Operation Manual

V1.0

AutoMATE™ 96

Microplate Pipetting Workstation

MP9604

ACCURIS INSTRUMENTS

Thank you for purchasing the AutoMATE™ 96 Microplate Pipetting Workstation. This user manual details the instrument's features, specifications, as well as complete operating instructions; please read it carefully before operation. Keep this user manual for later use.

Important:

Please keep the box and packaging material for this instrument. If service is required, the box will be needed to ship the instrument to our Service Department.

Initial Inspection

Please inspect the instrument as well as all included accessories when you first open the packaging. If you find anything damaged or missing, please contact Benchmark Scientific or your local distributor immediately.

BENCHMARK SCIENTIFIC / ACCURIS INSTRUMENTS

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Safety Warnings and Guidelines

1. Important information for safe use

Users should understand how to use this instrument before operating. Please read this manual carefully prior to operation.

Any improper operation may cause injury. Please read this manual carefully and operate safely according to the guidelines.

2. Operation and Maintenance

The operation and maintenance of the instrument should comply with the basic guidelines and warnings below. Incorrect operation or maintenance will have detrimental effects on the life, performance, and safety features of the instrument.

The instrument is a normal indoor instrument which conforms to class Ⅰ of the GB 4793.1 standard.

This instrument is designed for use in a laboratory environment. The device must be operated by skilled laboratory personnel with appropriate training.

To prevent injury or voiding the warranty, the operator should not attempt to repair the instrument without explicit guidance from Accuris Instruments. If service is required, please contact Accuris Instruments or your local distributor for repair.

Before powering on, confirm that the voltage used meets the electrical requirements of the instrument as stated on the rating plate. If the electric cord is damaged, replace it with the same type of cord. Hold the socket firmly before pulling the plug from an outlet. Do not pull the electric cord.

The temperature of the heating block can be high; please do not touch it while it is in use to prevent injury.

The instrument should be installed in an environment of standard room temperature, low dust, low humidity, and away from direct sunlight, electromagnetic interference, and heat sources. Do not block the vents on the instrument.

Always power off the instrument when you are finished using it. Unplug the power cord and cover the instrument with a cloth or plastic sheet to prevent excessive dust from entering the housing.

Pull the connector plug from the electrical outlet immediately and contact the vendor in the event of:

- Liquid entering the housing.
- Abnormal operation: such as any abnormal sound or smell.
- The instrument is dropped or there is any damage to the housing.
- Any malfunction.

3. Maintenance

The instrument should be cleaned regularly using a soft cloth dampened with a small amount of alcohol.

4. Transportation and storage requirements

Ambient temperature: -20℃ ~ 55℃

Relative humidity: ≤ 80%

Place in a well-ventilated room, away from corrosive gas.

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Chapter 1 Introduction

The AutoMATE™ 96 from Accuris Instruments is a fully automated, high throughput liquid handling workstation that improves productivity when filling microplates. Capable of dispensing up to 96 channels simultaneously, the AutoMATE 96 significantly reduces the processing time and errors associated with manual pipetting.

The included tablet features an intuitive app for programming and operation. Unlike many 96-well pipetting stations, the AutoMATE 96 is “hands-free”, with motorized tip loading/ejection and a four position, automated, sliding platform that precisely aligns the tips with the appropriate microplate/reservoir. Once programmed, the instrument can run protocols to completion without any manual positioning or adjustment.

Three interchangeable heads allow for a pipetting range from 1.0µL to 1000µL. The AutoMATE 96 is compact enough to fit onto a standard lab bench or into a biosafety cabinet.

1. Key Features

- Precise pipetting - The pipetting range can be selected according to the specific requirements.
- Multiple pipetting functions - sample transfer, gradient dilution, plate replication, combining samples from multiple plates, 96/384 plate conversion and more.
- 4 position platform: Select tip, plate, and reservoir positions. Program automatic movement of the platform.
- Easy to use - Intuitive interface for manual and programmed operations.

Chapter 2 Specifications

1. Required Installation Environment

Environmental Temperature: -20°C - 55°C

Operating Temperature: 10°C – 40°C

Relative Humidity: ≤ 80%

Atmospheric Pressure: 86.9 kPA – 106.0 kPA

Input Voltage: AC 100～240V, 50Hz/60Hz

2. Instrument Specifications

Model	**AutoMATE™ 96 (MP9604)**
Pipetting Heads	20ul, 200ul, 1000ul (interchangeable)
Platform positions	Four
Plate positioning	Automatic / motorized
Operation interface	Tablet, basic mannual operation and progremmed operation
Channels	8 / 96
Compatible Tips	Accuris AutoMATE tips
Operating	Android
Display	8 inch tablet, color display
Instrument port	USB B
Power supply	100 to 240VAC, 50/60Hz, 100W
Tablet connection	Bluetooth
N.W.(KG)	32.6 Kg
Size(WxDxH)mm	69.0x35.0x67.3 cm

3. Pipetting Head Specifications

Pipette Head	**MP9600-20PH (20 μL)**	**MP9600-200PH (200 μL)**	**MP9600-1000PH** (1000 μL)
Number of pipetting channels	96	96	96
Pipetting range/μL	1~20	5~200	100~1000
Pipetting accuracy	1μL: ≤±12%	5μL: ≤±5%	100μL: ≤±2.5%
	2μL: ≤±5%	20μL: ≤±2%	500μL: ≤±1%
	10μL: ≤±1%	100μL: ≤±1%	1000μL: ≤±1%
	20μL: ≤±1%	200μL: ≤±1%	
Pipetting precision	1μL: ≤10%	5μL: ≤3.5%	100μL: ≤1.25%
	2μL: ≤5%	20μL: ≤1.5%	500μL: ≤0.4%
	10μL: ≤1%	100μL: ≤0.8%	1000μL: ≤0.4%
	20μL: ≤0.8%	200μL: ≤0.4%	

4. Dimensions

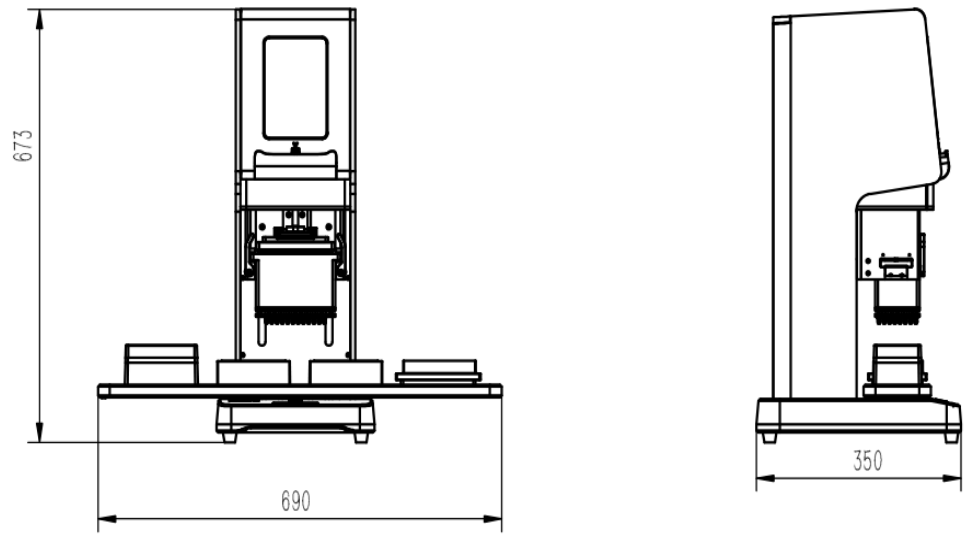


Fig 1. Dimensions

Chapter 3 Instrument Overview

1. Structure

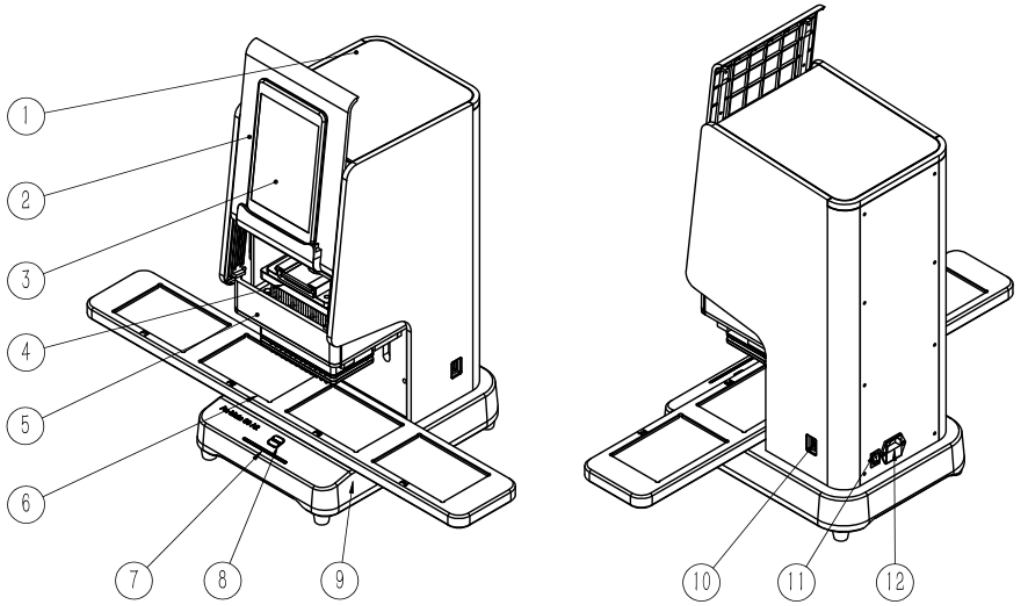
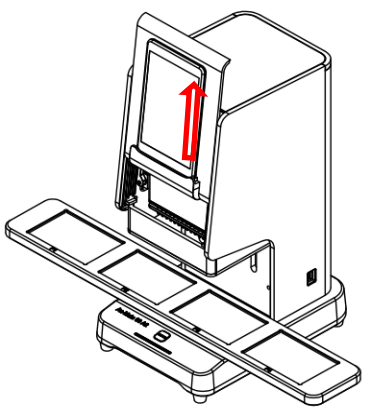


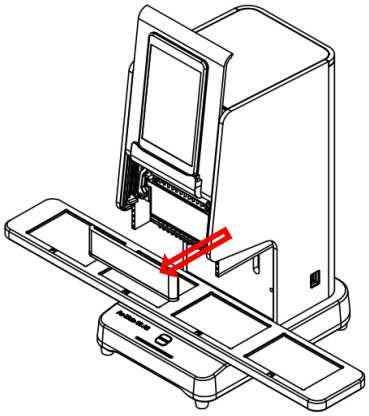
Fig 1. AutoMATE 96 Structure

1. Shell	2. Front casing	3. Tablet	4. Pipette Head	5. Front Plate
6. 4-position motorized platform	7. Operational LED Indicator	8. SWITCH key	9. Instrument Base	10. USB Inlet
11. Power switch	12. Power Inlet			

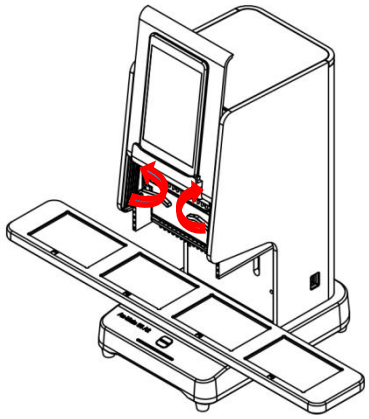
2. Pipette Head Installation / Replacement



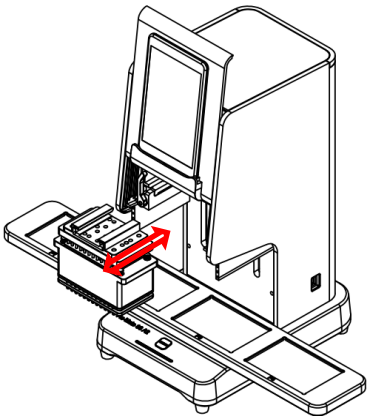
① Push front casing up



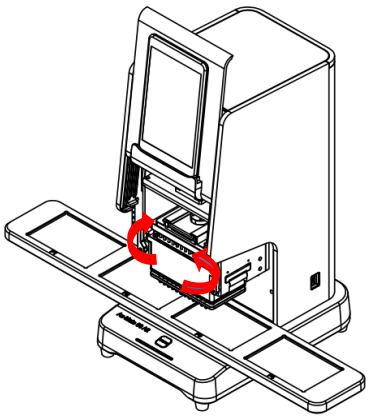
② Remove the front edge



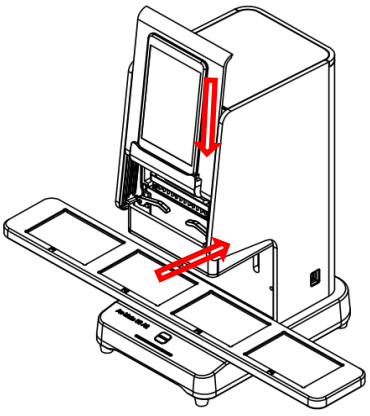
③ Loosen the locking levers



④ Replace pipetting head



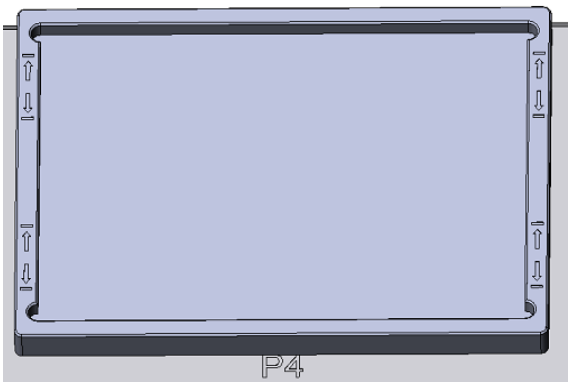
⑤ Tighten levers



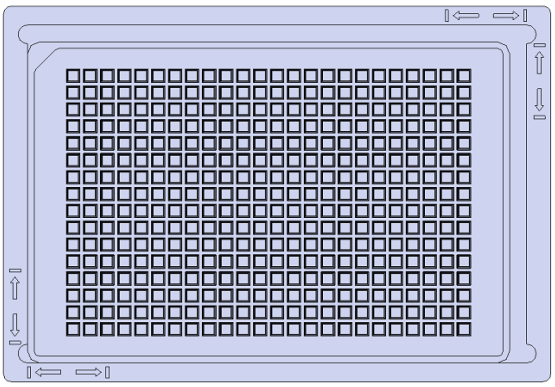
⑥Replace front casing & front edge

Fig 3. Pipette Head Replacement

3. 384-Well Microplate Pipetting



384-well Microplate Adapter



384-well Microplate Positioning

Place the 384-well microplate adapter onto a platform position. Place the 384-well microplate onto the bottom left side of the adapter. During a program run, the AutoMATE 96 will dispense into two horizontal positions, and then instruct the user to move the 384-well microplate to the top left side of the adapter to dispense into the final 2 horizontal positions.

1. Installation

1.1. Pre-installation inspection

The instrument should be unpacked by an experienced laboratory technician with experience and background suitable for installing and testing automated lab equipment. The persons installing the instrument should carefully inspect all items that accompany the instrument and compare to the included Packing List. If there are any questions about the condition of the instrument or included accessories, please make a detailed record and contact Accuris Instruments or your distributor.

1.2. Installation environment

① This product is designed for indoor use only

② Operating temperature range: 10℃ ~ 40℃.

③ Relative humidity: below than 80%, no condensation.

④ Atmosphere pressure: 86.0 k Pa~106.0k Pa.

⑤ Power input: 100~240VAC, 50Hz/60Hz.

⑥ Power sockets must be properly grounded.

⑦ The minimum distance between the back of the instrument and the wall is 10 cm.

⑧ The instrument should be installed on a stable surface with dimensions of at least 730X360mm and designed to hold at least 35kg.

1.3. Installation sequence

① Open the shipping packaging.

② Carefully lift and transfer the instrument to the stable and level surface where it will be used.

③ Make sure that there is enough space to the left and right for the moving platform. It is recommended that signs or notes are posted to remind lab personnel to keep these areas clear.

④ Connect the power cable to an appropriate electrical outlet and to the back power inlet on the instrument and turn on the power switch.

⑤ Power on the included tablet computer. Make sure that the battery is charged appropriately for use with the included adapter and cord. Open the Auto-Mate 96 series app on the tablet.

1.4. Check the Software Version

After opening the Auto-Mate 96 app, check the instrument software version on the start-up screen. The software version displayed on this interface should be the same that is recorded in the product performance test table. See Fig. 1.

Fig 2 Software version

Chapter 4 Instrument Setup

1. Preparation Before Use

An experienced laboratory technician, with the requisite knowledge and background, should be the one to unpack and install the instrument. The technician should thoroughly examine all items that arrive with the instrument and compare them to the Packing List. Should there be any doubts or questions about the instrument or its accompanying accessories, such should be recorded and Accuris Instruments or the relevant distributor should be contacted.

Before beginning any pipetting process, the following checklist should be completed:

- Confirm that the tablet controller is connected to the instrument.
- Ensure that there are no obstructions to the moving platform and that it moves freely to both the right and left.
- Verify that the power supply connected to the instrument is steady and meets the power supply requirements: Voltage: 100~240V (±10%); Frequency: 50Hz/60Hz.
- Turn on the main power switch, as depicted in Figure 5, to the "I" position. Confirm that the instrument is powered on and that the Operational Indicator Light is lit.

Fig 3. Power Switch

2. Software Guide

On the included Android Tablet, select the “AutoMATE™ 96” app icon to enter the application interface.

Fig 4. AutoMATE™ 96 App Icon

Select the user (Admin or other), enter the corresponding user password, and click “Login” to enter the main interface, as shown in the figure below.

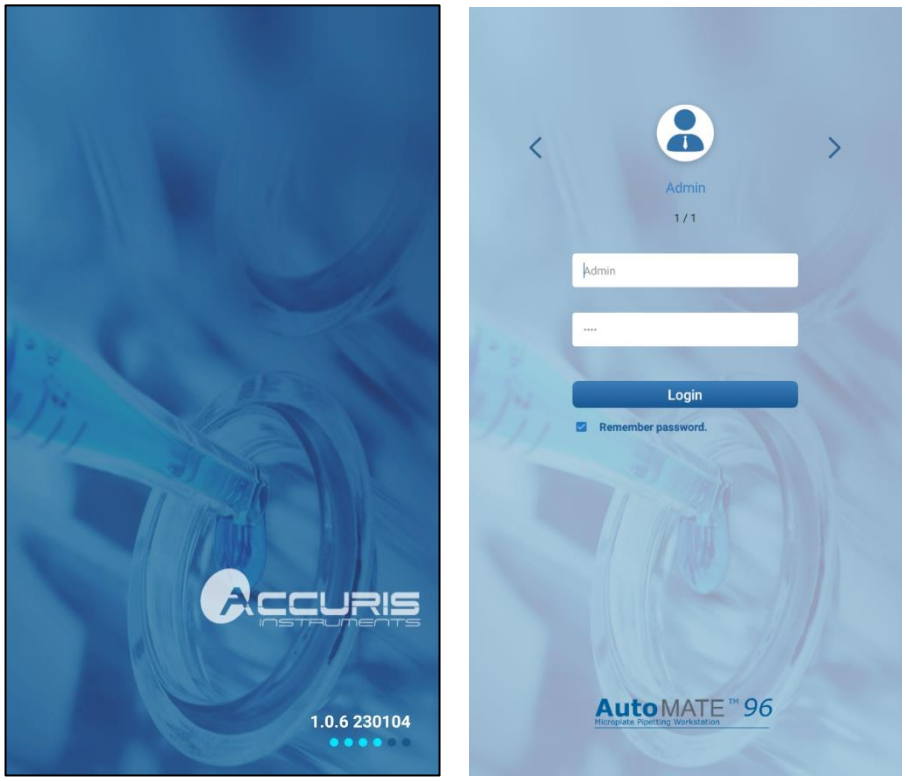


Fig 5. Login interface

2.1. Main Interface

After logging in, the main interface will display (**Figure 8**). On the main interface, choose one of the two pipetting modes: **Manual Mode** or **Automated Program Mode**, as shown in the figure below.

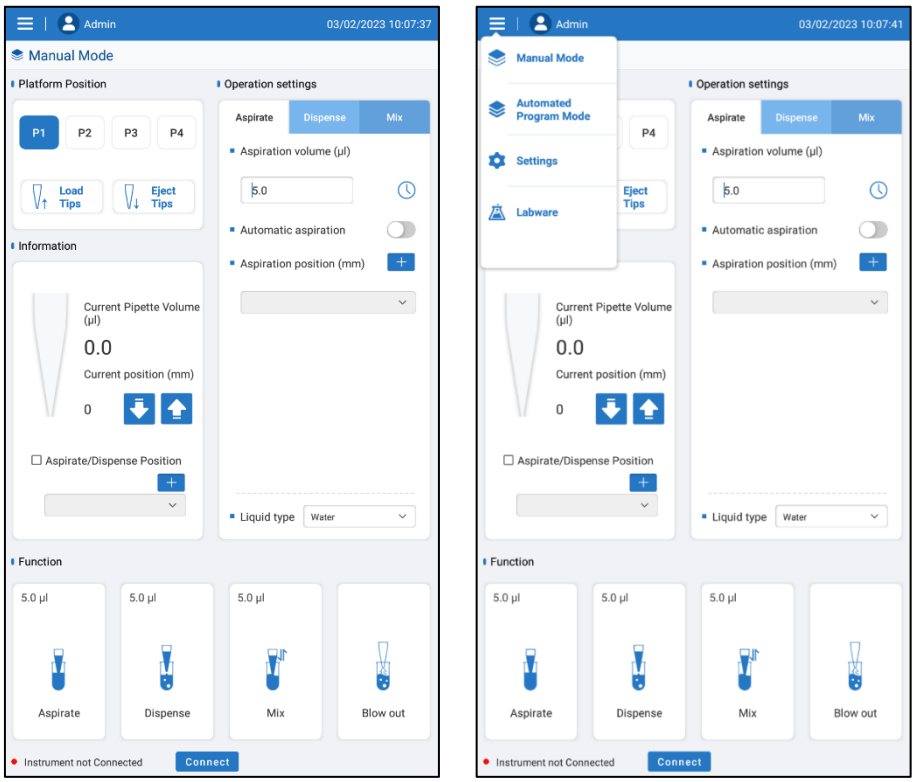


Fig. 6 AutoMATE™ 96 Application Main Interface

2.1.1 Manual Mode

Choose "Manual mode" to enter the basic mode, as shown in the figure below.

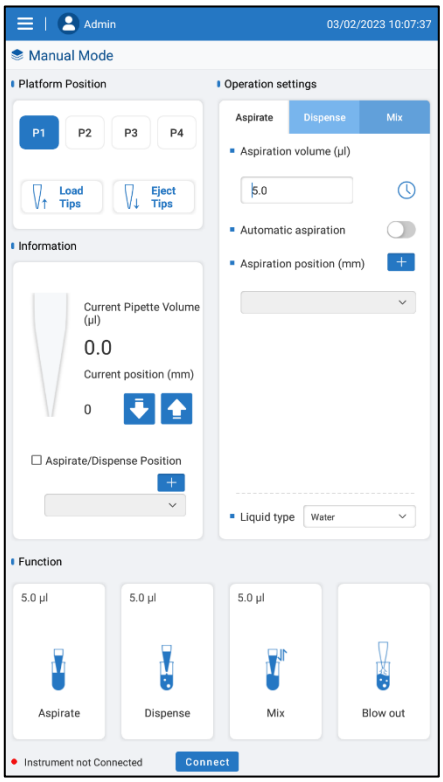


Fig. 7 Manual Mode Interface

Platform Positions:

The motorized platform has four positions: P1 corresponds to platform position 1, P2 corresponds to platform position 2, and so on. To change to another platform in the Manual Mode Interface, select a different platform position to highlight it blue (**Figure 10**); the instrument will automatically position itself to the platform position specified.

Fig. 8 Platform Position Selection

Tip Loading & Ejection

To load / eject pipette tips in the Manual Mode Interface, select the “Load Tips” or “Eject Tips” icons to highlight it blue (**Figure 11**); the instrument will automatically

load / eject tips to the currently selected platform position.

Fig. 9 Manual Mode: Tip Loading & Ejection

Pipetting Functions

In the Manual Mode Interface, users can toggle amongst settings for “Aspirate” , “Dispense”, and “Mix” (**Figure 12**).

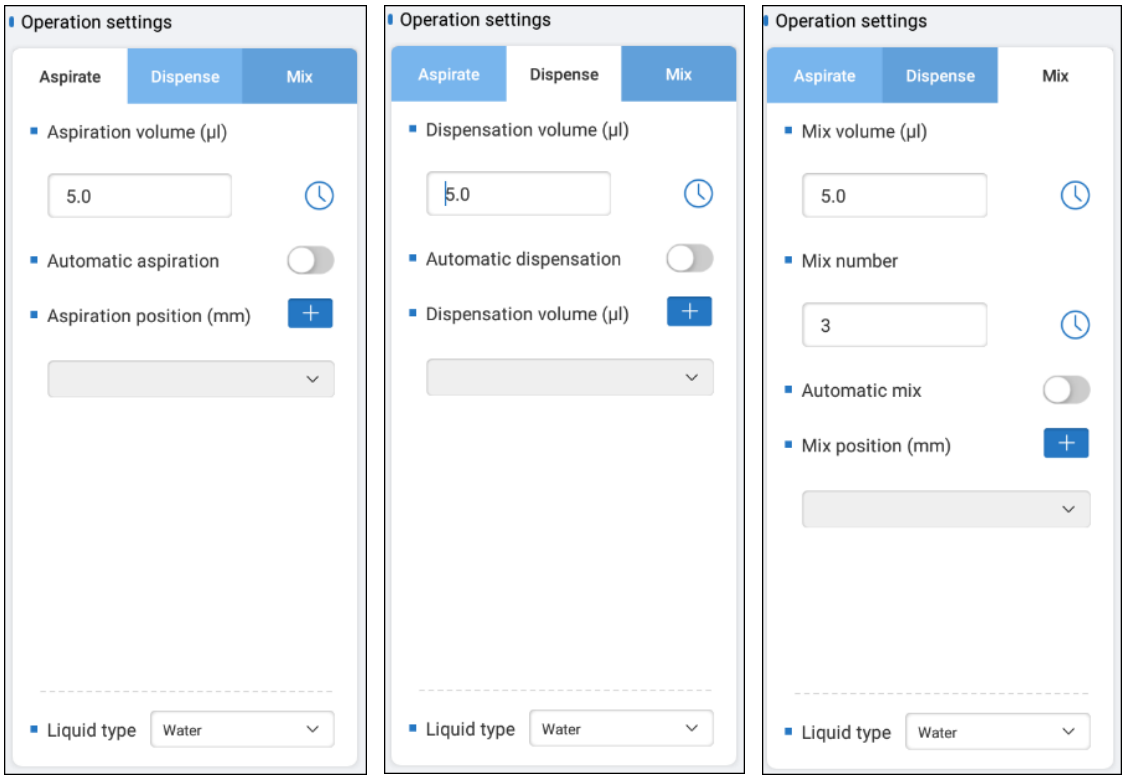


Fig 10 Manual Mode: Pipetting Functions

Table 1 Legend: Manual Mode Pipetting Functions

Aspiration volume	Click the Aspirate volume text box, enter the volume of liquid to be

(µL)	aspirated.
Dispensation volume (µL)	Click the Dispense volume text box, enter the volume of liquid to be dispensed.
Mix volume (µL)	Click the Mix volume text box, enter the volume of liquid to be mixed.
Automatic aspiration	Click on/off for the automatic aspiration function
Automatic dispensation	Click on/off for the automatic dispensation function
Automatic mix	Click on/off for the automatic mix function
Mix number	Click the Mix number text box, enter the # of mixing steps to be performed (Range: 0-99).
Aspiration position (mm)	Click to create a new aspirate position, or click the drop-down menu to choose an available aspiration position.
Dispensation position (mm)	Click to create a new dispense position or click the drop-down menu to choose an available dispensation position.
Mix position (mm)	Click to create a new mix position or click the drop-down menu to choose an available mix position.
Liquid type	Click the drop down to select the liquid type of the sample (Water, Alcohol, Lysis Buffer, Magnetic Beads, etc.).

Positions for aspirate, dispense and mix refer to position location of the bottom of the tip as measured vertically from the top surface of the platform. The position may need to be adjusted depending on the volume of liquid in the microplate/reservoir and the design of the microplate/reservoir. Settings for Automatic aspiration/dispensation/mix allow the user to create or select a position for the automation. Once a function key is selected with automatic aspiration turned on, the instrument will automatically perform aspiration at the specified position.

Manual Mode: Function Keys

As shown in the figure below, there are four Function Keys available : Aspirate, dispense, Mix and Blow out. The current set volume is shown in the upper left corner of each Operation button. If the Operation Setting has been set with automatic aspiration/dispense/mix with a position (mm) set, this set position will also be displayed in the upper left corner. If there is no position setting, the position data will not be displayed.

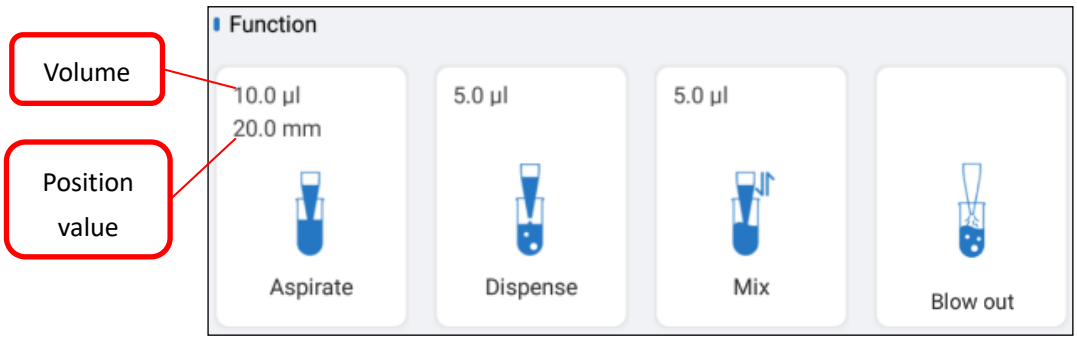


Fig. 11 Manual Mode: Function Keys

Real Time Information

In the Manual Mode Interface, real-time information of the pipette tips, such as the volume of liquid in the tips and position of the tips, can be seen. Below , the position of the tip can be manually adjusted according to the current position. Highlight the “Aspirate/Dispense Position” box to enable automatic aspiration / dispensation to the set descent position. To add descent position, click of Aspirate / Dispense Position.

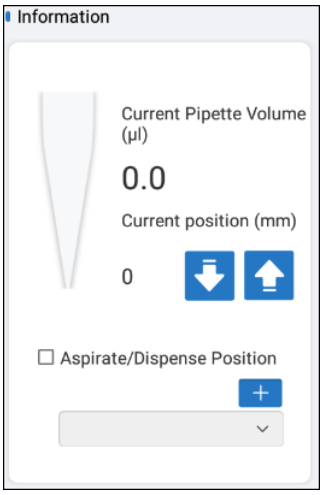


Fig. 12 Manual Mode: Real Time Information

2.2.1. Program mode

Choose “Automated Program Mode” from the upper left menu to enter the Automated Program Mode, as shown in the figure below.

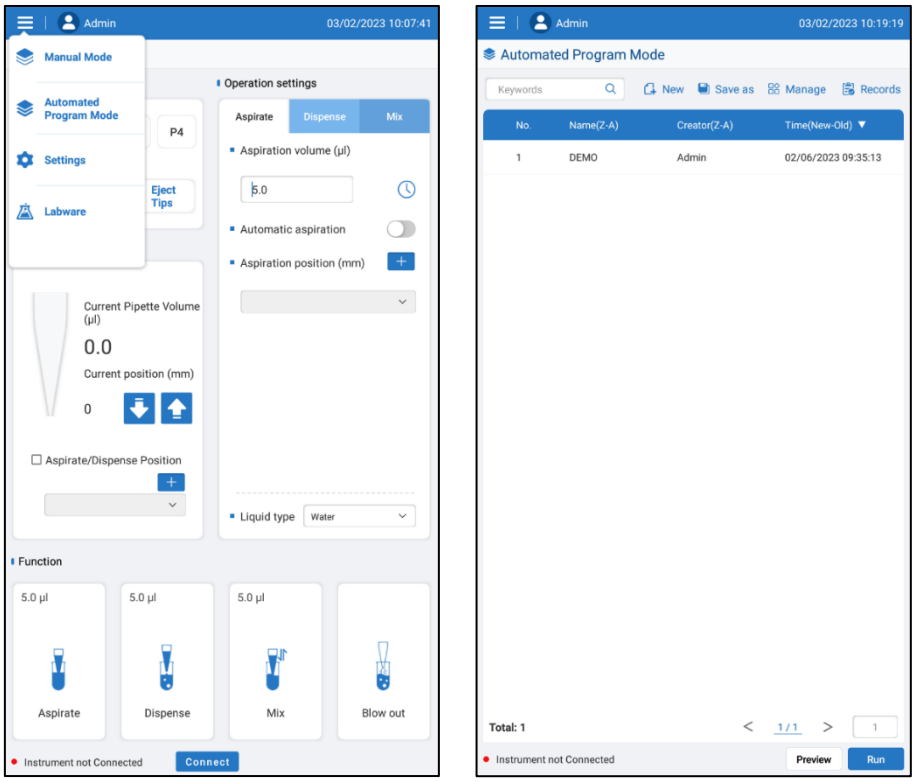


Fig 13 Automated Program Mode Interface

The Automated Program Mode offers four function buttons at the top right: New, Save as, Manage and Records.

2.2.2.1. New

Press the “New” button to create a new program. The default program name is the numerical combination of the current date and time (see Fig 15 Select step), click on this number to change the name if desired, then press OK to start the programming. Press “New Step” at the lower left and the “Select step” window till open. Press to highlight the type of step to add to the program, and click OK.

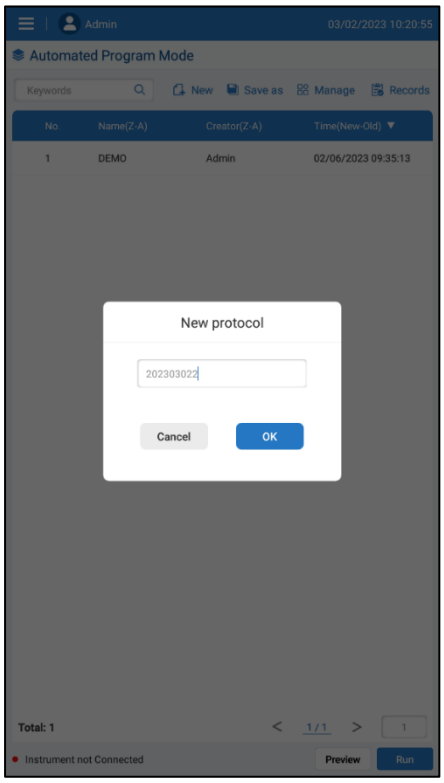
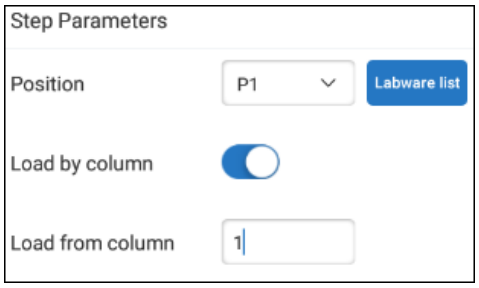


Fig 14 New protocol

Fig 15 Select step

The “Step Parameters” for the newly added step can now be set. Select a Position for the step (P1 to P4). Typically, “Load Tips” would be the first step, and for this the tips are usually positioned the at P1 (far left) position of the platform. Select the platform position P1.



Next, press the “Labware list” button to choose the appropriate tips to load, (Fig); Or, if pipetting with only a column of 8 tips, for a process such as serial dilution, choose “Load by column”. Choose the column of tips (1 to 12) which is to be loaded on the left most column of the pipetting head. See figure x. Unloading tips carry the same parameters as loading tips, but for tip ejection.

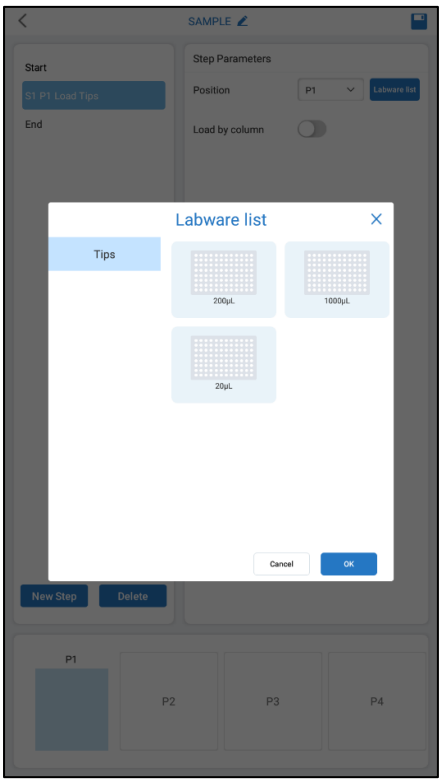


Fig 19 Labware list

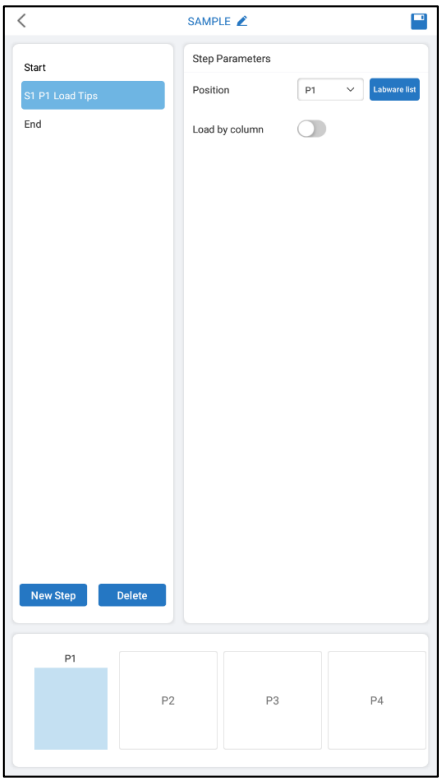
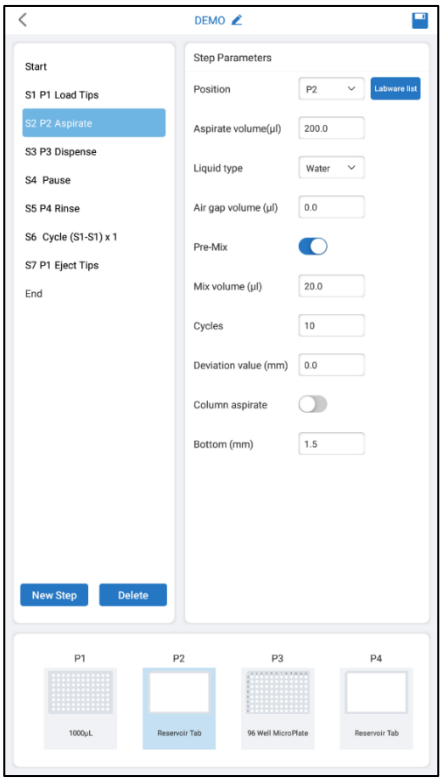
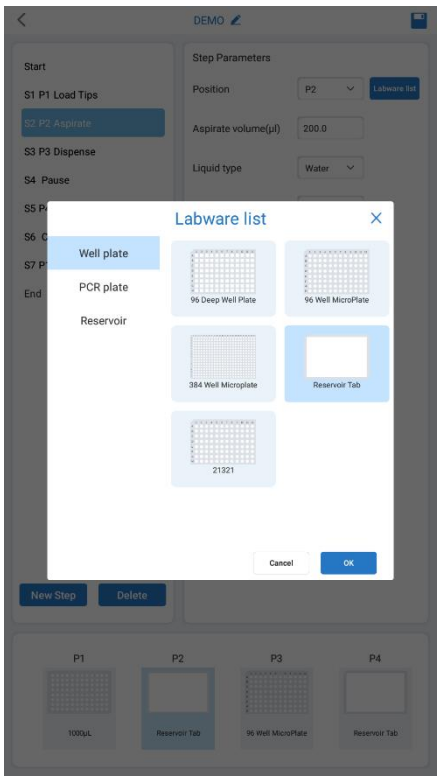


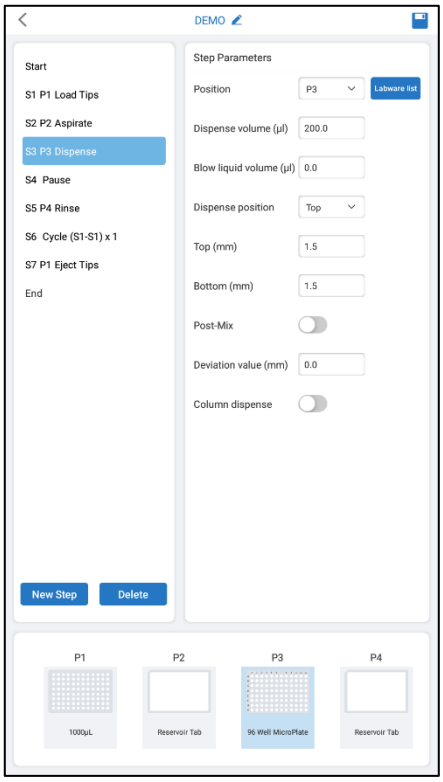
Fig 20 S1 P1 Load Tips

After setting up the step parameters, click on “New Step” to add another step. The program can be saved by pressing the disk icon in the upper right of the screen. Steps can be modified by pressing any of the created steps in the upper left.

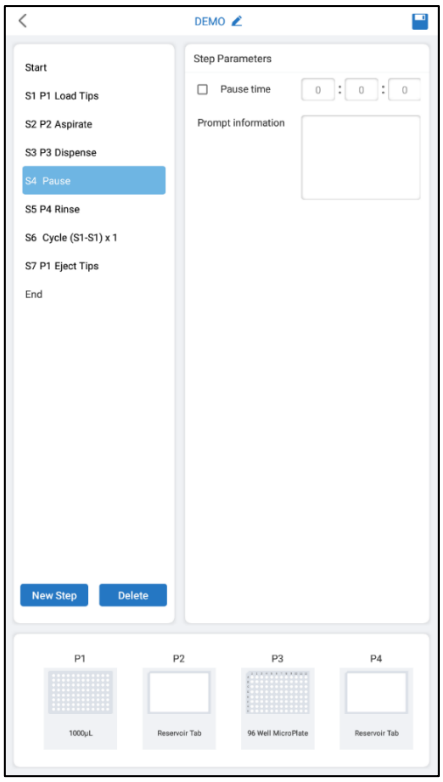
Automated Program Mode: Aspirate & Dispense Settings:

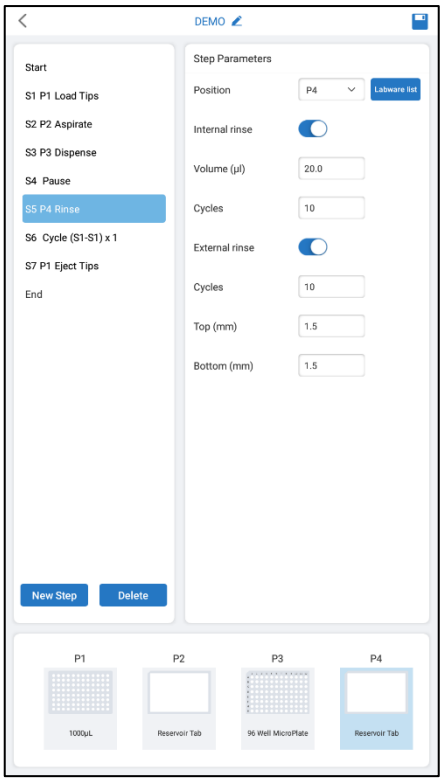




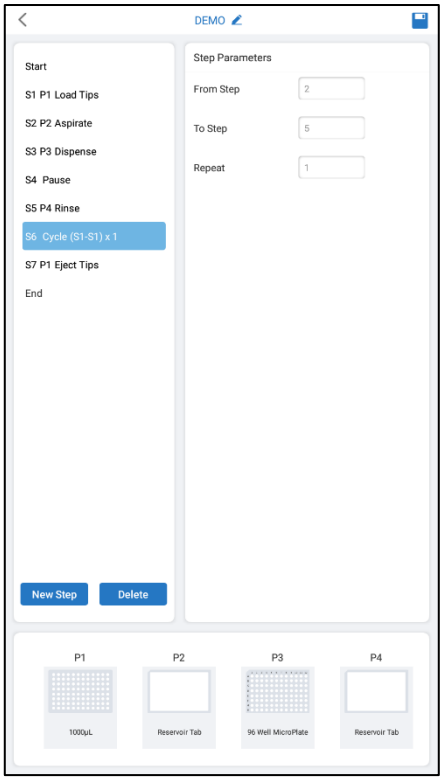


Automated Program Mode: Pause & Rinse Settings:





Automated Program Mode: Cycle Settings:



2.2.2.2. Save as

To save an existing program under a new name, highlight the desired program, click the **Save as** option, and enter a new name. This will create a copy of the program with the new name, which can then be modified according to the user's requirements.

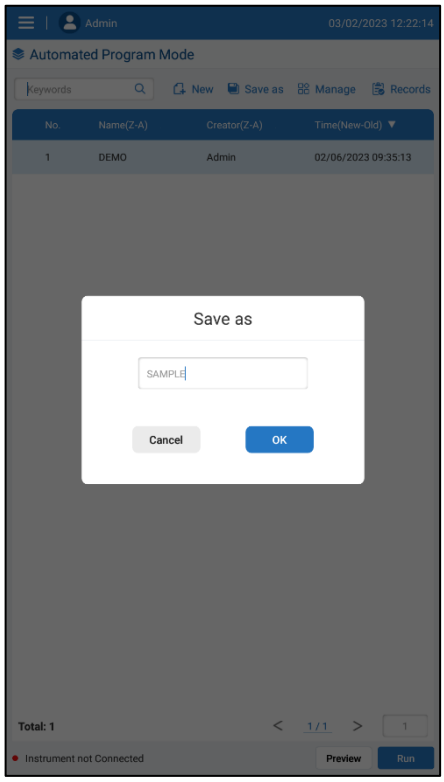


Fig 16 Save as protocol

2.2.2.3. Manage

The **Manage** function enables users to manage the stored programs in the system. With it, they can select a program to modify, delete, or even export and import it to and from a USB flash drive.

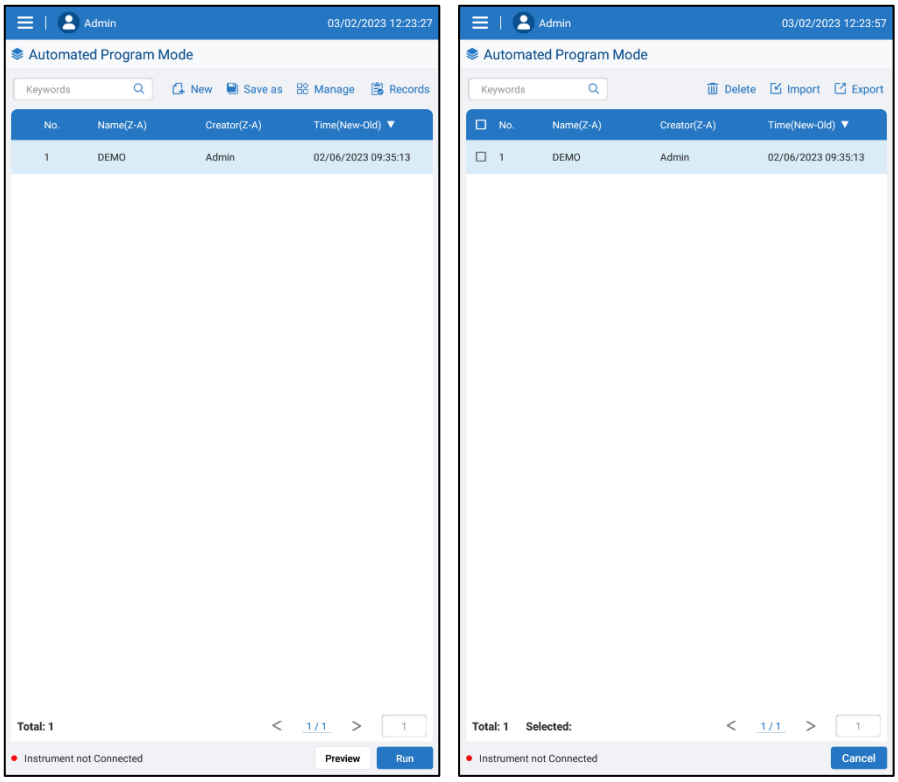


Fig 17 Manage interface

2.2.2.4. Records

The **Records** function allows users to review, import, export, or delete usage data of the instrument. To view detailed usage data, users can double click on any record. If a user wants to delete a record or export/import it to/from a USB flash drive, they can click the check box on the left of the record. Additionally, the user may also select multiple records for importing or exporting using this function.

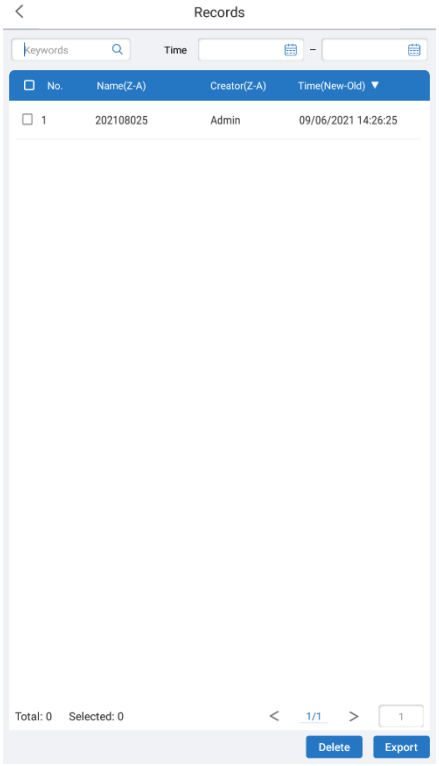


Fig 18 Record interface

This is in the wrong place:

2.2.2.5. Protocol Preview

To **Preview** the detailed steps of a saved protocol, users can highlight the protocol and click the **Preview** button (as shown in Figure 37). From the preview screen, the user can click the **Run** button to start the protocol or press the **<** icon at the top left of the screen to return to the protocol list screen. Additionally, users may also be able to control the settings of the protocol from this screen, including the name and accessibility.

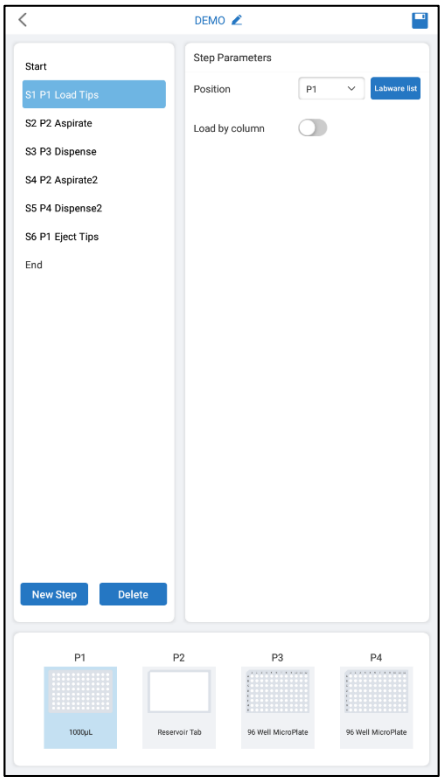


Fig 19 Preview protocol interface

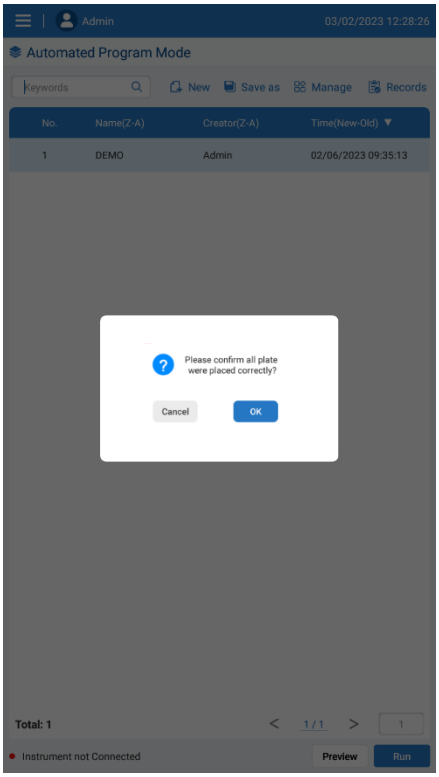


Fig 20 Confirm prompt box before running

2.2.2.6. Running a protocol

From the protocol list screen (Figure 20), click to highlight a single protocol, then click the “Run” button. A window will appear to confirm all consumables are placed properly before starting the run.

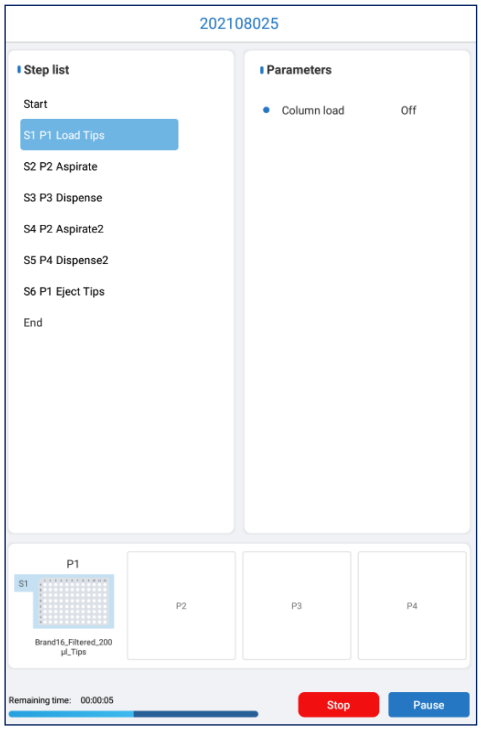
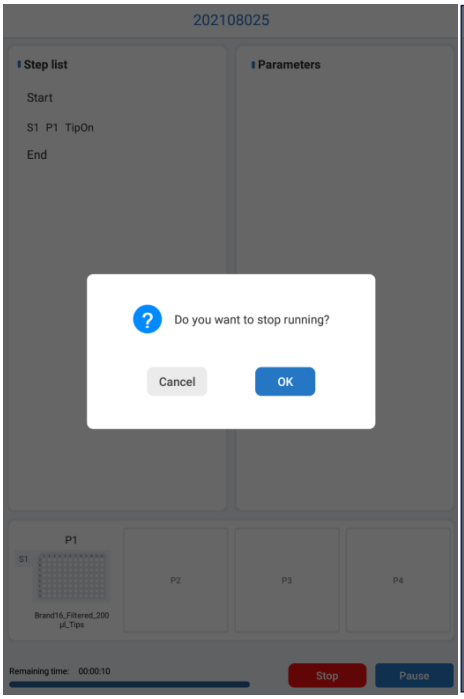


Fig 21 Run interface

Stop or Pause a Run

During a protocol run, the user can **Stop** the process by clicking the **Stop** button. A window will appear to confirm the stopping of the run (as shown in Figure 40), and clicking **OK** will stop the current protocol. The pipetting head and motorized platform will return to the home position. To **Pause** a run, the user can press the **Pause** button. The run can then be resumed by pressing **Continue** or stopped by pressing **Stop**. Additionally, users may also be able to view the progress of the run from this screen.



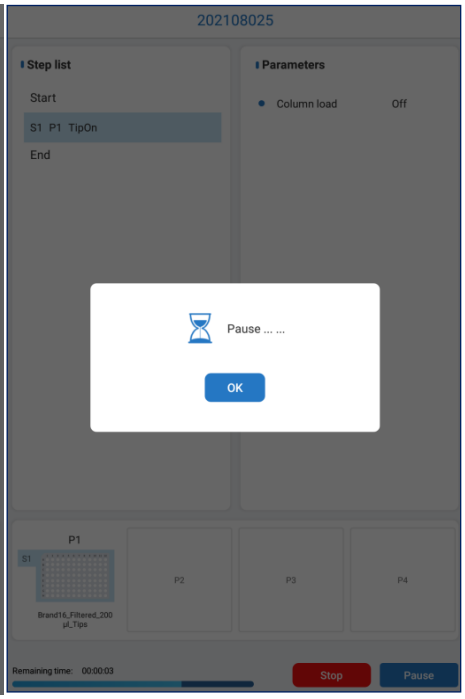


Fig 22 Stop prompt box Fig 23 Pause prompt box

2.2.2. Settings

The Settings mode can be selected from the upper left menu. The settings interface includes three sections: parameter, system and maintenance.

Fig 24 Settings

2.2.3.1. Parameters settings

Parameters setting allows adjustments to Liquid parameter, Speed parameter and Default Tips, per figure 43,

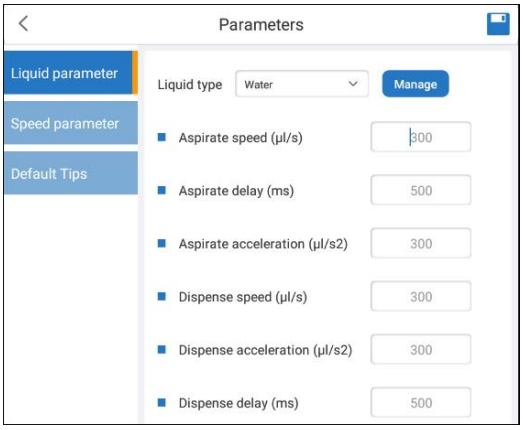


Fig 25 Parameter interface

2.2.3.1.1. Liquid parameter settings

Different liquids require different pipetting parameters for accurate aspiration and dispensing. The liquid parameter management interface allows adding or removing different liquids from the selection list, and adjusting parameters for the different liquids. Liquid parameters can also be imported from or exported to a USB drive.

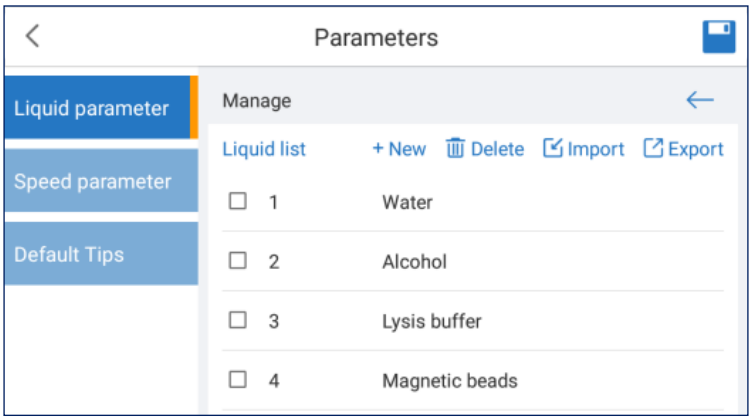


Fig 26 Liquid Parameter Management Interface

2.2.3.1.2. Speed parameter

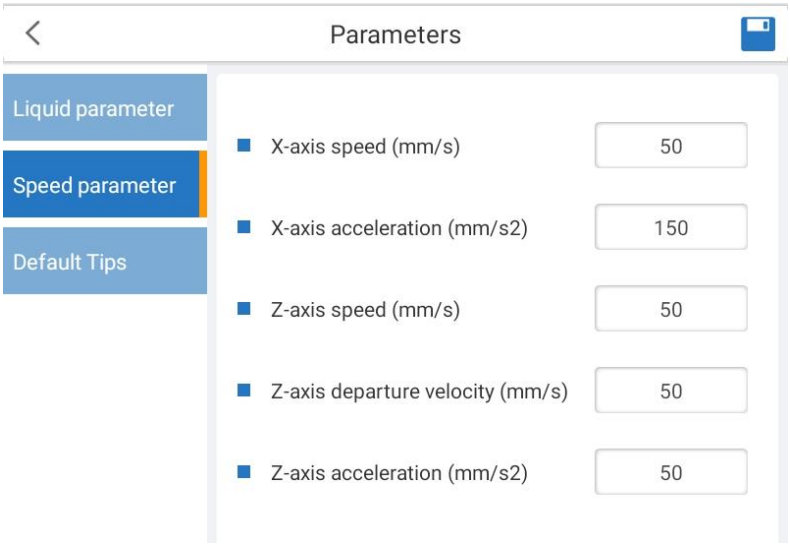


Fig 27 Speed parameter

The speed parameter interface allows adjusting the speed and acceleration values of the X axis (motorized platform) and Z axis (pipetting head).

2.2.3.1.3. Default Tips

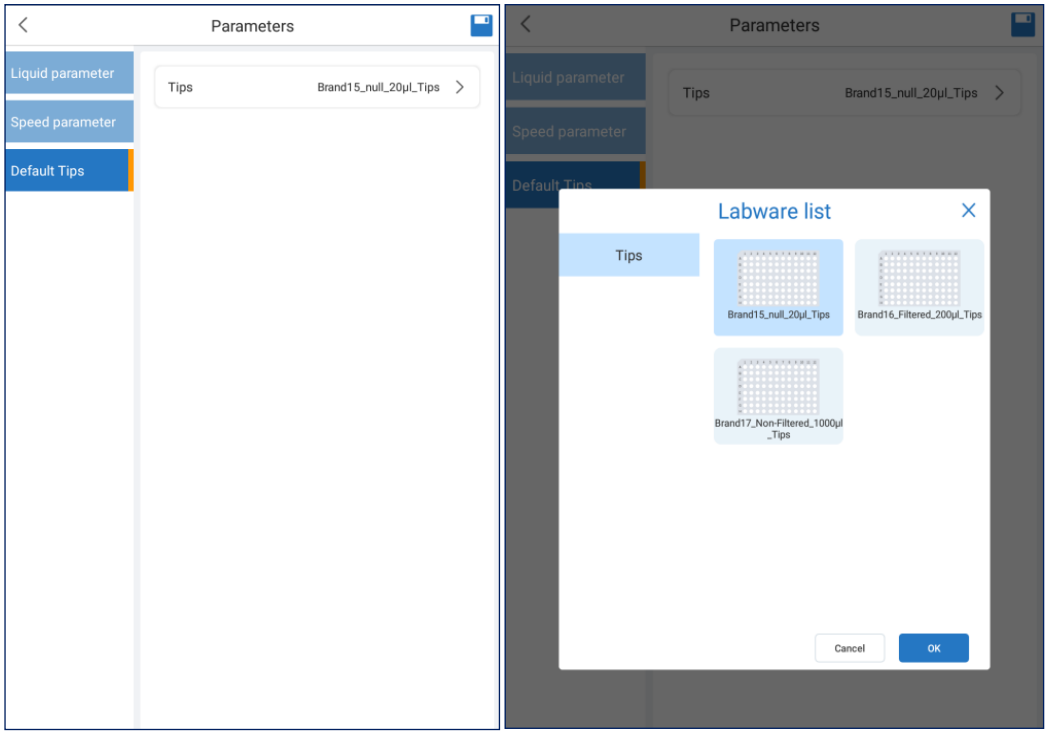


Fig 28 Default tips interface

Default tips interface can set default for tips.

2.2.3.2. System

System settings are for selecting Language, Time, Screen brightness, Firmware Upgrades and Bluetooth options .

For firmware upgrades, insert a USB drive with updated firmware files to perform updates (Fig 320.)

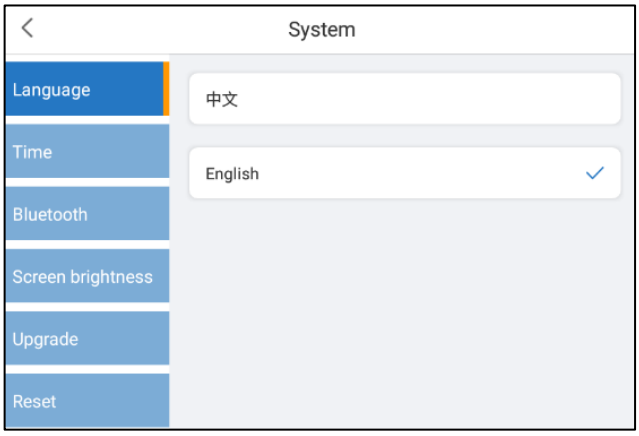


Fig 29 System settings interface

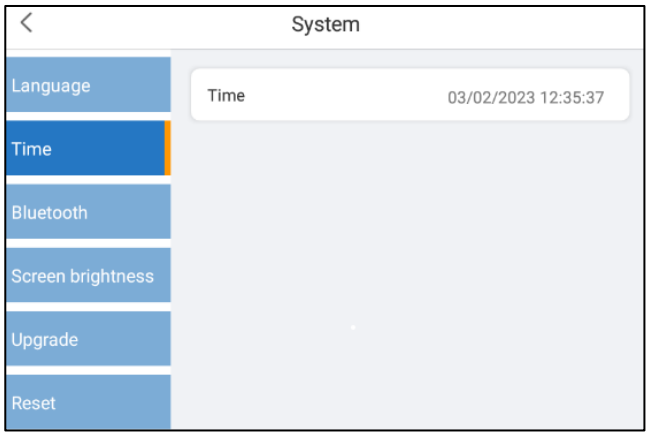


Fig 30 Time settings

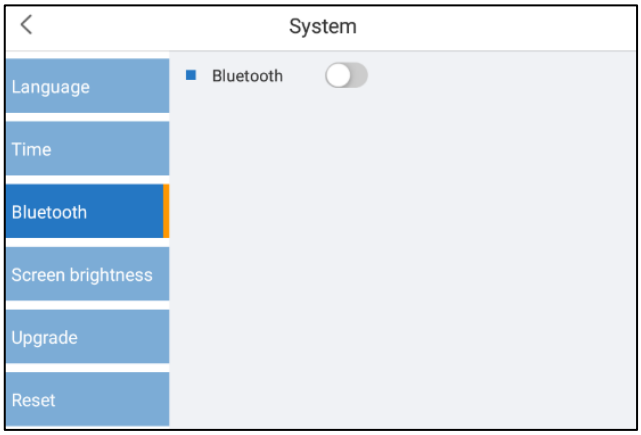


Fig 32 Bluetooth Settings

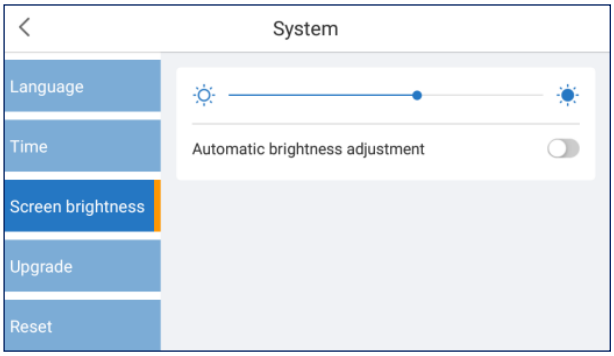
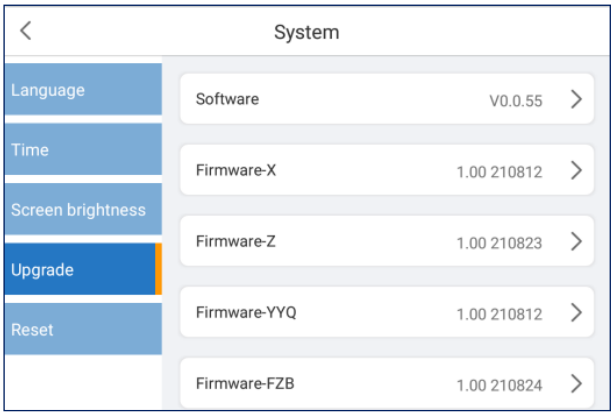


Fig 31 Screen brightness settings



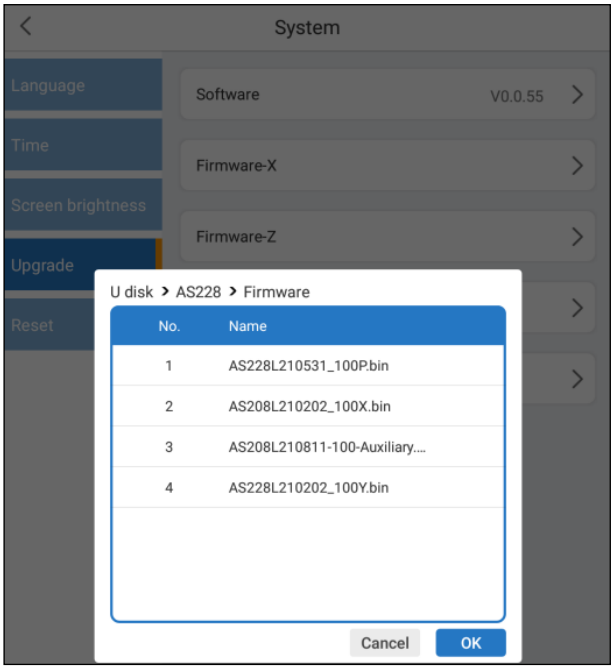


Fig 32 Upgrade settings

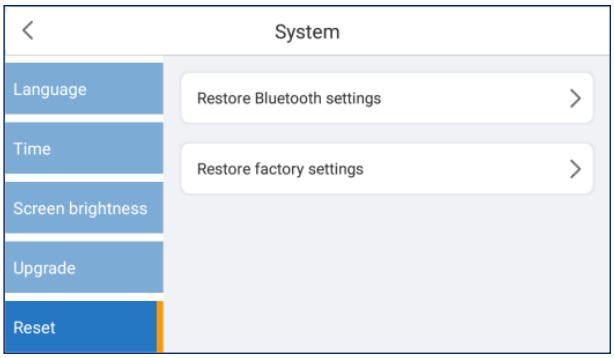


Fig 33 Resert settings

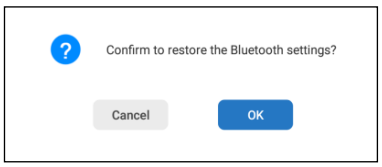


Fig 34 Bluetooth settings

Fig 35 Restore the factory setting

2.2.3.3. Maintenance

In the Settings mode, select “Maintenance” to enter the maintenance interface.

Base calibration and Pipettor calibration adjustments should be performed by

authorized service personnel. Contact the Accuris Technical Services or a local distributor for more information.

To switch a pipetting heads, click Pipettor calibration and click the button “Replace module”. Follow the flow chart for pipettor head replacement in Section 2. Click the icon to scan the QR code label on the pipetting module using the rear camera of the tablet. This automatically loads the specific calibration data for the pipetting module.

Fig 36 Pipettor calibration

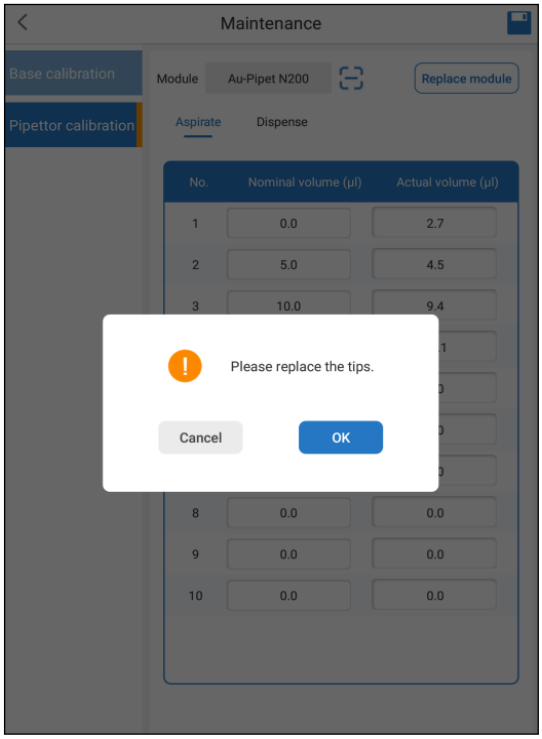


Fig 37 Prompt box for pipette head replacement

2.2.3. Labware management.

From the main settings menu, click “Labware”, to enter labware management interface, as shown figure below.

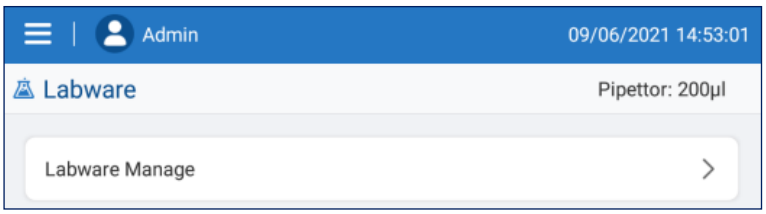


Fig 38 Labware main interface

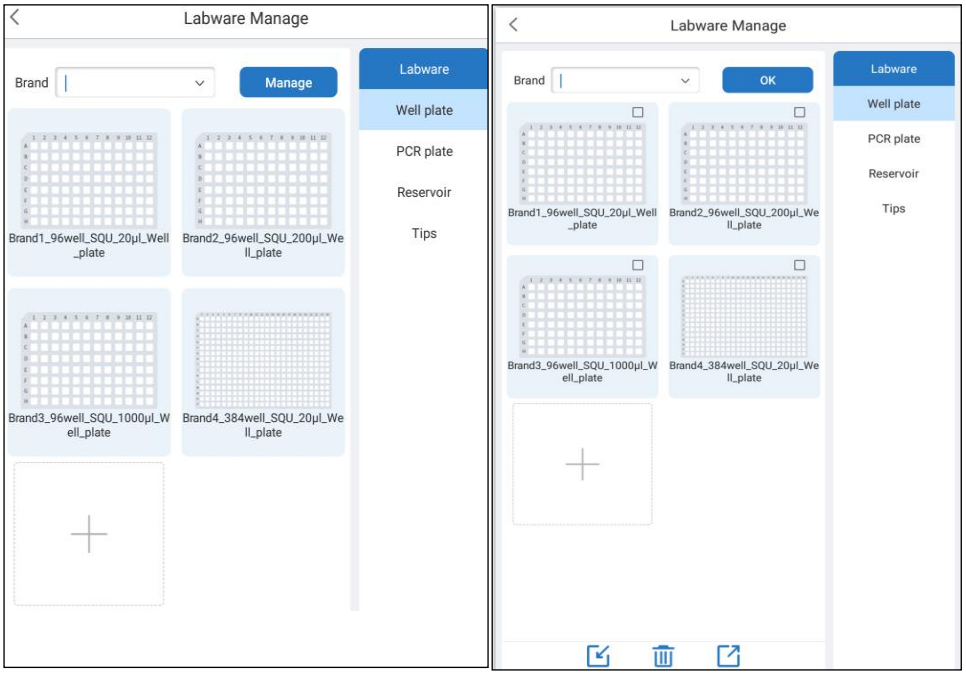


Fig 39 Labware management interface

Fig 40 Labware new well plate interface

To add a new consumable that can be selected during programming, choose the type of consumable listed under "Labware", then click the “new” box which is the box with the “+” in the center (see Fig 39); A brand can be selected or a new brand can be added. After entering a new brand and saving the newly created

consumable, the new brand will be automatically saved as an option for future selection (see Fig 40); Click the “Manage” button to delete a consumable. Or to import from or export to a USB drive. (see Fig 39); Basic parameters such as well shape, well volume, dimensions, and liquid levels, can be adjusted (see Fig 41, Fig 420, Fig 43). The bottom and top of the liquid interface respectively represent the distance between the tips and the bottom when aspirate, the distance between the tips and top when dispensing.

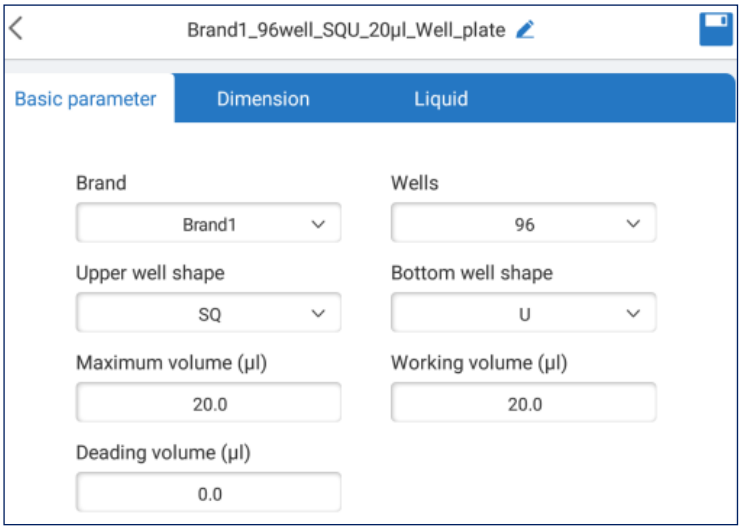


Fig 41 Basic parameter interface

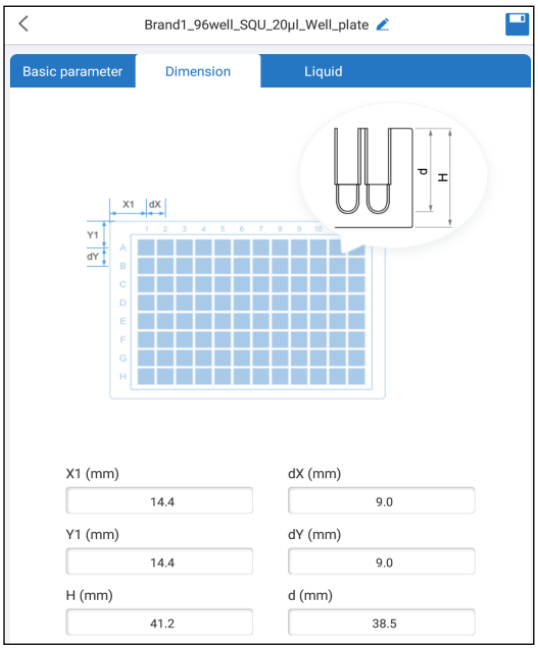


Fig 42 Dimension interface

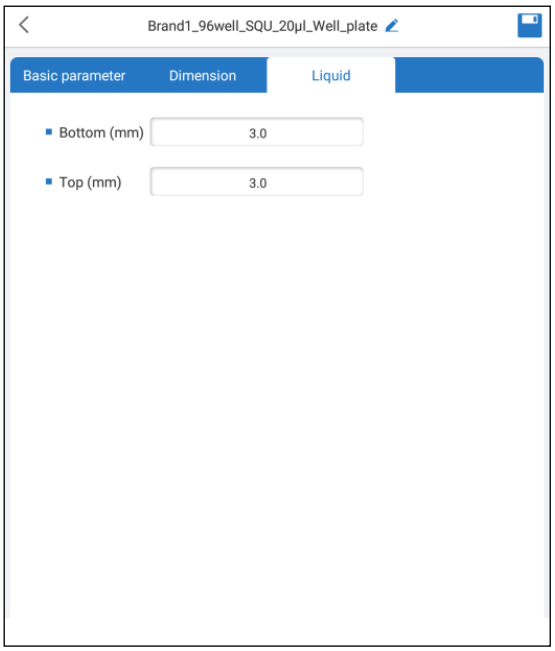


Fig 43 Liquid interface

2.2.4. User Settings

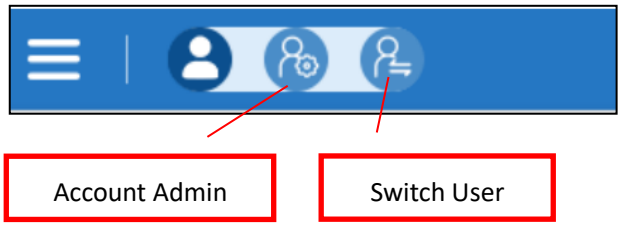


Fig 44 User settings interface

Clicking on the user name in the upper left corner to see user options, including Account Administration and Switch User, as shown in the image above.

2.2.5.1. User settings

Per Fig 44, the Account Admin icon to enter user settings interface. Click “Password” to change the Admin password and click “Manage” to add or remove user accounts.

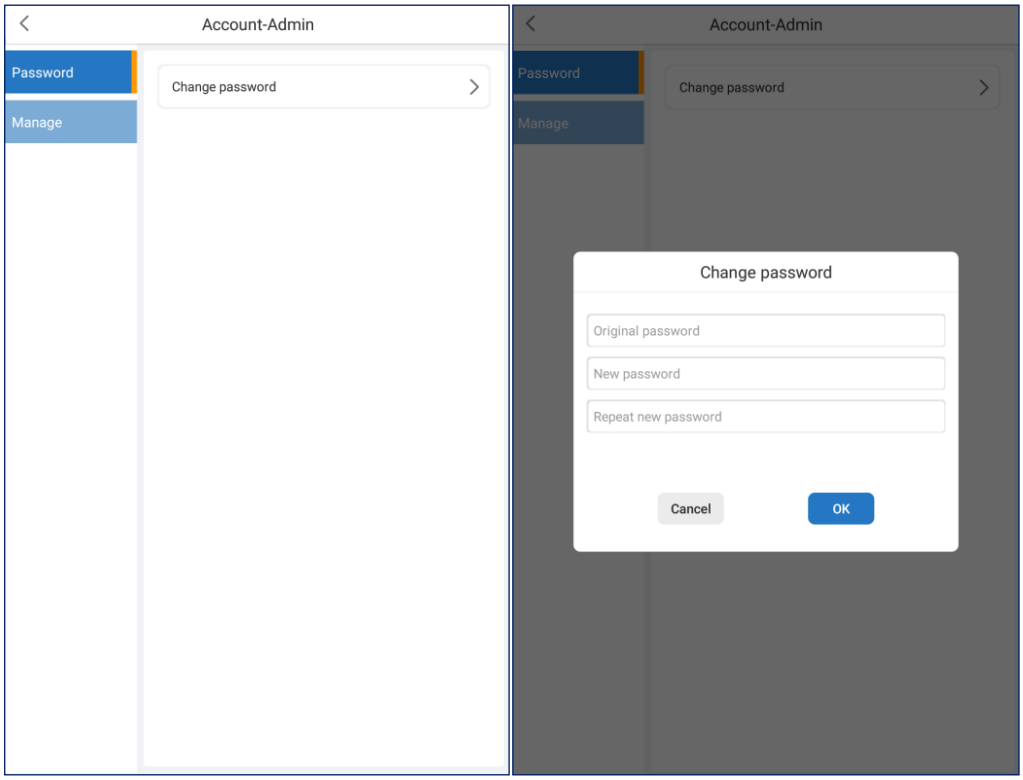


Fig 45 Change password interface

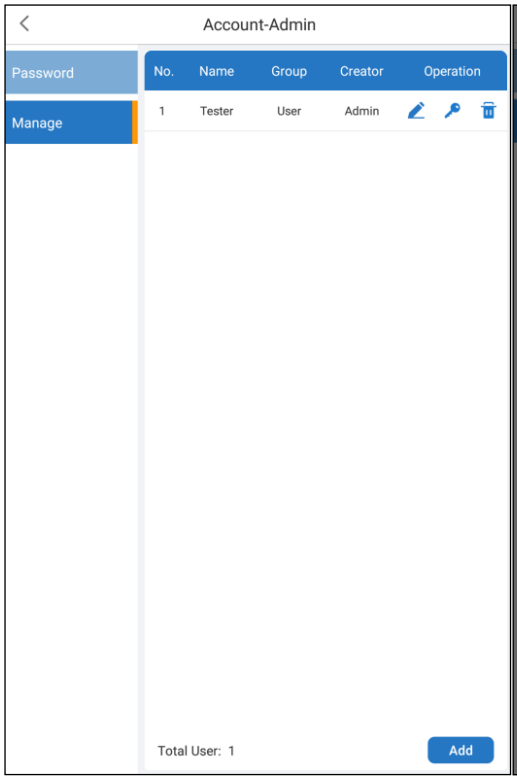


Fig 46 User manage interface

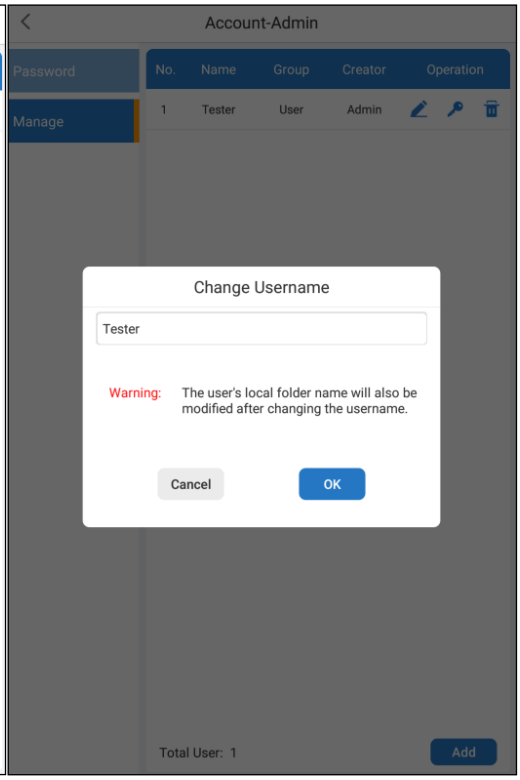


Fig 47 Change username interface

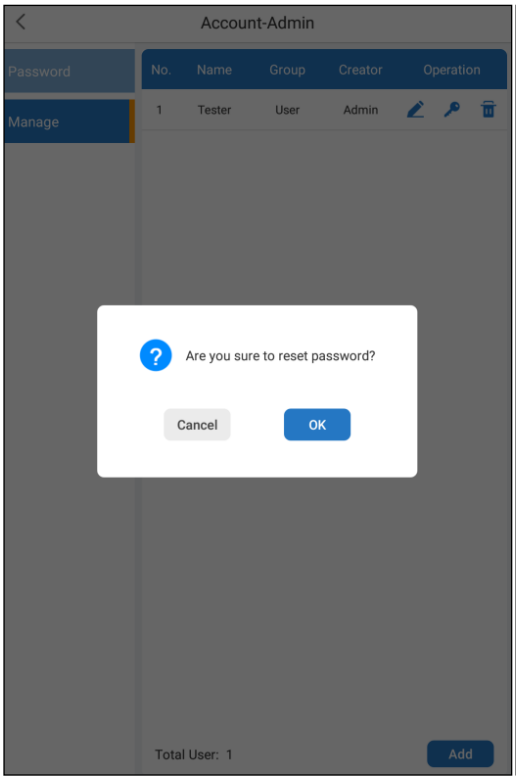


Fig 48 Reset password interface

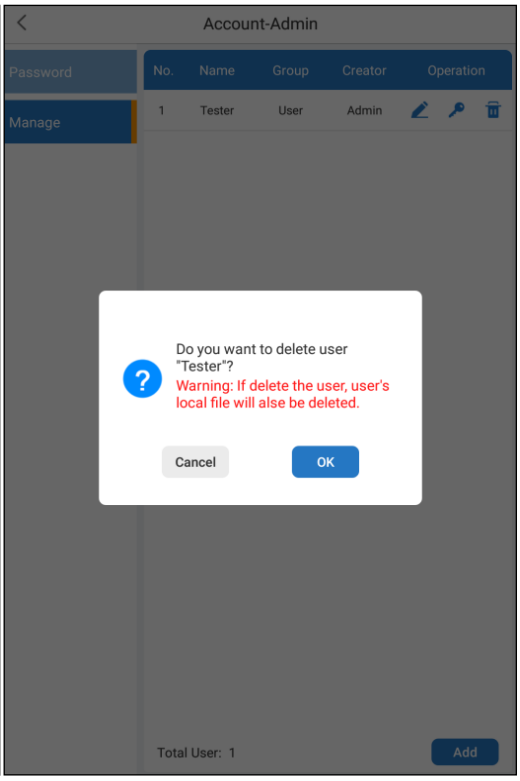


Fig 49 Delete interface

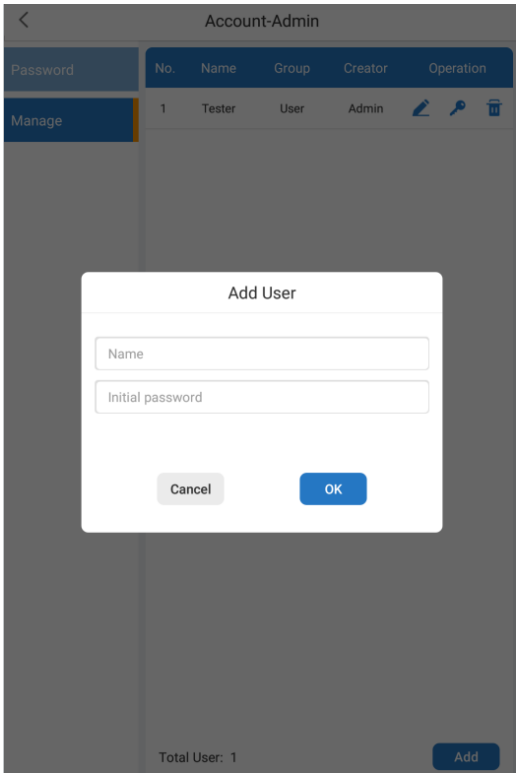


Fig 50 Add user interface

Table 2 Function

	Click to change the current user name (maximum of 16 characters can be used); See Fig 47
	Click to change the password for the user (maximum of 10 characters, including digits and case-sensitive letters) See Fig 48
	Click, to delete a user. After deleting a user, all data of the user will be deleted; See Fig 49
Add	Add a new user name; See Fig 50

2.2.5.2. Change user

Per Fig 44, click the “Switch user” icon to switch to a different user account.

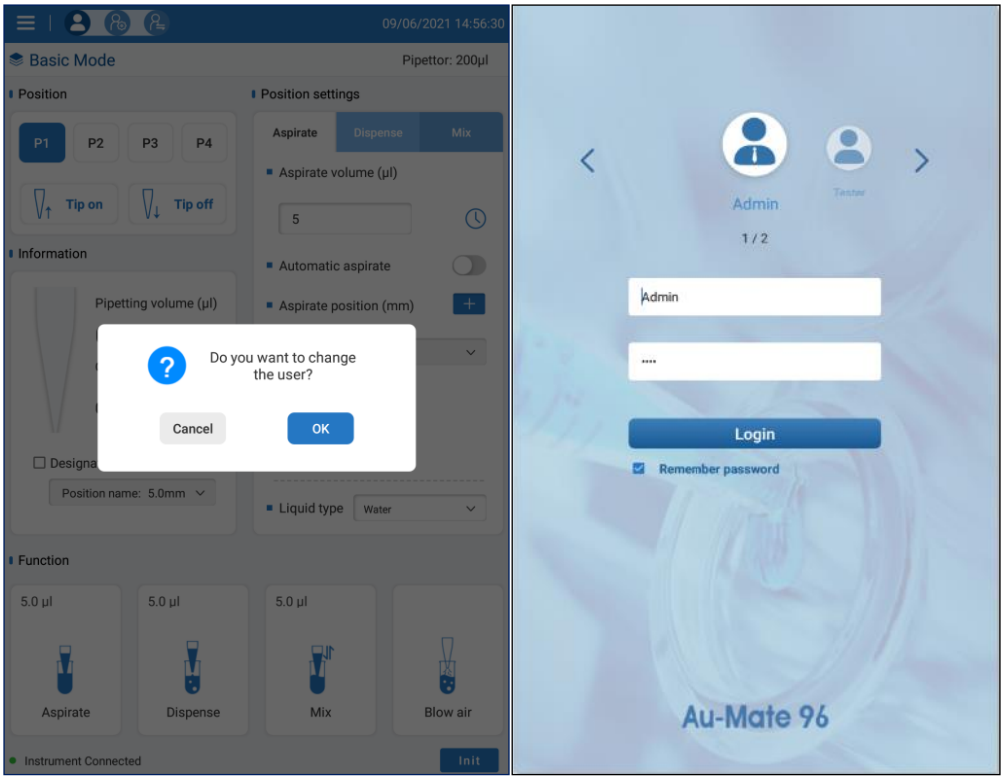


Fig 51 Change interface

2.2.5. SWITCH button function

Fig 52. SWITCH button

The SWITCH button is located on the base of the instrument and has the following functions:

1. In Manual Mode, the switch button is used to Aspirate and Dispense.

If the Current Pipette Volume is 0.0 (no liquid in the tips) then the SWITCH button will activate aspiration. If the Current Pipette Volume is >0.0 (there is liquid in the tips) then the SWITCH button will activate dispensing.

2. In Automated Program Mode, the function of the SWITCH button can be used to start a run (same as Run button), and when a program is running the SWITCH button can be used to Pause the run.

Chapter 5 Product Maintenance

1. Maintenance tools

The following tools are suggested for routine maintenance work:

A set of 1.5-6mm hex (Allen) keys , Phillips head screwdriver (large, medium, small), small tweezers, clean gauze, clean cotton swabs, clean brush, rubber gloves, 75% alcohol and cleaning fluid, etc.

2. Daily maintenance

Daily maintenance is recommended after daily use. The specific operation steps are as follows:

1)After daily use is completed, power off the instrument and remove the samples, reagents and consumables from the platform.

2)Properly dispose of any used pipette tips and waste liquids, according to laboratory regulations or local regulations.

3)Keep the platform clean. There should be no residual liquids or stains on the platform or in the rectangular indentations. If there is liquid residue, use paper towels to absorb any liquids, and then wipe and clean the platform with a clean soft cloth. Use 75% alcohol on a clean soft cloth to wipe and disinfect the platform and any other surfaces that require cleaning.

4)When the instrument is not in operation for a long period, unplug it, and

cover it with dust cover.

3. Regular maintenance

In addition to daily maintenance, regular maintenance is required after the instrument has been operating for 6 months or has been in storage for a long period.

1)Run a typical program without any consumables installed to check that the motors and tracks (X and Z axis) are operating smoothly. Check that the platform the guide rail is well lubricated and there is no dust and impurities on the guide rail. If found, please clean it up in time.

2)Check that all the moving parts are not making any abnormal noises and that all screws are tight. If any screws have become loose, please tighten them.

4. Annual maintenance

Contact the Accuris Instruments, your authorized distributor or authorized service provider for any necessary maintenance, including but not limited to the following items:

1) Check that the moving platform is level and operating smoothly.

2)Check the pistons and seals to make sure there is no leakage, and that pipetting volumes are consistent between channels.

3)Calibrate the instrument as required to make sure it meets specifications.

Chapter 6 Trouble Shooting

1. Common failure and solutions

No.	Symptom	Causes Analysis	Solution

1.	Tablet not connecting to Instrument	Power cord not connected	Check power
		Power Switch failure	Replace switch
		Fuse blown	Replace fuse
		Other	Contact distributor or Accuris Service Dept.
2.		File of software installation missing	Contact distributor or Accuris Service Dept.
		Others	Contact distributor or Accuris Service Dept.
3.	Instrument does not operate	Controller failure	Contact distributor or Accuris Service Dept.
		Motor failure	
4.	Abnormal sound during operation	Guide rail problem	Contact distributor or Accuris Service Dept.
		Motor failure	
		Gears or screw drive is worn or damaged	
5.	SWITCH button not working	Button failure	Contact distributor or Accuris Service Dept.
6.	Pipetting is not accurate	Calibration required	Contact distributor or Accuris Service Dept.
7.	The pipetting head not positioning correctly during operation	Calibration parameters missing	Restore factory Settings/ Contact distributor or Accuris Service Dept.

2. Software Error Alarm List

Failure module	Failure name	Error
X-axis	Over temperature pre-warning.	E109

	Over temperature.	E119
	Short circuit in motor.	E107
	Failed to leave zero.	E413
	Failed to move to destination.	E114
	Failed to return zero.	E403
	Memory is damaged.	E713
	Motor data is lost.	E723
	Motor data error.	E733
	Calibration data is lost.	E743
	Calibration data error.	E753
	Steps lost.	E134
Z-axis	Failed to leave zero.	E413
	Failed to return zero.	E403
	Memory is damaged.	E713
	Motor data is lost.	E723
	Motor data error.	E733
	Calibration data is lost.	E743
	Calibration data error.	E753
Movement module	Over temperature pre-warning.	E109
	Over temperature.	E119
	Short circuit in motor.	E107
	Memory is damaged.	E713
	Motor data is lost.	E723
	Motor data error.	E733
	Calibration data is lost.	E743
	Calibration data error.	E753
Auxiliary plate	Memory is damaged.	E703