Cole-Parmer®

Single-Use Dispensing Pump Powered by i-FILL®

91400-81

Operator's Manual

coleparmer.com

CE

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1. General Information

Congratulations on the purchase of the Cole-Parmer® Single-Use Dispensing Pump Powered by i-FILL®. With recommended set up, use, and maintenance, this unit can provide reliable, accurate and repeatable liquid filling. The unit is designed to eliminate time-consuming changeovers, expensive head cleaning and replacements. Gamma-irradiated, disposable fluid path kits provide the convenience of a peristaltic pump while providing unmatched, repeatable dispense accuracy. This digitally controlled pump also eliminates manual adjustments.

Now is a good time to note the serial number and/or keep in a convenient location for reference. You will need the serial number if you require technical support or service. The unit serial number plate is located on the back of the pump housing.

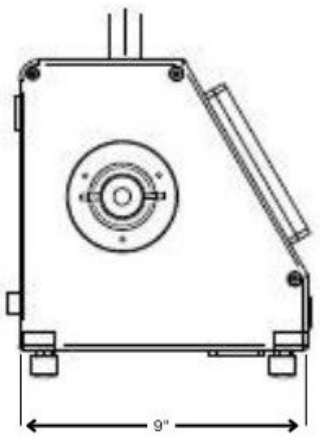
1.1. Utility Requirements

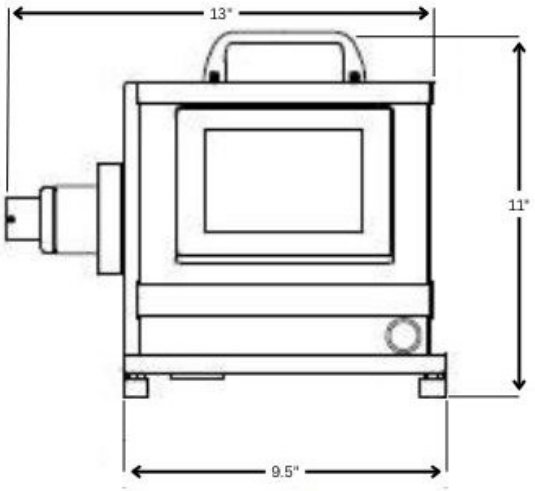
Electrical: 120 VAC, 60 Hz, 5 amps

The unit ships with an AC/DC Adaptor with Input: 100-240VAC, 50/60Hz, 4.0A; and Output 24V, 9.2A, 221W MAX

1.2. Physical Dimensions

Dimensions (Drive Only)	11" H x 9.5" W x 9" D (28 x 24 x 23 cm)
Dimensions (with 10 mL Kit)	11" H x 13" W x 9" D (28 x 33 x 23 cm)
Net Weight	19.5 lb (8.8 kg)





1.3. Operational Accessories

Foot Switch
91400-87
The foot pedal is useful for hands-free operation. The foot pedal inserts into the 5-pin receptacle on the rear of the pump.

Angled Pump Stand
91400-86
For increasing the height and ease of priming of the pump.

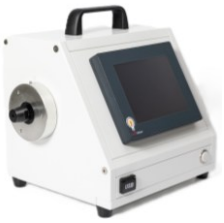
XY Filling Fixture
For semi-automatic tray filling. The filling fixture inserts into the 5-pin receptable.

2. Set Up

2.1. Shipping Contents

Use the handle to lift and gently place the drive assembly on a stable surface that is large enough to accommodate the filler, your product, and containers. The Cole-Parmer i-FILL Micro pump ships with the following items:

Pump Drive (1)



Thumb Screws (3)

1 mL Piston (1)

Power Cord and Adapter (1)

10 mL Piston (1)

2.2. **Assembly**

A power cord, piston, and 3 thumbscrews, certainly nothing difficult. This pump fits easily on a standard bench or tabletop.

Note the physical dimensions in section 1.2 to allow adequate room for the unit.

1. **Connect Power Cord to Drive Assembly and Plug into Outlet**

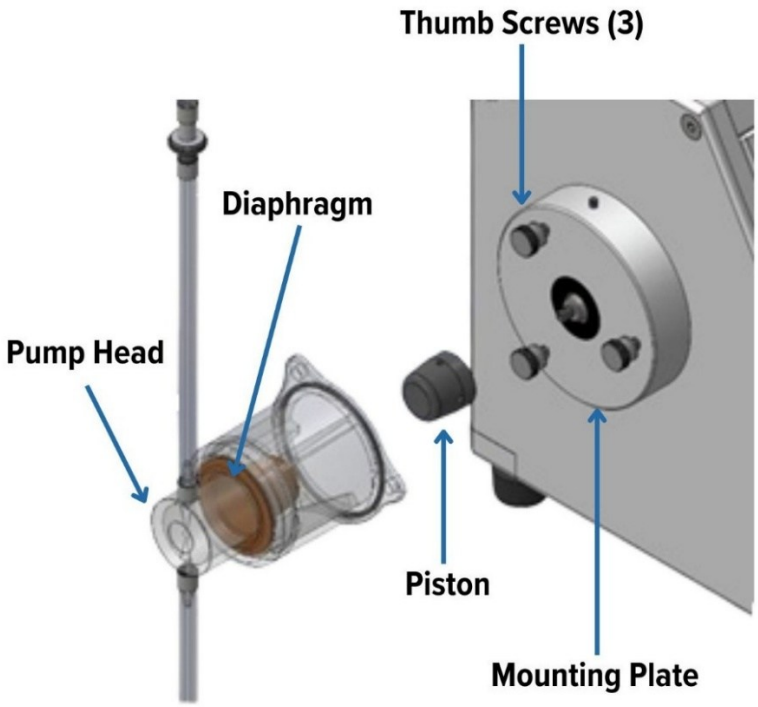
Plug the AC/DC adapter 4-pin cord into the Cole-Parmer i-FILL Micro pump pressing firmly until you hear the connector click into position. Plug the three-prong adaptor power cord into a wall outlet. (Refer to section 1.1 for electrical requirements). The 4-pin connector has a pull-back sheath for disconnecting it from the unit. Note the arrows on the connector pull-back sheath.

2. **Screw in Piston and Hand Tighten**

There is a 1 mL piston and a 10 mL piston depending on which disposable fluid path kit you are using. Both pistons screw into the center of piston shaft located on the side of the drive assembly. Hand tighten only. Do not overtighten.

3. **Screw on Disposable Fluid Path Kit**

The Cole-Parmer i-FILL Micro pump uses either a 1 mL kit, part number 91400-82, a 10 mL kit, part number 91400-83, or a customer specified custom kit.



- Remove the single-use, disposable fluid path from the double bag. Adhere to internal SOP's, as applicable.
- Turn the mounting plate all the way to the left with the pin on the mounting plate in the 6 o'clock position. Align the pump base with the 3 screw holes on the round mounting plate located on the side of the drive. Install with the discharge tubing with nozzle tubing pointing in the 12 o'clock position. Refer to the diagram on the side of the kit product box. Start each of the 3 screws and then HAND TIGHTEN each screw. This is to ensure that the pump base is flush with the mounting plate. The O-ring in the base of the kit creates a seal.

FOR DISPENSING - Dispensing is for outputting the product into the desired container. The intake tubing should be at 6 o'clock and the discharge tubing at 12 o'clock for dispensing and the mounting plate pin is at 6 o'clock.

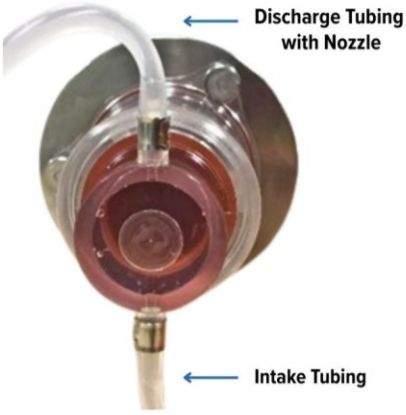
FOR PRIMING - Priming is for filling the entire fluid path with product. This ensures accurate and consistent dispense volumes. The intake tubing should be at 12 o'clock and the discharge tubing/nozzle at 6 o'clock for priming and the mounting plate pin is at 12 o'clock.

Note: When priming the pump, tilting the pump head upward to remove any air may be required to fully prime the pump head. The pump head is fully primed when there is no air pockets/bubbles left in the pump head and fluid path.

- Jiggle the pump head to make sure it cannot move horizontally or vertically. If the pump head can move, tighten the thumb screws until there is no movement.
- Place the intake tubing in your supply and place the discharge tubing with the attached nozzle in the nozzle holder.

Rotate mounting plate pin all the way to the left (counterclockwise)

Place mounting plate pin at the bottom 6 o' clock position



Attach pump head kit with mounting plate pin at the bottom 6 o' clock position

4. **Plug in Optional Foot Switch or XY Filling Fixture**

If either a foot switch or XY tray filling fixture are purchased, either accessory has a 6-pin connector that plugs into the back of the drive assembly. DO NOT PLUG THESE IN WHILE THE POWER IS ON!

2.3. Power On

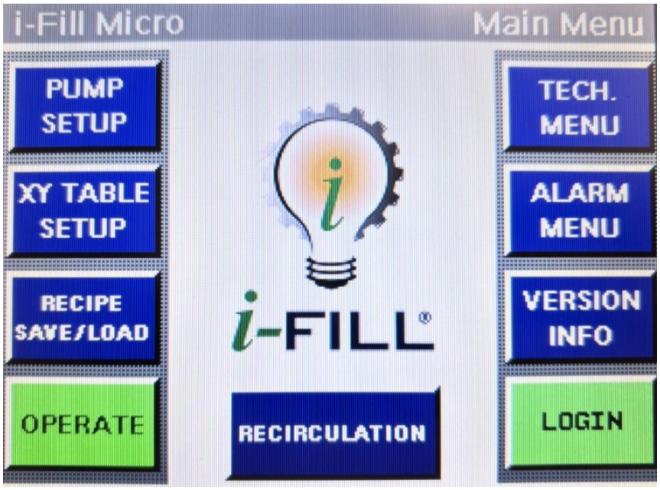
> **WARNING!**
>
> Electrical connections are the responsibility of the customer and must be made in accordance with national and local codes by qualified personnel.

After plugging the 3-prong (grounded) power cord into an electrical outlet (Step 2.2.1 above), verify that all connections are secure. Press the round button located below the screen on the front of the drive assembly. You will hear the vacuum pump begin to run. The touch control panel will proceed through the boot-up menu and display the i-FILL 'splash' screen in roughly 20 seconds.

From the splash screen, press anywhere on the screen to continue. You will hear an audible beep, and the unit will display the main menu.

3. Menu Screens

Once the logo has been pressed, the main menu will appear.



The buttons on the main menu that allow the operator to set or change filling parameters are:

• **PUMP SETUP**: This is where the pump settings are located. Specific parameters can be entered here. The motor parameters (actual position of the pump and acceleration) can be accessed here.

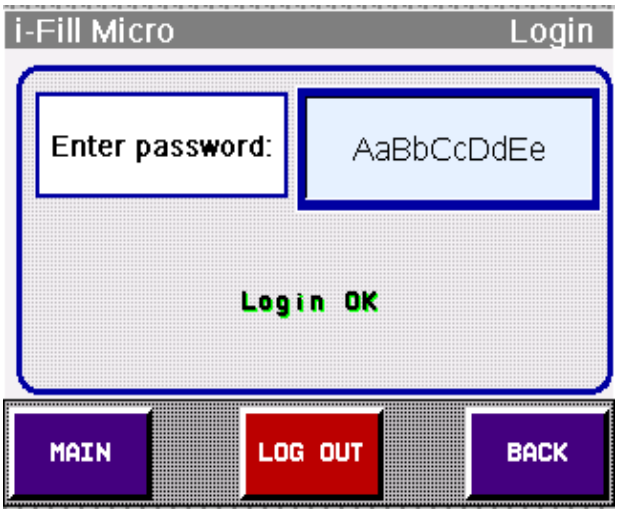
• **RECIPE SAVE/LOAD**: This is where the user can save and load specific recipes, as well as calibrate the pump.

• **OPERATE**: This is where the user can control the pump based on the parameters inputted in the settings. The motor parameters (actual position of the pump and acceleration values) can be accessed here.

• **XY TABLE SET UP**: This is where the XY table settings are located. Specific parameters can be entered here. The motor parameters (actual position of the X and Y positions and acceleration) can be accessed here. The XY table setup can only be accessed once successfully logged in.

3.1. **Log In/ Log Out**

An operator must be logged into the pump to create or change recipes or settings. The LOGIN icon will appear at the bottom of every screen. The log in status will appear GREEN if a user is logged in.



3.2. **Using the Alpha Numeric Keypad**

On either the alpha or numeric keypad, the same keys appear and are described below:

• Esc: Returns the display to the previous screen without making a change.

• ←: Deletes the character to the left of the cursor.

• ◄ ►: Moves the cursor within the entry shown in the field.

• Clr: Deletes the cursor current position.

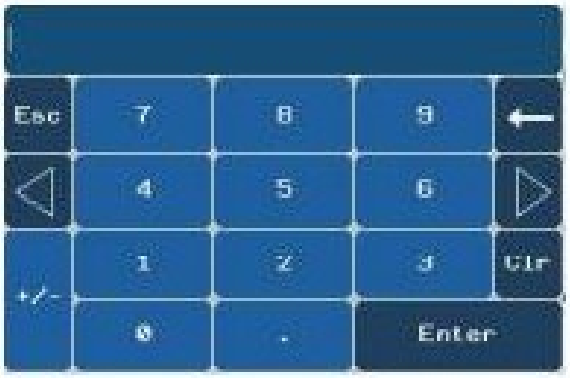
• Enter: Accepts the value in the field as the new value.

On the alpha keypad the following keys appear and are described below:

• Cap: When pressed, will illuminate GREEN and indicate the CAP Lock is on; all characters entered will be the capitalized version.

• Shift: When pressed, will illuminate GREEN and will make the next (one) character entered an uppercase character.

• Space: Enters a blank character in the field.



NOTE: When the keypad is displayed, the minimum and maximum values for the relevant field entry are displayed below the field value bar. If a value is entered outside the min and max range, the values in the field will appear RED and will not be entered. If the ENTER key is pressed with the value being RED, audible beeps will be emitted indicating the value needs to be changed.

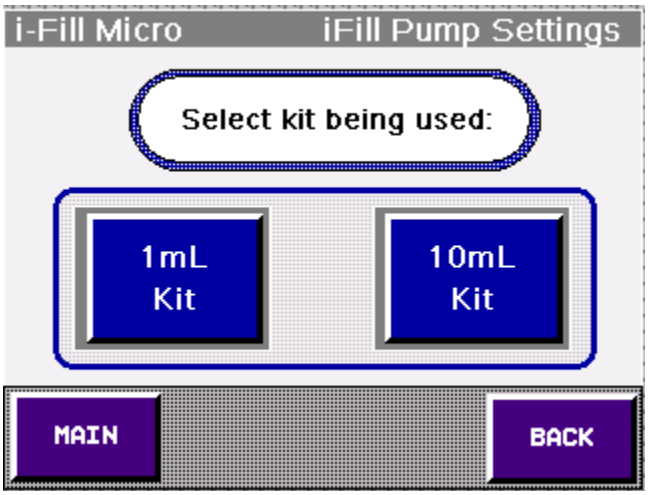
3.3. **Pump Set Up**

A screen will be displayed upon clicking this icon. The user is required to choose what size kit they are using for the pump.

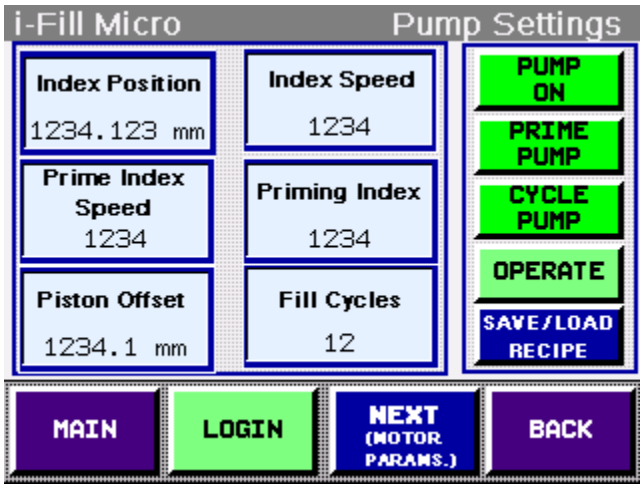
WARNING: VERIFY THAT THE CORRECT KIT AND PISTON IS INSTALLED ON THE PUMP. SELECTING INCORRECT SETTINGS CAN RESULT IN DAMAGE TO THE KIT AND THE PUMP.

If using the 1 mL kit, do not use index position settings that exceed 18 mm.

The 10 mL kit may use factory settings.



Once a kit size is selected and verified, the Pump Settings screen will be displayed:



• **PUMP ON/OFF**: This button controls the power to the pump. PUMP ON is green and PUMP OFF is red. When the PUMP OFF button is pressed, the pump will stop moving. When pressing PUMP ON, the motor will reset and return to the home position.

• **SAVE/LOAD RECIPE**: This will take the user to the recipe save/load screen.

• **OPERATE**: This will take the user to a more detailed menu to run and control the pump as well as the XY filling tray add-on. This menu also includes status indicators for the pump and the XY filling tray.

• **NEXT (MOTOR PARAMS)**: This is a secondary Pump Settings menu that allows the user to adjust acceleration and deceleration settings of the piston. This menu also allows the user to adjust the movement and position of the XY filling tray add-on.

• **PRIME PUMP**: When pressed, the settings loaded to the drive assembly will execute, which allows for a single extension and retraction of the piston displacing a corresponding volume of liquid. Prime will stroke the amount displayed in the priming index, at the prime index speed.

Note: When priming the pump, tilting the pump head upward to remove any air may be required to fully prime the pump head. The pump head is fully primed when there is no air pockets/bubbles left in the pump head and fluid path.

• **Index Position (mm)**: The distance of piston stroke/travel in mm (or how far the piston will extend and retract); the number displayed represents the distance, in millimeters, the piston will extend from a home position to an end position and return; where the minimum is .001 mm and the maximum is 46 mm (18 mm maximum for 1 mL kit). This number must be manually translated into liquid volume measurement by process of trial and error which supports calibration of the fill volume. The following table provides an estimate or starting point. Manufacturer testing trials have suggested increases or decreases of 0.10 mm for 10% of mcl and 2 mm for 1 mL for reference only in solutions where viscosity is that of water.

Note: The index position settings shown in Table 1 are approximate and may require further adjustment to achieve the target fill volume. It is recommended that further adjustment is made when changing the kit. Differences in fill volumes between kits typically fall within ±10% of the target fill volume without calibration.

Table 1. **Approximate Index Position (mm) Settings for Typical Fill Volumes**
At Index Speed: 3000 and Acceleration/Deceleration: 150

Fill Volume	1 mL Kit Approximate Index Position Setting (mm)	10 mL Kit Approximate Index Position Setting (mm)
25 µL	2	Use 1 mL Kit
50 µL	3	Use 1 mL Kit
100 µL	4	Use 1 mL Kit
1 mL	15	6
5 mL	Use 10 mL Kit	17
10 mL	Use 10 mL Kit	28
15 mL	Use 10 mL Kit	37

• **Index Speed and Prime Index Speed**: The velocity of piston movement (or how fast the piston will extend and retract); where the minimum is 100 and the maximum is 4000.

• **Priming Index and Fill Cycles**: The value entered for the priming index is the number of piston strokes the unit will complete in succession, without stopping, when the PRIME PUMP button is pressed. Fill cycles is the number of piston stokes the pump will complete before moving to the next tray slot when the i-FILL is running with an XY tray.

Warning: The pump will continue running if the source container is empty, which may affect fill accuracy. Verify that the number of Priming Index / Fill Cycles will not deplete the source fluid to maintain fill accuracy.

• **Piston Offset**: This parameter controls the initial starting position or home position of the piston while idling. This parameter is useful for achieving more consistent fill volumes when the fill volumes are appropriately small. The maximum piston offset that can be entered is 1.5 mm. To apply the setting:

1. Enter the desired offset distance (up to a maximum of 1.5).

2. Once the value has been entered, navigate to the PUMP ON/OFF button at the top right of the menu.

3. Turn the pump off, and then on again to apply the setting.

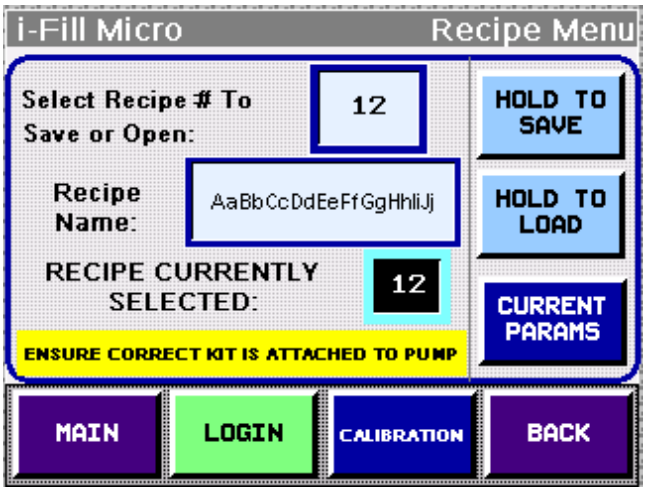
4. The piston should now adjust its home position to the offset value that was applied.

Note: The piston offset parameter affects the overall distance that the piston travels when pumping. The index position may require additional adjustment/calibration to achieve the desired fill volume.

3.4. **Recipe Menu**

This menu is used to display, create, and edit recipes. A recipe is a saved, named version of the filling parameters shown in the PUMP SETUP and XY TABLE SETUP screens described in the section below.

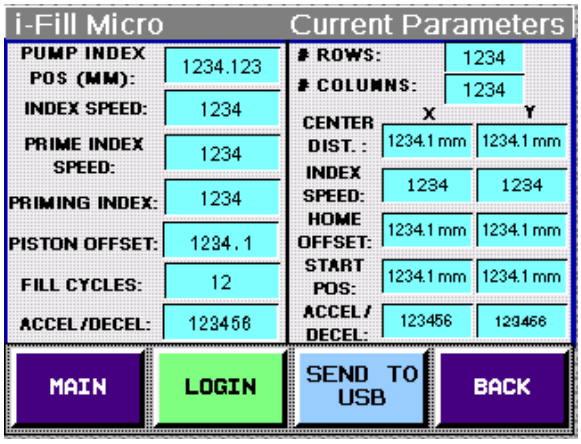
The unit can accommodate 10 recipes. A recipe contains both prime and fill cycles for each fill volume. For the fastest, most efficient prime cycle, set the prime index speed to the maximum speed that the product will allow without cavitation or damage. Set the priming index to greater than 1 cycle to complete the priming. From the recipe menu screen, the back and main button perform the same function, returning the display to the main menu.



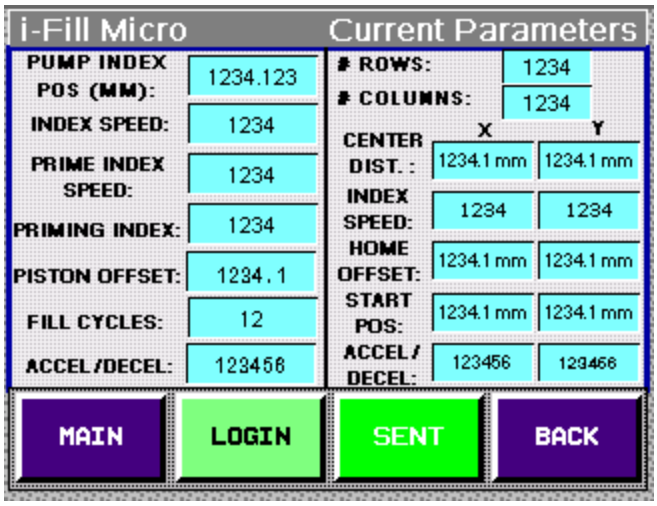
• **Save a Recipe**: Select a recipe number to save it as and press HOLD TO SAVE until it turns GREEN. A recipe can also be given a name.

• **Load a Recipe**: Select a recipe number to load and press HOLD TO LOAD until it turns GREEN.

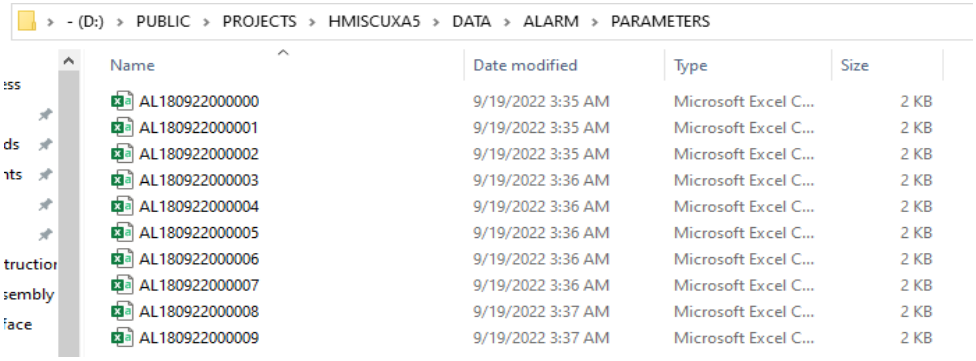
The current parameters loaded can be viewed in the CURRENT PARAMS icon. These values are for display only and cannot be edited in this screen.



• **SEND TO USB**: When this button is pressed, the currently loaded parameters will be sent to a USB drive and stored in an Excel file in ALdd/mm/yy000001.csv format. The production count, recipe name, and recipe number are also sent to the USB. Reset the production count before pressing the SEND TO USB button to keep a count of one recipe only, otherwise the production count will continue to increase despite a recipe change. The button will turn green and say SENT when it is finished with the process of sending the data and the USB can then be removed. Each recipe sent will be saved in a new file.



Click on PUBLIC > PROJECTS > HMISCUXA5 > DATA > ALARM > PARAMETERS to access the files.



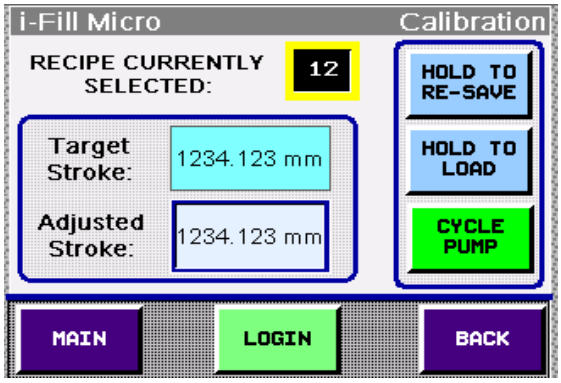
The following shows an example exported recipe:

1	Parameters 22/09/18 23:36:19		
2			
3	Date	Time	Message
4	18/09/2022	23:36:15	RECIPE NUMBER: 5
5	18/09/2022	23:36:15	RECIPE NAME: FIVE
6	18/09/2022	23:36:16	PRODUCTION COUNT: 0.0
7	18/09/2022	23:36:16	PUMP INDEX POSITION: 44.4
8	18/09/2022	23:36:16	PUMP ACCELERATION: 5000
9	18/09/2022	23:36:16	PUMP INDEX SPEED: 200
10	18/09/2022	23:36:16	PUMP PRIMING INDEX: 4
11	18/09/2022	23:36:16	PUMP PRIME INDEX SPEED: 452
12	18/09/2022	23:36:17	FILL CYCLES: 1
13	18/09/2022	23:36:17	PISTON OFFSET: 1.3
14	18/09/2022	23:36:17	ROWS: 2
15	18/09/2022	23:36:17	COLUMNS: 12
16	18/09/2022	23:36:17	X ACCELERATION: 520
17	18/09/2022	23:36:17	Y ACCELERATION: 210
18	18/09/2022	23:36:18	X CENTER DISTANCE: -23.0
19	18/09/2022	23:36:18	Y CENTER DISTANCE: -15.0
20	18/09/2022	23:36:18	X HOME OFFSET: 20.0
21	18/09/2022	23:36:18	Y HOME OFFSET: 23.0
22	18/09/2022	23:36:18	X INDEX SPEED: 300
23	18/09/2022	23:36:18	Y INDEX SPEED: 300
24	18/09/2022	23:36:19	X START POSITION: 521.0
25	18/09/2022	23:36:19	Y START POSITION: 364.0

3.5. **Calibration**

To use the calibration feature, the user must load a previously saved recipe.

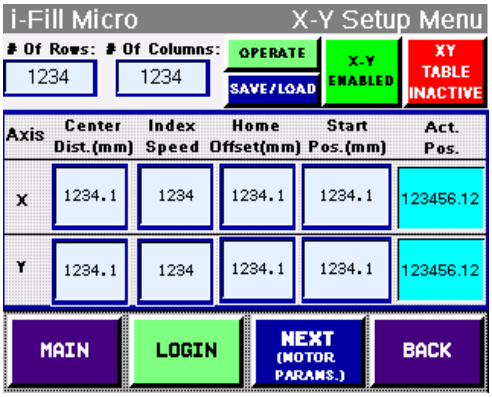
Press CYCLE PUMP to dispense the currently saved and loaded pump stroke length. If the dispensed volume is not accurate, change the pump stroke length in the Adjusted Stroke box and press CYCLE PUMP to dispense the new stroke length. If the adjusted value is accurate, press HOLD TO RE-SAVE to save to the currently loaded recipe.



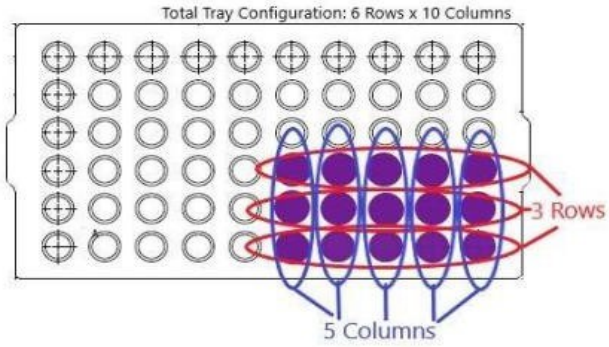
3.6. **XY Setup**

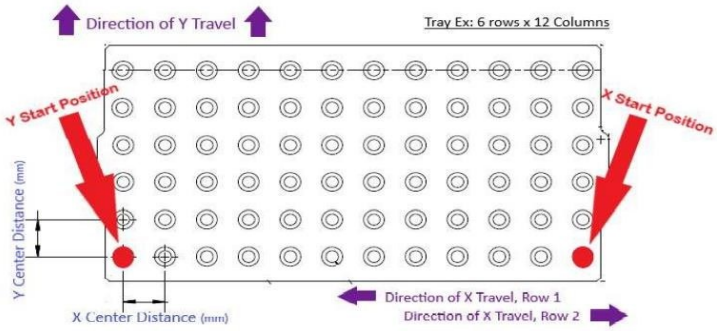
To enter XY parameters, plug in the XY power to the back of the drive and make sure the motor power is on (XY POWER ON button is green) and not red (XY POWER OFF), as well as the XY TABLE ACTIVE (green) and not INACTIVE (red). To run only the pump, the XY INACTIVE should be on and red. From the XY, an XY setup menu screen will be displayed with buttons to define the settings of the filling fixture operation and enabling the XY table. The filling fixture motion fills the entire first X row (west) and then moves in the Y direction (north) to the next X row (going east) and continues filling row by row until the entire number of rows and columns have been filled. With this pattern of motion, the nozzle will never pass over a filled position more than once.

Click on NEXT (MOTOR PARAMS) to set the values for the acceleration/deceleration of the motors.



• **# of Rows and # of Columns**: By pressing either button firmly, a numeric keypad screen will appear to enter the value representing the number (whole number, no decimal places) of rows or columns in the tray to be filled. The tray holding portion of the fixture is labeled X and Y axis. The image below is an example of a custom tray with 6 rows and 10 columns partially filled to represent a recipe entry of 3 rows and 5 columns.





• **X Center and Y Center Distance (mm)**: The value to be entered in each of these fields is the distance between the center of each point for X and Y. The distance from the center of X1 to X2 equals X center in millimeters and the process is then repeated vertically for Y. To find and enter this value, refer to tray drawings. If you are using custom trays from the manufacturer, the distance will be provided as a dimension on the drawing.

• **X and Y Home Offset (mm)**: This measurement is the distance from the X or Y tray from their home sensor. Trays do not sit on top of sensors and have “offsets” or distances they maneuver over the sensor. Standard offsets are 3.0 mm.

• **X and Y Index Speed**: This value represents the motor speed between filling positions on either the X or Y axis. The X index speed is how fast the tray will move from X1 to X2. The Y index speed is how fast the tray will move from the last XX position in the row to the YX position in the next row.

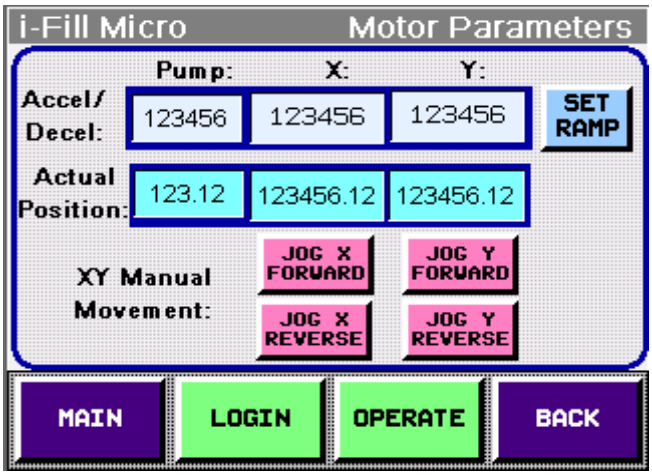
Note: Unit will not run at speed settings of 0, check that there is a value in your speed settings if the unit is not running properly. Velocity values can be entered in XY SETTINGS and acceleration in MOTOR PARAMS.

• **X and Y Start Position (mm) with Encoder Location Positions**: The XY filling fixture has smart servo motors that accurately control motion. The motor encoder position numerical value is used by the operator to enter in the start positions on the XY setup menu.

To determine the X START POSITION, go to the MOTOR PARAMS screen and use the jogging functions (JOG X FORWARD/JOG X REVERSE) to line the first bottle underneath the nozzle. Manually moving the X axis is difficult and therefore the jogging feature is recommended. See more about the jogging feature in Section 3.7.

To determine and set the Y START POSITION, from the XY setup menu, start by pressing the "XY Enabled" button located on the XY setup screen which will change to red and become the "XY Disabled" button and allow the trays to manually move. Press the NEXT button to display an additional XY setup menu. Manually move the filling tray to center the filling tip/nozzle over the first container in the X and Y position and note the value shown in the X and Y POSITION field. The numeric value is the encoder position of the motor. Press the X START POSITION button and enter the value provided in the X POSITION field. Next, press the Y START POSITION (mm) and enter the noted value (encoder position).

3.7. **Motor Parameters**



The actual positions of the pump, X motor, and Y motor can be seen here, as well as the acceleration/deceleration parameters. These values must be filled out to cycle/run the pump. Be sure to press the SET RAMP button after entering the parameters.

Acceleration and deceleration is the velocity of the piston reaches the entered position or speed and is reduced to its home/resting state. Very minimal range variables for these numbers are noticeable, factory settings recommend for all customers unless specified.

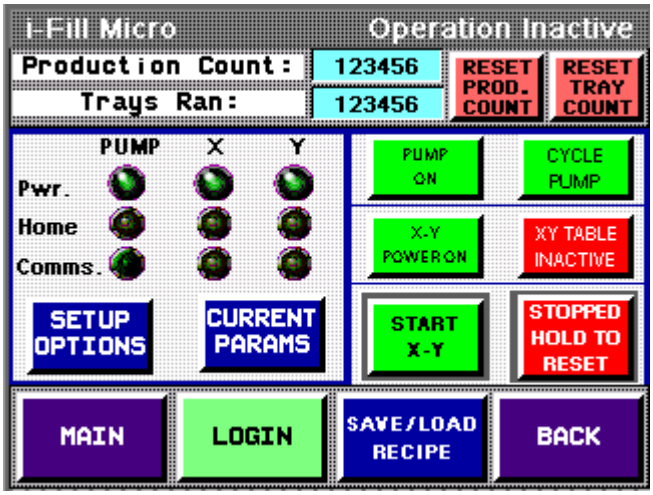
These values are primarily used for liquids with a propensity to foam or bubble. To use, (if required and settings provided by the manufacturer) press the Accel/Decel box next to specified motor and enter the number required and press enter. Press and hold SET RAMP until it flashes green to have the new values become “active’.

To manually move the X or Y axis, press and hold one of the JOG X/Y FORWARD/REVERSE buttons. For continuous movement the button will need to be pressed down for half a second.

When all the parameters are populated, go to the OPERATE screen to begin cycles.

3.8. **Operate**

The OPERATE screen displays the status of the pump/motors, as well as allowing for starting any cycles or operations. This screen allows the user to cycle the pump and start/stop the XY fixture. The production count is displayed in the upper portion of the screen and can be reset at any time. The following screen will display when nothing is operating:



The banner will turn green and display what state the machine is in.

Light Statuses:

• **Pwr**: This will illuminate green when the power is successfully supplied to the specified motor. No green light indicates a power connection error.

• **Home**: This will illuminate green when the motor is in the home position. No green light indicates a power connection error.

• **Comms**: This will illuminate green when the communication connection is secure and stable. No green light indicates a power connection error. If the XY TABLE ACTIVE is green and on but the XY is not connected or being used, there will be a pump comms error. Ensure the XY TABLE INACTIVE is red to allow regular pump communication with no XY fixture.

If any parameters need to be adjusted, the SETUP OPTIONS gives paths to setup pages.

SETUP OPTIONS: This displays a popup with three options:

• **Pump Setup**: Takes you to the pump setup screen.

• **XY Setup**: Takes you to the XY setup screen.

• **Motor Params**: Takes you the motor parameter screen (acceleration/deceleration, actual positions).

The current parameters loaded can be viewed in the CURRENT PARAMS icon. These values are only displayed and cannot be edited in this screen.

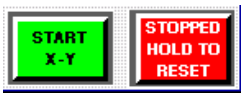
• **PUMP ON/OFF**: A button that toggles between RED PUMP OFF where the pump will not operate when either the CYCLE PUMP or PRIME PUMP buttons are pressed; and GREEN PUMP ON. When the PUMP OFF button is red, the pump will stop moving. If the pump needs to be shut off during a cycle, press the PUMP ON/OFF button to stop power. When pressing PUMP ON/OFF after turning off the power, the motor will reset and return to the home position. When the button is pressed to enable the pump, a message will appear momentarily on the screen as shown below. Allow a few seconds for the operation to complete.

PUMP ON (Green): Pump power is enabled. Press this to turn off the power to the pump motor.

PUMP OFF (Red): Pump power is disabled. Press this button to turn the power back on and reset the motor.

• **CYCLE PUMP**: When pressed, the settings loaded to the drive assembly will be executed where CYCLE is a single extend and retraction of the piston displacing a corresponding volume of liquid. Pressing CYCLE PUMP will only cycle the pump with a single piston stroke. The value displayed in fill cycles will not stroke.

• **START X-Y**: Found on the main menu, this button starts the XY filling fixture if one is plugged into the 6-pin connector located on the back panel of the drive. The status of the button will change to X-Y RUNNING during this time.

Buttons before starting XY fixture		Buttons after starting XY fixture	

• **STOPPED / PAUSE / HOLD TO RESET**: This controls the motors of the XY. The STOPPED/HOLD TO RESET button will remain idle and not change when the XY filling fixture is not connected and/or not running. To pause in the middle of a dispense, press the PAUSE button. The button will then turn into the STOPPED/HOLD TO RESET button. Hold for three seconds until the RESETTING… banner shows up at the top of the screen to reset the motors. The motors must be reset after stopping in the middle of a dispensing cycle if the same cycle is not going to continue. To continue after pausing, press the START X-Y to pick up exactly where it left off. Otherwise reset the motors to start over. When pressed in the middle of X-Y tray function this button acts as a pause feature allowing operators to stop and start in the middle of tray runs to avoid beginning again at the first tray fill location.

After pausing, either resume the cycle where it left off by pressing START X-Y again or hold the PAUSE/STOPPED/HOLD TO RESET to reset the cycle and home the motors.

If a fault occurs mid-cycle, reset the fault in the ALARM MENU. Also reset the cycle by holding down PAUSE/HOLD TO RESET. The banner on the top of the screen will say “RESETTING…” when successfully activated.

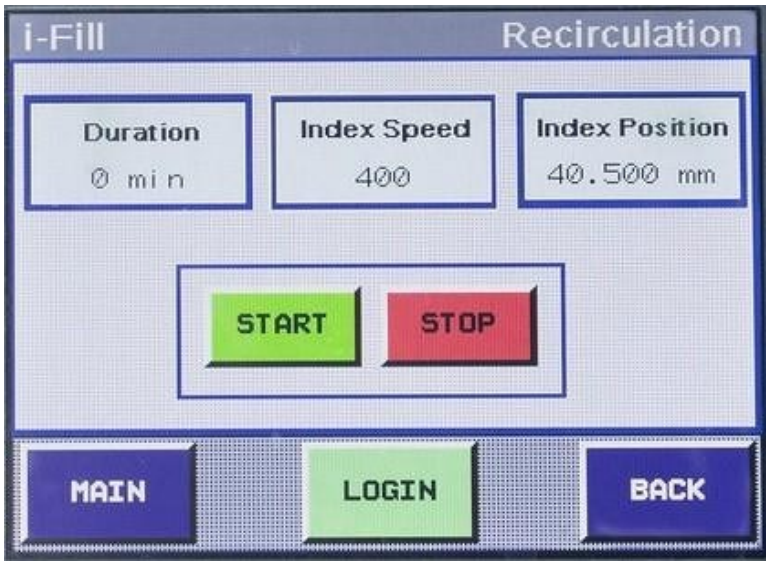
• **RESET COUNTER**: Press the RESET COUNTER button to change the production count to “0.” The production count field at the top of the main menu will be reset from whatever number appears in the field to zero “0.” The number shown in the field represents the number of cycles, or piston strokes, the pump has executed since being reset.

Note: The pump piston strokes performed during the priming operation are counted in the production count. If required, reset the counter after priming.

• **RESET TRAY COUNT**: Press the RESET TRAY COUNT button to change the tray count to “0.” The number shown in the field represents the number of trays the pump has executed since being reset.

3.9. **Recirculation**

From the main menu screen, select the RECIRCULATION button to go to the RECIRCULATION menu.



The RECIRCULATION protocol will allow for continuous dispensing. The recirculation screen is used for product transfer.

Select the LOGIN option and log in to adjust RECIRCULATION parameters.

Duration: This setting determines the amount of time the pump will pump continuously. Values are entered in minutes.

Index Speed: This is the velocity of the piston movement. Minimum/maximum settings are 100 and 4000 respectively.

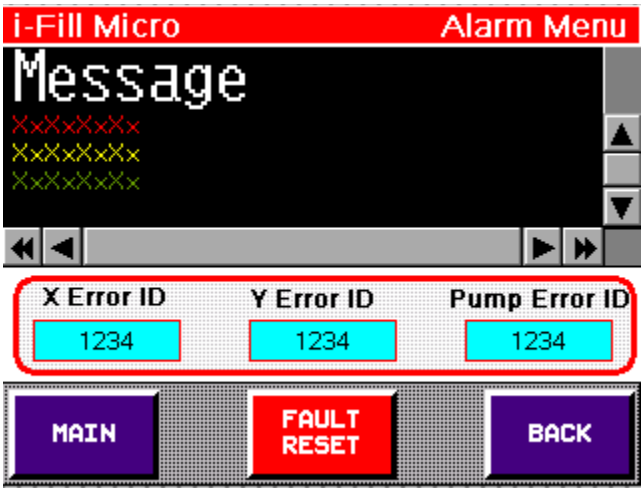
Index Position: The distance of piston stroke/travel in mm. Max positions are dependent on the kit that is currently being used. The maximum positions that can be set for the 1 mL kit and the 10 mL kit are 18 mm and 46 mm, respectively.

• **START**: When selected, the pump will start the RECIRCULATION protocol and pump continuously for the duration that was set.

• **STOP**: When selected, the pump will stop the RECIRCULATIUON protocol. The piston will pause in its current position. Ensure that RESET is selected to prevent any issues from.

• **RETURN**: When selected, the piston will retract to the original starting position. Allow the piston to retract completely before restarting the restarting the RECIRCULATION protocol.

3.10. **Alarm Menu**



By Pressing this button, the alarm menu screen is displayed listing any relevant alarm data, including:

• **X Y Jam**: One of the motors on the XY unit has jammed against a housing. This could be due to the tray not seeing the homing sensors.

• **Axis Y or X Communication Fault**: Displayed when the XY unit is disabled or unavailable.

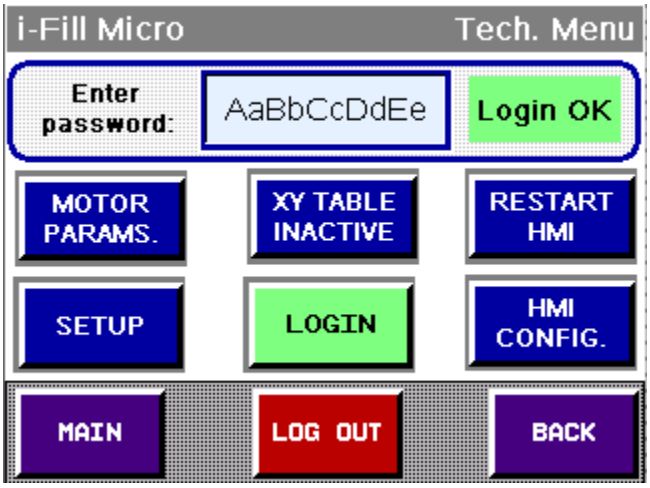
• **Pump Jam**: Displayed when there is a mechanical, and/or homing issue with a sensor.

An Error ID can be viewed on this screen to give more information on the error received.

After viewing the faults, by pressing the FAULT RESET button, the faults will be cleared from the screen, and the button will display green. The BACK button returns the display to the main menu.

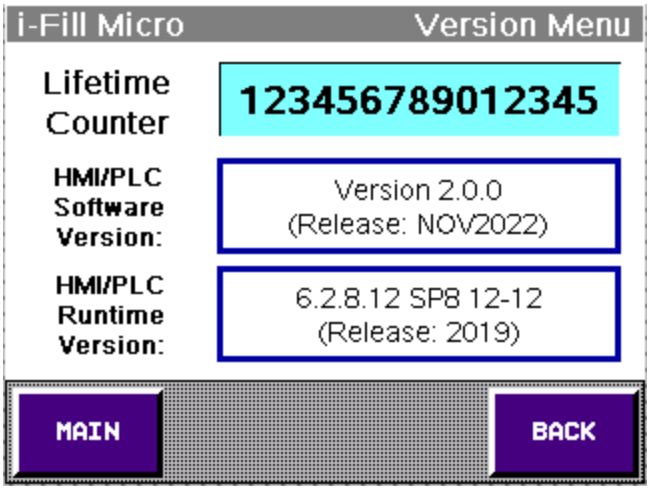
Refer to the Common Errors section for a list of common error IDs.

3.11. **Tech Menu**



This screen displays the different options to set up the pump and troubleshoot the HMI.

3.12. **Version Information**



The version information menu includes a lifetime counter of piston strokes similar to the production counter, but it cannot be reset by an operator. The screen also displays the HMI/PLC software version and runtime version loaded on the unit. The manufacturer uses a Semantic Versioning Schema for the HMI/PLC software version to track and control software development, upgrades, and releases. The HMI/PLC runtime version is from the hardware manufacturer. Both items of information are necessary for technical support or service.

The BACK button changes the display to the main menu.

4. Recipes

4.1. Create a Recipe

1. From the main menu, press the RECIPE SAVE/LOAD button.
2. Press LOGIN and press in the password field. A numeric keypad will display. Enter the appropriate user password. The display will return to the recipe login and LOGGED IN will appear in GREEN.

   NOTE: You must be logged in to be able to enter or change values in any settings screen. When you are logged In, you can edit/change any of the parameter settings by pressing the relevant button.

3. After entering a password, press BACK.
4. Press in the field to the right of “Select Recipe # To Save or Open” and enter in the numerical keypad a new recipe number.
5. Press in the field to the right of “Recipe Name” and enter in the a new recipe name. Use the ABC for text or the 123 for numbers to enter a descriptive recipe name up to 26 characters.

   NOTE: There is a Cap and Shift button for uppercase.

6. Press MAIN.
7. Press HOLD TO LOAD until the button flashes GREEN. The current recipe number will be reflected in the blue box RECIPE CURRENTLY SELECTED.
8. Press PUMP SETUP and select the correct kit being used. Press each yellow setup button and enter the value required.
9. Press MAIN.
10. If you are creating a recipe using the XY tray press the XY TABLE SETUP button and enter the values required. If not using XY tray skip to step 12.
11. Press MAIN.
12. Press RECIPE SAVE/LOAD, and on the recipe screen, press HOLD TO SAVE until it turns GREEN.

    NOTE: If at any time throughout the process boxes come on the screen with diagonal hashes you will need to LOGIN again. Repeat step 2.

4.2. **Change a Recipe**

From the main menu press RECIPE SAVE/LOAD, press the recipe # field and use numeric keypad to enter recipe number. Press HOLD TO LOAD until it turns GREEN. The recipe name will appear in the field displayed on the screen and the number will be in the blue box “Recipe Currently Selected”. Press BACK or MAIN to return to the main menu.

4.3. **Run a Recipe**

To cycle the pump with the settings saved in a recipe, press recipe # field and use numeric keypad to enter recipe number. Press HOLD TO LOAD until it turns GREEN. The recipe name will appear in the field displayed on the screen. Go to the PUMP SETUP menu and press the CYCLE PUMP button to complete one fill cycle at the saved parameters.

5. Operation

5.1. **Log In**

The user must be logged in to create or edit recipes for the pump and XY table settings. To log in from the main menu, press LOGIN on the bottom right of the screen. Press in the password field *** and a numeric keypad will appear. Enter the appropriate password and press ENTER. The recipe login screen displays LOGGED IN in GREEN after a successful log in.

Press MAIN to return to the main menu.

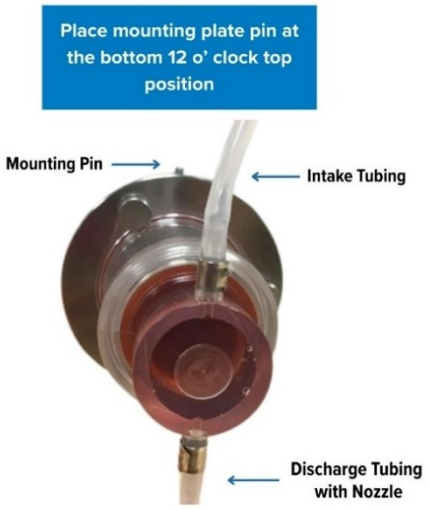
NOTE: If the PUMP SETUP screen displays the buttons for pump settings with diagonal brown striping, the user has timed out of being logged In and must log in again.

5.2. **Recipe Load / Parameter Population**

Load a saved recipe in the RECIPE SAVE/LOAD screen or enter in all the pump and motor parameters in the PUMP SETUP and MOTOR PARAMS. screen. When going to the pump settings, select the correct kit you will be using. See Section 3.3 Pump Setup for pump parameter information and instructions, Section 3.7 Motor Parameters, and Section 4 Recipes for more details.

If you are loading a recipe from the main menu, press RECIPE SAVE/LOAD. Select the appropriate recipe by entering the recipe number in the “Select Recipe # To Save or Open” field via the numeric keypad and press ENTER. With the number shown in the field on the recipe menu screen, press and hold the HOLD TO LOAD button. The button will turn GREEN indicating the recipe has been loaded and the correct recipe name will appear in the field. Press MAIN and from the main menu, press PUMP SETUP and select the correct kit being used. The recipe settings will be populated in the parameter fields.

5.3. **Prime the Pump**



The FACTORY SETTING FOR PUMP PRIMING INDEX SPEED is 1000.

CAUTION: Higher pump priming index speeds can cause fluid path kit FAILURE resulting in leaking and/or spraying product, especially with product of a higher viscosity than water.

1. Once a recipe is loaded or all the pump settings are populated with values, go to the main screen. Go to PUMP SETUP screen and select kit being used. Ensure the PUMP ON/OFF button is green and pump is ON. Ensure that the pump, supply tubing, nozzle and nozzle tubing are correctly installed, and an adequate supply of product is available.
2. With the kit installed, turn the mounting plate clockwise, all the way to the right, with the pin and intake tubing at the 12 o'clock position. Place an empty container under the nozzle and the intake tubing in the supply fluid.
3. On the main screen, press the PUMP SETUP button and from that screen, select the correct kit being used, and press the PRIME PUMP button. Ensure the correct kit (1 mL or 10 mL) is selected. Failure to do so can cause damage to the kit and pump.
4. The pump will run the prime cycle per the recipe parameters. Enough pump cycles must be consecutively executed to pull fluid through the entire intake and nozzle tubing and discharge any air in the tubing set, including the pump head. This will require turning the mounting plate 180 degrees to its cycling orientation to finish removing air from the kit head.

   Note: If air seems to be stuck in the kit head the operator may tilt the drive up on the mounting plate side (elevating the top end of the kit and tubing) allowing the air pocket to move towards the output end of the kit allowing for release of the air. Ensure no air is present in any part of the tubing (this will be seen by the formation of bubbles). The smaller 1 mL kits may require a faster ACCEL/DECEL setting as well as a longer stroke length (not exceeding 18 mm) to remove all air from the kit.

5. The pump is now primed.

   Note: If the pump is not priming or failing to cycle see troubleshooting section.

5.4. **Calibration**

The Cole-Parmer i-Fill Micro, part number 91400-81, does not require calibration at the device level. It is recommended that fill volume calibration is performed as part of a Standard Operating Procedure.

As the surroundings of the pump may vary from time to time and as single-use kits, tubes and products have small tolerances, it may be necessary to calibrate the filler when it is powered on, at batch changes and/or when a disposable fluid path kit is changed.

A measuring cylinder or a calibrated balance may be used as a control and measuring unit to calibrate the fill volume. The balance will always be the more accurate, especially for small quantities.

It is recommended that calibration be performed with each fill batch and/or change of single-use fluid path kit to assure optimal accuracy.

If a previously saved recipe is being used, the user should calibrate the pump for accurate dispensing. Go to the RECIPE SAVE/LOAD screen and load a saved recipe. Refer to Section 5.2 Save/Load Recipe for more detail. Click on the CALIBRATION icon at the bottom of the screen. Observe the TARGET STROKE amount is the pump position loaded from the saved recipe. Press CYCLE PUMP and determine if the dispensed amount is accurate. If it is not accurate, use the ADJUSTED STROKE box to input a different pump position. The new pump position can be re-saved and re-loaded by holding down the appropriate buttons. A recipe must be loaded to use the calibration feature.

Note: If the pump is not priming or failing to cycle, see troubleshooting section.

5.4.1. **Volume Calibration with Measuring Container and Calibrated Balance**

The pump must be fully primed before calibration can be performed with accurate repeatable results.

1. Press RECIPE SAVE/LOAD and load a recipe. Press CALIBRATION.
    - If a recipe is not saved and loaded, ensure desired stroke distance is entered in the index position cell in the pump setup screen.
    - Reference the chart in Section 3.3 Pump Setup for estimate amounts for mm to mL conversions

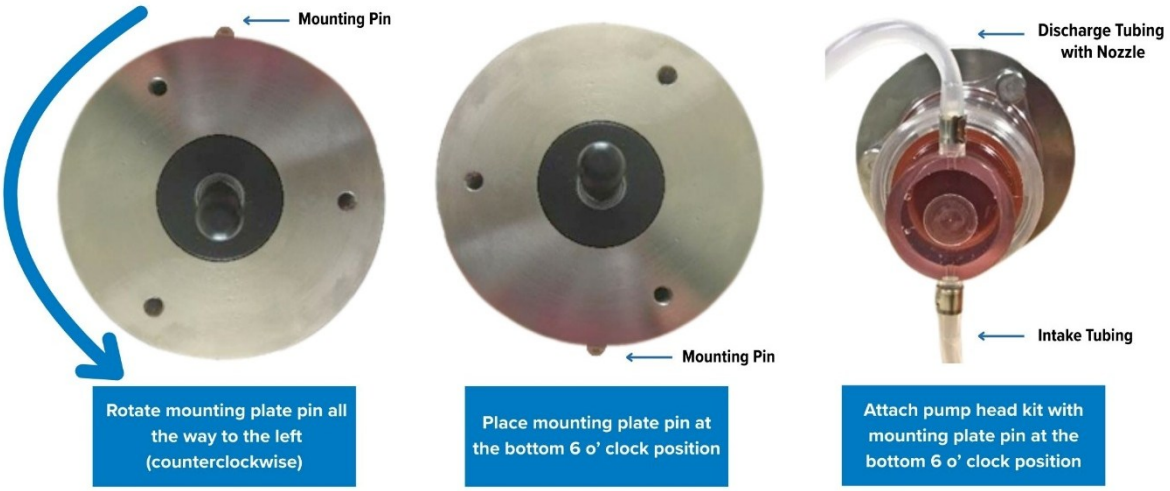
Note: It is recommended to cycle the pump for 1-2 fills before the calibration is carried out.

2. Tare a measuring cylinder and/or container on a calibrated balance, place it under the nozzle and press the CYCLE PUMP button to complete a single fill (optional foot switch can be used in lieu of cycle button for one cycle).

3. Weigh the filled container on the same scale used to tare the empty container.
4. Adjust the ADJUSTED STROKE up or down to achieve the desired fill volume, repeat as required.
    - Press SAVE to re-save new stroke (pump index pos). This will take you to the RECIPE SAVE/LOAD screen. Enter recipe number to re-save and press and hold the HOLD TO SAVE button.

5.5. **Cycle/Run the Pump**

FOR DISPENSING- The intake tubing should be at 6 o'clock and the discharge tubing at 12 o'clock for dispensing and the mounting plate pin is at 6 o'clock.



1. From the main menu, press the PUMP SETUP button and select the kit being used to display the pump settings screen. Populate the parameter fields. Check the MOTOR PARAMS. screen. Ensure the proper parameter and values are entered into all the boxes.

2. Press the OPERATE button to display the operation screen. Ensure PUMP ON is green. Ensure XY INACTIVE button is red and XY OFF.

3. Press the CYCLE PUMP button. Using the optional foot switch will cycle the pump.

4. To stop the pump, press the PUMP ON button so that it turns red and says PUMP OFF. The cycle will stop and when the PUMP OFF is pressed to turn into a green PUMP ON again, the motor will home and reset.

Note: If the pump is not priming or failing to cycle see the troubleshooting section. Use the OPERATE screen to observe the status of the pump.

After each cycle, the production count will increase by one. This value can be reset at the top of the operate screen.

Cycle/Run Pump (XY Attachment Used)

1. Plug in XY power cord in the back of the drive.

2. Log In: See Section 5.1 for how to log in.

3. Load a saved recipe in the RECIPE SAVE/LOAD screen or enter in all the pump and motor parameters in the PUMP SETUP and XY TABLE SETUP. See Section 3 Menu Screens for pump and XY parameter information and instructions. See Section 4 for recipe instruction.

4. In the PUMP SETUP screen, prime the pump. See Section 5.3 for more priming information.

5. Calibrate the pump if a recipe is loaded: See Section 5.4 for calibration information.

6. Go to OPERATE.

7. Press the XY INACTIVE button and it should turn into a green XY ACTIVE, which allows for the use of the XY.

8. Ensure that the XY ENABLED is green and ON and not red XY DISABLED. This enables the motors.

    a. To find the actual positions of the X and Y motors, DISABLE XY and manually move the fixture.

    b. Ensure all the parameters are entered.

    c. If loading a previously saved recipe, check the starting positions for both the X and Y to avoid any deviations. Re-save locations if necessary.

9. Select START XY. This will start the function of the fixture if the X-Y unit is plugged into the 6-pin connector located on the back panel of the drive. The status of the button will change to X-Y RUNNING during this time. Use the OPERATE screen to observe the status of the motors and pump.

10. When the STOPPED button is held (now displayed as PAUSE/ HOLD TO RESET) during X-Y tray running, the recipe will reset, and the X-Y tray will return to its home position. Pressing the STOPPED button pauses function, holding the button resets the recipe to start over. Ensure the cycle is reset completely if the current run is not continued.

6. Safety Features

This machine was built to meet, at a minimum, the requirements of the ANSI /PMMI B155.1 Safety Requirements for the Construction, Care and Use of Packaging and Packaging-Related Converting Machinery. Other voluntary standards are also referenced such as NFPA 79 (electrical), ANSI B11.19 (safeguarding), ANSI Z535.4 (warnings) and ANSI Z535.6 (instruction manuals), OSHA Standard 29 (lockout/tagout).

7. Troubleshooting

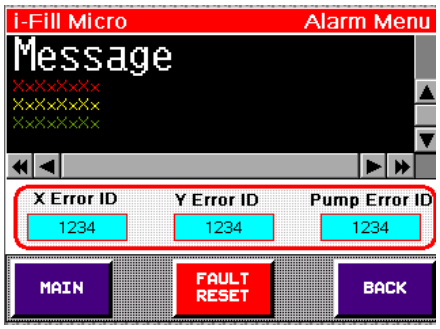
7.1. General Troubleshooting

Problem	Possible Cause	Action
Nothing happens when a button is pressed, although the audible beep is heard.	The button on the touch control screen has not completed the circuit to initiate the operation.	Press and hold the button until it changes color indicating the command is received and begins to execute.
Fluid noticed in exhaust tubing.	Pump diaphragm ruptured due to excessive cycles.	Turn off pump and remove the disposable fluid path kit. Replace the kit. See Section 2.2. Before replacing the kit, turn the pump on and allow it to run for 20 minutes to discharge the fluid in the exhaust tubing and vacuum pump. Depending on the type of fluid and how much got into the vacuum pump, the vacuum pump may need to be replaced. Contact Cole-Parmer at 1-800.323.4340.
Pressing the **CYCLE PUMP** button does not accurately dispense product.	The piston is loose. Pump is not fully primed.	Refer to Screw in Piston, Section 2.2. Refer to Prime the Pump, Section 5.3. Contact Cole-Parmer at 1-800.323.4340.
The production counter is incorrect.	The **RESET COUNTER** button was not pressed after priming. Note: When resetting during the middle of an XY run, the production count will increase. Reset after resetting the XY to restart from zero.	From the operate screen, press the **RESET COUNTER** button.

Failing to prime or cycle properly. Fluid kit tubing is collapsing.	The intake tubing end could be suctioned to the side of product container causing a seal and forcing the pump to vacuum shut the tubing.	Pull the intake tubing from the product container wall to ensure a suction isn't created blocking product flow. The operator may choose to cut corner off the end of the intake tubing to ensure suction doesn't occur. 
When **CYCLE PUMP** is pressed, nothing happens.	Pump power is not on.	Ensure the **PUMP ON/OFF** button is in the green PUMP ON state prior to dispensing.
There is a pump comms error when the XY is not attached and not being used.	The communication from the HMI to the pump motor was disrupted.	Ensure electrical wiring is correct and secure. Ensure the XY TABLE ACTIVE button is in the red XY TABLE INACTVIE state, as well as XY POWER OFF. When not using the XY attachment, ensure there is no power being supplied to those motors (red XY INACTIVE and XY DISABLED states in XY SETUP or OPERATE screens).
Dashed lines on the input settings boxes. Values won't change.	The user is not logged in.	Log in to the device to allow for access to changing the parameter settings.
XY filler is attached but can't be started.	The XY TABLE is in the inactive state and/or no power is enabled to the XY motors.	Go to the XY SETUP screen and ensure XY TABLE ACTIVE/INACTIVE is in the green XY TABLE ACTIVE state as well as the XY ENABLED/DISABLED being in the green XY ENABLED state.
When a fault occurs mid X-Y tray run and it is reset, the START XY button continues the previous cycle. When a cycle is paused during the XY and a new cycle is started, it resumes previous cycle instead of starting over.	The previous XY run was not reset.	Go to the OPERATE screen and hold the PAUSE/HOLD TO RESET button until the motor returns to home position.
When homing the XY motors, a fault occurs close to home position.	The motors are triggering the sensor before the homing sequence starts.	Disable the motors and slightly move away from the home end. Check the home offsets and edit if necessary. Enable them and ensure proper homing is completed.

7.2. **Faults and Common Error ID's**

If a problem occurs when running the operating the system, a message describing the error and the specific error ID can be seen in the alarm menu.



The types of messages are detailed in Section 3.10 Alarm Menu.

The specific motor with the fault will display an Error ID below the message screen in the alarm menu. If there are no faults, the value will be 0 in the box. Reference the table below for common error ID's.

Fault	Banner	Error ID	Solutions
Pump Jam	Fault Active	273	Press FAULT RESET. Motor should home and reset. Check placement of sensor inside i-FILL drive.
X Axis Jam	Fault Active	0	Check for mechanical obstructions. Move tray away from home. Check the home offset is at least 3.0 mm. Press FAULT RESET. Motor should home and reset.
Y Axis Jam	Fault Active	0	Check for mechanical obstructions. Press FAULT RESET. Motor should home and reset. If fault occurred near home position, slightly move sensor away from home position.
Pump Communication Error	Comms. Error	3	Check that pump is ENABLED. Check internal wiring. Ensure XY is INACTIVE if not being used. Check internal wiring. Ensure XY is INACTIVE if not being used.

X Communication Error	Comms. Error	3	Ensure XY is ENABLED and ACTIVE. Check wiring.
Y Communication Error	Comms. Error	3	Ensure XY is ENABLED and ACTIVE.
XY active but not plugged in	Comms. Error	3	Ensure XY is INACTIVE.
Unplugged power cord to motor	Comms. Error	3	The power is shut off. Plug cord back in for power to be turned on.
Unplugged comms. wire to motor	Comms. Error	3	Communication to motor is terminated. Plug cord back in.

8. Periodic Preventative Maintenance

The Cole-Parmer i-FILL Micro pump is a self-contained unit that requires little to no maintenance. Users should occasionally wipe the unit with a soft, clean cloth. The touch screen control is protected by a cover that should protect it from the regular use of an appropriate stylus. Maintenance should only be performed by an authorized technician. Please call Cole-Parmer at 1-800-323-4340 for technical support or service regarding the proper care of this unit.

8.1. Daily or Monthly

- Make sure all thumb screws are secure on the disposable fluid path kit.
- Inspect tubing and tube fittings for damage, signs of wear or leaking.
- Be sure all cables are plugged in securely (power and optional foot switch and X-Y filling fixture).

8.2. Yealy or Appropriate Period Based on Use

- Cover the four bearing rails on the X-Y filling fixture with an FDA approved white lithium grease, if required.
- Clean any particulate from the X and Y screw(s).

9. Recommended Spare Parts

Part Number	Description
91400-82	Disposable Fluid Path Kit, 1 mL
91400-83	Disposable Fluid Path Kit, 10 mL
91400-84	Replacement Piston, 1 mL
91400-85	Replacement Piston, 10 mL

10. Warranty and Factory Repair

For Warranty and/or Factory Repair request, contact Cole-Parmer at 1-800-323-4340 with the Unit part and serial numbers and a description of the problem. The model and serial information can be found on the equipment identification tag mounted on the unit.

The manufacturer warrants that all equipment designed and manufactured will be free from defects in parts and workmanship for a period of ninety (90) days from the date of shipment. As the Buyer's sole and exclusive remedy, the manufacturer will repair or replace the equipment with no cost to the Buyer after inspection and determination of applicable warranty. For a period from ninety-one (91) days after shipment, to one (1) year after shipment, as the Buyer's sole and exclusive remedy, the manufacturer will repair or replace only defective parts at no cost to the Buyer. However, Buyer will be responsible for any labor and shipping charges associated with any repair, replacement, or service at the manufacturer's prevailing rates.

The manufacturer will repair or replace at no cost, any part proving defective in materials or workmanship. Defectiveness shall be verified by the manufacturer's inspection. Removal and installation expenses shall be the responsibility of the owner, and the manufacturer liability is extended only to furnishing said part or parts. Modifications or alterations to the equipment without the express written consent of the manufacturer are strictly prohibited. Failure to obtain consent in writing voids any warranty, expresses or implied, and relieves the manufacturer from any and all liability for said product.

Charges for correcting any defects will not be allowed, nor will the manufacturer accept parts returned for credit unless the manufacturer is notified in writing and return or correction is authorized by the manufacturer in writing. Any design changes or modifications performed by anyone other than a manufacturer authorized representative voids any warranty in its entirety. COMPONENTS TAMPERED WITH BEFORE INSPECTION BY THE MANUFACTURER SHALL BE CONSIDERED FREE OF ALL WARRANTY CLAIMS. Failure due to abuse, improper adjustments or maintenance, exposure to corrosive or abrasive environment or operation in damp conditions does not constitute failure due to materials or workmanship. Warranty extends to the original Buyer and is not transferable.

The manufacturer is not liable for consequential damages, such as loss of profit, delays or expenses incurred by failure of said part or parts.

Notwithstanding, anything herein to the contrary, the manufacturer's warranty does not extend past the warranty provided by the manufacturer's components purchased for use in the manufacture of this equipment. Component parts not from the manufacturer (i.e., motors, gear reducers, etc.) will be repaired or replaced at the option of the respective manufacturer. Customers may contact the nearest authorized service center for warranty claims.

EXCEPT AS EXPRESSLY STATED ABOVE, THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, ARISING BY STATUTE OR OTHERWISE, FOR THE EQUIPMENT FURNISHED HEREUNDER. THE MANUFACTUER. DISCLAIMS ALL IMPLIED WARRANTIES OR WARRANTIES OF MECHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

For Product Information

Scan the QR code or visit coleparmer.com to learn more about the Cole-Parmer Single-Use Dispensing Pump Powered by i-FILL.

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