1 straight (1/4" cup).

Pen-Vac™ Kit with Cup Material	Cat. #
Red High Temperature Silicon*	**6422-03**
Black Conductive High-Temperature Silicon	**6422-04**
Non-Marking Black Static Dissipative	**6422-37**

Withstands temperature up to 500˚F for up to one minute.

Additional Vacuum Cups

Diameter	Red High-Temperature Silicon Cat. #	Black Conductive High-Temperature Silicon Cat. #	Black Non-Marking Static Dissipative Cat. #
1/8"	**6422-06**	**6422-09**	**6422-31**
1/4"	**6422-07**	**6422-10**	**6422-32**
3/8"	**6422-08**	**6422-11**	**6422-33**
1/2"	**6422-25**	**6422-28**	**6422-34**
5/8"	**6422-26**	**6422-29**	**6422-35**
3/4"	**6422-27**	**6422-30**	**6422-36**

Porta-Wand™ Kit

- **Portable, self-contained continuous vacuum system provides reliable wafer handling**
- **Ergonomic, rounded design is easy to hold and operate**
- **ESD and Class 1 cleanroom compatible**
- **Low-profile tips grip wafers in industry-standard wafer boats**

The Porta-Wand Kit is ideal for handling wafers, disk media or any item with a flat, hard surface. It easily lifts over 500 grams, and an internal exhaust filter ensures better-than-Class 1 performance. Exhaust exits the tool at rear, away from the wafer. A single pushbutton provides easy on/off control.

Standard features include a fixed internal rechargeable 9.6V NiMH battery for versatile, cordless operation, an in-stand 24 VDC charger, and one molded wafer tip (see below). It operates continuously for about 3 to 4 hours between charges; a low-battery indicator flashes red when the battery needs to be recharged. An internal air filter is replaceable from the front of the tool, and an internal exhaust filter ensures better-than-Class 1 performance. Weight: less than 5 ounces.

Porta-Wand™ Kit	Cat. #
With wafer tip for up to 4" wafers	**6422-38**
With wafer tip for up to 6" wafers	**6422-39**
With wafer tip for up to 8" wafers	**6422-40**

Porta-Wand 3™ Kit **6422-41**
Similar to kits above, but designed for use with 300mm (12") wafers. An "Operation Indicator" turns on only when vacuum power is sufficient for safe wafer handing. Includes wafer tip for 300mm wafers.

Replacement Wafer Tips

Molded from ESD-safe plastic to handle wafers up to 100˚C. Low-profile tip head provides easy access to wafers in industry standard boats.

	Cat. #
For 4" wafers	**6422-42**
For 6" wafers	**6422-43**
For 8" wafers	**6422-44**
For 300mm wafers	**6422-45**

Replacement Air Filter **6422-46**
Pack of five.

Squeegee Blades

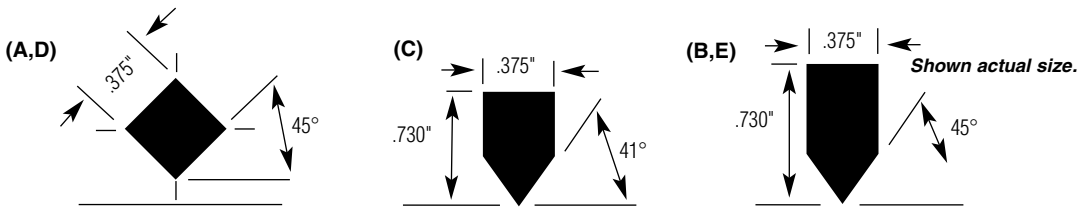
- **Suitable for use in a wide range of semiconductor screen printing operations**
- **Available in eight hardnesses of polyurethane**

The Squeegee Blades offered here fit a variety of screen printers used today in the microelectronics industry.

Blades are precision-molded from polyurethane in eight durometers (from soft 30 to hard 100 Shore). For ease of identification, polyurethane blades are color coded by durometer.

All squeegees are supplied in full-molded lengths, as noted below, and you can easily cut the blades to required lengths. Squeegee dimensions are accurate to a tolerance of ±0.001", over a 6" length. Thus, with a proper holder, these precision blades let you obtain highly accurate printing results.

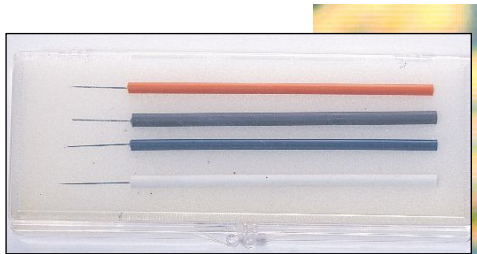
Call for Free Sample!

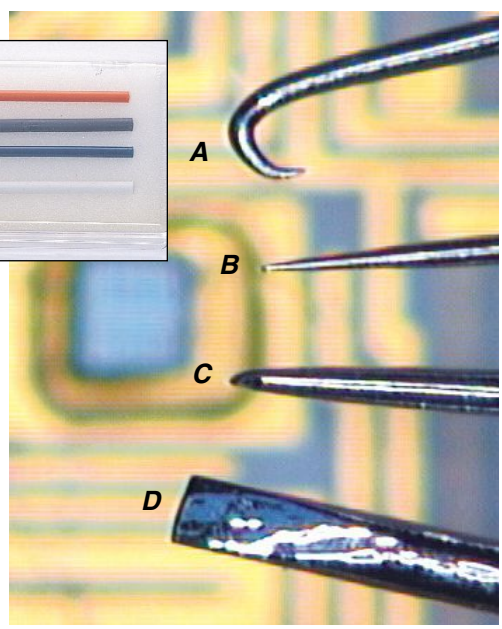


Durometer (Shore)	Color Code	A ◆ 18" Long Cat. #	B ⬟ 12" Long Cat. #	C ⬟ 10" Long Cat. #	D ◆ 22" Long Cat. #	E ⬟ 24" Long Cat. #
30	Orange	**8101-01**	**8101-08**	**8101-15**	**8101-31**	**8101-38**
40	Blue	**8101-02**	**8101-09**	**8101-16**	**8101-32**	**8101-39**
50	Black	**8101-03**	**8101-10**	**8101-17**	**8101-33**	**8101-42**
60	Brown	**8101-04**	**8101-11**	**8101-18**	**8101-34**	**8101-43**
70	Yellow	**8101-05**	**8101-12**	**8101-19**	**8101-35**	**8101-44**
80	Red	**8101-06**	**8101-13**	**8101-20**	**8101-36**	**8101-45**
90	Green	**8101-07**	**8101-14**	**8101-21**	**8101-37**	**8101-46**
100	Grey	**8101-48**	**8101-55**	**8101-61**	**8101-62**	**8101-63**

Universal Tool Kit

- **Allows accurate manipulation of wire bonds, gold ribbon, and aids in dressing and tuning**
- **Indispensable for laying down and removing epoxy, removing foreign material**
- **Convenient color-coded handles for easy tip identification**





This Universal Tool Kit comes with four hand tools: two pointed, one hooked end, and one chisel-end. The color-coded handles make it easy to grab the right tool for the right job. Handles are 4" long and 3⁄16" in diameter. Unless specified, dimensions indicated below are inches.

A. Hook (Blue)
Ideal for dressing of gold wire and removal of bond wire.
Shank: .020 Hook Length: .011
Hook Angle: 60 degrees

B. Fine Point (White)
Handy for applying small amounts of epoxy and removing foreign materials in small areas. It also helps in dressing of gold wire.
Shank: .020 Taper Angle: 5 degrees
Taper Length: .150 Tip Radius: .0003

C. Medium Point (Black)
For applying epoxy in small areas, removing foreign materials and tuning gold ribbon.
Shank: .020 Taper Angle: 10 degrees
Taper Length: .050 Tip Radius: .0005

D. Chisel (Gray)
Great for removal of bond wire, dressing gold pads prior to bonding, and removal of large foreign material. Chisel edge is razor sharp.
Shank: .020 Taper Angle: 5 degrees
Taper Length: .070 Tip Radius: .0015

Universal Tool Kit Cat. # **9300-35**

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Portable Wire-Bond Strength Tester

- **Performs destructive and nondestructive tests in conformance with MIL-STD 883C**
- **Delivers low-cost, on-line test capability**
- **Provides true wire-bond strength measurement**
- **Maintains smooth motion throughout the pull cycle**
- **Seven pull ranges available**
- **Chuck height adjusts to fit many package types**

The many advanced features of this portable Wire-Bond Strength Tester enable it to provide accurate, reliable wire-bond tests—in either destructive or non-destructive mode.

Ahead of the Competition

Designed as a compact, portable benchtop unit, this tester features a minimum of moving parts, all of which are built to last a lifetime. Side forces on the wire are eliminated through the precise alignment of the pivot axis of the gauge arm to the swing bracket and through a free-swinging hook at the gauge tip. A recoil guard prevents undue snap-back of the instrument's gauge arm and indicator needle, thereby protecting the accuracy of the needles. A dash pot (included with all testers) lets you adjust the pull rate and delivers smooth motion through the entire pull cycle, thereby guaranteeing the independence of test results from operator variables.

These features assure the repetitive read-out accuracy that is essential in wire bond testing—but which is impossible with other testers. They also provide QA technicians with meaningful data and help to eliminate debates between QA and production personnel.

Easy Operation

Simple to use, this device can be run by an operator with little or no previous training. The test sample is first positioned on the accessory chuck, which adjusts to fit various packages. (The Wire-Bond Strength Tester is designed for use with most standard wire bond chucks; the magnetic accessory chuck offered on page 632 is suitable for most applications.) Next, you position the pull hook under the wire to be tested with the aid of a microscope (not included).

To conduct nondestructive tests, you simply adjust the stop-screw (which limits the movement of the swing-bracket) until the gauge shows the desired pull force. Because the wire-loop heights of finished bonds are within close tolerances, this limited force testing can be performed with sufficient accuracy to ensure that wire bonds are good.

The unit is supplied with your choice of one gauge in a range of your choice: 0.3-3 g, 0.5-5 g, 2-15 g, 3-30 g, 5-50 g, 10-100 g, and 15-150 g. All gauges can be easily and quickly interchanged on the tester, and hooks are available for any wire or gauge size.

Simple, Precise Calibration

Calibration weights are also provided for every pull range so that you can perform checks of the tester's accuracy. For reliable results, calibration checks should be performed frequently.

To ensure that a gauge is in good working order, simply hang the correct weight onto the pull hook, drop the swing bracket until the pull arm is horizontal, and then compare the gauge reading with the weight number. All calibration weights are manufactured and inspected in accordance with MIL-STD 45662.

Dimensions	Basic Unit:	8 1/4"L x 4 3/4"H x 5"W
	Chuck:	2"H x 1 3/4"D
Weight	Basic Unit:	2 lbs. 7 oz.
	Chuck:	6.4 oz.

Portable Wire-Bond Strength Tester, Complete Package — Cat. # **9101-00**

The complete package consists of one tester, all seven gauges (with one pull hook for each), all seven calibration weights, and an accessory chuck.

Portable Wire-Bond Strength Tester, Tester and Gauge Only

	Cat. #
With 0.3-3 gram gauge	**9101-36**
With 0.5-5 gram gauge	**9101-37**
With 2-15 gram gauge	**9103-00**
With 3-30 gram gauge	**9104-00**
With 5-50 gram gauge	**9105-00**
With 10-100 gram gauge	**9101-38**
With 15-150 gram gauge	**9101-39**

Comes with one tester and your choice of any of the seven gauges (with hook). Additional gauges and hooks can be ordered separately. **NOTE:** The accessory chuck and appropriate calibration weight must be ordered separately (see ordering information on page 632).

See page 632 for accessories and replacement parts.

Wire-Bond Strength Tester Inspection Station

- **Provides cost-effective, on-line destructive and nondestructive testing**
- **Delivers smooth motion throughout pull cycle**
- **Stereo microscope increases precision and reliability**
- **Variety of pull gauges provide a wide pull range, allow accurate wire-bond strength measurement**
- **Chuck height adjusts to fit many types of packages**
- **Meets MIL-STD 883C**

This inspection tester package combines cost-effectiveness and operator convenience in a reliable, precision instrument.

See next page for accessories and replacement parts.

Stereo Microscope Enhances Flexibility

It offers all of the advantages of a standard test but also incorporates a lightweight stereo microscope that delivers deep focal fields and high resolution. This feature allows an operator to perform much more delicate wire-pull tests—including microscopic hook positioning—than would otherwise be possible with a less sophisticated wire-bond strength tester. The exceptional light gathering capability of the system allows even high-magnification applications with just normal room light.

Allows Destructive and Nondestructive Testing

This system's precise adjustments allow both destructive and nondestructive testing. In nondestructive testing, you simply set a predetermined pull strength to be applied to the unit under test. In destructive tests, the system applies pull force until the wire bond breaks, allowing you to measure precisely the strength of the bond.

Calibration weights are provided for every pull range so that you can perform checks of the tester's accuracy. For reliable results, calibration checks should be performed frequently. To ensure that a gauge is in good working order, simply hang the correct weight onto the pull hook, drop the swing bracket until the pull arm is horizontal, and then compare the gauge reading with the weight number. All calibration weights are manufactured and inspected in accordance with MIL-STD 45662.

The complete package includes 10X eyepieces, seven pull gauges, hooks, and calibration weights, along with an accessory chuck and dashpot. The magnetic chuck can accommodate all standard semiconductor packages; custom chucks are also available on special order. The dashpot ensures smooth testing throughout the pull range.

Basic units allow you to select only the gauges and calibration weights your application requires. 20X eyepieces are also available and can be purchased with the package or individually.

Complete Packages:

Wire-Bond Strength Tester Inspection Station with 10X Eyepieces — Cat. # **9101-17**

The complete package consists of one tester with microscope and 10X eyepieces, base/stand, seven pull gauges (3g, 5g, 15g, 30g, 50g, 100g, and 150g) with one hook for each, seven calibration weights (1.5g, 2.5g, 7.5g, 15g, 25g, 50g, and 75g), a dash pot, and an accessory chuck.

Wire-Bond Strength Tester Inspection Station with 20X Eyepieces — Cat. # **9101-26**

Includes equipment as in No. 9101-17 above, but features 20X instead of 10X eyepieces.

Spare Eyepieces

	Cat. #
10X	**9101-24**
20X	**9101-25**

Wire-Bond Strength Tester Inspection Station, with one gauge only

	With 10X Eyepieces Cat. #	With 20X Eyepieces Cat. #
With 0.3-3 gram gauge	**9101-41**	**9101-45**
With 0.5-5 gram gauge	**9101-42**	**9101-46**
With 2-15 gram gauge	**9101-20**	**9101-28**
With 3-30 gram gauge	**9101-21**	**9101-29**
With 5-50 gram gauge	**9101-22**	**9101-30**
With 10-100 gram gauge	**9101-43**	**9101-47**
With 15-150 gram gauge	**9101-44**	**9101-48**

Includes one tester with microscope and 10X or 20X eyepieces, base/stand, one gauge of your choice with a pull hook, a gauge/weight holder, and a dash pot. Additional gauges and hooks can be ordered separately. Note: The accessory chuck and appropriate calibration weight must be ordered separately (see ordering information on page 632).

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Wire-Bond Strength Tester, Accessories

Adjustable Accessory Chuck

This magnetic chuck holds the sample in place during testing (2"H x 1¾" diameter; 6.4 oz.). Chuck height adjusts to fit many types of packages.

Cat. #
9101-60

Calibration Weights

Inspected and verified by calibrated weights, all in accordance with MIL-STD-45662.

Note: Select a weight that matches the mid-scale of the dynamometer scale in use.

	Cat. #
1.5 grams	**9101-52**
2.5 grams	**9101-05**
7.5 grams	**9101-06**
15 grams	**9101-07**
25 grams	**9101-08**
50 grams	**9101-15**
75 grams	**9101-53**

Tester Gauges with Hooks

Each comes with one hook; accessory chuck and calibration weights must be ordered separately.

	Cat. #
0.3-3 grams	**9101-32**
0.5-5 grams	**9101-33**
2-15 grams	**9101-02**
3-30 grams	**9101-03**
5-50 grams	**9101-04**
10-100 grams	**9101-34**
15-150 grams	**9101-35**

Spare Pull Hooks

	Cat. #
0.3-3 grams	**9101-54**
0.5-5 grams	**9101-49**
2-15 grams	**9101-11**
3-30 grams	**9101-12**
5-50 grams	**9101-13**
10-100 grams	**9101-50**
15-150 grams	**9101-51**

Replacement Dash Pot

Delivers smooth motions throughout the entire pull cycle and allows adjustment of the pull rate.

Cat. #
9101-14

Adjustable Diamond Scriber

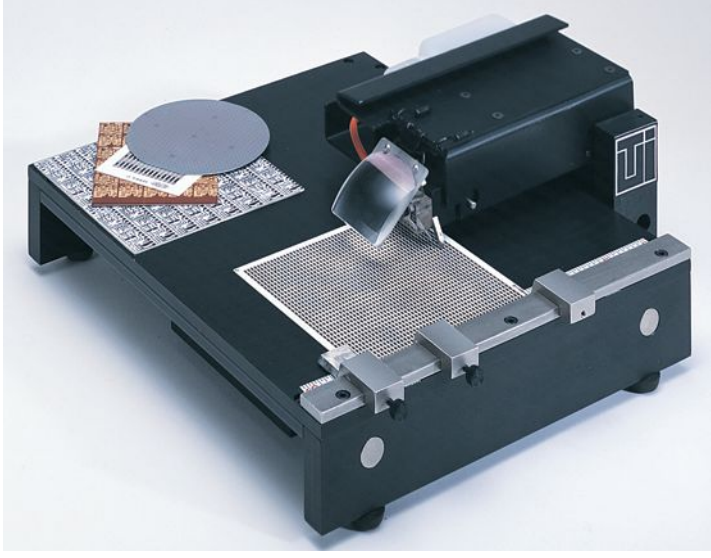
- **Performs fast, easy scribing on a variety of substrates**
- **Features four-edged diamond for efficient operation, with fully adjustable scribing force**
- **Mechanical stop ensures precise stepping and repeat**
- **Adjustable optical lens enhances visual control of operation**
- **Easy to maintain**

This reliable Diamond Scriber performs fast, easy scribing and cutting of silicon wafers, as well as ceramic and glass substrates, for thick and thin-film circuits.

It scribes the precise grooves necessary for effective glass or ceramic cutting: shallow, even and continuous. All essential operating parameters—the angle of the scribing tool, the scribing force, and the cutting speed—are fully adjustable to ensure optimal flexibility and repeatable results. In addition, an adjustable dispensing head releases an alcohol coolant to increase operating efficiency and prolong the life of the cutting diamond. A tool holder further enhances system performance.

The system includes a trial plate, measuring gauge, scriber head with diamond cutting tool, tool holder, and viewing lens. A special tool for scribing glass substrates and a special diamond holder for scribing silicon wafers are available upon request.

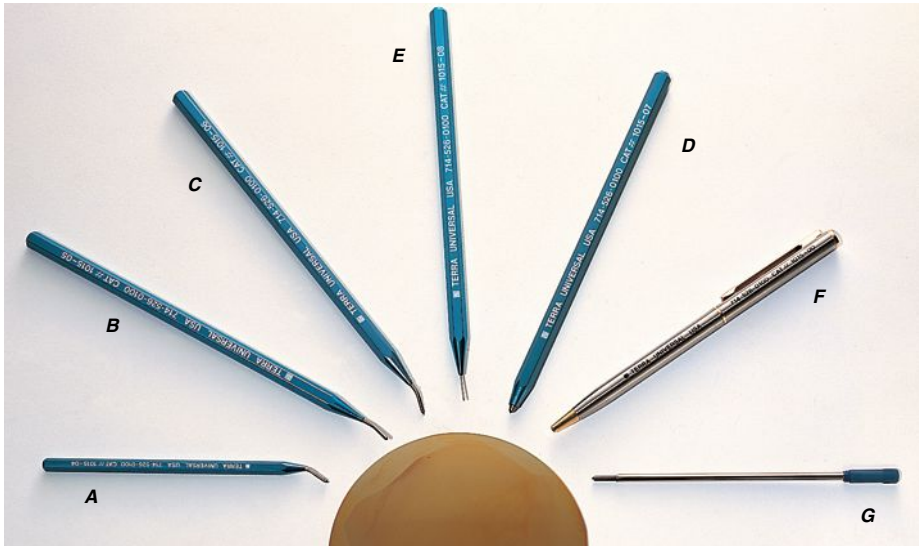
Overall Dimensions:	11" x 10 1/4" x 4"
Maximum Scribing Length:	5"
Scribing Force Range:	Approx. 200-800 grams, adjustable



	Cat. #
Diamond Scriber	**8920-00**
Replacement Scribing Diamond Tool	**8920-01**

Manual Diamond Scribers

- **Easy, economical manual scribing of wafers and other materials**
- **Polished diamond tips scribe fine lines on most metals, glass, silicon, ceramics, and other materials**
- **Angled tip cleans solder, trims resistors on hybrids**
- **Allow easy tagging**



These general purpose scribing tools are suited to a wide range of industrial and laboratory use. Each of these high-quality hand-held tools is equipped with a polished natural diamond that scribes fine lines in a wide range of materials, from metals to silicon to plastics.

The unique high-precision tips of these scribers allow greater accessibility to smaller work areas and make it possible to continuously view what is being scribed. They are thus ideal for R & D operations that require very low tolerances.

Scribers are available in several tip designs and handle designs to suit a wide range of applications.

Hex Scribes ("A"-"E" in photo)

These hexagonal aluminum-handle scribes feature an extra-sturdy design and are ideal for hard-to reach places. Select desired head and diamond tip angle and type of tip. Non-refillable. Weight: 5 oz.

Diascribe ("F" in photo)

Diamond tip is exposed by twisting the pen's handle. Overall length is 5". Weight: 5 oz.

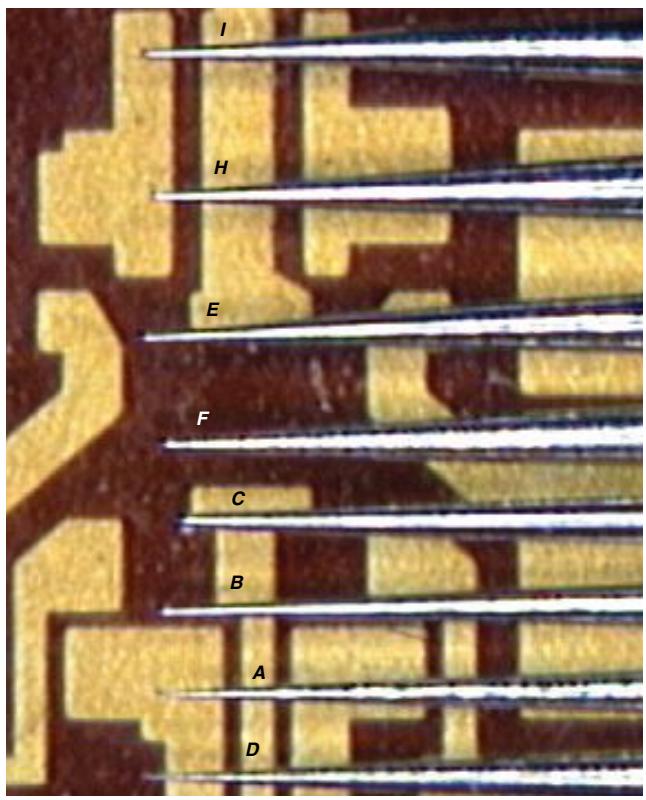
Type	Head Angle	Diamond Tip Angle	Tip	Overall Length	Cat. #
A	30˚	60˚	Fine	4 1/2"	**1015-04**
B	30˚	90˚	Heavy	6"	**1015-05**
C	30˚	90˚	Fine	5 1/2"	**1015-06**
D	Straight	90˚	Heavy	5 3/4"	**1015-07**
E	Straight	90˚	Fine	5 1/2"	**1015-08**

	Cat. #
F. Diascribe	**1015-00**
G. Diamond Refills	**1015-01**

Probe Tips

Produced by a unique electro-mechanical process, these tungsten probes feature parabolic tips to minimize breakage. Contact resistance is also reduced because of electropolished tips. Available in a variety of configurations, these probe tips are used for all automatic and manual wafer probing units. Probe tips of 1 inch length are packaged in a box of 5.

Shipping Weight: .3 oz.



Type	Shank Diameter (inches)	Taper Angle (degrees)	Taper Length (inches)	Tip Radius (inches)	Cat. #
A	.020	5	.230	.0001	**9111-01**
B	.020	5	.230	.0005	**9111-02**
C	.020	5	.230	.0010	**9111-03**
D	.020	8	.145	.0001	**9111-04**
E	.020	8	.145	.0005	**9111-05**
F	.020	8	.145	.0010	**9111-06**
G*	.020	10	.115	.0001	**9111-07**
H	.020	10	.115	.0005	**9111-08**
I	.020	10	.115	.0010	**9111-09**
J*	.020	5	.230	.00002	**9111-10**

**** Not Shown***

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Appendix I: FED-STD-209E - September 11, 1992 Airborne Particulate Cleanliness Classes

Class limits are given for each class name. The limits designate specific concentrations (particles per unit volume) of airborne particles with sizes equal to and larger than the particle sizes shown.*

* *The class limits shown in Table I are defined for classification purposes only and do not necessarily represent the size distribution to be found in any particular situation.*

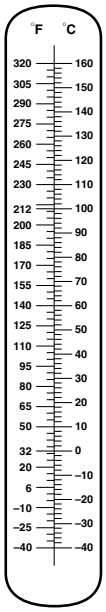
** *Concentration limits for intermediate classes can be calculated, approximately, from the following equations:*
$particles/m^3 = 10^M(0.5/d)^{2.2}$
where M is the numerical designation of the class based on SI units, and d is the particle size in micrometers, or
$particles/ft^3 = N_C(0.5/d)^{2.2}$
where N_C is the numerical designation of the class based on English (U.S. customary) units, and d is the particle size in micrometers.

*** *For naming and describing the classes, SI names and units are preferred; however, English (U.S. customary) units may be used.*

Class Name**		Class Limits									
		0.1 µm Volume Units		0.2 µm Volume Units		0.3 µm Volume Units		0.5 µm Volume Units		5 µm Volume Units	
SI	English***	(m^3)	(ft^3)	(m^3)	(ft^3)	(m^3)	(ft^3)	(m^3)	(ft^3)	(m^3)	(ft^3)
M 1		350	9.91	75.7	2.14	30.9	0.875	10.0	0.283	—	—
M 1.5	1	1,240	35.0	265	7.50	106	3.00	35.3	1.00	—	—
M 2		3,500	99.1	757	21.4	309	8.75	100	2.83	—	—
M 2.5	10	12,400	350	2,650	75.0	1,060	30.0	353	10.0	—	—
M 3		35,000	991	7,570	214	3,090	87.5	1,000	28.3	—	—
M 3.5	100	—	—	26,500	750	10,600	300	3,530	100	—	—
M 4		—	—	75,700	2,140	30,900	875	10,000	283	—	—
M 4.5	1,000	—	—	—	—	—	—	35,300	1,000	247	7.0
M 5		—	—	—	—	—	—	100,000	2,830	618	17.5
M 5.5	10,000	—	—	—	—	—	—	353,000	10,000	2,470	70.0
M 6		—	—	—	—	—	—	1,000,000	28,300	6,180	175
M 6.5	100,000	—	—	—	—	—	—	3,530,000	100,000	24,700	700
M 7		—	—	—	—	—	—	10,000,000	283,000	61,800	1,750

Appendix II: Conversion Tables

Temperature



$°C = \frac{5}{9}(°F-32)$

$°F = \frac{9}{5}°C+32$

Fluid Flow

To Convert	Into	Multiply By
Cubic Feet/Min.	Liters/Sec.	4.720×10^{-1}
Cubic Yards/Min.	Liters/Sec.	1.274×10^{-1}
Cubic Yards/Min.	Cubic Ft./Sec.	4.5×10^{-1}
Cubic Yards/Min.	Gallons/Sec.	3.367

One SCFM is one cubic foot of a gas flowing for one minute past a point at which the temperature is 60°F and the pressure is 30.00 inches of Mercury (from American Gas Association).

Power

To Convert	Into	Multiply By
Horsepower	Kilowatts	.746
Horsepower	Foot-Lb./Min.	3.3×10^4
Horsepower	BTU/Min.	42.41

Illumination

To Convert	Into	Multiply By
Lux	Lumen/$Ft.^2$	0.0929
Lumens/$Ft.^2$	Foot-Candles	1.0
Lambert	Candles/$In.^2$	2.054

Length

To Convert	Into	Multiply By
Feet	Meters	0.3048
Feet	Centimeters	30.48
Yards	Inches	36.00

Pressure/Vacuum

To Convert	Into	Multiply By
Pounds/Sq. in.	Atmospheres	0.06804
Pounds/Sq. in.	Feet of Water	2.307
Pounds/Sq. in.	Inches of Mercury	2.036
Pounds/Sq. in.	Pounds/Sq. ft.	144.0
mm of Mercury	Atmospheres	760
mm of Mercury	Torr	1.00
Torr	mbar	0.75
Atmospheres	Inches of Mercury	29.92
Bars	Atmospheres	9.869×10^{-1}
Bars	Pounds/Sq. in.	14.5
Inches of Water	Inches of Mercury	7.355×10^{-2}
Millibars	Inches of Mercury	2.953×10^{-2}

Electric Charge

To Convert	Into	Multiply By
Coulombs	Faraday	9.652×10^4
Amp-Hr.	Faraday	26.81

Volume

To Convert	Into	Multiply By
Cubic Feet	Cubic Inches	1728
Cubic Feet	Liters	28.32

Appendix III: Trademarks

ACAI™ (Automatic Count Accuracy Improvement) — California Scales
Adjust-A-Shelf™ (Desiccator) — Terra Universal, Inc.
AirFlow™ — Excelta Corp.
AirGard® — Alnor Instrument Co.
Altima® — Excelta Corp.
ASD-600™ — Terra Universal, Inc.
Auto-Strat™ (Desiccator) — Terra Universal, Inc.
Automatic IonWatch™ — Terra Universal, Inc.
Automatic RB® Valve — Terra Universal, Inc.
BCR® — Berkshire Corp.
Berkshire®—Berkshire Corp.
BLUESORB® — Berkshire Corp.
Bow Guard™ — Terra Universal, Inc.
Buna-N® — Pittway Corp.
Celcon® — Celanese Corp.
ChemStat® 909A — Stern and Stern Industries, Inc.
CleanCube™ — Terra Universal, Inc.
Clean Phone™ — GAI-Tronics Corp.
Clean Stocker™ — Terra Universal, Inc.
Cleanline® — Controlled Environmental Equipment
CleaNotes® — Berkshire Corp.
Cobaltima® — Excelta Corp.
CompuDat® — Alnor Instruments
CompuFlow® — Alnor Instruments
Delrin® — E. I. du Pont de Nemours & Co.
DesiCart™ — Terra Universal, Inc.
DewWatch™ — Terra Universal, Inc.
DoorGuard™ — Terra Universal, Inc.
Double Agent Desiccator™ — Terra Universal, Inc.
DOW Corning® — Dow Corning
DownDraft™ — Terra Universal, Inc.
Dryex™ — Terra Universal, Inc.
Dual-Lock Velcro® — 3M Corp.
Dual Purge™ System — Terra Universal, Inc.
Duo-Vac®— Lab-Line
DURX® — Berkshire Corp.
EnviroWatch™ — Terra Universal, Inc.
ErgoHeight™ — Terra Universal, Inc.
Excelta® — Excelta Corp.
EXSORBX® — Berkshire Corp.
Faraccator™ — Terra Universal, Inc.
FASTSORB® — Berkshire Corp.
FreeFlow™ — Terra Universal, Inc.
Freon™ — E. I. du Pont de Nemours & Co.
GAMMA WIPE® — Berkshire Corp.
Gore-Tex® — W. L. Gore
GroundWatch™ — Terra Universal, Inc.
Humex™ — Terra Universal, Inc.
Hump-Free Bow Guard™ — Terra Universal, Inc.
Hypalon® — Manostat Corp.
Hypoclean Critical™— Safeskin Corp.
Implants™ — Excelta Corp.
Ionizing AeroBar® — Ion Systems, Inc.
IsoClean® — Kappler
IsoStat® — Kappler
IsoVent™ — Terra Universal, Inc.
Kiticcator™ — Terra Universal, Inc.
Kynar® — Pennwalt Corp.
LAB-TIPS® — Berkshire Corp.
Lexan® — General Electric Co.
LockBar™ — Terra Universal, Inc.
LockLatch™ — Terra Universal, Inc.
Magnahelic® — Dwyer Instruments
Microccator™ — Terra Universal, Inc.
MicroFirst® — Berkshire Corp.
MicroPrinter™ — Alnor Instrument Co.
MicroSeal®— Berkshire Corp.
Microtemp™ — Thermo-O-Disc
MicroVac™ — Terra Universal, Inc.
MultiSONIK™—CAE Blackstone, Inc.
NEGA-STAT® — E. I. du Pont de Nemours & Co.
NEGA-WIPE® — Berkshire Corp.
Neverust® — Excelta Corp.
NitroPlex™ — Terra Universal, Inc.
NITRO WATCH® System — Terra Universal, Inc.
NoGlare™ — Excelta Corp.
No Sweat® NVR® — Quality Rubber Products, Inc.
Norprene™ — Norton Co.
Noryl™ — General Electric Co.
NSR® — Kappler USA
OpenTop™—Terra Universal, Inc.
Optima® — Excelta Corp.
Paddle Tip™ — Excelta Corp.
Particle Vision® — Pacific Scientific
Pen-Vac™ — Virtual Industries, Inc.
Photohelic® — Dwyer Instruments
Plasma Preen Etcher™ — Terra Universal, Inc.
Polaroid® — Polaroid Corp.
POLX® — Berkshire Corp.
Poly-D® — Ansell Edmont Industrial, Inc.
Poly-Flo® — Bellpipe
Poly-Tuff® — Quality Rubber Products, Inc.
PortAll™ — Pacific Scientific
Portable Clean Booth™ — Terra Universal, Inc.
Porta-Wand™ — Virtual Industries, Inc.
Precista® — Excelta Corp.
ProClean® — Kappler
Pro/Shield® — Kappler
PureDry™ — Terra Universal, Inc.
PureFlow™ — Terra Universal, Inc.
Purifier®— Labconco
Qualatrile®— QRP Inc.
QUICK-SEAL™ — Accu-Seal
QuietTop™—Terra Universal, Inc.
Roto-Pic® — Excelta Corp.
SatPax™ — Berkshire Corp.
Selecta™ — Excelta Corp.
Selguard® — Teijin, Ltd.
Sensatherm™ — Hankison® div. of Hansen, Inc.
SiteSelect™ — Intermetro Industries
SmartDesiccator™ — Terra Universal, Inc.
Snap-Tite™ — Terra Unversal, Inc.
Sneeze Guard™ — Terra Universal, Inc.
Sno Gun™ — Va-Tran Systems, Inc.
SnowBox™ — Terra Universal, Inc.
Soft Tip™ — Excelta Corp.
Sole Cleaner™ — Terra Universal, Inc.
Squaroid™ — Lab-Line Instruments
Stand Easy™ — Charvoz
Sticky Mats® — Controlled Environmental Equipment
SUNSORB® — Berkshire Corp.
Super Adjustable™ — Intermetro Industries
SUPER POLX® — Berkshire Corp.
SUREX® — Berkshire Corp.
SweepSONIK 2D™ — CAE Blackstone Inc.
Tape-and-Reel™ — Terra Universal, Inc. (Desiccator)
Teflon® — E. I. du Pont de Nemours & Co.
Tray Packs® — Quality Rubber Products, Inc.
TWILLX® — Berkshire Corp.
Twist-O-Flex® — Hirsh Speidel, Inc.
Tygon® — Norton Co.
Tyvek® — E. I. du Pont de Nemours & Co.
Ultimate Acid/ALKALI™ — QRP Inc.
Ultimax® — Ircon Inc.
ULTRA-SEAL® — Berkshire Corp.
UltraClean™ — Terra Universal, Inc.
Universal Card Holder™ — Terra Universal, Inc. (Desiccators)
ValuSeal™ — Berkshire Corp.
Viton® — E. I. du Pont de Nemours & Co.

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Appendix IV: Chemical Compatibility Chart

This chart is intended as a general guide for various materials and chemicals. It shows some of the materials used in Terra's products and chemicals likely to be used with them. Testing is strongly recommended for extreme conditions of use, such as prolonged exposure or immersion, high temperatures and high concentrations. The acids, caustics and salts in this chart are assumed to be in solution. Materials may react differently to the pure substances (glacial acetic acid, for example).

Explanation for symbols:

- ❍ = **No noticeable effect.**
- ◗ = **Minor effect or slight change in appearance or properties. Test before repeated exposure.**
- ✶ = **No noticeable effect at low concentration and room temperature. Moderate to severe effect at high concentration and/or high temperature. Test before using.**
- ● = **Severe effect or degradation, exposure not recommended.**

Hazards (Only the primary ones are shown. For example, chlorine is not shown as an asphyxiant because its toxicity will kill you first).

- **A = Asphyxiant (gases and vapors only)**
- **C = Corrosive**
- **F = Flammable**
- **O = Oxidizer**
- **T = Toxic**

			METALS					PLASTICS								
		HAZARDS	Aluminum	Brass	Bronze	Copper	304 Stainless Steel	316 Stainless Steel	Acrylic (plexiglass)	ABS	CPVC	Noryl	Nylon	Polycarbonate	Polyethylene	Polypropylene
ACIDS	Acetic	C	◗	●	◗	◗	●	✶	●	✶	✶	❍	●	✶	●	
	Aqua Regia	C	●	●	●	●	●	●	●		◗	●	●	●	●	
	Chromic	C	●	●	●	●	◗	◗	◗	◗	✶	✶	●	✶	✶	
	Hydrochloric	C	●	●	●	●	●	●	✶	❍	✶	❍	●	✶	✶	
	Hydrofluoric	C	●		◗	◗	◗	◗	●	◗	●	✶	●	●	✶	
	Nitric	C	●	●	❍	●	❍	❍	●	✶	✶	✶	●	✶	✶	
	Phosphoric	C	◗	●	◗	●	●	●	●		✶	❍	●	❍	✶	
	Sulfuric	C	●		◗	●	●	●	✶	✶	✶	❍	●	✶	✶	
CAUSTICS	Ammonium Hydroxide	C	◗	●	●	●	❍	❍	◗	❍	✶	❍	❍	●	✶	
	Potassium Hydroxide	C	●	●	●	◗	◗	❍	◗		❍	❍	◗	●	❍	
	Sodium Hydroxide	C	●	●	◗	●	◗	◗	◗	❍	✶	❍	✶	✶	✶	
GASES	Air	O	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	
	Ammonia	C,F,T	❍	●	●	●	❍	❍	◗		✶	◗	❍	●	●	
	Argon	A	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	
	Carbon Dioxide	A	❍	❍	❍	❍	❍	❍	◗		✶	❍	❍	❍	✶	
	Carbon Monoxide	F,T	❍	❍	❍	❍	❍	❍			✶	❍	❍		✶	
	Chlorine	C,T	●	●	●	●	❍	❍			●	●	●	❍	●	
	Flourine	C,O,T	✶	✶	◗	✶	❍	❍	❍		✶		●	◗	●	
	Helium	A	❍	❍	❍	❍	❍	❍	❍	❍	✶	❍	❍	❍	❍	
	Hydrogen	A,F	❍	❍	❍	❍	❍	❍			✶	❍	❍	❍	◗	
	Hydrogen Sulfide	C,F,T	❍	❍			❍	❍	◗		✶		●	◗	✶	
	Methane	A,F	❍	❍	❍	❍	❍	❍			✶	●	❍		❍	
	Nitrogen	A	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	
	Nitrous Oxide	O	❍	❍	❍	❍	❍	❍			✶		◗		❍	
	Ozone	O	◗		◗	❍	◗	❍	❍		❍	❍	●	●	❍	
	Propane	A,F	❍	❍	❍	❍	❍	❍			❍	❍	❍	◗	❍	
OXI-DANTS	Hydrogen Peroxide	O	❍	●	◗	●	◗	❍	❍	❍	✶	❍	●	❍	❍	
	Sodium Hypochlorite	O	●	●	◗		✶	✶	◗	❍	✶	❍	●	◗	✶	
SALTS	Ammonium Nitrate		◗	●	●	●	❍	❍	❍		✶	❍	●	❍	✶	
	Ammonium Persulfate		●	●	●	●	●	◗	❍		✶	❍	●		✶	
	Sodium Carbonate		●	◗	❍	❍	❍	❍	✶	❍	✶	❍	❍	❍	❍	
SOLVENTS	Acetone	F	❍	❍	❍	❍	❍	❍	●	●	●	●	❍	●	●	
	Carbon Tetrachloride	T	●	❍	❍		◗	◗	●	◗	●	●	●	●	●	
	DI Water		❍	❍		◗	❍	❍	❍	❍	❍	❍	❍	❍	❍	
	Ethyl Alcohol	F	◗	❍	❍	❍	❍	❍	❍	◗	◗	❍	❍	◗	✶	
	Ethylene Glycol		❍	◗	❍	❍	◗	◗	◗		✶	❍	❍	❍	◗	
	Glycerine		❍	◗	❍	❍	❍	❍	◗		✶	❍	❍	❍	◗	
	Isopropyl Alcohol	F	◗		❍	◗	◗	◗		◗	◗	❍	●	❍	✶	
	Kerosene	F	❍	❍	❍	◗	❍	❍	◗	❍	✶	●	❍	✶	✶	
	Methyl Alcohol	F,T	❍	❍	❍	◗	❍	❍	●	◗	✶	❍	❍	◗	✶	
	Methyl Ethyl Ketone	F	◗	❍	❍	❍	❍	◗	●		●	●	◗	●	●	
	Toluene	F	❍	❍	❍	❍	❍	❍	●	●	●	●	❍	●	●	
	Trichloroethane	A	●		❍		◗	◗				●	◗	●	❍	

APPENDIX IV

Explanation for symbols:

- ❍ = No noticeable effect.
- ◗ = Minor effect or slight change in appearance or properties. Test before repeated exposure.
- ✶ = No noticeable effect at low concentration and room temperature. Moderate to severe effect at high concentration and/or high temperature. Test before using.
- ● = Severe effect or degradation, exposure not recommended.

		PLASTICS (Cont.)								RUBBER & SYNTHETICS (ELASTOMERS)											
		Polymethylpentene (TPX)	Polypropylene	Polystyrene	PPS (Ryton)	PVC	PVC, Static Dissipative	PVDF (Kynar)	Styrene Acrylonitrile (SAN)	Teflon, PTFE	Buna N	EPDM	Hypalon	Natural Rubber	Neoprene	Nitrile	PVA (Polyvinyl Alcohol)	Tygon	Silicone	Viton
ACIDS	Acetic	✶	✶	❍	✶	✶	❍	✶	❍	❍	◗	❍	✶	✶	✶	◗	●	●	◗	✶
	Aqua Regia		●		●	●		❍		❍	●	◗	◗	●	✶	✶	●	●	●	✶
	Chromic	✶	✶	●	❍	✶		❍	✶	❍	●	◗	◗	●	●	◗	●	◗	◗	✶
	Hydrochloric	✶	✶	✶	●	✶	❍	✶	❍	❍	◗	✶	✶	❍	✶	◗	●	●	●	✶
	Hydrofluoric	✶	❍	✶	❍	✶	✶	✶		❍	●	●	◗	✶	●	❍	●	●	●	✶
	Nitric	✶	✶	●	●	✶	❍	✶	◗	❍	●	✶	✶	●	●	✶	●	●	●	✶
	Phosphoric	❍	◗	❍	●	◗	❍	✶		❍	●	◗	◗	◗	✶	✶	●	●	●	✶
	Sulfuric	❍	✶	✶	✶	✶	✶	✶	❍	❍	✶	✶	✶	✶	✶	●	●	●	●	✶
CAUSTICS	Ammonium Hydroxide	❍	❍		❍	✶	❍	✶	❍	❍	❍	❍	❍	✶	✶	❍	●	❍	❍	●
	Potassium Hydroxide		❍		✶	✶	❍	✶		❍	◗	❍	❍	❍	❍	❍	●	◗	◗	◗
	Sodium Hydroxide	❍	◗	❍	◗	✶	❍	✶		❍	✶	◗	❍	❍	✶	❍	●	◗	❍	✶
GASES	Air	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
	Ammonia	❍	◗		✶	❍	❍	✶		❍	◗	❍	●	●	❍	❍		❍	◗	●
	Argon	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
	Carbon Dioxide	❍	◗	❍	❍	✶	❍	✶		❍	✶	✶	✶	✶	✶	✶			✶	✶
	Carbon Monoxide		◗		❍	✶	❍	✶		❍	❍	❍	◗	●	✶	✶			❍	✶
	Chlorine	●	●		●	●	●	✶		❍	◗	❍	●	●	●			◗	●	✶
	Flourine		●		❍	●	●	✶		●	●	❍		◗	●				●	✶
	Helium	❍	◗	❍	❍	✶	❍	✶	❍	❍	❍	❍	❍	❍	✶	❍	❍	❍	❍	❍
	Hydrogen		◗		✶	✶	❍	◗		❍	❍		❍	✶	✶			❍	◗	✶
	Hydrogen Sulfide		◗		◗	✶		✶		❍	●	◗	◗	◗	●			●	◗	✶
	Methane		◗		❍	✶		✶		❍	❍	●	◗	●	✶				●	✶
	Nitrogen	❍	❍		❍	❍	❍	●		❍	❍	❍	❍	❍	✶	❍		❍	❍	✶
	Nitrous Oxide		●		❍	✶		❍		❍	❍				●					✶
	Ozone		◗			◗		❍		❍	●	❍	❍	●	◗				❍	✶
	Propane		◗		❍	✶	❍	✶		❍	❍	●		●	✶				●	✶
OXI-DANTS	Hydrogen Peroxide	✶	✶	❍	●	●	✶	✶		❍	●	✶	●	◗	●	❍	●	◗	✶	✶
	Sodium Hypochlorite	❍	✶	❍	●	✶	❍	✶	❍	❍	◗	◗	✶	◗	✶		●	◗	◗	✶
SALTS	Ammonium Nitrate	❍	✶	❍	❍	✶	❍	✶	❍	❍	❍	❍	❍	◗	◗	❍	●	❍	◗	✶
	Ammonium Persulfate		✶		❍	✶	❍	✶	❍	❍	❍	◗	❍	❍	✶	❍	●	❍	●	✶
	Sodium Carbonate	❍	✶	❍	✶	✶	❍	✶	❍	❍	❍	❍	❍	❍	✶		●	◗	❍	✶
SOLVENTS	Acetone		❍	●	✶	●	●	●	●	❍	●	❍	◗	◗	✶	✶	●	●	◗	●
	Carbon Tetrachloride	●	●	●	❍	●	●	✶		❍	◗	◗	●	●	✶	✶	❍		●	✶
	DI Water		❍		❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍		●	❍	❍	❍
	Ethyl Alcohol		✶		❍	◗	❍	❍	◗	❍	◗	❍	❍	❍	✶	❍	●	◗	◗	✶
	Ethylene Glycol	❍	◗	❍	✶	✶	❍	✶		❍	❍	❍	❍	❍	✶	❍	◗	◗	❍	✶
	Glycerine		◗	❍	✶	✶	❍	✶	❍	❍	❍	❍	❍	❍	✶	❍	◗	❍	❍	✶
	Isopropyl Alcohol		✶			◗	❍	✶		❍	◗	❍	❍	❍	✶	❍	●	❍	❍	✶
	Kerosene		●		✶	◗	❍	✶		❍	❍	●	●	●	●	❍	◗	●	●	✶
	Methyl Alcohol		✶		❍	◗	❍	✶	●	❍	◗	❍	❍	❍	✶	❍	●	❍	◗	✶
	Methyl Ethyl Ketone	◗	✶	●	✶	●	●	●	●	❍	●	❍	●	✶	●	●	◗	●	●	●
	Toluene	●	●	●	✶	●	●	✶	●	❍	●	●	●	●	✶	✶	◗	●	●	✶
	Trichloroethane		◗			●	❍	❍	❍	❍	●	●	●	●	✶	✶	◗		●	❍

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