apricot S3
user guide

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Notes:

Introduction

Thank you for purchasing the apricot S3, part of the S-Pipette series, by SPT Labtech. The S-Pipette series multi-channel liquid handling pipettors bring automated liquid handling within reach of any lab that needs to routinely perform pipetting operations onto microplates.

The S3 Pipettor adds greater flexibility with automated X, Y & Z positioning, automated 24 to 96 and 96 to 384 indexing. Automated open clamp and LED display light the stage. Plus, access to the S3 Pipettor core is quick and easy for additional flexibility in pipettor operation. Just determine the pipetting configuration that best matches the applications you want to perform. Then, load a 96 or 384 channel core into the pipettor (without tools!), and you're ready to go.

This manual is your ready reference to the care, maintenance, and operation of the instrument, so you should store it in a convenient place. With proper handling and maintenance, as detailed in this manual, this instrument will provide years of efficient and reliable service. Failure to adhere to proper care, maintenance, and operation of the instrument may lead to poor experimental results, reduced equipment life, and the possibility of injury to the operator.

Our ongoing commitment is to help you get the best results. We truly appreciate your business and the trust you have placed in us. Should you have any questions, comments, or suggestions regarding this instrument, please feel free to contact us at apricotsupport@sptlabtech.com

Frequency Interference

There are a variety of external causes for frequency interference and/or interruptions in connectivity or loss of data/information.

Frequency interference can occur when another signal passes through your location corrupting the signal.

Frequency interference is location specific and not device dependent and may result from the location of the device and nearby competing signals.

SPT Labtech staff does not provide any technical support relating to troubleshooting or identifying frequency interference.

SPT Labtech is not responsible and assumes no liability for interruptions in connectivity or loss of data/information due to frequency interference.

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Table of Contents

:::: sptlabtech

Version 1.00

1. Specifications

The following is a list of the ideal operating parameters for the S3. This instrument will perform optimally and safely under standard laboratory settings. The use of this instrument in other environments is not recommended, and results may prove unsatisfactory.

Model	S3
Dispensing Precision	(1250) <3% CV at 10µL *Note: 1250µL Aluminum Core
	(1000) <3% CV at 10µL
	(500) <3% CV at 5µL
	(125) <3% CV at 1µL
Dispensing Accuracy	(1250) +/− 2% error at 10µL
	(1000) +/− 2% error at 10µL
	(500) +/− 2% error at 5µL
	(125) +/− 2% error at 1µL
Resolution	(1250/1000/500) 1µL
	(125) 0.1µL
Volume	Max channel capacity 1250µL
	Dispense range
	(1250) 5–1000µL
	(1000) 5–1000µL
	(500) 1–500µL
	(125) 0.5–125µL
Particle Size	< 0.032" diameter to prevent tip blockage
Current	3 Amp
Power (Input)	100 – 240VAC, 50 – 60Hz
Power Consumption (MAX)	130W
Power Consumption Idle	60W
Operating Temperature	40 –104°F, 5 – 40°C
Relative Humidity (MAX)	80% (non-condensing)
Equipment Ratings	Indoor use only, temperature regulated, non-dusty
Altitude	Up to 2000m
Pollution Degree	2
Power Supply Voltage	Fluctuations not exceeding ± 10% of the nominal voltage
Transient Over Voltage	According to Category II (Installation Category)
Dimensions	18" W x 16" D x 23" H
	(457mm W x 406mm D x 584mm H)
Weight	Approx. 60lbs (27kg)

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1.1 – Software Specs and Requirements

System Requirements

o   Compatible with Windows 10/8/7
o   i5 CPU Processor, 4gb RAM, 1gb HD
o   USB cable, type B to type A
o   Power cord

Software Requirements

o   Access -> AccessDatabaseEngineFor2007up.exe
o   This is included in the SPTLabtech folder after installation. No need for further steps.
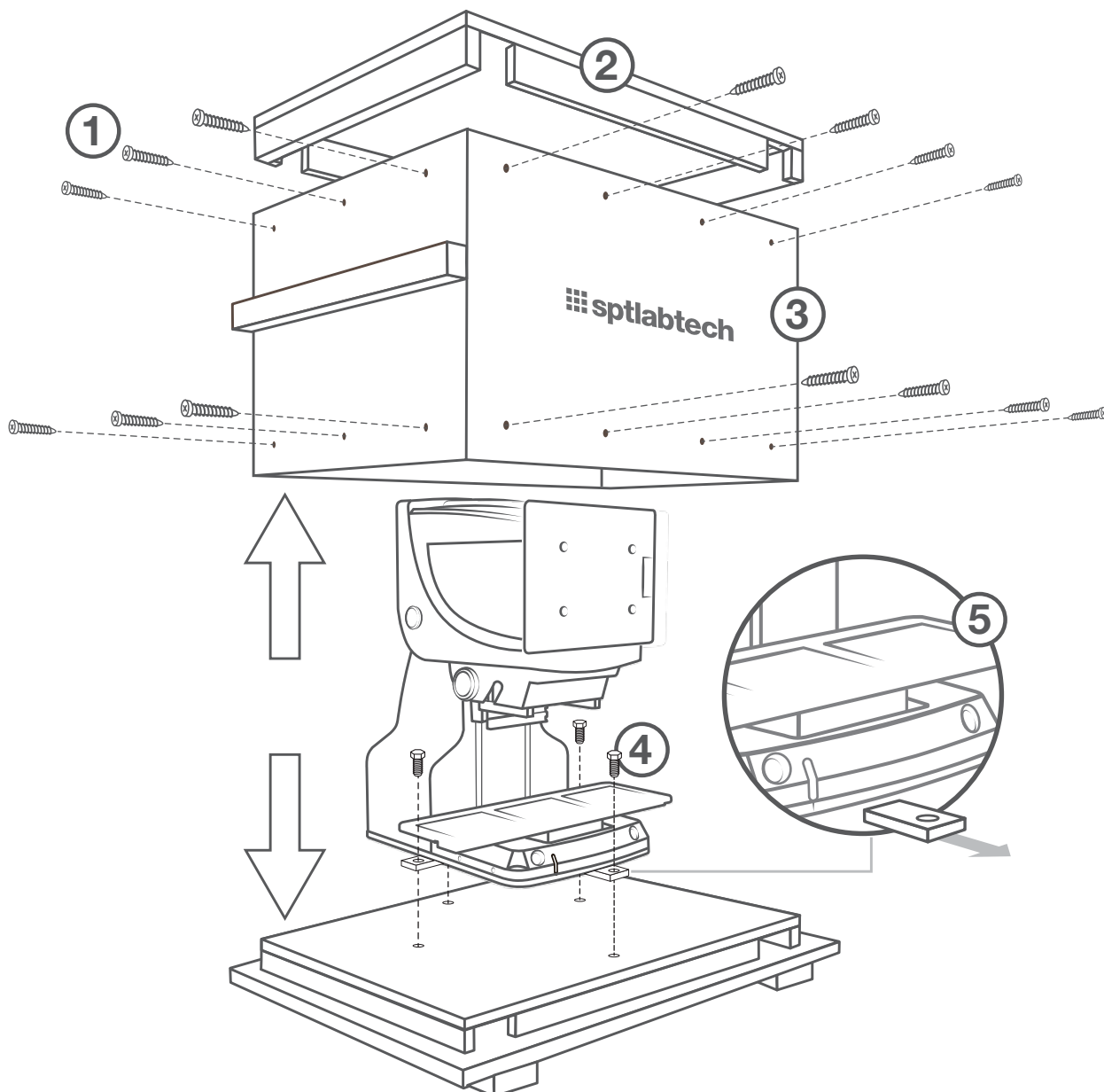
Display Requirements

o   Screen resolution needs to be 1920 x 1080
o   Change Display size to 100% ratio
o   Note: Both of these requirements can be found in Control Panel->Display.
o   Taskbar needs to autohide

2. Unpacking the Instrument

2.1 – Unboxing the Instrument

:

1 With a Phillips screwdriver, remove the 28 packaging screws from all four sides of the crate.

2 Lift off the top of the crate and remove any boxes and accessories.

3 Lift the sides of the crate up and off the base and remove the tool kit.

4 With the 14mm open-ended wrench, remove all four bolts that secure the instrument to the bottom of the crate.

5 Remove the transit blocks by pushing in, then pull down and out.

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3. Features / Accessories

3.1 – System Overview

- o High-performance instrument – easily configured for a variety of applications
- o Automated pipetting into all wells of a 96-well plate with the 96 core
- o Automated pipetting into all wells of a 384-well plate with the 384 core
- o Automated pipetting 24-96, or 96-384
- o 12x faster than an 8-channel handheld pipettor – pipette into all 96 wells without having to replace tips 12 times
- o Pipette 24, 96 and 384 full plate
- o Serial dilution by column: 8, 16
- o Automated plate elevators for plate sampling – automatically raise   or lower plate/reservoir to programmable height
- o EZ-Load tip technology to load disposable tips quickly and easily, without tools!
- o Control via easy to use interface – Microsoft Surface Pro™ Tablet (Bluetooth-enabled)
- o 2 or 3-position shuttle with programmable serial dilution indexing
- o Small footprint maximizes bench space and fits suitable hoods

3.2 – Applications

- o Plate replication
- o Plate reformatting
- o Reagent addition
- o Compound addition
- o Serial dilution by column

3.3 – Pipettor+Head+Tips = Repeatable Results

The S3 Pipettor, pipetting head, and tips in a variety of volumes is a triad that works together to help you get the best results.

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EZ-Load = EZ-Change

The "pipette head" is separate from the pipetting mechanism, allowing easy and economical reconfiguration in the lab.

Changing heads only takes a few seconds – easily reconfigure as needed!

For best pipetting results – consider pipette tip selection along with the "pipette head" that will be used.

3.4 – Compatibility for Core, Tip, and Head

The S3 base unit is compatible with five different pipetting cores (96/1250, 96/1000, 96/500, 96/125, and 384/125). Each Core is designed to work optimally within its volume range and requires a specific Head and Tip combination.

The system is also capable of Serial Dilution. Specific Heads or Inserts and Tips are required. Tips are available in Non-Sterile (NS), Sterile (S), and Filter Sterile (FS). Please see the matrix below for complete Core/Head/Tip compatibility. The part numbers listed are for your convenience in ordering.

*Please contact your SPT Labtech Sales Representative or email apricotsupport@sptlabtech.com for assistance.

384/125	Volume Range	Heads	Tips (384 channel)	Serial Dilution Heads/Inserts	Serial Dilution Tips (Strip Tips)
SP-C-384-125	.5-125μL	SP-384-A-01-0125	125-384-EZ-NS/S/FS	SP-384-A-01-125-SC	125-016-EZ-NS/S/FS
			050-384-EZ-NS/S/FS		050-016-EZ-NS/S/FS
			015-384-EZ-NS/S		

96/125	Volume Range	Heads	Tips (096/024 channel)	Serial Dilution Heads/Inserts	Serial Dilution Tips (Strip Tips)
SP-C-096-125	.5-125μL	SP-096-A-01-0125	125-096-EZ-NS/S/FS	SP-096-A-01-0125-SC	125-008-EZ-NS/S/FS
			050-096-EZ-NS/S/FS		050-008-EZ-NS/S/FS
			015-096-EZ-NS/S		

96/550	Volume Range	Heads	Tips (096/024 channel)	Serial Dilution Heads/Inserts	Serial Dilution Tips (Strip Tips)
SP-C-096-500	1-500μL	SP-096-A-01-0500	550-096-EZ-NS/S/FS	096-A-01-EZL-550-SC	550-008-EZ-NS/S/FS
			250-096-EZ-NS/S/FS	(w/SP-096-01-0500)	250-008-EZ-NS/S/FS
			550-024(OS)-EZ-NS/S/FS		
	1-125μL	SP-096-A-01-0125	125-096-EZ-NS/S/FS	SP-096-A-01-0125-SC	125-008-EZ-NS/S/FS
			050-096-EZ-NS/S/FS		050-008-EZ-NS/S/FS
			015-096-EZ-NS/S		

96/1000	Volume Range	Heads	Tips (096/024 channel)	Serial Dilution Heads/Inserts	Serial Dilution Tips (Strip Tips)
SP-C-096-1000	5-1000μL	SP-096-A-01-1000	1000-096-EZ-NS/S/FS	096-A-01-EZL-1000-SC	1000-008-EZ-NS/S/FS
				(w/SP-096-01-1000)	
	5-500μL	SP-096-A-01-0500	550-096-EZ-NS/S/FS	096-A-01-EZL-0500-SC	550-008-EZ-NS/S/FS
			250-096-EZ-NS/S/FS	(w/SP-096-A-01-0500)	250-008-EZ-NS/S/FS
			550-024(OS)-EZ-NS/S/FS		
	5-125μL	SP-096-A-01-0125	125-096-EZ-NS/S/FS	SP-096-A-01-0125-SC	125-008-EZ-NS/S/FS
			050-096-EZ-NS/S/FS		050-008-EZ-NS/S/FS
			015-096-EZ-NS/S		

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3.6 – EZ-Load Tip Technology

The S3 Pipettor uses the exclusive EZ-Load tips to simplify pipettor operation with disposable tips. This patented technology is the only system using disposable tips that do not need to be "pressed on" with excessive downward force in order to create a reliable seal. Load disposable tips into the head quickly and easily. No tools required for a consistent seal!
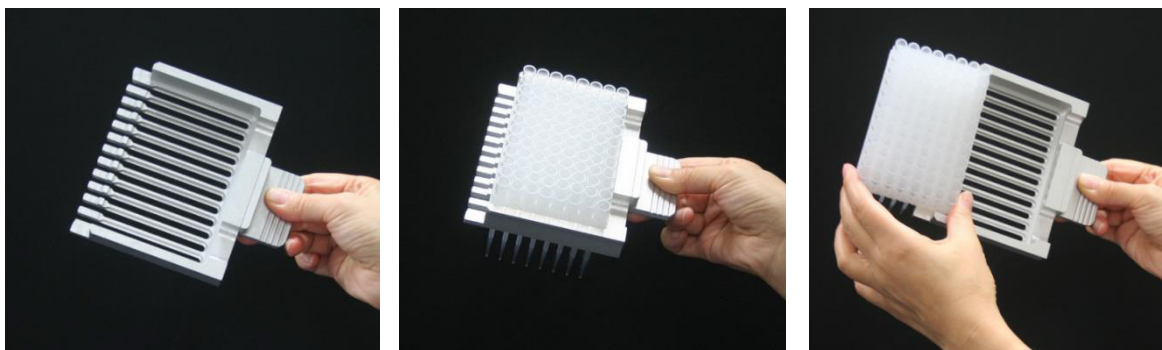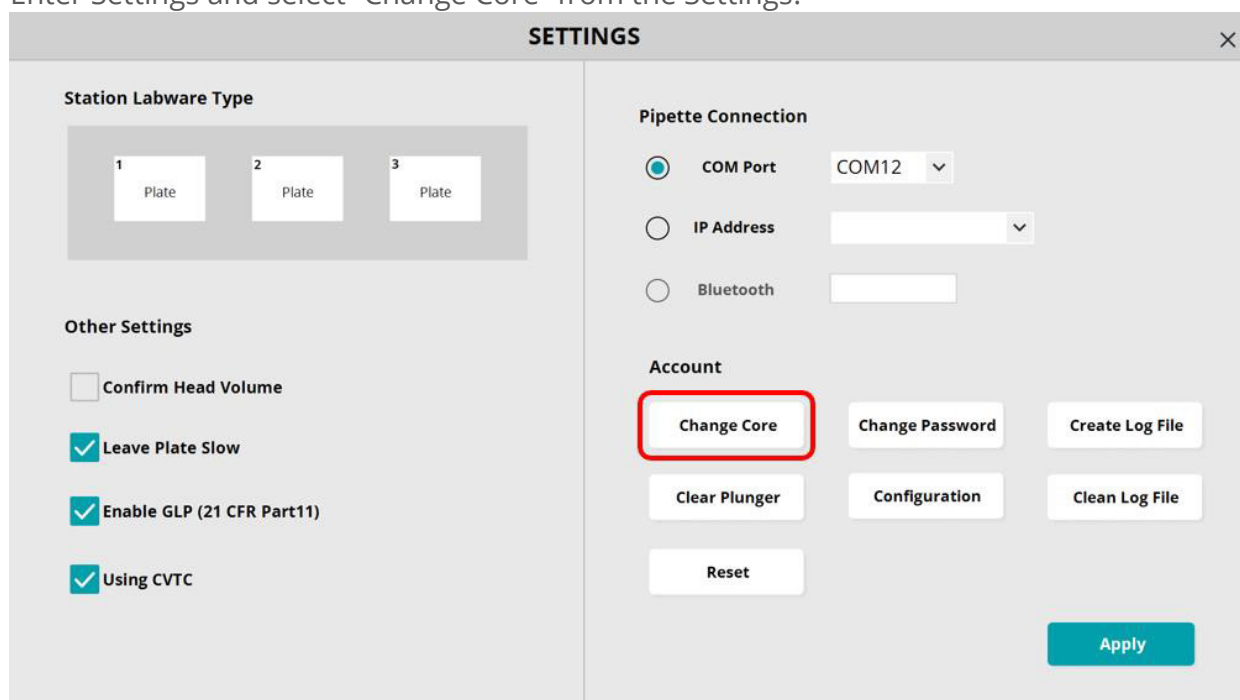

3.7– Accessing the Pipetting Core

The S3 Pipettor features an interchangeable pipetting core. To change the core:

Step 1
Enter Settings and select "Change Core" from the Settings.
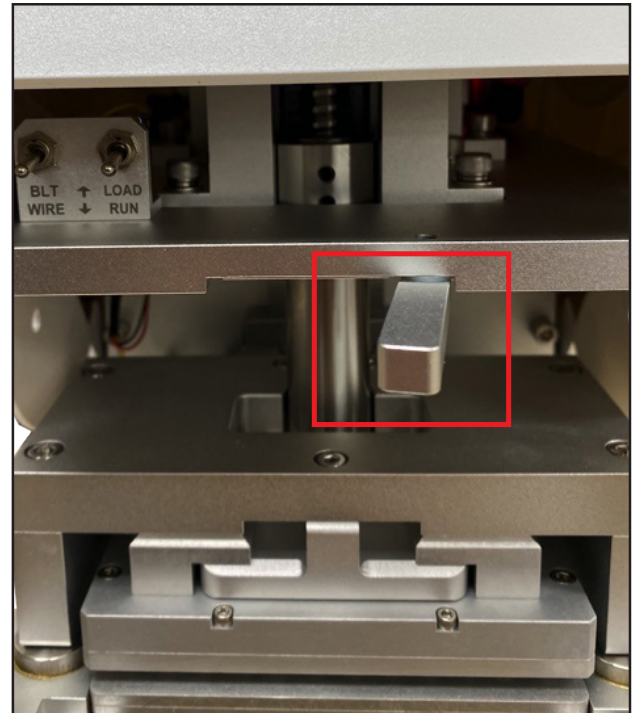
Step 2

Unscrew silver screws on both sides.

Step 3

Raise the hood, pull out the
support rod to place the hood.

Step 4

Adjust the plunger position by using the software.

CHANGE CORE

Open hood and change core, then click 'OK'. (If the replaced core doesn't match plunger home position, click 'Jog Plunger Down' to adjust the position and put the core inside). Machine enter in maintenance mode, need initialize machine.

| Home Plunger | Jog Plunger Down | Jog Plunger Up |

OK

Step 5

Exchange the core and select "OK" and "Apply" to return to the main menu.

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3.8 – Personalize Operation Functions

The function operation menus will vary depending on the type of plate, full head or single column head, and channel tip the user selects.

For example, here are the different types of menu for Aspirate function of a 96-500uL core:
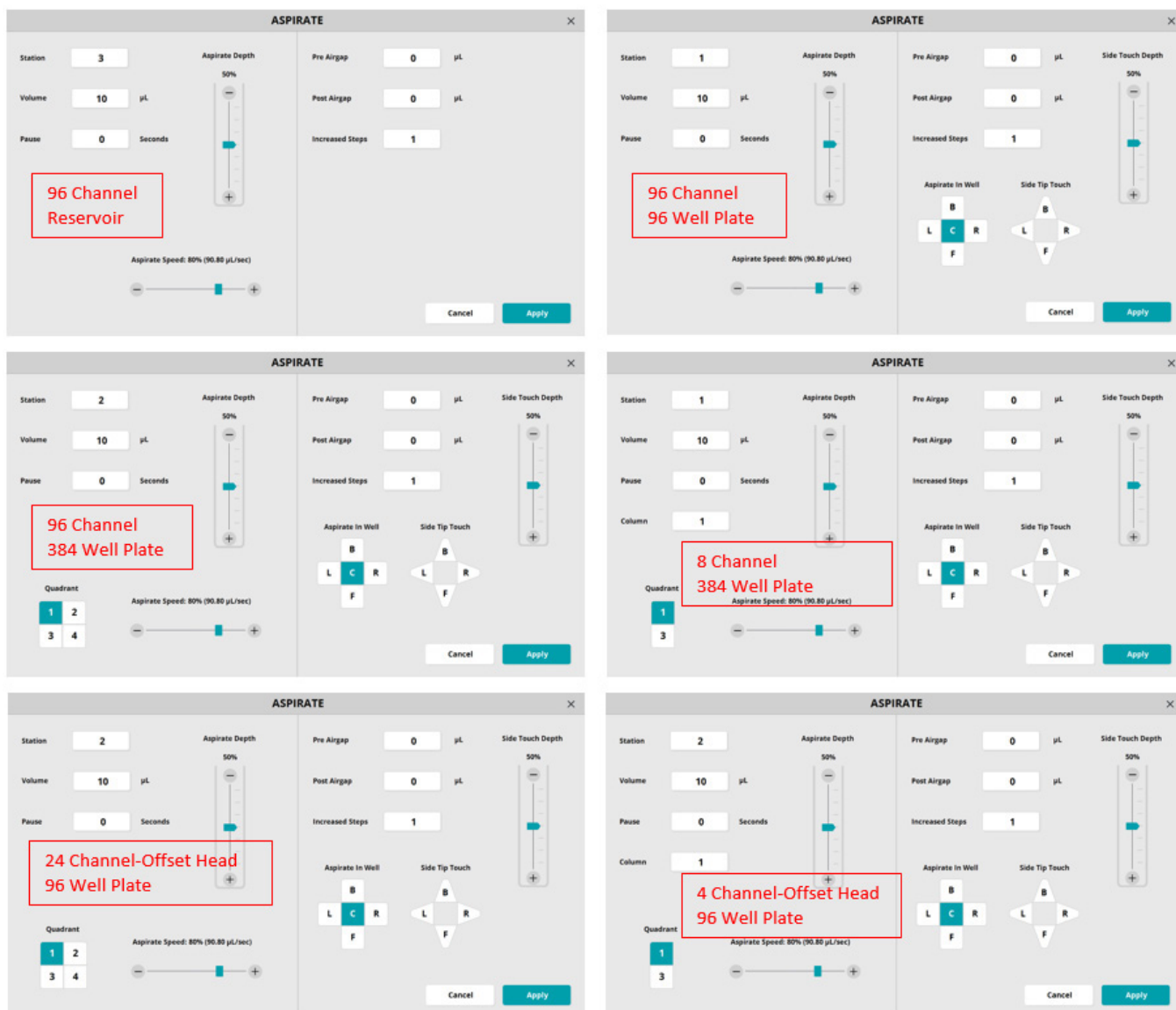
Functions Available by Core, Head & Tips

	96 Core				384 Core			
	96 Channel	24 Ch-Offset	8 Channel	4 Ch-Offset	384 Channel	96 Ch-Offset	16 Channel	8 Ch-Offset
Aspirate	●	●	●	●	●	●	●	●
Dispense	●	●	●	●	●	●	●	●
Empty	●	●	●	●	●	●	●	●
Mix	●	●	●	●	●	●	●	●
Transfer	●	●	●	●	●	●	●	●
Serial Dilution			●	●			●	●
Fill Plate			●	●			●	●
Pooling			●	●			●	●

Plate & Head Compatibility

	96 Core				384 Core			
	96 Channel	24 Ch-Offset	8 Channel	4 Ch-Offset	384 Channel	96 Ch-Offset	16 Channel	8 Ch-Offset
Reservoir	●	●	●	●	●	●	●	●
24 Wells		●		●				
96 Wells	●	●	●	●		●		●
384 Wells	●		●		●	●	●	●

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4. Safety Warning

4.1 – Safety Precautions

The S3 Pipettor is designed and engineered with your safety in mind. However, failure to adhere to proper care, maintenance, and operation of the instrument may lead to poor experimental results, reduced equipment life, and the possibility of injury to the operator.

Please adhere to the following safety guidelines when working with the S3 Pipettor:

o   Open the hood to exchange cores only!
o   Do not attempt to make an adjustment or try to repair something that is not working correctly – this could result in injury and will void the warranty. If you encounter a problem with the instrument, please contact SPT Labtech. or your distributor.
o   Operate the instrument in an indoor environment only!
o   Avoid exposure to direct sunlight and excessive humidity. Also, for safe operation, do not operate the instrument with wet hands.
o   Always connect the instrument via a grounded power outlet.
o   Use only SPT - Apricot Designs optional tools, equipment, and peripherals!
o   Our optional tools, equipment, and peripherals will enhance the performance of the manufactured instrument to help you get the best results.
o   It is highly recommended that you use disposable tips manufactured by SPT - Apricot Designs because they are designed to perform optimally with our instruments.
o   Using add-on products or modifications not supplied by SPT - Apricot will void the warranty and likely affect the performance of the instrument as well as lead to poor experimental results, reduced equipment life, and the possibility of injury to the operator.
o   Under no circumstances should any part of the operator's body or any foreign object(s), except the labware in use, enter the area directly under the pipetting tips and above the elevator. In case of emergency, turn the power off immediately.
o   Place the instrument on a sturdy and level surface. Use appropriate caution when operating this instrument.
o   Wear protective clothing/goggles when dealing with dangerous, corrosive, or radioactive substances.
o   This instrument is designed to fit inside a suitably sized fume hood when working with volatile organic solvents.

For full instructions regarding the handling of pathogens or biological hazards in Risk Group 2 or higher, please refer to the current edition of the Laboratory Biosafety Manual, published by the World Health Organization.

5. Setup

Here's a general overview of how a user will run the apricot S3:
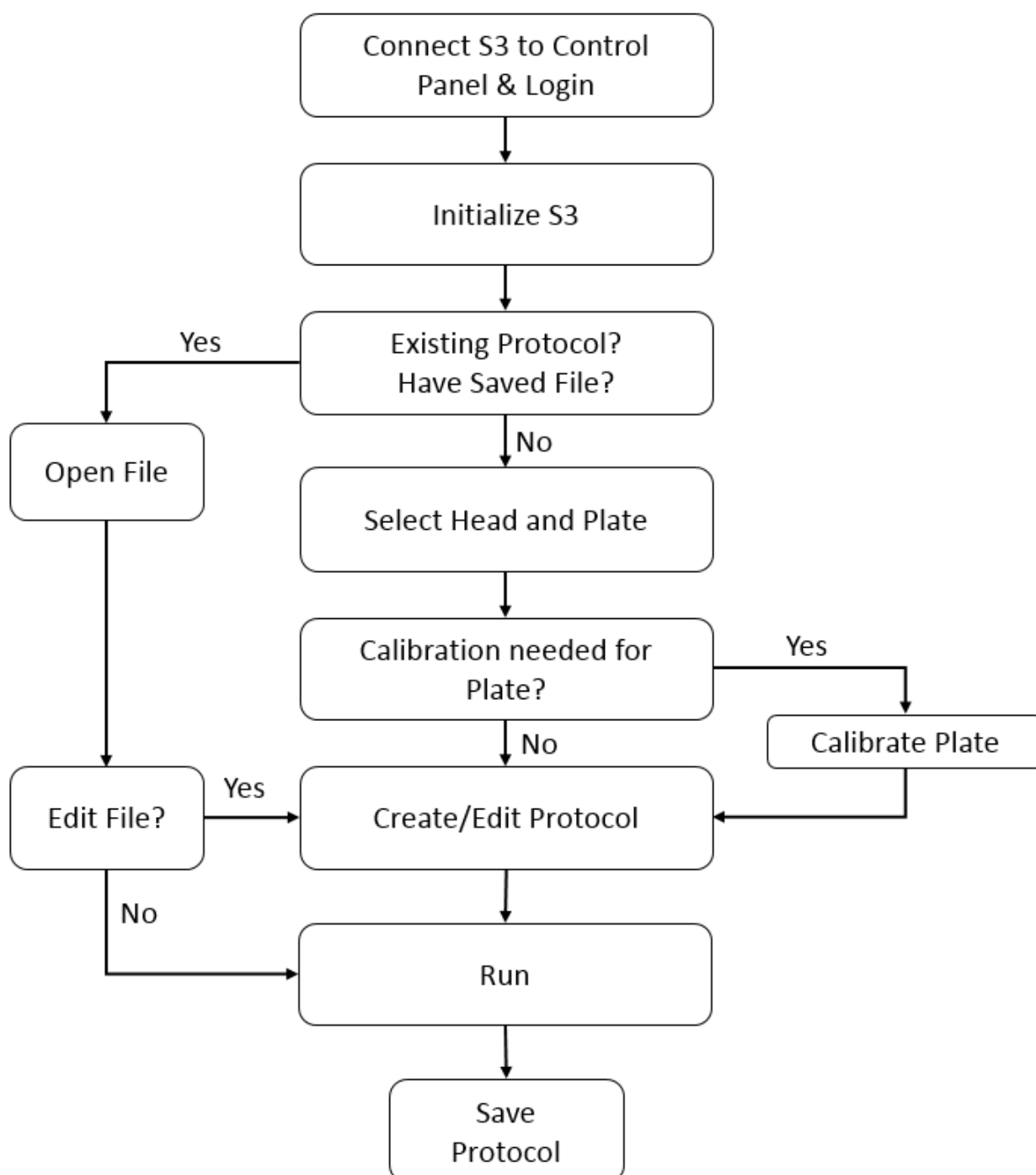
5.1 – User Login

For the latest version of S3 downloaded, refer to *www.apricotdesigns.net*.
Double click the S3 software icon after it has been downloaded. The login screen will display. If this is the first time using the software, a SPT Labtech professional will log in and set up a Username and Password for you. If you have any questions, please contact SPT Labtech for assistance.

5.1.1 – Language Selection

The default language is **English**. Chinese is also available.

Unless changes are made in the next step, the login screen looks like this:

Changing between English and Chinese

To change the language to Chinese (Simplified or Traditional), set **MultiLanguage** to "**True**" in Settings/Configuration.

When MultiLanguage is set to True, the login screen will display an option to select a different language:

5.1.2 – Login Software with Three Level Account

User Names and Features

There are three account levels: Admin, Super User, and User. The table below shows the password for each account.

Priority	Level	Example Name	Password
Highest	Admin	Admin	9663299
Medium	Super User	Apricot	654321
Low	User	Customer	123456

Features Available by Account Level

	Functions	Admin	Super User	User
Account	Change Core	●	●	●
	Change Password	●	●	●
	Create Log File	●	●	
	Clear Plunger	●		
	Configuration	●	●	
	Clean Log File	●	●	
	Reset	●		
Other Settings	Confirm Head Volume	●	●	
	Leave Plate Slow	●	●	
	Enable GLP	●		
	Using CVTC	●	●	
Menu	New/Save/Save As File	●	●	
	Open File	●	●	●
	Rename File	●	●	
	Select Head/Plate	●	●	
	Training Plate	●	●	
	Variable	●	●	
	Manual Operation	●	●	●

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Password Errors

If the password is entered incorrectly, an alert message will pop up for 10 seconds.

CONFIRM ✕

Password is not correct.

OK
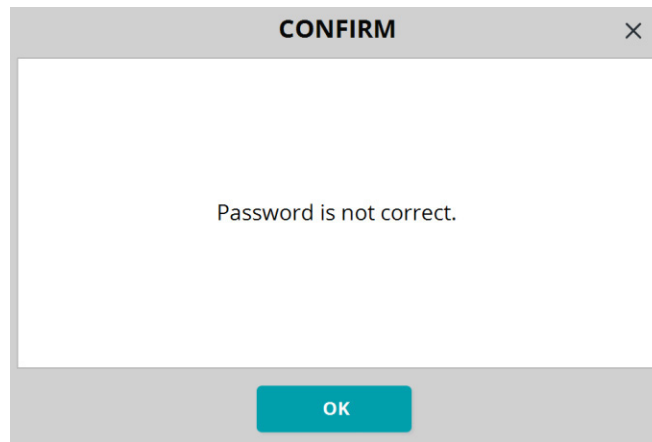
Make sure to input the correct password **within 10 tries.** Otherwise, the login will be locked for **5 minutes**.

CONFIRM ✕

Waiting for 5 minutes before retrying. Too many password attempts.

OK
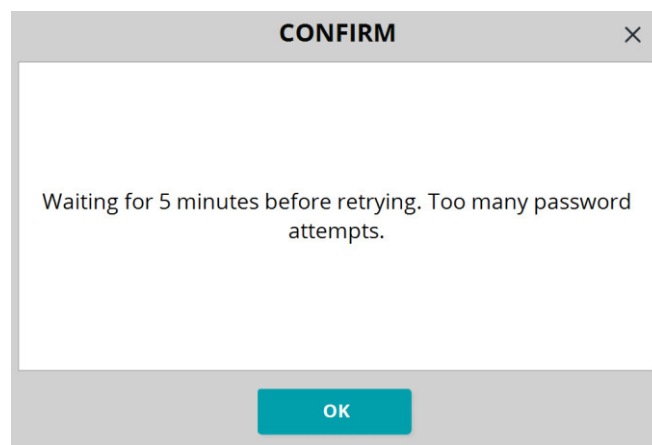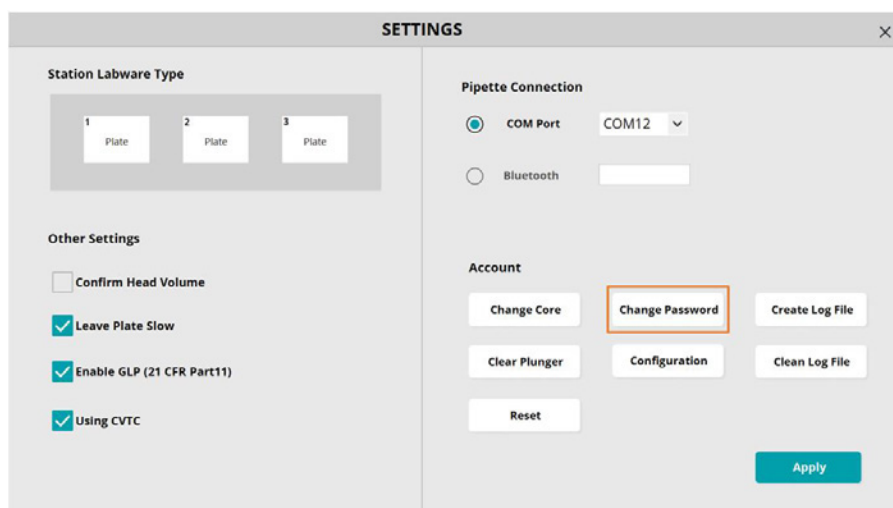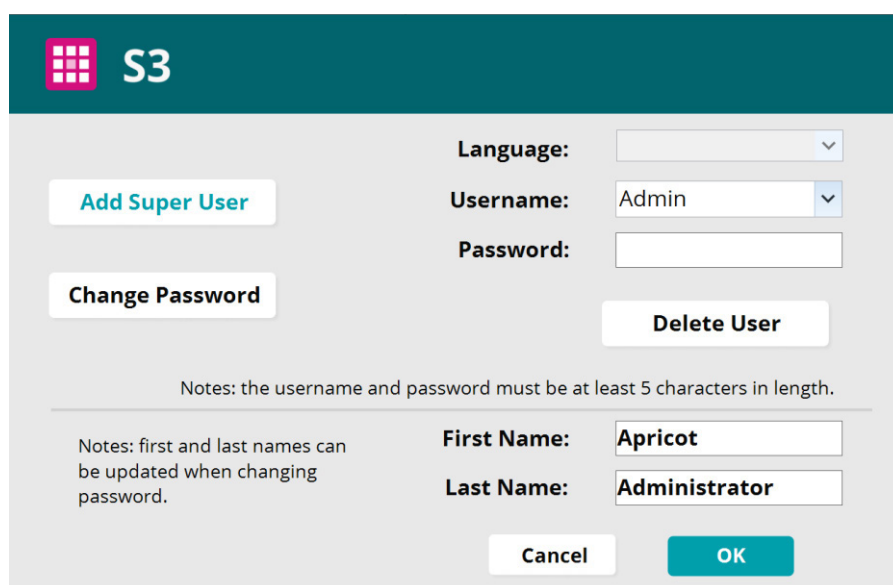
5.1.3 – Admin Account

Admin Accounts have access to all features.

Add Super User

Only Admin level logins can add Super User logins. Select "Change Password" from Setting. Fill in Username and Password. Then click "Add Super User" on the left.

Delete Super User

To delete the Super User account, select the desired username and click "Delete User".

Restore Super User

Admin can restore a previously deleted Super User / New user account with original level by entering the same name and password, then click "Add Super User" on the

left.

5.1.4 – Super User Account

"Apricot" is the username for Super User account. As shown in the picture below, it does not have the same access as the Admin account. It does not have the option to Enable GLP, Clear Plunger, or Reset the instrument.

Add New User
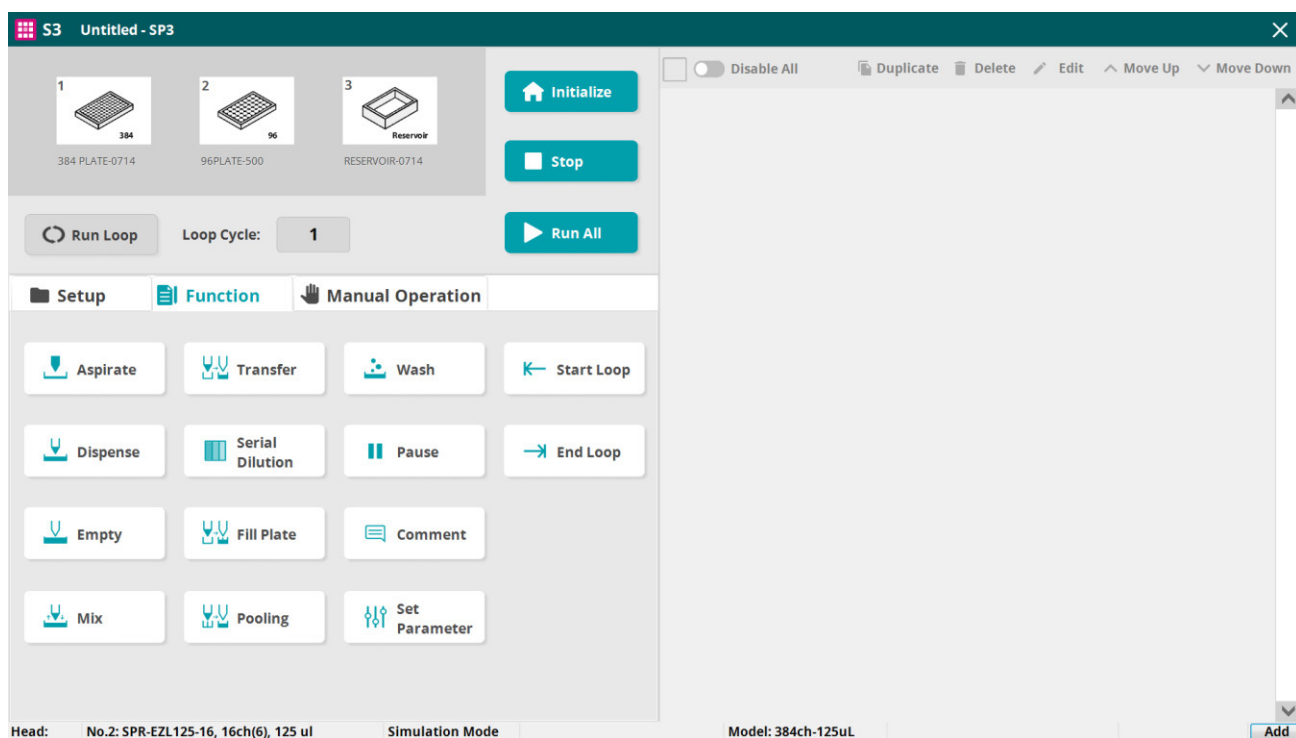
Fill in Username and Password then click "Add New User".

Delete New User

Select the desired username and click "Delete User".

5.1.5 – User Account

The username for general User account is "Customer". It is the most basic account. The purpose for User account is to open the file and run the protocol. Therefore, it cannot create new files, edit labware types, train plates, edit variables, edit protocols, or create protocol.

S3   Untitled - SP3   ✕

1 [384]	2 [96]	3 [Reservoir]
384 PLATE-0714	96PLATE-500	RESERVOIR-0714

🏠 **Initialize**

⬛ **Stop**

◯ Run Loop   Loop Cycle: 1

▶ **Run All**

☐ Disable All   📋 Duplicate   🗑 Delete   ✏ Edit   ⌃ Move Up   ⌄ Move Down

📁 **Setup**   📋 **Function**   ✋ **Manual Operation**

⬇ Aspirate	Transfer	Wash	← Start Loop
⬇ Dispense	▮▮ Serial Dilution	⏸ Pause	→ End Loop
⬇ Empty	Fill Plate	💬 Comment	
⬇ Mix	Pooling	Set Parameter	

Head: No.2: SPR-EZL125-16, 16ch(6), 125 ul   **Simulation Mode**   Model: 384ch-125uL   Add

User cannot edit most of the features in settings. Users can only access Change Core and Change Password.

Change Password

Click "Change Password", then select the desired Username, and fill in the current and new password fields. Confirm the new password and click "OK".

5.2 – Setup for Protocol

5.2.1 – Step 1: Connect S3 to Tablet

The tablet can communicate with the S3 via the built in USB wired connection or the Bluetooth connection. There are 2 steps for setting the connection up: hardware and software. Both need to be satisfied to utilize the instrument either by Wire connection or Bluetooth connection.

5.2.1.1 – Hardware Setting

1. Unscrew the silver screws on both sides.
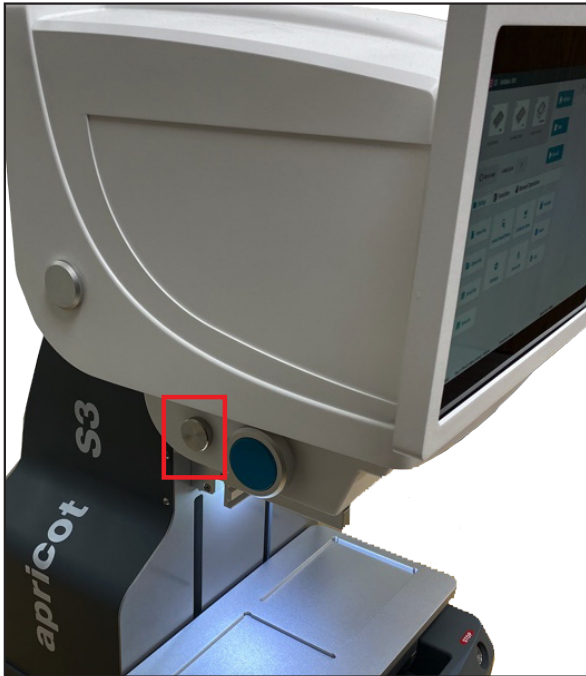
2. Raise the hood.

3. Adjust the left switch to either "Wire" or "BLT" (Bluetooth). Adjust the right switch to "Run".

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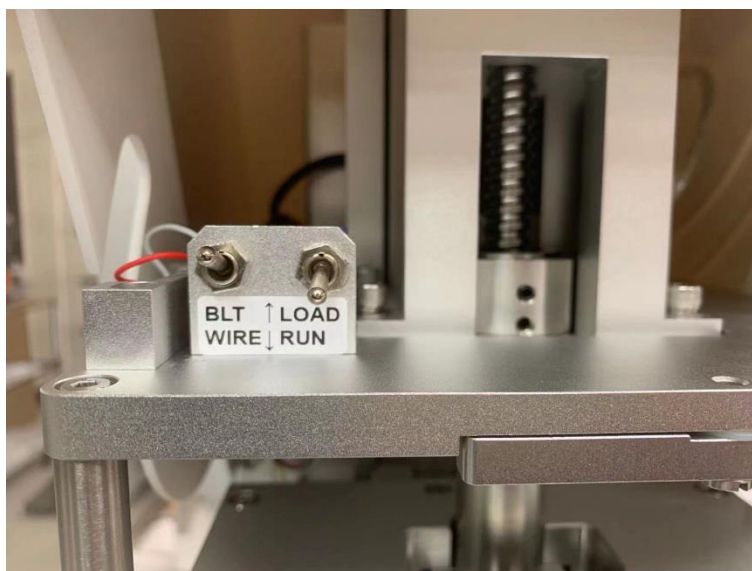
5.2.1.2 – Software Setting

Open Settings in the software. Select "COM Port" for wired connection. Select "Bluetooth" for wireless connection. This Pipette Connection has to match the Hardware Setting.

For Wire Connection, check the COM Port setting in the computer device manager. Confirm the port number in the drop down matches the port number in the device manager.

For Bluetooth connection, input the Bluetooth name, which can be found in the back of the instrument cover.

After select the Pipette Connection, click "Apply" to return to the main menu and select "Initialize" to connect the tablet to the instrument.

5.2.1.3 – Instrument Initialization

There are multiple ways to initialize the instrument:

Software Initialization

Method 1: After open the software, a confirmation window will be popped up asking the user to initialize the pipettor. Click on "Yes" will initialize the instrument.
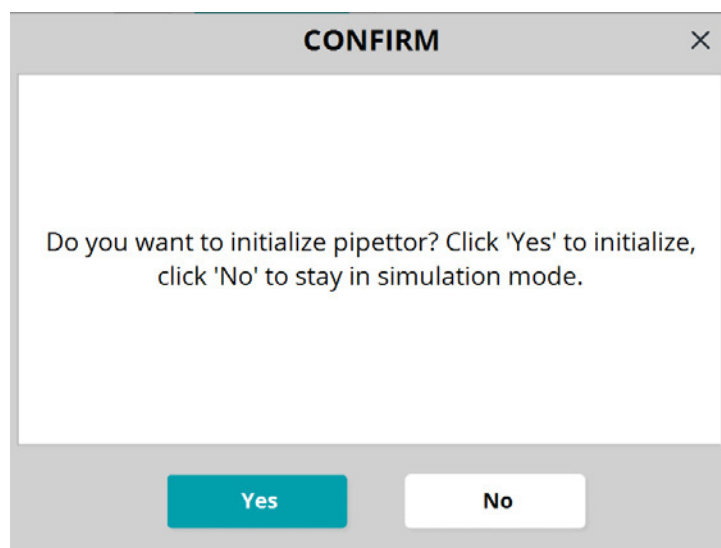
Method 2: Another way to initialize the instrument through software is by clicking the "Initialize" button from the main menu.
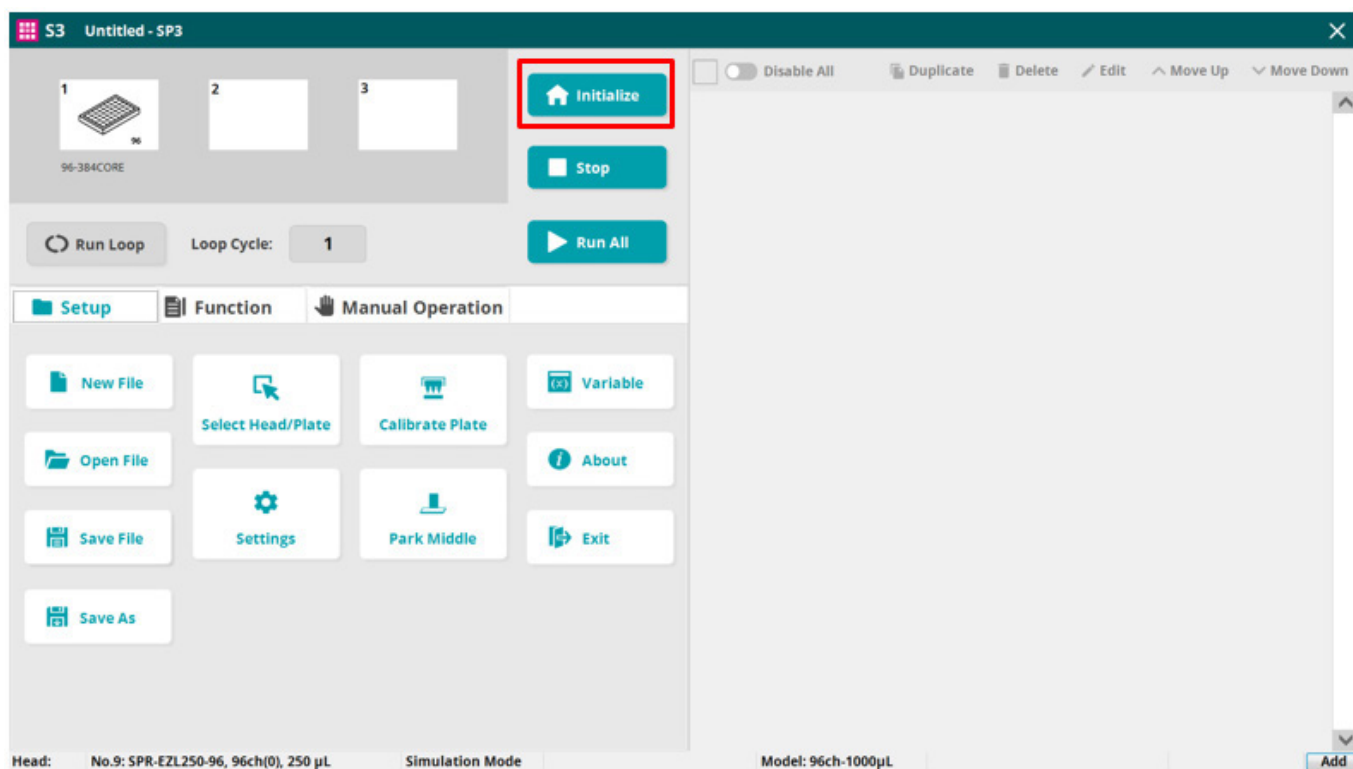
Hardware Initialization

Method 1: This method is usually for debug purpose only.

1. Push the STOP button to "in" position while the instrument is powered off.
2. Turn on the Power.
3. Release the STOP button for the instrument to initialize.

Note: The STOP button location is shown in the figure below.

5.2.2 – Step 2: Define Head/Plate Type

User can enter Select Head/Plate from the "Check head and maximum volume" prompt after Initializing or click the "Select Head/Plate" from the Setup tab. There are 2 sections: Select Head and Select Plate.

5.2.2.1 – Select Head

User can browse all the heads and select the desired one.

Or choose the channel first, then select the desired volume.

If there's a protocol created, switching the head within the same channel will have no effect to the protocol lines.

Switching to a different channel will automatically empty the existing protocol.
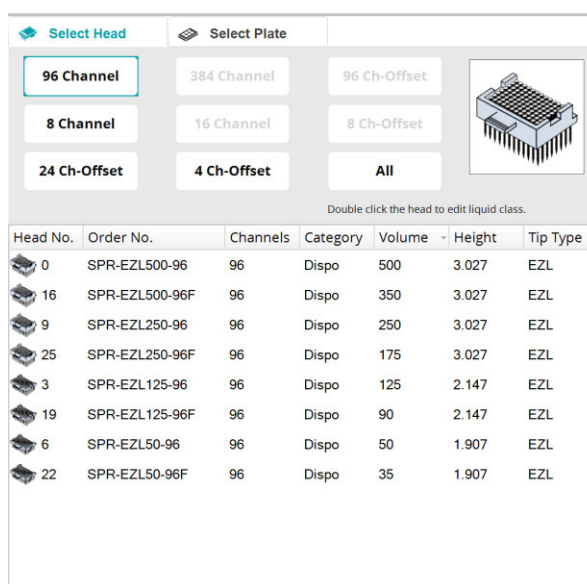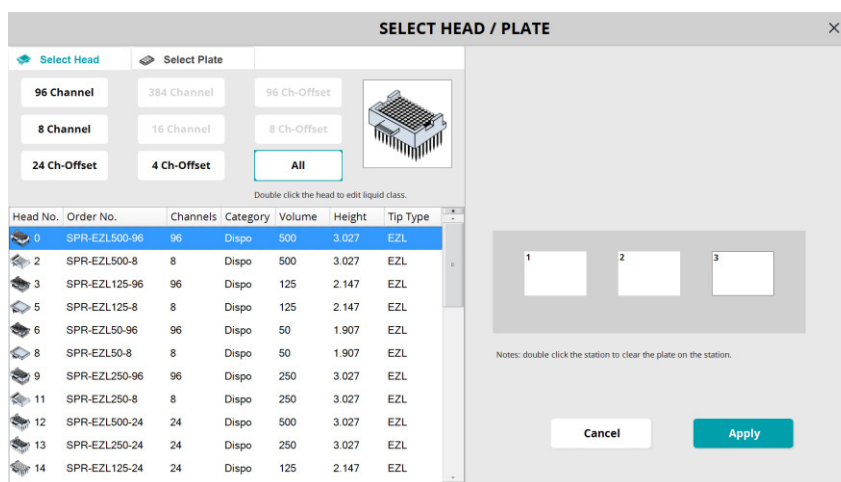
5.2.2.2 – Select Plate

To select the plate, click on the desired plate in the left, and click on the desired station to put. If user wants to create a new plate, then leave the station empty and proceed to calibrate plate.
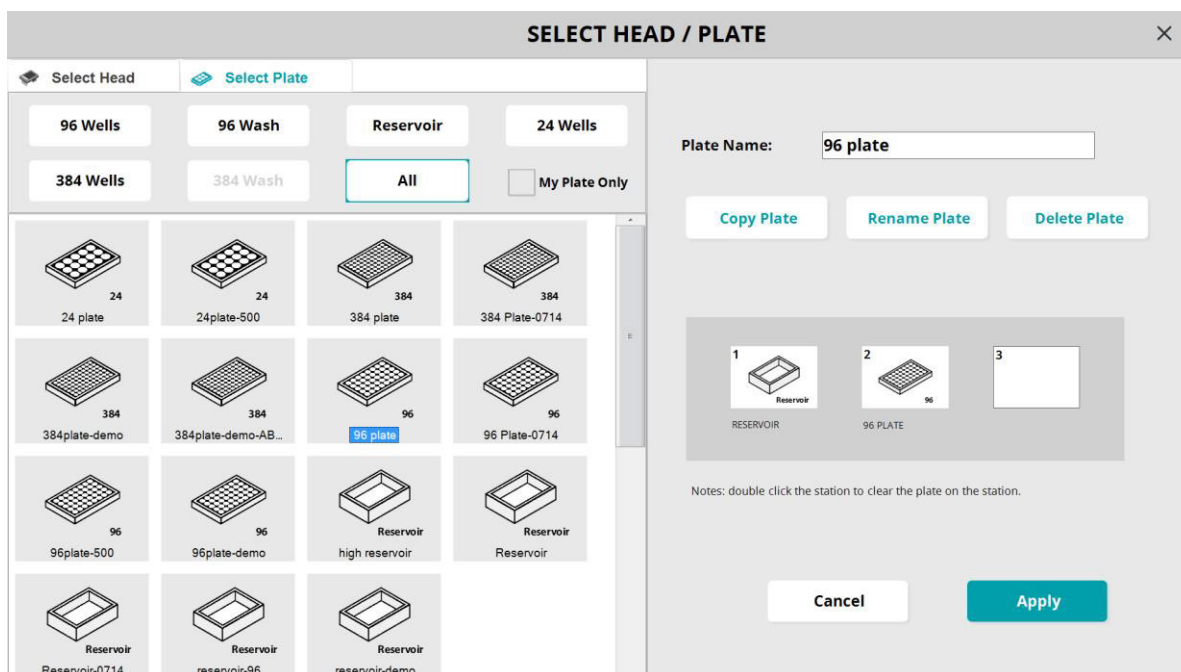
To copy plate, select the desired plate, input a different plate name, and select "Copy Plate". Same procedure for Rename Plate function. To delete plate, select the plate, and select "Delete Plate".
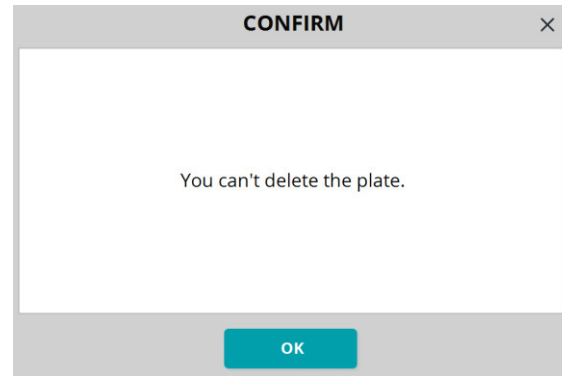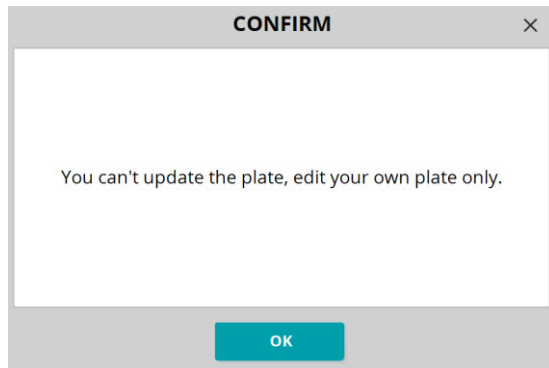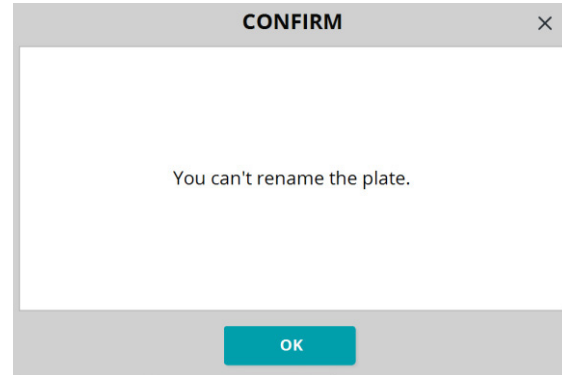
5.2.2.3 – My Plate Only

There's an option to select "My Plate Only" under Select Plate section. By checking the box, software will only display the plates that created by that specific account. Unchecking "My Plate Only" will display all plates.
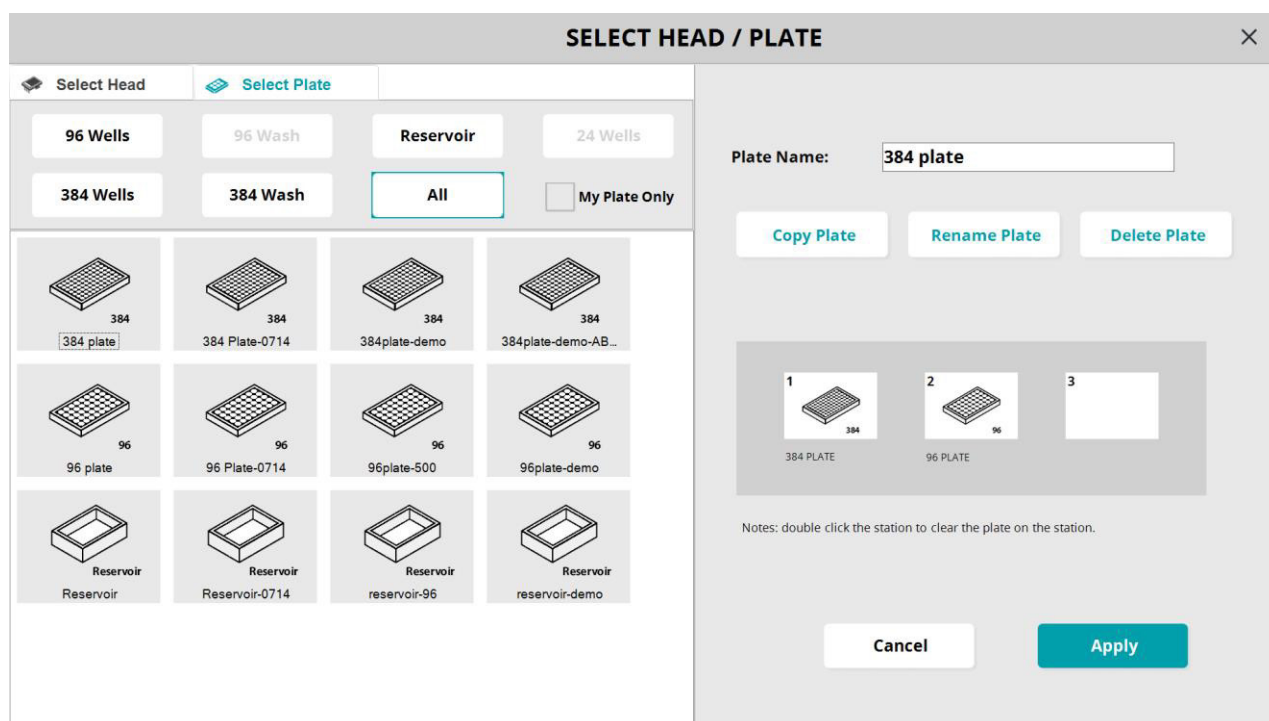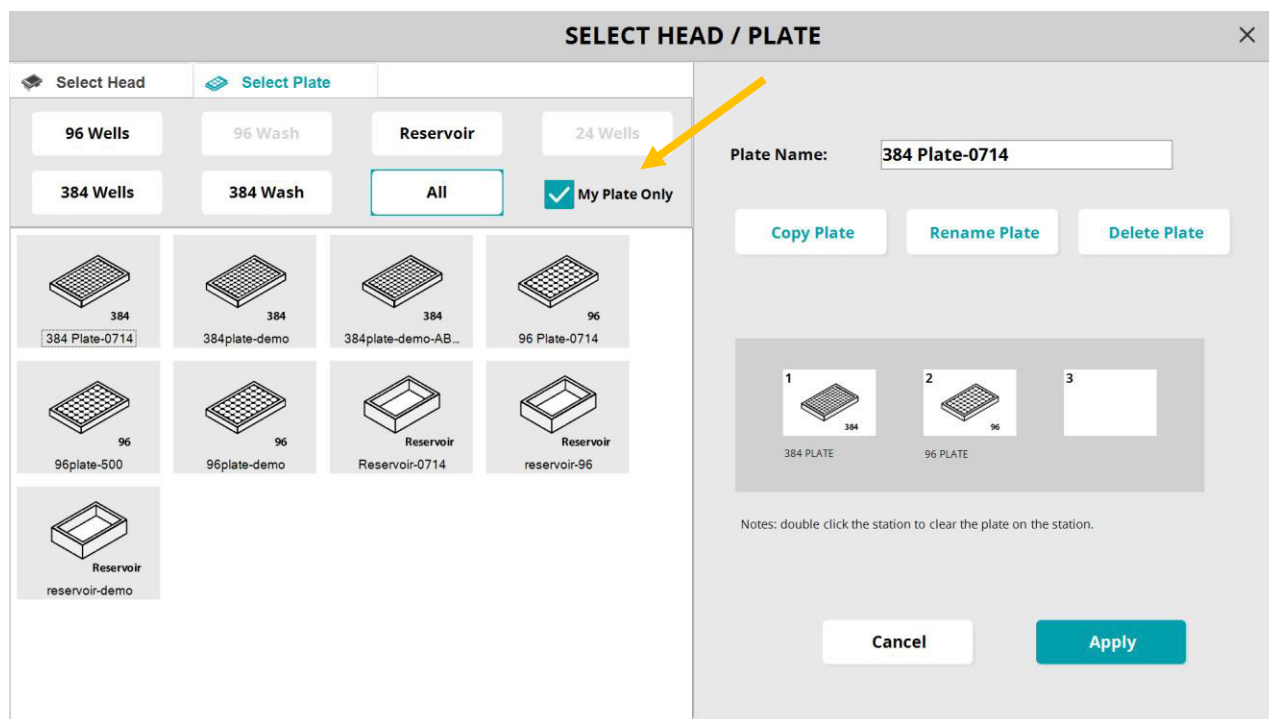
Access Denial

If you are receiving errors shown to the right, such as "You can't rename the plate", this is due to your account type.

Access to Features by User Type	
Admin	o Can create or edit their own plate under "My Plate". o Can edit Super User's plate without the need to copy their plate.
Super User	o Can create or edit their own plate under "My Plate". o Cannot rename or delete another Super User's plate or Admin's plate o Cannot calibrate another Super User's plate or Admin's plate. Although it can go through the steps for plate calibration, it does not allow the Super User to save the changes at the end. o Can copy another Super User's plate or Admin's plate. The copied plate can be found under "My Plate Only" which can be edit from there.
User	o Does not have the access to "Select Head/Plate".

For additional user information, see *Section 5.1.2. Login Software with Three Level Account.*

5.2.3 – Step 3: Calibrate Plate

Note: A full head must be loaded to train plate.

5.2.3.1 – Calibrate New Plate

To calibrate new plate, click "Training Plate" from Setup tab, then select the empty station.
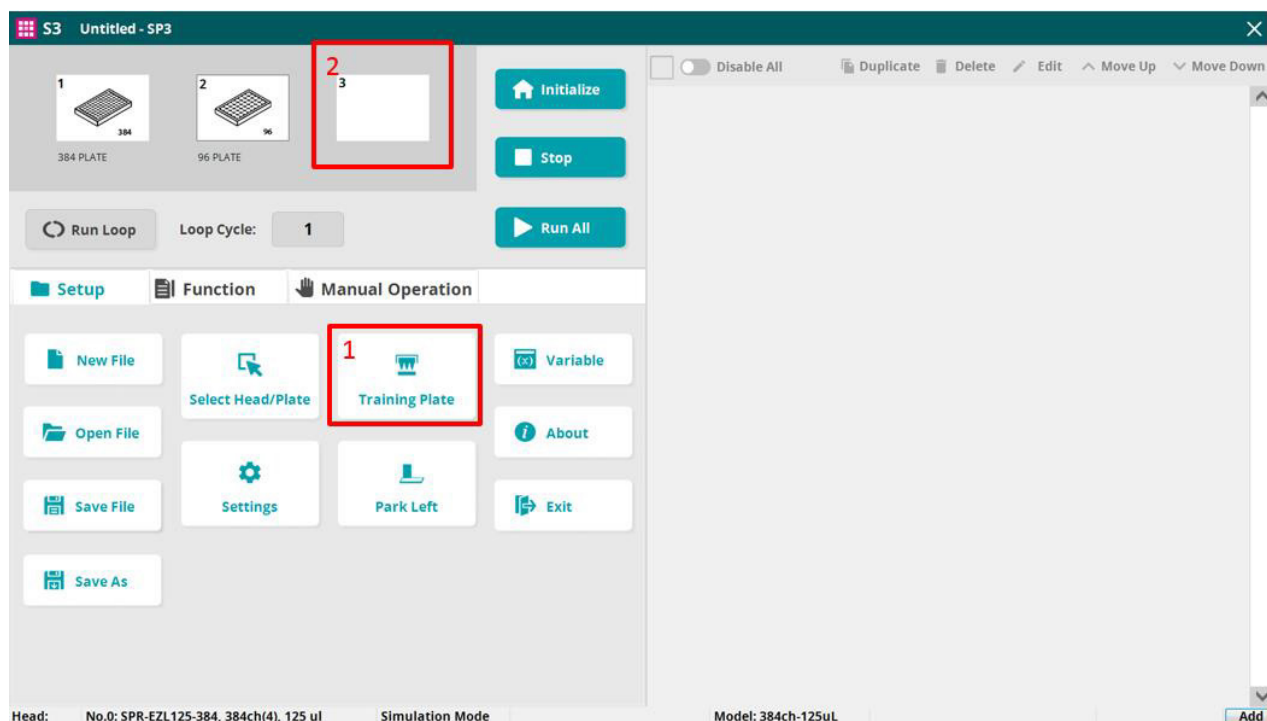
Follow the steps to define the plate name and define the plate type. Note that Step 1 and Step 2 are only allowed to make changes during new plate calibration.

CALIBRATE PLATE   ✕

Head Type   [96]   Channel

○ **Step 1: Define Plate Name**

[   ]

Step 2: Define Plate Type

[96-well]   Place a 96-well plate on station 3 !

○ **Step 3: Define Plate Top Center (unit: step)**   Center

X: 0   Y: 0   Z: 0

○ **Step 4: Define Plate Tip Touch Position (unit: step)**   L   R

X: 0   Y: 0   Z: 0   or

○ **Step 5: Define Plate Well Depth (unit: step)**   Bottom

X: 0   Y: 0   Z: 0

○ **Step 6: Define Plate Passing Height (unit: step)**   Passing Height

X: 0   Y: 0   Z: 0

Shuttle Position (unit: step)   Z in Database:
(plate top)
X: 0   Y: 0   Z: 0   0

[Home X]   [Home Y]   [Home Z]

Shuttle Movement   [Jog Up]   [Jog Backward]

[Jog Left]   [100 ⌄]   [Jog Right]

[Jog Forward]   [Jog Down]

┌ Instruction: Step 1 ─────────────────────┐
│ Input a name for the new plate.   │
│   │
└───┘

[Cancel]   [Back Step]   [**Next Step**]

There are four types of Plate user can train: 96 Well, 384 Well, Reservoir, and Washer. Either 96 Wash or 384 Wash will be displayed depending on using a 96 Core or 384 Core.

SELECT PLATE TYPE   ✕

[**96 Well**]   [384 Well]   [Reservoir]

[96 Wash]   [384 Wash]

[Cancel]   [**Apply**]

A full 96 head can train 96 well plate and 384 well plate. A full 24 head can train 24 well plate and 96 well plate, but it cannot train 384 Well. For more detail, please refer to the table in Section 3.8.

After defining the type of the plate, user can follow each step description to move on. Note that different plate type will have different steps for training.

Once the plate finished training, the new plate can be found in Select Head/Plate under Select Plate section. User can then assign the new plate to the desired station.

5.2.3.2 – Calibrate Existing Plate

To calibrate an existed plate, click "Calibrate Plate" from Setup Main Menu, then select the desired plate to enter Calibrate Plate menu. Follow the steps to calibrate the plate. Notice that Step 1 and Step 2 are not allowed to make changes and cannot select "Back Step" from Step 3.

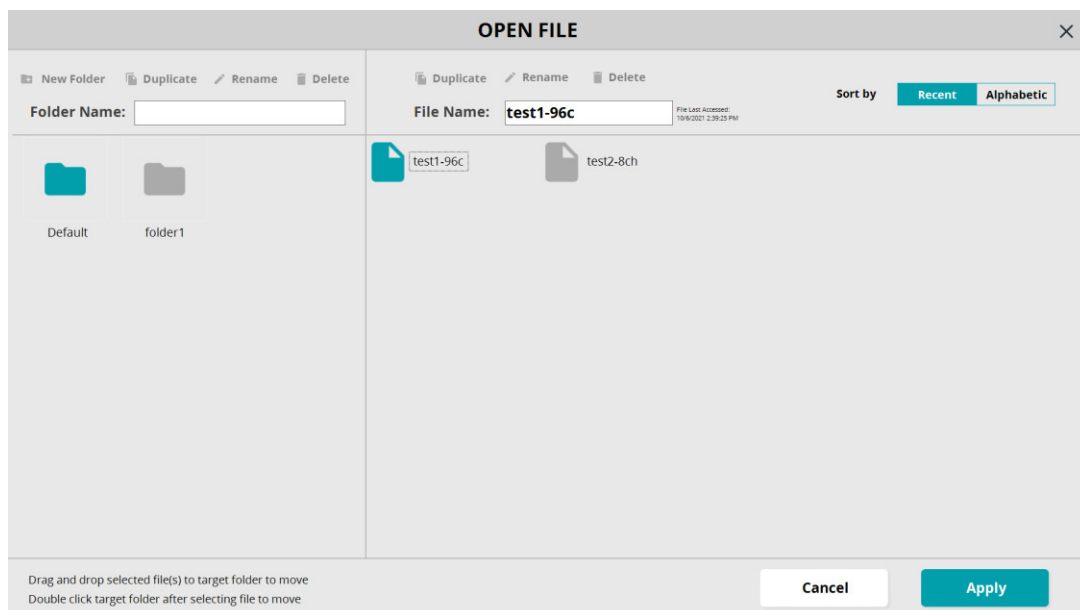# 5.3 – Main Menus

5.3.1 – Setup Main Menu

Plate Display **Protocol Line Section**
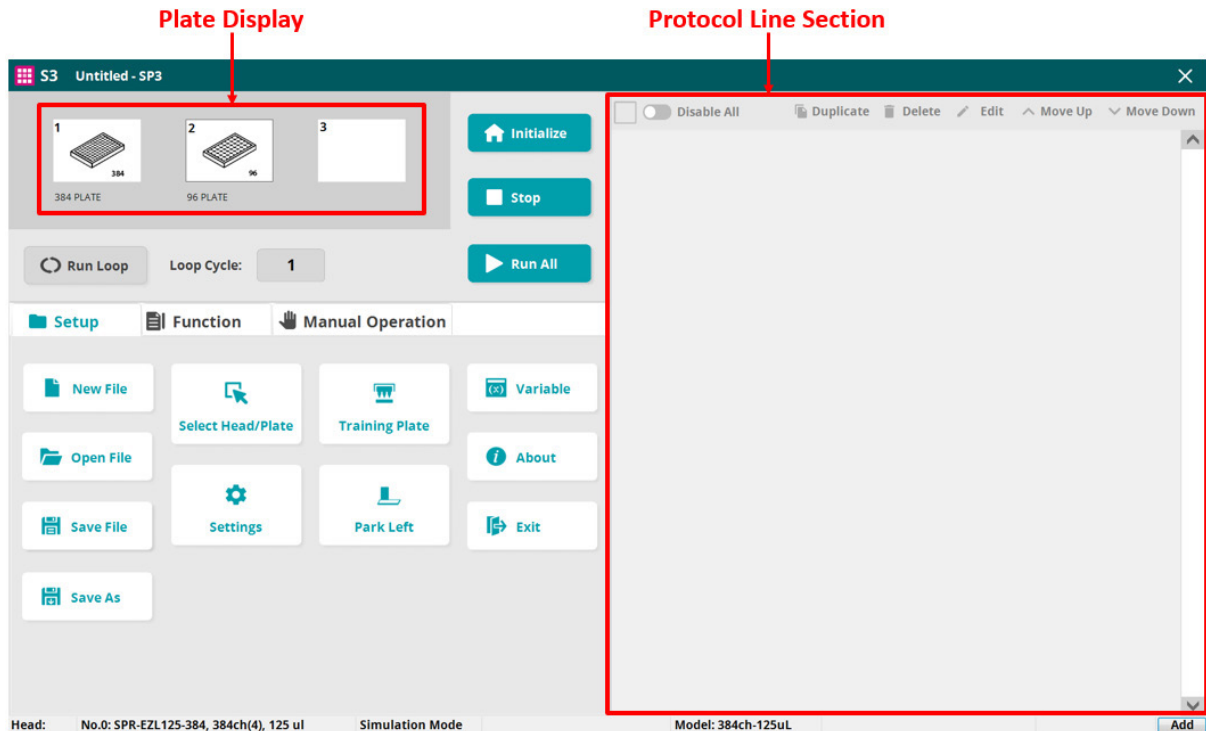
New File

When having an existing protocol opened, select "New File" once will empty the Protocol Line Section. Select the second time will empty the Plate Display.
When having an empty protocol, and existing Plate Display, select "New File" once will empty the Plate Display.

Open File

User can open the file, edit the file, or edit the folder in the "Open File" window.

To open a saved file:
- o Click the folder
- o Select the file
  - o Either double click the file
  - o Or select the file and click "Apply"

To duplicate/rename a file:
- o Click on the file user wants to duplicate
- o Enter a different name in File Name
- o Select Duplicate / Rename

To create a new folder:
- o Enter a new folder name
- o Select "New Folder"

To duplicate / rename a folder
- o Select the folder user wants to duplicate (cannot be the Default folder)
- o Enter a different Folder Name
- o Select Duplicate / Rename

To move a file to a different folder
- o Select the file user wants to move
- o 2 methods to move:
  - o Drag the file to the desired folder
  - o Double click the folder

Notes:
- o For keyboard users, ctrl and shift are allowed in the software. Therefore, user can delete multiple file or folder at the same time.
- o Hold down the "ctrl" key to select multiple specific items.
- o Select 1 item, hold down the "shift" key, and select another item. Items in between, the first selected item, and the second selected item will all be selected.

Save File

User can select "Save File" to save a new created file. To save an edited file, user have to enter Password for "SPT Labtech Electronic Signature Required Record".

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RECORD ✕

SPT Labtech Electronic Signature Required

Date/Time: 10-12-2021/11:52:42

Username: Admin

Password: [   ]

Reason: [   ]

Cancel   **Apply**

Save As

This can be used either for a new created protocol file or an edited protocol file. Select "Save As" will open the Open File window. Select the desired folder, enter a File Name, and select "Apply" to save.

Select Head/Plate

This function can be used to define the head type and plate type in each station. It can also rename, copy and delete plate. It is covered in Section 5.2.2.

Training Plate

This function is used as plate calibration. It is covered in Section 5.2.3.

Park Station

User can choose the location (left/middle/right) of the shuttle to be parked after finished running the protocol or after initialization.

5.3.2 – Function Main Menu

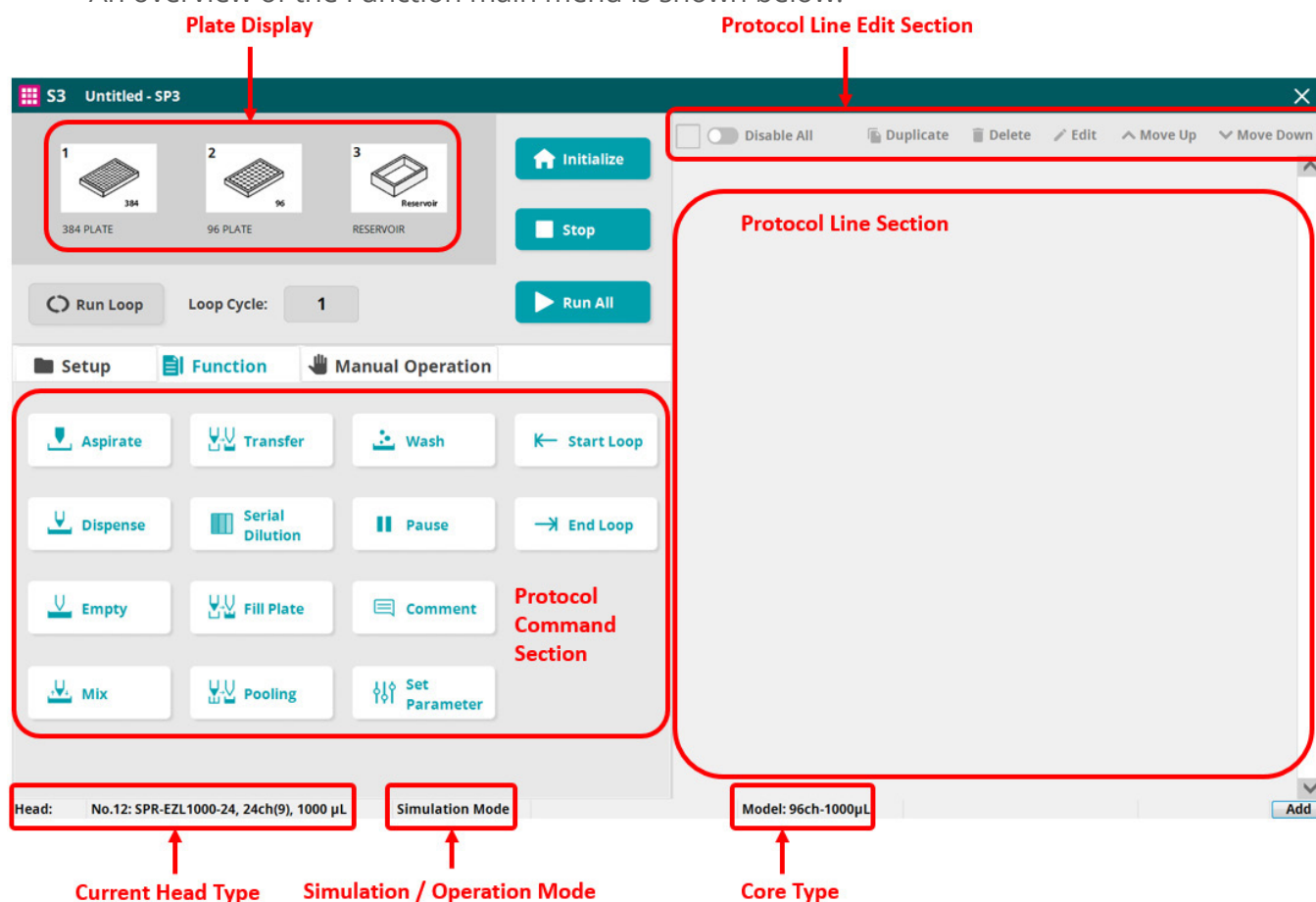An overview of the Function main menu is shown below:

Plate Display

The display should match how the plates are physically being put on the S3. This will show different numbers of stations depending on different machine model.

Protocol Command Section

User can use the functions in this section to create protocol. Detail will be discussed in Section 6.
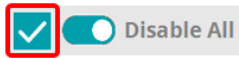
Protocol Line Section

This is the section containing all protocol lines.

Protocol Line Edit Section

User can use this section to edit a specific protocol line or multiple protocol lines.

For Multiple Protocol Line Operation, start with any one from the below:

1. Check the checkbox

2. Use keyboard "shift" to select multiple protocol lines

3. Use keyboard "ctrl" to select multiple protocol lines

User can then perform:

1. Disable/Enable All
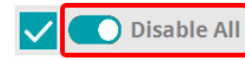

2. Duplicate

3. Delete

Simulation/Operation Mode

User must initialize the instrument to switch from Simulation Mode to Operation Mode. User can create or edit protocol during Simulation Mode but have to switch to Operation Mode to run the protocol.

Core Type

Software will automatically detect which core user put in after initialization. "Select Head/Plate" will be shown differently depending on 96 core or 384 core.

Current Head Type

User can select the head type in Select Head/Plate.
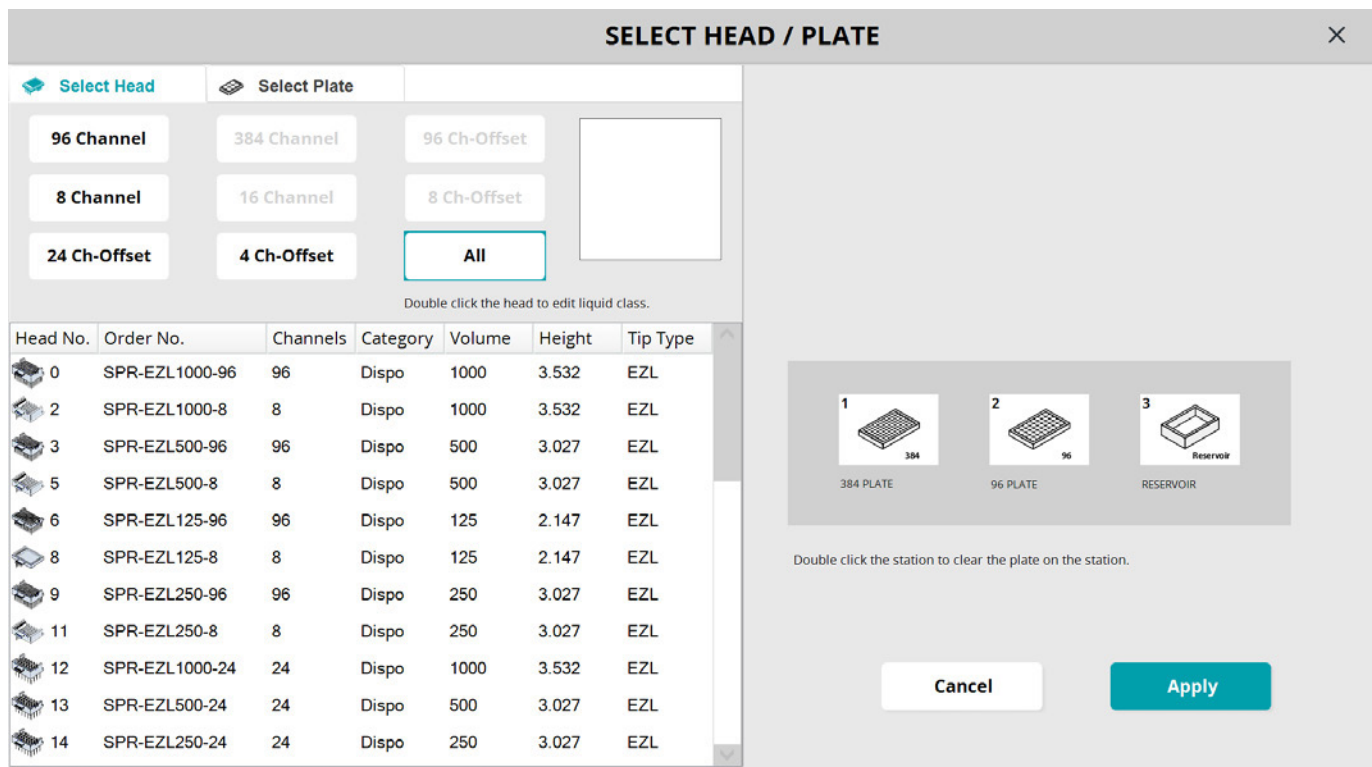
5.3.3 – Manual Operation Main Menu

Below is the main menu for Manual Operation. There are 15 profiles user can define. Operational parameters can be defined on the right and can be stored by double click the Profile number on the top right. Then operate using the manual operations commands on the left.
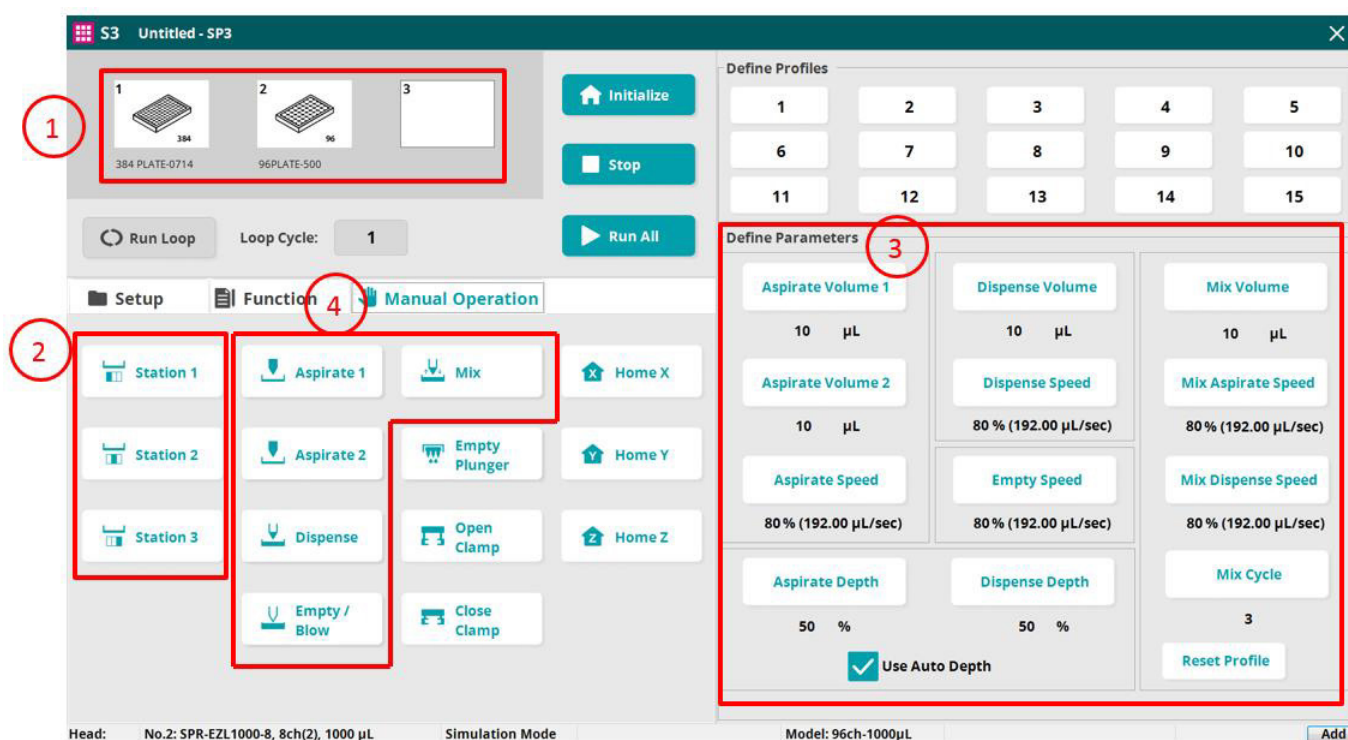
To perform any operation in **Manual mode**, the procedure would be:

1. Define the head type and plate type
2. Select the station number to perform the operation. If user select an empty station, a confirm window will pop up. No operation can be performed in the empty station except park there.
3. Edit Defined Parameters
4. Select desired Manual Operation Function

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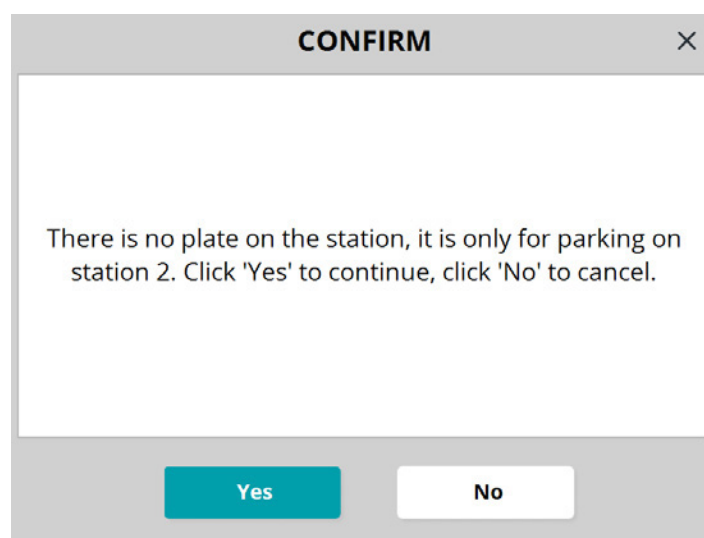
Use Auto Depth

If user check the "Use Auto Depth", the shuttle will lift automatically to the defined depth when perform Aspirate, Dispense, Empty/Blowout, and Mix. The height it lifted is defined from Plate Training. If disable this, user would have to lift the shuttle manually to the appropriate height, or hole the plate manually right below the tips, then select the desired function.

Empty/Blow

If there are liquid inside the tips, select once will empty the liquid. Select the second time will blow the excessive air out of the tip. If there are no liquid inside the tips, select once will perform Blow Out function.

Empty Plunger

This function can be operated only when there's liquid left inside the tips. This is usually being used before running a protocol while the tips are not empty.

Reset Profile

Select "Reset Profile" will reset the current defined profile.

Open Clamp and Close Clamp

This is one of the ways to open and close clamp to change head. Another way is by pressing the Tips Load/Unload button located on the front bottom left side.

6. Create Protocol

After the system is connected, head and plates are defined, and the plates are trained, user can start to create protocol. Procedure to operate the functions would be:

1. Select the desired function
2. Select the desired station number from Plate Display

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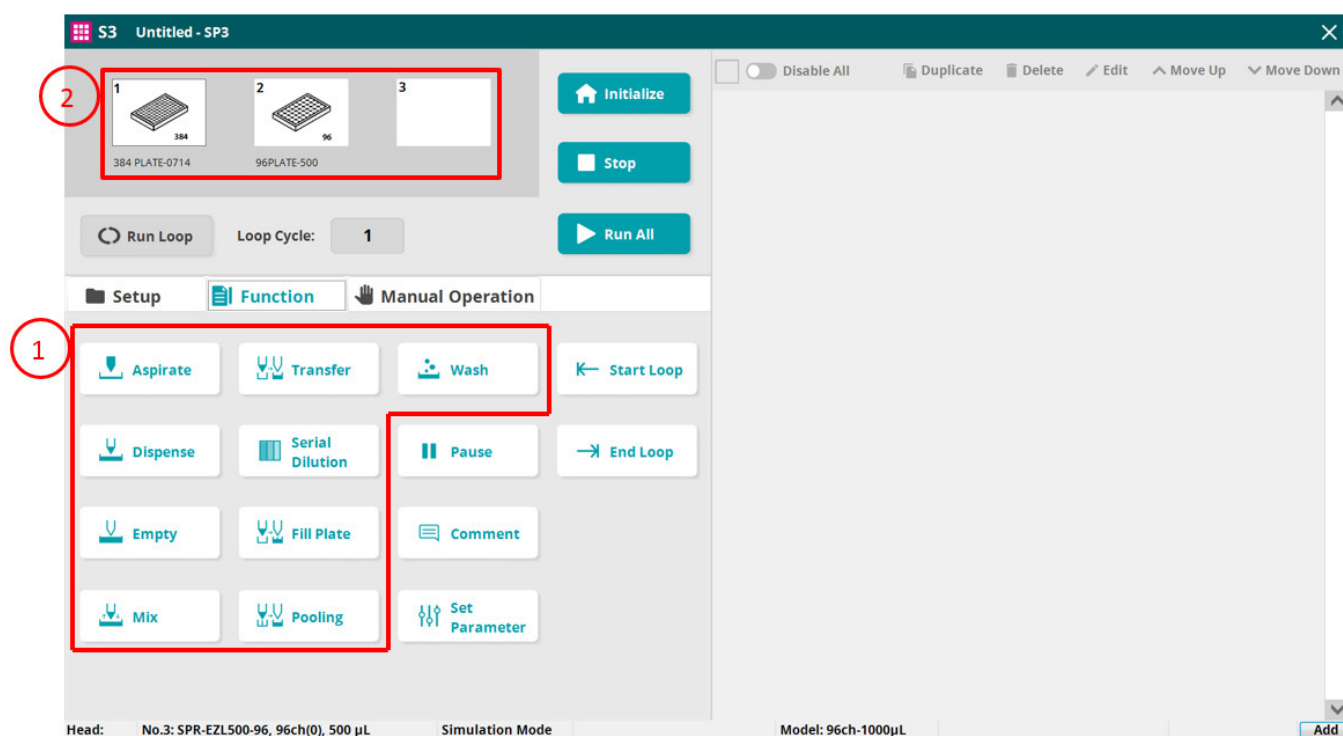
6.1 – Aspirate

Select "**Aspirate**" under Function Main Menu and select the desired plate to enter the Aspirate Main Menu. Below shows the menu for 96-Channel tip with 384 well plate.

The options for user are to edit the station number, aspirate volume, pause period, aspirate depth and speed, pre and post airgap, increased steps, Preview Position, and quadrant selection.

6.1.1 – Varieties of Menus

There are different features depending on the types of plate, full head, single column head, single row head and the different channel tip. For more detail, check section 3.8.

6.1.2 – Station

Select the Station number will open an interface for user to choose other desired station.
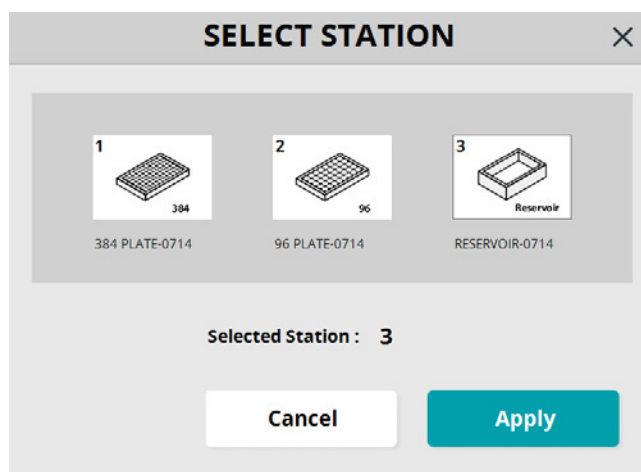
6.1.3 – Variables

To edit the aspirate volume, click on the number next to the volume to open Change Value Interface shown below. User can either use:
- o The sliders on the left
- o The number pad on the right
- o Click "Select Variable" in the bottom to set the volume variable

If user click on "Select Variable", variable interface will be opened. User can add variable, edit name, or change the value of the variable. Select "Apply" to save the changes.

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6.1.4 – Pause

To pause after aspirate and before tips leave the well, edit the Pause seconds.

6.1.5 – Pre-Airgap and Post-Airgap

Here's the flowchart to aspirate with pre- and post- airgap. The airgaps will be emptied after other dispensing functions.
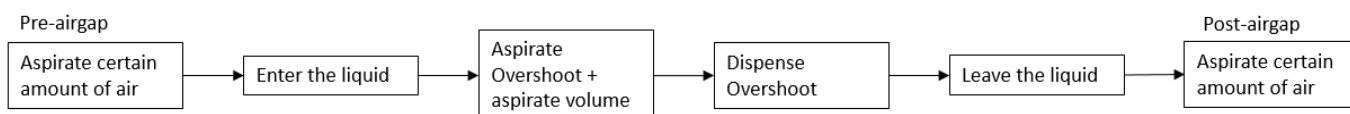
6.1.6 – Increased Steps

Increased Steps can be edit between 1 to 10. It is the number of different aspiration points from Start Depth to End Depth. After user changes the Increased Steps above 1, the Aspirate Depth will be changed from 1 slider to 2 sliders. Notice that the Start Depth needs to be less than or equal to the End Depth.
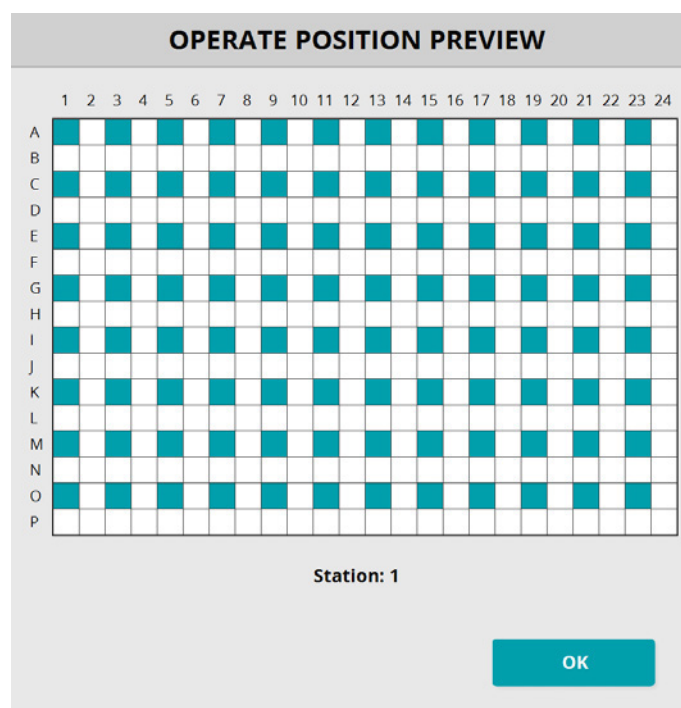
6.1.7 – Preview Position

Preview Position highlights the plate position that will be operated by the instrument. In this example, it is using a 96 core with 96 channel head and aspirate in a 96 well plate, all wells are highlighted.
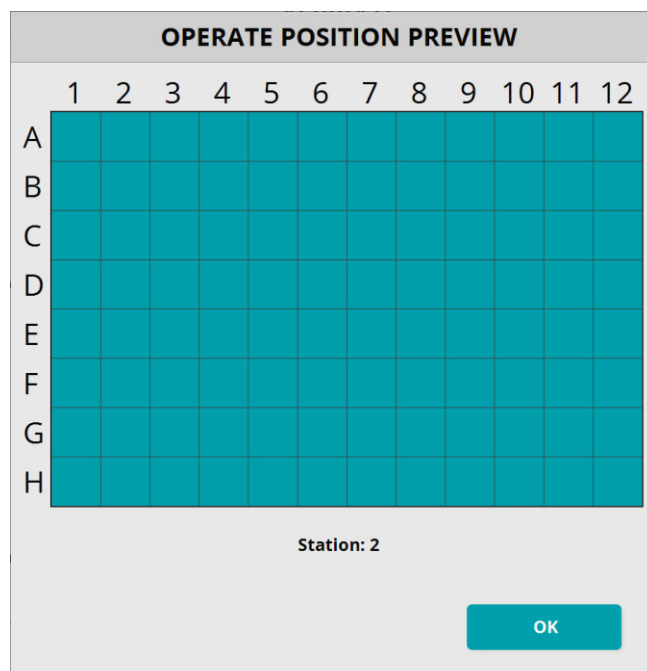
Below shows the Position Preview for a 96 core with 96 channel head and aspirate in quadrant 1 384 well plate.

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6.2 – Dispense

Below shows the Dispense menu for 96-Channel tip with 384 Well plate. The red and blue boxes indicate that the same color features are operate together.

6.2.1 – Multi-Dispensing Quadrant

Noticed in the above figure, multiple quadrants are selected. Only Dispense function can perform multi-selecting quadrants. The instrument will be dispensing the volume of 10uL in both quadrants, so it will dispense total of 20uL.

6.2.2 – Dispense Speed Over 60uL

There are two dispensing speeds for dispensing. One is for the volume over 60uL and the other one is for the volume less than 60uL.

6.2.3 – Dispense Location in Well

User can only select one of the sides under "Dispense in Well" on the right. The machine will dispense the liquid at the selected side.

6.2.4 – Side Touch

The "Side Touch Depth" will be operated only if the user selects one or more sides under "Side Tip Touch". Side Touch Depth is the depth where the tips touching the side for 96 or 384 well after dispensing. User can multi-select the Side Tip Touch with the order of left, right, front, and back.

6.2.5 – Bottom Touch

The Bottom Touch Depth will be operated only if the user selects "Yes" for Bottom Tip Touch. The tips will be going to the Bottom Touch Depth after liquid dispensed.

6.2.6 – Decremental Steps

Decremental Steps can be edit between 1 to 10. It is the number of different dispensing points from Start Depth to End Depth. After user changes the Decremental Steps above 1, the Dispense Depth will be changed from 1 slider to 2 sliders. Notice that the Start Depth needs to be greater than or equal to the End Depth.

6.3 – Empty

Below shows the Empty menu for 96-Channel tip with 384 Well plate. Most of the features are already covered in previous sections. Notice that for Empty function, only one quadrant can be selected.

6.4 – Mix

Below shows the Mix menu for 24-Channel tip with 96 Well plate.

6.4.1 Volume Retained

Volume retained is the volume will aspirate after finished mixing. This feature can be set as variable.

6.4.2 Mix at Corners

After enabling this feature, the tip will mix by each side depending on the mix cycles. The order the tip will be mixing on the side is: left, front, right, back.
For example, if the tip cycle is 2, then the mixing procedure with "Mix at Corners" would be:
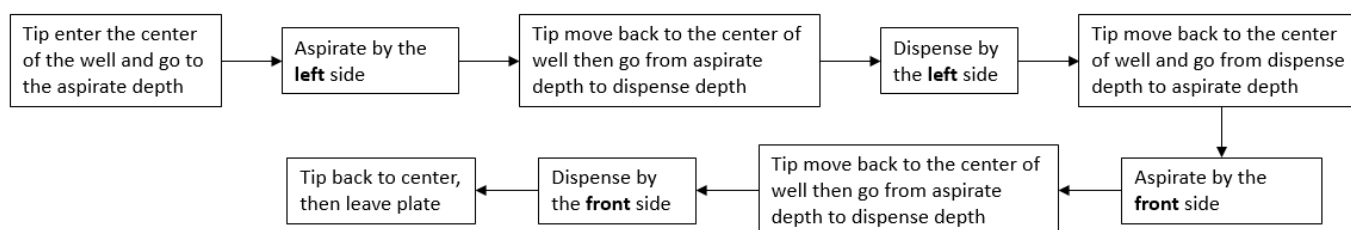
Note that in this feature, user can adjust the aspirate and dispense depth.

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6.5 – Transfer

Below shows the Transfer menu for 8-Channel tip and transfer from 384 Well plate to 96 Well plate. Notice that the Quadrant figure only showed under Source because station 1 is a 384 well plate.

Select "Source Column" will open a visualized 384 wells which allows user to select the desired locations to perform the function. User can also select the quadrant 1 or 3 to determine if the function would perform in the front or in the back.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Cancel

Apply

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6.6 – Serial Dilution

Below shows the Serial Dilution menu for 8-Channel tip from 96 Well plate to 384 Well plate. This function is not allowed using a full head (384-channel, 96-channel or 24-channel) operation.

6.6.1 – Start Column and End Column

The columns from Start Column to End Column will perform Serial Dilution through mixing. It can be performed from left to right or right to left through the settings for Start Column and End Column. The color will be faded from dark to light represents the moving direction in Preview Position.

6.6.2 – Interval

The interval is for the columns that will be perform Serial Dilution between Start and End Column. If using the default "1" interval, the software will run all the columns. If change the value to "2", the software will skip 1 column during the operation. If change the value to "3", the software will skip 2 columns during the operation. And so on.

6.6.3 – Preview Position

The display of Preview Position for single column channel is different than the full head channel. When there includes a spread-out multi- aspirate or dispense, the display color will be faded. The color transit from dark to light which represents the operation sequence.

Below shows the Operate Position Preview from the Serial Dilution Menu. The instrument picks up 10uL from the Source Station 2 Column 1. Then mix and dispense 10uL in the Target Station 1 from Column 1 to 24 with an interval of 3.

OPERATE POSITION PREVIEW

Source Station: 2

Target Station: 1

OK

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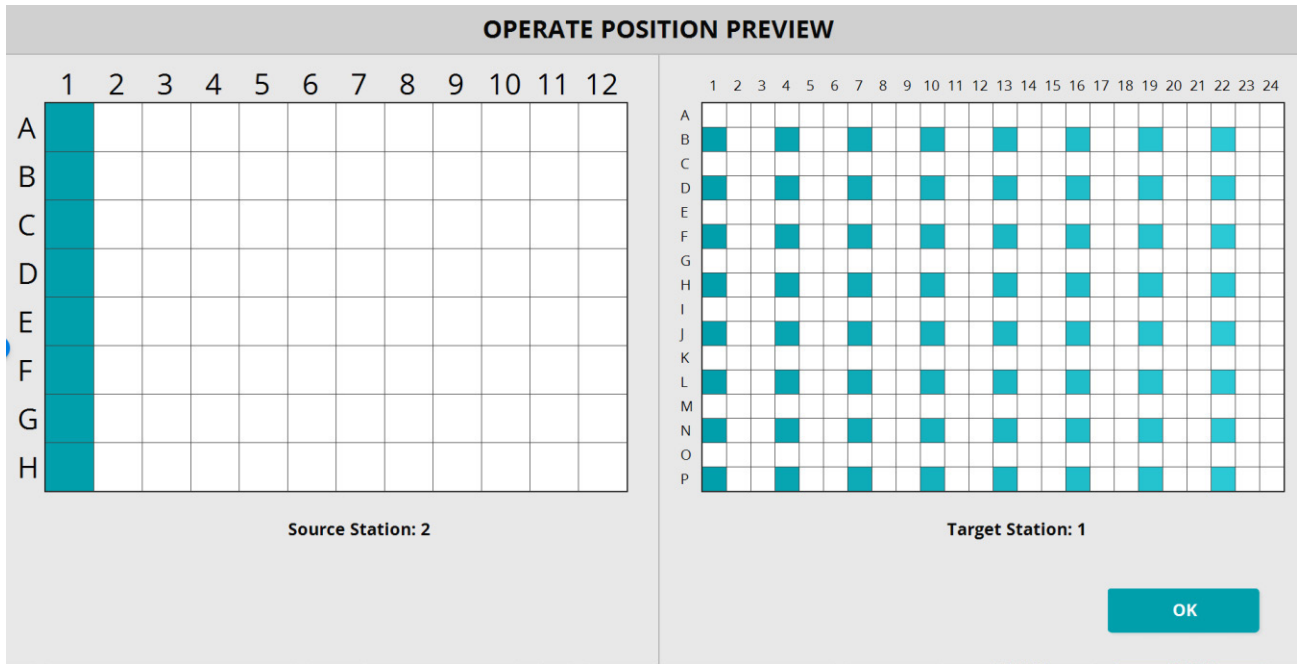
6.7 – Fill Plate

Unlike other functions that user would give direct command on how much to aspirate in the Source well, Fill Plate function give direct command on how much liquid to **dispense** in the Target well.

Therefore, user only need to set the fill volume, and define other features if needed, the system will automatically calculate how much to aspirate in the Source well.

If the volume is not enough to fill all the define columns at once, it will go back and forth from the Source well to the Target well until the filling is complete.

Below shows the Fill Plate menu for 8-Channel tip from 384 Well plate to 96 Well plate. This function is not allowed using a full head (384-channel, 96-channel or 24-channel) operation.

6.7.1 – Maximum Aspirate Volume

The default value for the Maximum Aspirate Volume is depending on the maximum tip volume. User can only adjust the Maximum Aspirate Volume lower than the maximum tip volume.

6.7.2 – Remain Volume

This feature is similar with the Volume Retained in Mix function. But it cannot be edit as a variable, and the maximum value for this is 25uL regardless on the tip volume.

6.7.3 – Preview Position

Below shows the Operate Position Preview for Fill Plate. The instrument will aspirate 60uL from Source Station 1, and dispense 10uL to the Target Station 2 from Column 12 to Column 1 with an interval of 2.

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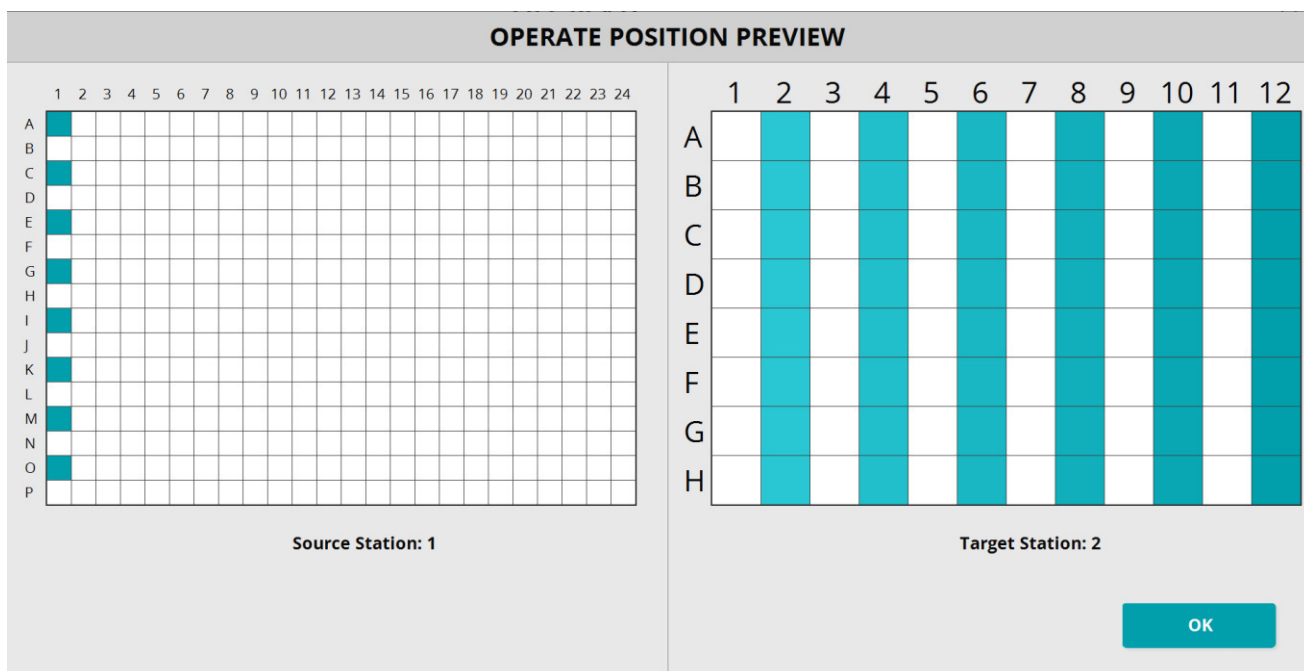
6.8 – Pooling

Unlike Fill Plate that aspirate from one and distributes to multiple. Pooling aspirates from multiple and dispense to one. If Pooling Volume is large, it will perform pooling multiple times by going back and forth between the Source and Target plate.

In the example showed above, the instrument will:
- Aspirate 100µL each well from Column 1 to 5 in Source Station 2
- Dispense all 500µL to Column 10 in Target Station 1
- Aspirate 100µL each well from Column 6 to 10 in Source Station 2
- Dispense all 500µL to Column 10 in Target Station 1
- Aspirate 100µL each well from Column 11 and 12 in Source Station 2
- Dispense al 500µL to Column 10 in Target Station 1

OPERATE POSITION PREVIEW

Source Station: 2

Target Station: 1

OK

6.9 – Wash

This function is similar with Mixing, but the purpose is to wash the tips with or without Pump.

Above shows the example to wash 96-channel tip in a 384 plate. Notice the quadrant figure is not showing for user to select because system assumes Wash function is performed in a reservoir.

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OPERATE POSITION PREVIEW

Station: 1

OK

6.9.1 – Using Pump

If the instrument connects to the Pump, select "Yes" to use pump.

6.9.2 – Pre-Fill Period

This is the period in seconds the system can pause before washing.

6.9.3 – Post Wash Period

This is the period in seconds the system can pause after washing.

6.10 – Pause

To pause between functions, select Pause from Function Main Menu. User can set instrument to Home X, Y, and Z during Pause. There are two options to pause:

1. Set pause period by using "Minute" and "Second"
2. Enable "Wait for User".
3.

The first method will disable Comment and Change Tip features. The second method will disable Minute and Second features.

6.10.1 – Comment

Comment will be shown if user select "Yes" to Wait for User. This can be used to remind user their action during Pause.

6.10.1 – Change Tips

When enable Change Tips Function, instrument will open clamp during Pause for user to switch tips.
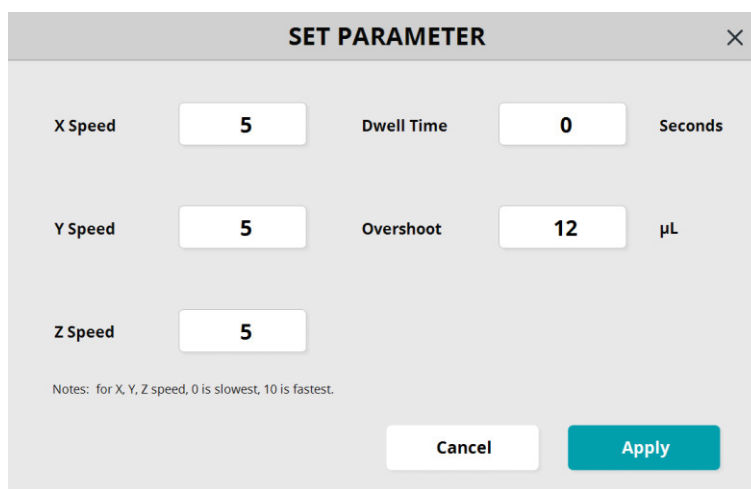
6.11 – Comment

This is different than the Comment in Pause. Comment function is worked as a note that can be seen in protocol lines for user and will be ignored during the Protocol running.

6.12 – Set Parameter

The protocol will be running according to these set parameters after this protocol line. The XYZ speed are the axis motor speed where 0 is the slowest and 10 is the fastest. Dwell Time is the pausing time after aspirating or dispensing in the liquid. Overshoot is the liquid volume the system will aspirate before the aspirate volume and dispense after aspirate volume. Its main purpose is to overcome backlash.

SET PARAMETER				✕
X Speed	5	Dwell Time	0	Seconds
Y Speed	5	Overshoot	12	µL
Z Speed	5			

Notes: for X, Y, Z speed, 0 is slowest, 10 is fastest.

Cancel   **Apply**

Dwell Time would be invalid for Aspirate and Dispense functions. To perform the same function, use the Pause feature.

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6.13 – Loop

There are two ways to run the loop: Outer Loop and Inner Loop.

Outer Loop: user can edit the Loop Cycle and select "Run Loop" from the main menu to run all the protocol lines in loop. During protocol running, the Loop Cycle number will be decreasing simultaneously until Protocol finished.
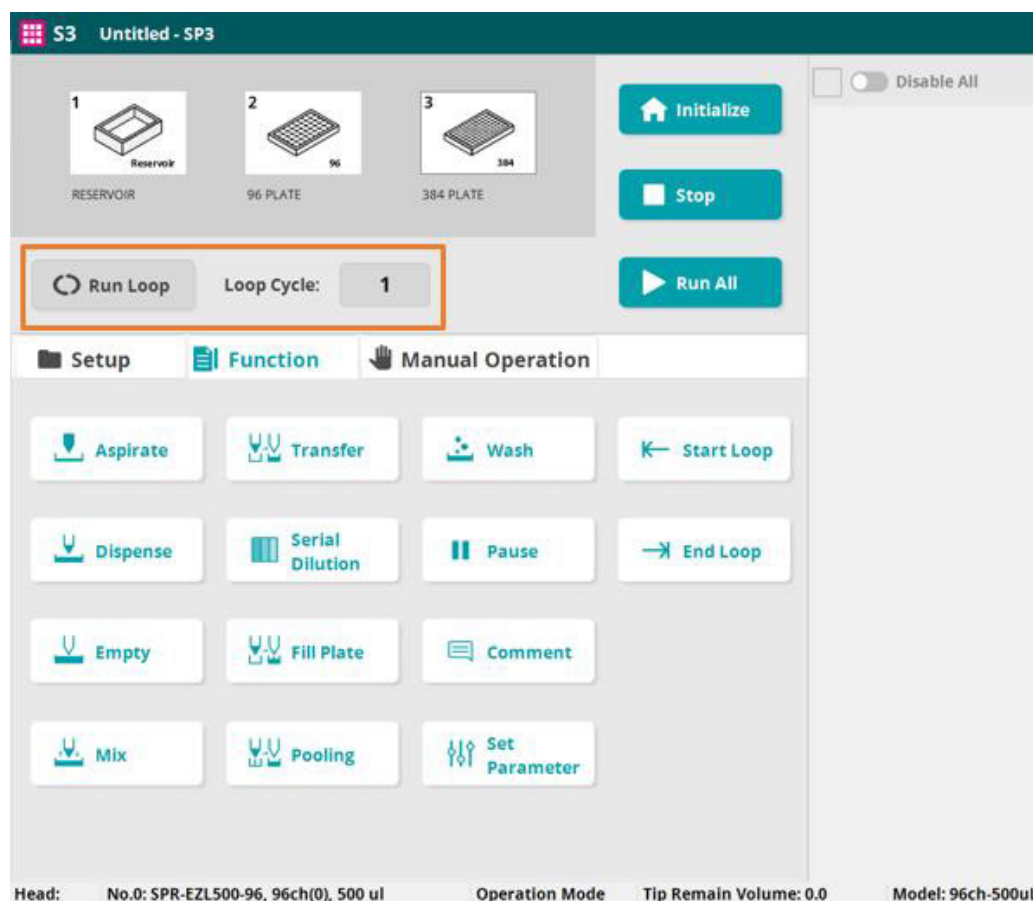
Inner Loop: user can select the function "Start Loop" to edit the Loop Name and Loop Cycle. The protocol lines between Start Loop and End Loop will be running in a loop. Start Loop and End Loop can be adjusted by moving up and down between the protocol lines. During protocol running, the remaining loop number is shown in the status bar located in the bottom.

SET START LOOP ✕

Loop Name   Loop A

Loop Cycle   1

Cancel   **Apply**

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7. Settings

Here are some of the detail about the features in Settings Menu.

7.1 – Confirm Head Volume

Enabling this function will prompt the user to confirm the maximum volume of the selected head after each initialization.
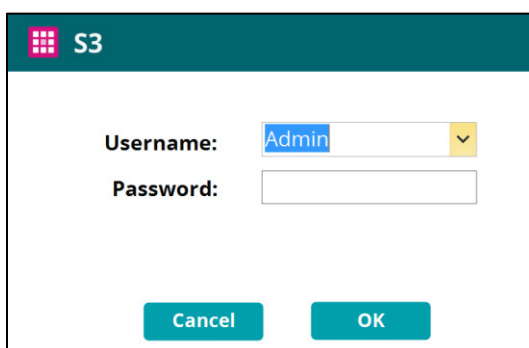
7.2 – Leave Plate Slow

Enabling this function will reduce the speed of the Z-axis as the tips exiting the plate wells. This function is useful for cell-culture applications and helps improve CVs by reducing residual drops on the tips. If disabled, the Z speed will run at the default setting throughout the protocol.

7.3 – Enable GLP (21 CFR Part 11)

Enable this function will enable login interface and disabled text file edit. The content from the text file will be locked and unreadable.
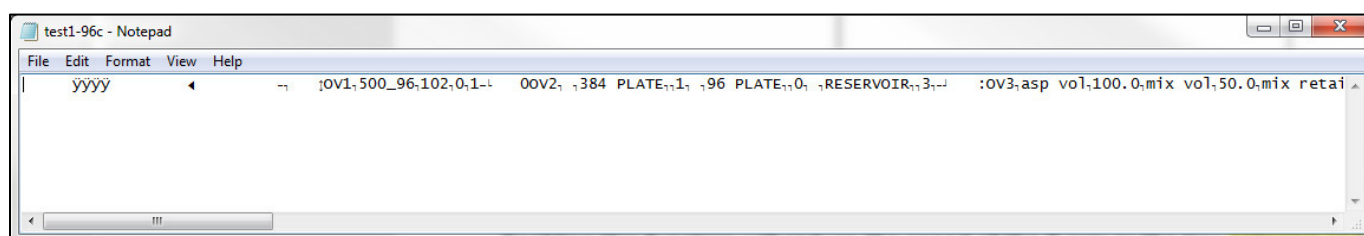
Disabling this function will skip the login interface and will be able to edit the text file.

7.3.1 – Text File Edit

Uncheck "Enable GLP" will be allowed to edit text file. Text files can be found in: C:\Program Files (x86)\SPT Labtech\S3\ProtocolTXT.

Uncheck and check "Enable GLP" will store files in different locations. User cannot access both location at one time. But they still share the same database of plates.

User can copy and paste, edit, or delete Protocol lines. To edit in Notepad and run properly, user must understand what each parameter represents in Notepad and be able to edit the right parameter. Improper way to edit the text file will result in error.

Copy and Paste Protocol Lines

User can copy and paste the function in Notepad. With the example from above, select both Aspirate and Dispense line and copy:

Then press enter to create another line right under Dispense, and paste.

Save the change. Open the file from software, and the new changes will be shown.

Parameters Representing

Here's a brief view of what are the number representing for aspirate.
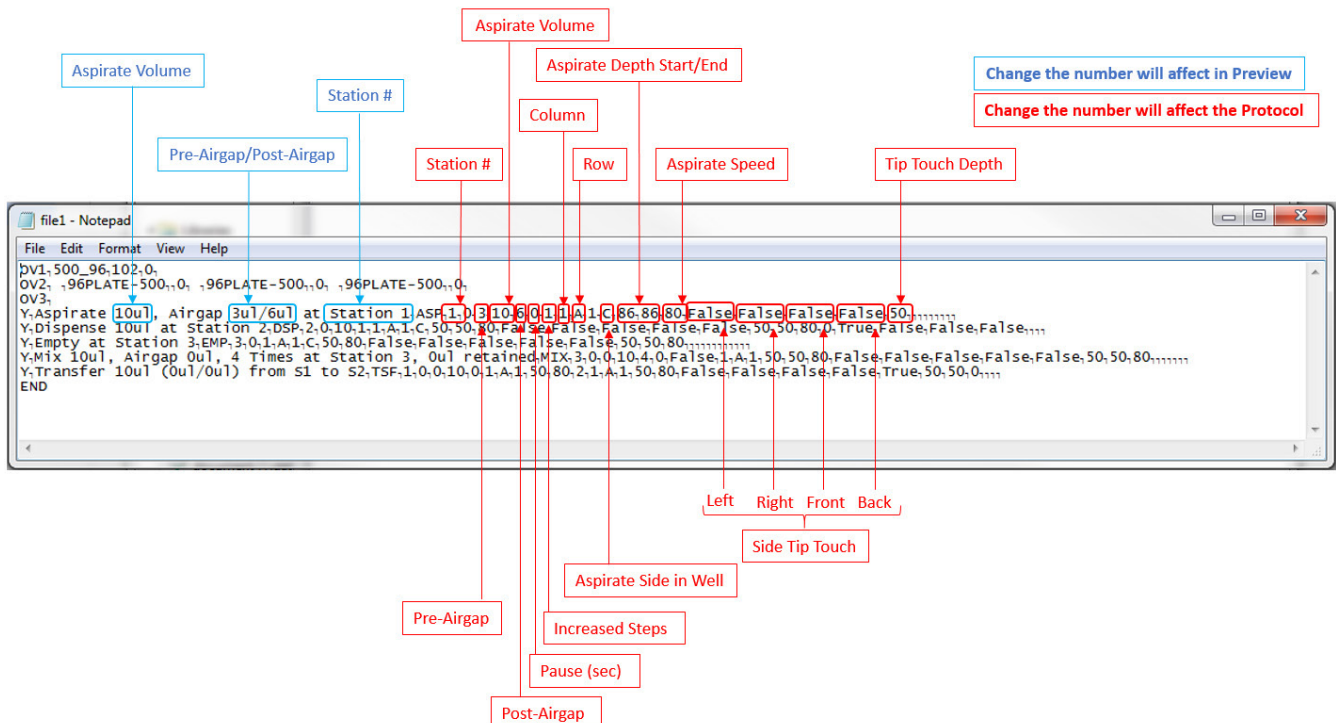
Example

To edit the volume, side, aspirate speed and station number, use must edit all related parameters. Here's an example to edit the aspirate volume from 10uL to 20uL and station number from 1 to 2. Notice that user has to edit twice (one for preview and one for software running) to run the software properly.

Aspirate Volume   Station Number   Aspirate Volume
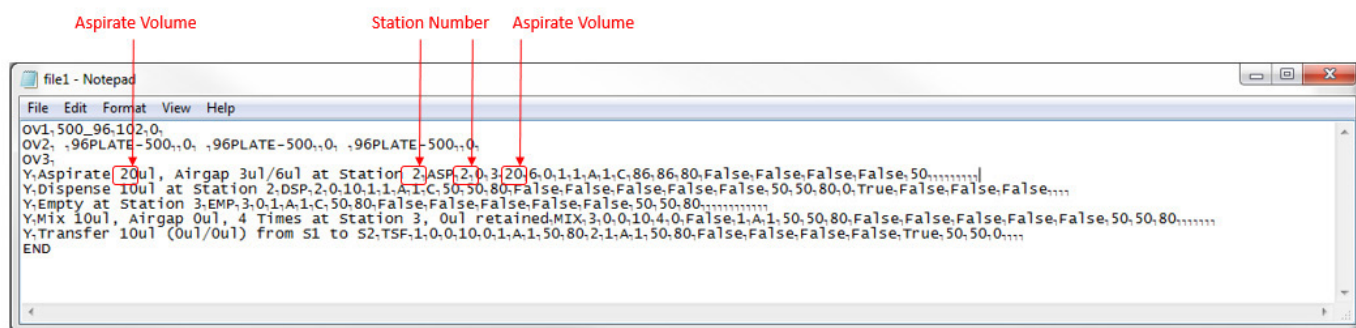
Save the Notepad. Then re-open the file using "Open File" under the Protocol tab. The preview and the actual aspirate volume will be changed.

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7.4 – Using CVTC

Enabling this function will allow user to select liquid type. The left figure below shows enable CVTC. The right figure below shows disable CVTC.

7.5 – Change Core

Refer to 3.7 Accessing the Pipetting Core

7.6 – Configuration

Edit the parameters from Configuration to change the system default settings. Please consult an SPT representative for any questions about the parameters. Changing parameters without fully understand may cause unexpected results.

Config Parameters		×
Name	Pvalue	Notes
AdminMode	TRUE	
autoSaveLogFileOverSize	True	T/F
BLEname		
ChineseFontSizeFunctionBody	20	default = 20
ChineseFontSizeFunctionHead	30	default = 30
ChineseFontSizeMainFunction	20	default = 20
confirmHeadVolume	True	
controlMedia	RS232	
CurrentHeadNo	0	
CurrentHeadType	0	
defXDefaultRunSpeed	50	%
defYDefaultRunSpeed	20	%
defZDefaultRunSpeed	15	%

Notice: Value can be changed by professional person only, effected after initialization.

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8. Pipetting Technique

SPT Labtech pipettors are highly accurate and precise systems. However, to achieve optimum results, the end user should practice some specific programming and pipetting techniques.

8.1 – Training Plates

In some versions of the Software, the end user is responsible for adding plates/reservoirs to the software database. These user defined settings will be utilized when writing programs. Inaccurate settings can result in complications. Please use the following guidelines for defining plates.

Well Top

The bottom of the tip should be level with the top plane of the plate and centered over the well. An accurate Well Top setting (along with the Well Bottom setting) will help ensure greater accuracy when selecting the operation depth of a liquid handling function.

Well Bottom

The tip bottom should be just above the bottom of the well (not touching the bottom surface). To set this, the user can drive the tip down, using small increments, until it touches the plate. Then move up in small increments until the plate can slide or lift slightly under the tip. The tips should not touch the well bottom when 100% depth is selected in the liquid handling functions.

Note: When performing Tissue Culture, or similar assays which require the well's lower portion to be undisturbed, the user can program a Well-Bottom height that will be above the samples. This will help prevent accidents in programming.

Tip Touch

The Tip Touch function is designed to help draw liquid off the tip. The user should set the Tip-Touch position to make contact with the well (the Tip-Touch setting should not move the plate).

Note: When setting the Tip Touch position, consider the shape of the well.
For example, a V shaped well definition should be based on the desired depth (in the plate) of the Tip Touch function in a program.

8.2– Improving Accuracy

The end user us responsible for adding plates/reservoirs to the software.

Note to the programmer: Many of the settings discussed are located within the liquid handling commands of a program (aspirate/dispense/empty/mix etc.). These settings are "local" and will be applied only to the specific program. Any settings that are made within a Config or Setup file will be "universal" and will apply to all programs as they run.

The **Overshoot** and the **Pre-Air Gap** functions are both designed to help improve pipetting accuracy.

Overshoot – The overshoot function can improve the accuracy of Multi-Dispense and Serial-Dilute commands. It automatically over-aspirates the target volume of the Aspirate command and immediately dispenses the excess back into the source (the Overshoot volume is set by the user). The extra movement of the plungers helps pick up slack in the chain of motor and piston movements and "primes" the piston for an accurate initial dispense. The following are standard Overshoot volumes for the SPT Labtech - Apricot pipettors (based on the high volume of the system).

- o 125µL = 3µL Overshoot
- o 550µL = 12µL Overshoot
- o 1000µL= 24µL Overshoot

If the first dispense of a Multi-Dispense function is lower than the target volume, the user should increase the Overshoot value.

The Overshoot should be changed to 0 for a Neat Transfer (1-3µL transfer) and the user should incorporate Pre-Airgap.

Pre-Air Gap

The Pre-Air Gap setting is designed to Aspirate a specific volume of air, dictated by the user, before aspirating the volume of liquid. It will help with the accuracy of Neat Dispensing. As with the Overshoot, The Pre-Air Gap helps pick up slack in the chain of motor movements and provides greater accuracy.

Note: Using an Empty command will purge both the Liquid and Air Gap. A Dispense command allows the user to set a specific dispense volume.

Note: When the Pre-Air gap is purged, it can cause air bubbles in the sample. To prevent this the user can program a slower Plunger Speed during Dispense, and/or utilize the Divided Steps function in the Dispense and Empty commands.

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Post Air Gap

The Post Air-Gap is best utilized when aspirating liquids with a low surface tension (Methanol for example). The post air gap will provide a buffer between the liquid and the tip orifice. This well help slow, or prevent, the liquid from leaking prematurely.

An Empty command will purge the Air-Gap and the Liquid. Pre and Post-Air Gaps can be combined within a function.

Tip Touch

The Tip-Touch function can be utilized to help prevent post-dispense hanging-drops, thus providing a complete dispense. It is very useful for dispensing into a dry plate.

Plunger Speed

Slowing the plunger speed can improve results when working with viscous materials. The slower speed allows the natural capillary action of the tips to work more efficiently.

Dwell Time

The Dwell Time setting is useful for accurately Aspirating/Dispensing viscous material. Dwell Time is defined as the amount of time the tips stay in position after liquid handling functions. Similar to slowing the Plunger Speed, a longer Dwell Time allows capillary action to work more efficiently. This setting is usually located in the CONFIG or SETUP files of applicable Software.

9. Emergency Stop

Located on the bottom panel (front right) of base cover of the instrument is a red emergency stop button. The button doubles as a power indicator light.

When pressed, the instrument will stop, and the Z-elevator will move down in case something is pinched. A message will appear on the screen instructing the user to put a reservoir under the tips to catch any remaining liquid. Click the button again to release and the machine will empty the liquid and move the shuttle back to the home position. Select initialize to reset, then the instrument is ready to operate.
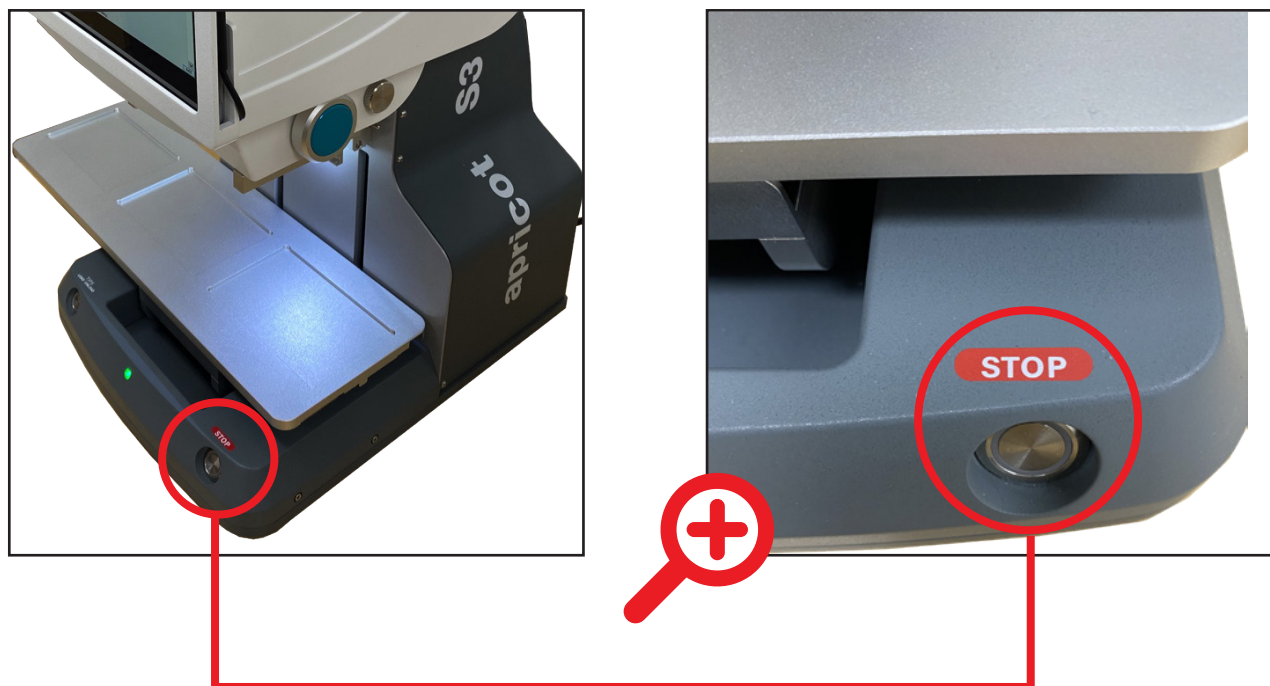
10. Care and Maintenance

Proper care and maintenance is an important part of user safety. It can help to prolong equipment life and have a positive impact on your results, as well.

Proper usage of tips will prevent contamination.

- o   Avoid touching the bottom of plates/reservoirs while aspirating or dispensing to prevent liquid from reversing flow and contaminating the core.
- o   When using low volume tips on high volume instruments, exercise extreme caution in setting the volume to avoid over aspiration and contaminating the core.
- o   While replacing tips, avoid contact between the tips' discharge end and the head to prevent cross contamination. Cleaning the head regularly using ethyl alcohol is recommended.

It is imperative that an appropriate cleaning regimen be devised so that the pipetting heads and cores do not become contaminated or damaged by harsh solvents.

Recommended, easy to follow, regular maintenance program:

Always unclamp the tips from the pipettor after use! Never leave tips clamped in the pipettor overnight.

Clean the unit regularly. Using a clean cloth moistened with ethyl alcohol or cleanser wipe down the instrument surfaces. **Avoid cleaning the Touch Screen** with solvent or cleanser that may damage the screen surface.

Regularly inspect the underside of the cores, the top of the pipetting heads and all moving parts. Look for and remove dirt or foreign objects. Failure to do so may severely jeopardize the performance of the instrument.

Regularly lubricate all moving parts. Lubricate with high-quality instrument-grade lubricant that contains silicone or molybdenum as necessary.

Regularly inspect the instrument for worn or damaged components. Replace worn or damaged components immediately. For help with replacing components, please contact Apricot Designs, Inc. or your distributor.

**Periodically apply a thin layer of mineral oil to the bottom of the core.** Applying a thin layer of mineral oil will help to promote proper vacuum seal. **Caution: Use mineral oil only.** Other types of lubrication may be detrimental to the gasket material and prevent a reliable seal.

Yearly maintenance is recommended. Proper maintenance helps ensure the accuracy and performance of your apricot S3.

11. Troubleshooting

Can't Open Software the First Time?

Solution: Right click the icon to open Properties, go to Compatibility tab, and check "Run the program as an administrator", then select "OK" to exit. Program should be able to open now.
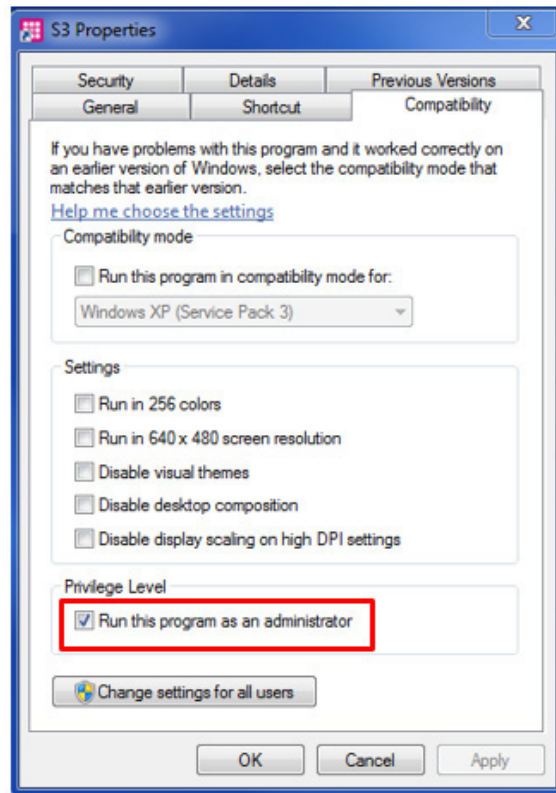
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Can't change COM port, protocol or teach a new plate position?

This is a problem with permissions.

Solution 1: Grant security permission for user in Windows 7 and higher Operating Systems.

1. Locate software folder: Usually under C:\Program Files\ SPT Labtech.
2. Right Click the Folder and select Properties.
3. Select Security: Then click Edit
4. Check Allow full control for the Users.
5. Click Apply then OK to close the window and it is completed.
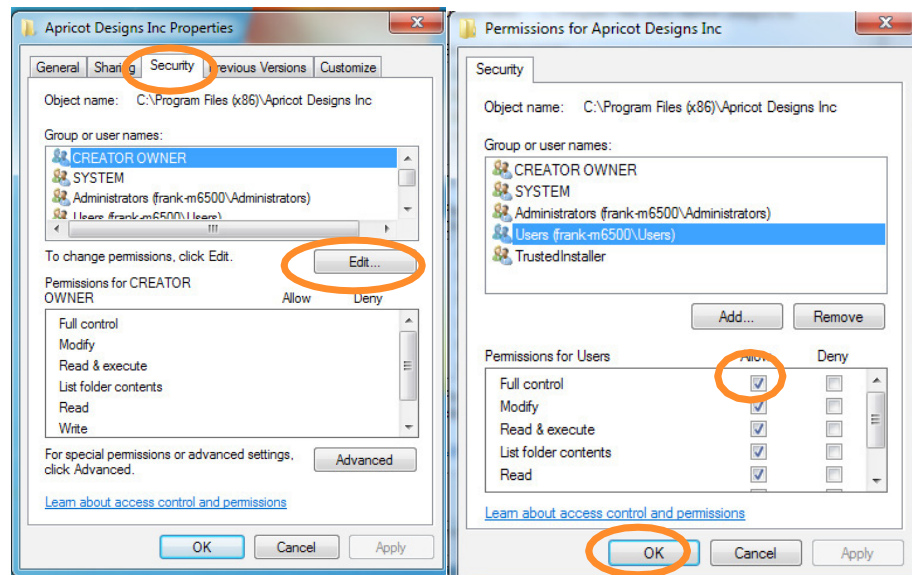
Solution 2: Install "AccessDatabaseEngine_x64.exe" in the computer.

You will also be required to change the COM Port, or IP Address.

Technical Support Contact Information

reliance

reliance is your support partner throughout the life of your instrument, minimizing downtime, maintaining optimal performance, and giving you absolute confidence to assure research success. SPT Labtech products are renowned for their industry-leading reliability and efficiency. With our reliance service, you have access to a dedicated support team to safeguard your investment and secure your productivity.

To request support from reliance, please use the contact information below:

Tel: +1 (855) 601-5867 (USA)
          +44 (0)1223 627500 (UK/Europe)

Email: apricotsupport@sptlabtech.com

Web: sptlabtech.com/support

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