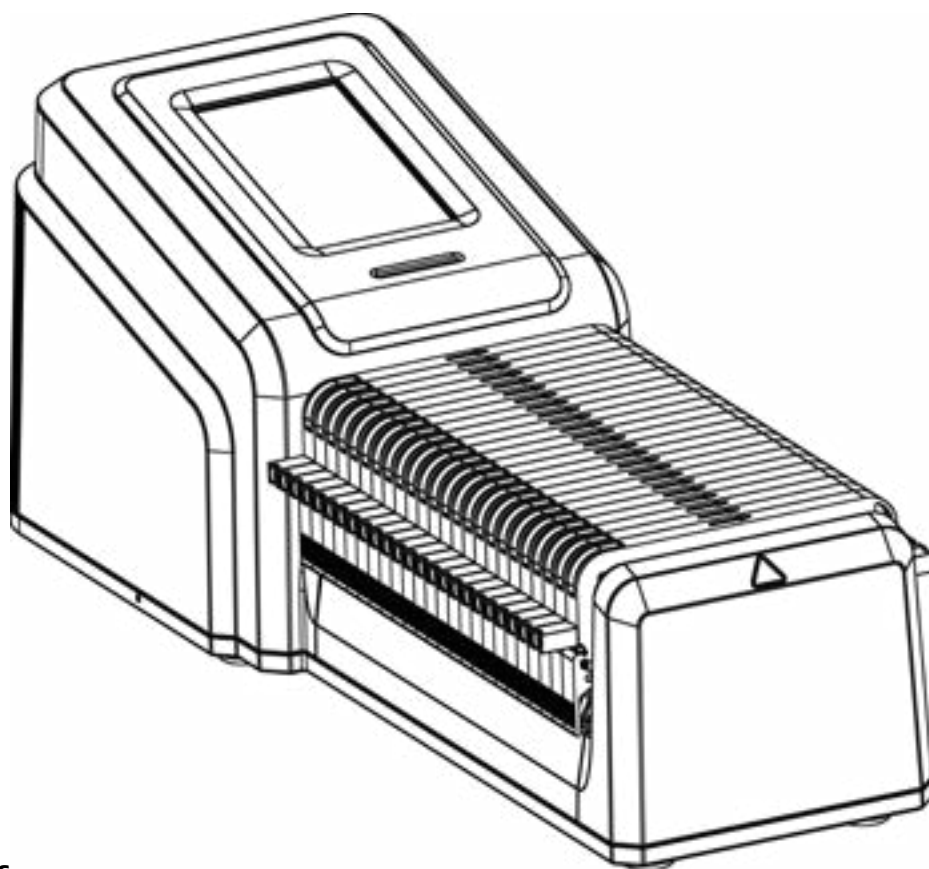


OPERATING MANUAL

Masterflex® Ismatec® Multichannel Peristaltic Pumps



MODEL NUMBERS

IPC 45 RPM

MFLX78006-22

MFLX78006-24

MFLX78006-26

MFLX78006-28

IPC 11.25 RPM

MFLX78006-42

MFLX78006-44

MFLX78006-46

MFLX78006-48

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PUMP FOR LIQUIDS ORIGINAL INSTRUCTIONS

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SECTION 1: INTRODUCTION









SAFE OPERATION

The IPC Masterflex® Ismatec® Multichannel Peristaltic Pumps are designed for fluid pumping and dispensing applications in laboratory and process environments. Ensure that the pump is operated only in the manner specified in this operating manual and that Good Laboratory Practice (GLP) and safe work practices are followed. Misuse of the pump may compromise built-in safety protections and result in injury and/or damage to equipment. Do not operate the pump with water on the surface of the touchscreen.

The following safety symbols are used in this documentation:

	CAUTION: Risk of Danger. Consult operating manual for nature of hazard and corrective actions.
	CAUTION: Crushing risk. Consult operating manual for nature of hazard and corrective actions.
	CAUTION: Hot Surface. Do not touch.
	CAUTION: Risk of electric shock. Consult operating manual for nature of hazard and corrective actions.

Please observe the following cautions and recommendations:

	CAUTION: To avoid injury from the pump rollers, ensure all cassettes are loaded onto the pump to cover the rollers before operation.
	CAUTION: Do not operate the pump in a way that exceeds the designed operating and environmental conditions outlined in this operating manual.
	CAUTION: The pump must not be used: <ul style="list-style-type: none"> • As a medical device. • In explosion proof chambers or in the presence of flammable gases or fumes.
	CAUTION: The circuit between the mains power supply and the pump must be connected to earth ground.
	CAUTION: Turn the pump off before removing or installing cassettes and tubing. Fingers or loose clothing could get caught in the pump rollers.
	CAUTION: Do not open or remove the housing while the pump is operating.
	CAUTION: Tubing can tear and burst during operation. It is the responsibility of the user to take the necessary precautions to avoid injury or damage to equipment.
	CAUTION: It is recommended that any repairs be performed only by an authorized technician. If service and repairs are performed by the customer or by any third party company, Masterflex denies all responsibility.

ABOUT THE IPC PUMPS

The Masterflex® Ismatec® Multichannel Peristaltic Pumps offer precise flow control and highly accurate fluid dispensing ideal for laboratory, process, and field use. All pumps include a highly accurate, maintenance-free motor and an easy to navigate touchscreen that makes setup and operation easier than ever. The IPC pumps feature Ethernet, Wi-Fi, DB-25, DB-9, and USB-A connections for remote control and monitoring through the MasterflexLive™ website (see www.avantorsciences.com/masterflex), as well as analog input control, serial communications, and EtherNet/IP network protocol.

Package Contents

NOTE: Please check the package and its contents for any visible signs of damage. If any damage is found please contact Technical Assistance immediately (see "[Technical Assistance](#)" on page 5-7).

- Pump
- 24 VDC Desktop Power Supply Set
- Quick Start Guide

Features

- A 5-inch multi-language touchscreen display providing easy access to user-defined operation parameters and direct readouts of pump operation data, including pump speed, flow rates, flow direction, and batch totals
- Volume, Time, Continuous, and Analog Input modes for quick and easy operation
- User selectable dispense volumes, tube diameters, flow rates, pump speeds, and run times
- Anti-drip control
- Easy user management with three levels of access: ADMIN, SUPER USER and USER
- Advanced connectivity through Wi-Fi, Ethernet, DB-25, DB-9, and USB-A
- Easy pump priming and tube calibration
- IPC 45 RPM model pumps have a maximum speed of 45 RPM and flow rate capacities that range from 0.0016 mL/min to 45 mL/min (depending on the tube size). IPC 11.25 RPM model pumps have a maximum speed of 11.25 RPM and flow rate capacities that range from 0.00039 mL/min to 11.25 mL/min (depending on tube size)
- Takes Click'n'go tube cassettes for easy loading and unloading
- Multichannel pumping options ranging from eight to twenty-four channels (depending on the model) allowing simultaneous fluid channels on the same pump

Visit www.avantorsciences.com/masterflex for further information.

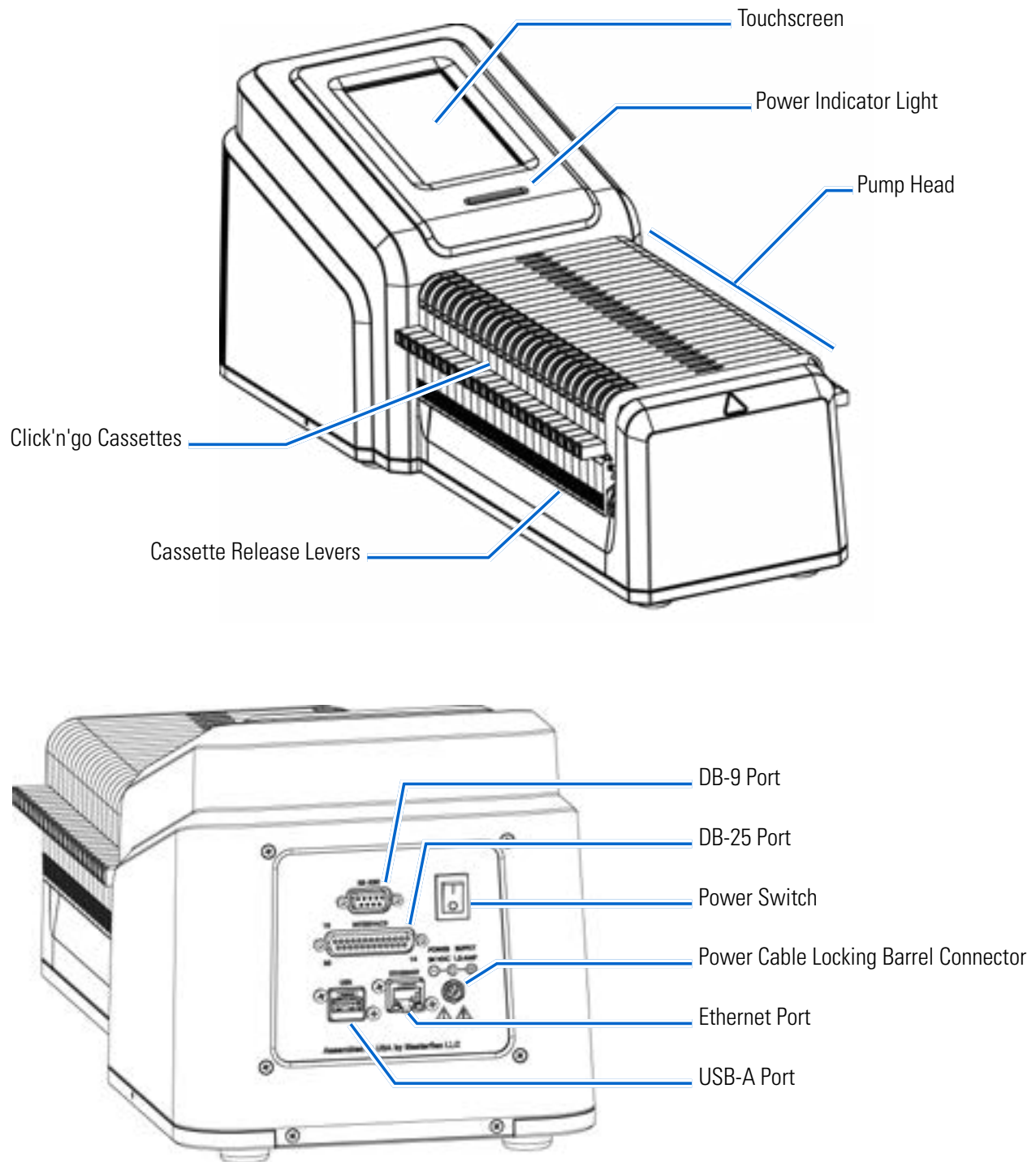
Available Models

Model	Description	RPM Range (Min – Max)	Channels	Cassettes/Heads
MFLX78006-22	IPC 45 RPM 8CH Click'n'go Pump	0.45 – 45	8	Click'n'go
MFLX78006-24	IPC 45 RPM 12CH Click'n'go Pump	0.45 – 45	12	Click'n'go
MFLX78006-26	IPC 45 RPM 16CH Click'n'go Pump	0.45 – 45	16	Click'n'go
MFLX78006-28	IPC 45 RPM 24CH Click'n'go Pump	0.45 – 45	24	Click'n'go
MFLX78006-42	IPC 11.25 RPM 8CH Click'n'go Pump	0.11 – 11.25	8	Click'n'go
MFLX78006-44	IPC 11.25 RPM 12CH Click'n'go Pump	0.11 – 11.25	12	Click'n'go
MFLX78006-46	IPC 11.25 RPM 16CH Click'n'go Pump	0.11 – 11.25	16	Click'n'go
MFLX78006-48	IPC 11.25 RPM 24CH Click'n'go Pump	0.11 – 11.25	24	Click'n'go

NOTE: For additional cassette options see "[Accessories](#)" on page 5-2.

SECTION 2: BASIC SETUP & SETTINGS

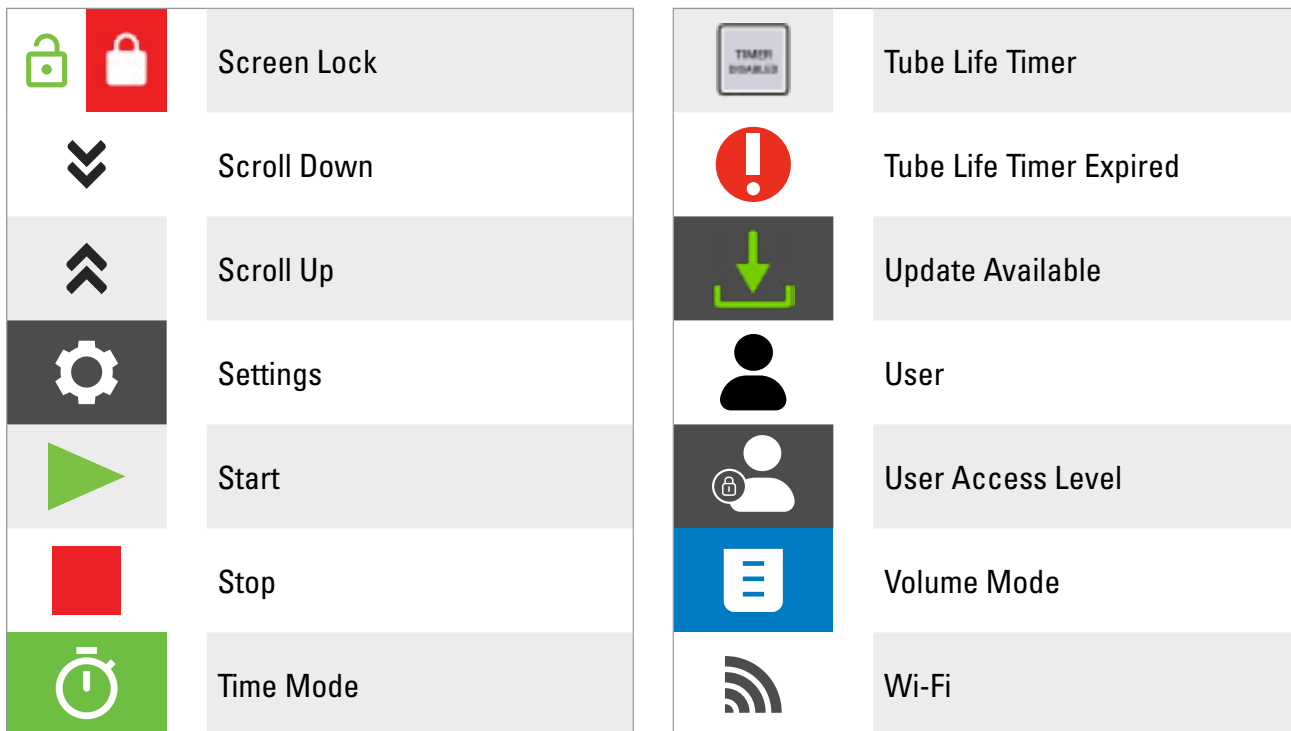
FRONT & REAR OF THE PUMP



TOUCHSCREEN ICONS

	Add New User
	Analog Input Mode
	Calibrate
	Calibration Complete
	Clockwise
	Close/Cancel
	Confirm
	Continuous Mode
	Counterclockwise
	Delete
	Delete User
	Display Brightness
	Edit
	EtherNet/IP Connected
	EtherNet/IP Lost Connection

	Factory Reset
	Language
	Logout
	MasterflexLive Connected
	MasterflexLive Not Connected
	New Program
	Notification Alert High Priority
	Notification Alert Medium Priority
	Notification Alert Low Priority
	Pause
	Prime
	Program
	Record Volume
	Reset



BEFORE STARTING THE PUMP

	CAUTION: To avoid injury from the pump rollers, ensure all cassettes are loaded onto the pump to cover the rollers before operation.
	CAUTION: Do not block the rear panel of the pump. The power switch must always be easy to access and the power supply must always be easy to disconnect.
	CAUTION: Turn the pump off before removing or installing cassettes and tubing. Fingers or loose clothing could get caught in the pump rollers.
	CAUTION: The power supply provided with your pump meets the requirements of the country where you purchased the pump. If you use the pump in another country, you must use a power supply that meets the requirements of that country.
	CAUTION: To avoid electrical shock, the power cord protective grounding conductor must be connected to ground. Not for operation in wet locations as defined by EN61010-1.

- The cassettes cover the pump rollers. Ensure all cassettes are loaded into the pump channels before operating the pump (**NOTE:** Cassettes can be loaded without tubing to ensure that all the pump rollers are covered).
- Ensure the pump is mounted on a flat surface.
- Ensure adequate air flow around the pump and ensure that the ambient air temperature does not exceed 104° F (40° C).

- Tubing should be clean and routed so that bend radii are at a minimum of four (4) times the outside tube diameter and are as short as possible.
- Use the appropriate tube diameter for the required flow rate and viscosity.
- Recalibrate tubing regularly to maintain the best flow rate accuracy (for further information see "[Tube Calibration](#)" on page 2-22).
- For tubing selection and compatibility see "[Tubing](#)" on page 2-13 or visit www.avantorsciences.com/masterflex.
- Unplug the pump power cable from the mains power outlet when cleaning or performing maintenance on the pump.


SWITCHING ON THE PUMP

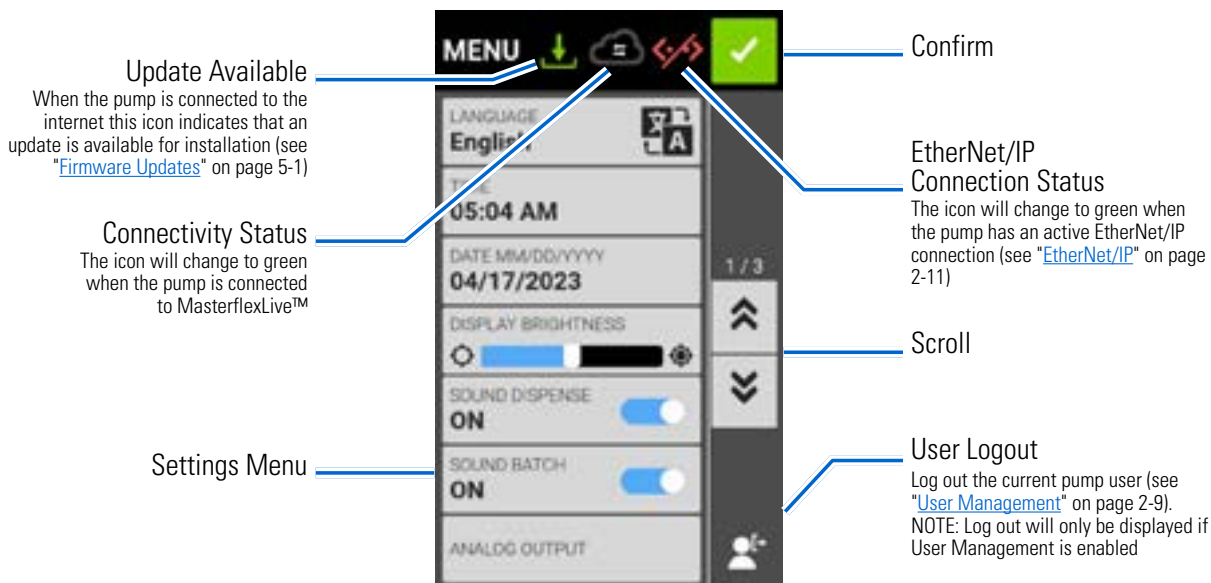
1. Plug in and securely fasten the supplied 24 VDC desktop power supply to the power cable barrel connector located at the rear of the pump.
2. Plug the opposite end of the power cable into a mains power outlet.
3. Switch the pump on using the power switch located at the rear of the pump. **NOTE:** The pump takes approximately one to two minutes to complete start-up.

NOTE:

- On the initial start-up the Language Settings Screen will be displayed. A language must be selected before pump operation (for further information see "[Language Settings](#)" on page 2-5).
- If User Management is enabled you will be prompted for a username and password (for further information see "[User Management](#)" on page 2-9).
- Following the initial start-up, all subsequent start-ups will revert to the mode of operation screen previously in use.
- After 30 minutes of inactivity the pump will enter sleep mode and the display will turn off. Tapping the touchscreen will reactivate the screen. To enable (default) or disable the screen saver see "[Screen Saver](#)" on page 2-7. **NOTE:** The power indicator light will remain on as long as power is connected to the pump.

SETTINGS



The Settings Menu Screen allows access to basic configuration settings. The Settings Menu Screen is accessed by tapping **SETTINGS**  from any of the mode screens. **NOTE:** If User Management is enabled only users with authorization can access the Settings Menu Screen (for further information see "[User Management](#)" on page 2-9).



Language Settings




The pump can display Chinese, English, French, German, Italian, Japanese, and Spanish languages. The default display language is English.

To change the display language:

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. Tap **LANGUAGE**.
3. Select the desired language from the available list.
4. Tap **CONFIRM**  to save the new language selection.




Setting the Time

To change the time:

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. Tap **TIME**.
3. Select either 12-HOUR or 24-HOUR time.
4. Tap **HH** to select hours and enter the desired time using the onscreen keypad.
5. Tap **MM** to select minutes and enter the desired time using the onscreen keypad.
6. If using 12-HOUR time, tap **AM/PM** to select either AM or PM.
7. Tap **CONFIRM**  to save or **CANCEL**  to discard changes.


Setting the Date

To change the date:

1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. Tap DATE.
3. Select the desired date format (either month/day/year or day/month/year).
4. Tap the desired MM, DD, or YYYY field to select and then enter the date using the onscreen keypad.
5. Tap CONFIRM  to save or CANCEL  to discard changes.

Display Brightness


To adjust the display brightness:

1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. Use the DISPLAY BRIGHTNESS slider to adjust the touchscreen brightness to the desired level.

Dispense Completion Alerts

When Sound Dispense is enabled a short beep will sound at the completion of each pump dispense.


To enable or disable the dispense completion alert:

1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. Tap the SOUND DISPENSE toggle to select either ON or OFF.

Batch Completion Alerts






When Sound Batch is enabled a single long beep will sound at the completion of each batch cycle.

To enable or disable the batch cycle completion alert:

1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. Tap the SOUND BATCH toggle to select either ON or OFF.

Analog Output



The pump supports and controls analog output through the 25-pin connection on the rear of the pump (for further information see "[DB-25 Connection](#)" on page 4-34).

1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. Tap ANALOG OUTPUT. The Analog Output Screen will be displayed.
3. Tap to select the desired analog output type from the available list.
4. If using either ANALOG: VOLTAGE or ANALOG: CURRENT:
 - a. Tap EDIT . The Analog: Voltage Edit Screen or Analog: Current Edit Screen will be displayed.
 - b. Select the desired current or voltage operating range from the available list.
 - c. Tap CONFIRM  to save or CANCEL  to discard changes. The Analog Output Screen will be displayed.
5. Tap CONFIRM .

Device Information

The Device Information Screen provides details such as pump model, serial number, device ID, MAC address, IP address, software version, and firmware version. Factory reset and updates are also accessed from the Device Information Screen.

To access the Device Information Screen:



1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages and tap **DEVICE INFORMATION**. The Device Information Screen will be displayed.

See also "[Firmware Updates](#)" on page 5-1, and "[Restore Factory Settings](#)" on page 5-1.

Screen Saver

The pump has a screen saver to help extend the display life of the touchscreen. After 30 minutes of inactivity the pump will enter sleep mode and the display will turn off. Tapping the touchscreen will reactivate the screen.
NOTE: The power indicator light will remain on as long as power is connected to the pump.



To enable or disable the screen saver:

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages to locate **SCREEN SAVER**.
3. Tap the **SCREEN SAVER** toggle to select either **ON** or **OFF**.

Device Name

Individual names can be assigned to each pump to make identification easier when using more than one pump.

To assign a pump name:

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages and tap **DEVICE NAME**. The Device Name Screen will be displayed.
3. Enter the desired pump name using the onscreen keypad (up to 8 characters).
4. Tap **SAVE** to save name or **CANCEL** to discard changes.




Wi-Fi Settings

The pump can connect to a network using Wi-Fi and Ethernet connections.





NOTE:

- The Ethernet connection will take priority if both Wi-Fi and Ethernet are used simultaneously.
- The pump supports WEP, WPA, WPA2, and None (open) Wi-Fi security protocols.

To select a Wi-Fi network:

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages and tap **WIFI SETTINGS**. The Wi-Fi Settings Screen will be displayed.
3. If required, tap the **WIFI** toggle to select either **ON** or **OFF**.
4. Tap the desired Wi-Fi network from the available list.
5. If required, enter the network password using the onscreen keypad.
6. Tap **CONNECT** to join the network or **CANCEL** to cancel.
7. Tap **CONFIRM**  to return to the Settings Menu Screen.

To remove a Wi-Fi network:

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages and tap **WIFI SETTINGS**. The WIFI Settings Screen will be displayed.
3. Locate the desired Wi-Fi network and tap **REMOVE WIFI** .
4. Tap **REMOVE** to remove the network or **CANCEL** to discard changes.
5. Tap **CONFIRM**  to return to the Settings Menu Screen.





Ethernet Settings

The pump can connect to a network using Wi-Fi and Ethernet connections.

NOTE:

- Confirm that the Ethernet cable is securely attached to the Ethernet port at the rear of the pump.
- The Ethernet connection will take priority if both Wi-Fi and Ethernet are used simultaneously.

To configure Ethernet settings:

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages and tap **ETHERNET SETTINGS**. The Ethernet Settings Screen will be displayed.
3. Tap **DHCP** to automatically configure IP settings or **STATIC** to manually edit settings using the onscreen keypad.
4. Tap **CONFIRM**  to save or **CANCEL**  to discard changes.

User Management

The pump allows user access to be controlled using configurable permission levels.

Default permissions:

- USER: Able to use basic pump functions and run programs.
- SUPER USER: Same level of access as USER but with the ability to create and modify programs.
- ADMIN: Full administrative access to the pump.

User and Super User permission levels can be configured to allow access to different Settings Menu items.

Default ADMIN username and password:



When switching on User Management for the first time, or following a factory reset, you will be prompted for a username and password. You must log in using the below default ADMIN user account details to access user management settings.

Default username: **admin**





Default password: **123456**

It is recommended that the default password be changed after logging in (see **Editing an existing user** below for information on changing user passwords). **NOTE:** Performing a factory reset will restore the default password and remove all user settings and programs (See "[Restore Factory Settings](#)" on page 5-1).






Enabling user management:

1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. SCROLL  through the Settings Menu Screen pages to locate USER MANAGEMENT.
3. Tap the USER MANAGEMENT toggle to select ON.
4. Tap APPLY to enable User Management or DISMISS to cancel. If enabling User Management, the Login Screen will be displayed.
5. Enter your USERNAME and PASSWORD using the onscreen keypad. **NOTE:** If enabling User Management for the first time, use the default ADMIN username and password (see above).

Configuring user level permissions:




1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. SCROLL  through the Settings Menu Screen pages to locate MODIFY USER.
3. Tap MODIFY USER.
4. Tap ACCESS LEVELS.
5. Tap USER or SUPERUSER.
6. Select the desired settings menu items to be included in the user level.
7. Tap CONFIRM  to save or CANCEL  to discard any changes.

Adding a new user:





1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages to locate **MODIFY USER**.
3. Tap **MODIFY USER**.
4. Tap **NEW USER** .
5. Tap **USERNAME** and enter the new username using the onscreen keypad.
6. Tap **PASSWORD** and enter the desired password using the onscreen keypad. **NOTE:** The password must be at least six characters long.
7. Tap the required **PERMISSION LEVEL**. **NOTE:** There must always be at least one **ADMIN** user.
8. Tap **CONFIRM**  to save or **CANCEL**  to discard any changes.

Deleting a user:



NOTE: There must always be at least one **ADMIN** user. **ADMIN** users cannot delete their own user profile.

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages to locate **USER MANAGEMENT**.
3. Tap **MODIFY USER**.
4. Locate the desired username from the available list and then tap the **DELETE USER**  icon located next to the username.
5. Tap **DELETE** to delete user or **CANCEL** to cancel.

Editing an existing user:

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages to locate **USER MANAGEMENT**.
3. Tap **MODIFY USER**.
4. Select the desired username.
5. Edit as required.
6. Tap **CONFIRM**  to save or **CANCEL**  to discard any changes.

Logging out the current user:





1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. Tap **LOGOUT**  (located in the bottom right corner of the screen).
3. Tap **LOGOUT** on the popup window to confirm.

NOTE: After logging out, you will be prompted to log in again as a new user.

Auto Start

The pump has an auto start feature that will allow the pump to resume operation when power is restored after a power outage.





To enable auto start:

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages to locate **AUTO START**.
3. Tap the **AUTO START** toggle to select either **ON** or **OFF**.
4. Tap **CONFIRM**  to save or **CANCEL**  to discard any changes.





EtherNet/IP

The pump can be remotely monitored and controlled using EtherNet/IP network protocol (see "[EtherNet/IP Mode](#)" on page 4-25). **NOTE:** The pump can be set to stop the pump if the EtherNet/IP connection is lost during operation (see below).

To enable EtherNet/IP:


1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages and tap **EtherNet/IP**. The EtherNet/IP Screen will be displayed.
3. Tap the **ENABLE** toggle to select either **ON** or **OFF**.
4. Tap **ACCEPT** or **CANCEL** on the popup window.
5. Tap **CONFIRM**  to save or **CANCEL**  to discard any changes.

To enable the pump stop feature for EtherNet/IP disconnection:






1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages and tap **EtherNet/IP**. The EtherNet/IP Screen will be displayed.
3. Tap the **STOP PUMP WHEN EtherNet/IP IS DISCONNECTED** toggle to select either **ON** or **OFF**.
4. Tap **CONFIRM**  to save or **CANCEL**  to discard any changes.

Tube Life Timer




The pump features a Tube Life Timer that enables tube usage to be tracked during operation. When enabled, the Tube Life Timer counts down from the entered time (in hours) and, if required, can be set to stop the pump operation when the timer finishes. **NOTE:** The Tube Life Timer is used as a guide only. Tube life can vary based on several factors, including tubing formulation, frequency of use, fluid viscosity, and speed.

NOTE: Tube Life Timer settings are also accessible by tapping TUBE LIFE TIMER  on the Mode Run Screens.





To configure the tube life timer:

1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. SCROLL  through the Settings Menu Screen pages and tap TUBE LIFE TIMER. The Tube Life Timer Screen will be displayed.
3. Tap the TIMER ENABLE toggle to select either ON or OFF.
4. Tap DISMISS on the popup.
5. Enter the tube life time in hours and then tap CONFIRM  to save or CANCEL  to discard any changes.
6. Tap CONFIRM  to save.

To enable pump shutoff functionality on tube life timer expiration:

1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. SCROLL  through the Settings Menu Screen pages and tap TUBE LIFE TIMER. The Tube Life Timer Screen will be displayed.
3. Tap the SHUT OFF PUMP WHEN TIMER EXPIRES toggle to select either ON or OFF.
4. Tap CONFIRM  to save.

To reset the tube life timer:


















1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. SCROLL  through the Settings Menu Screen pages and tap TUBE LIFE TIMER. The Tube Life Timer Screen will be displayed.
3. Tap RESET  and then tap CONFIRM in the popup.
4. Tap CONFIRM  to save.

TUBING

Color-Coded Two-Stop Tubing

Color-coded stops provide easy tube identification and create a uniform tension in the pump for high accuracy and repeatability.





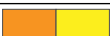













- Precision extruded to tight tolerances for high repeatability and accuracy.
- Extension tubing can be connected using straight fittings, barbed fittings, or by splicing.
- Flared ends are available for select materials, which aid in making connections (**NOTE:** Flared ends require special connections for correct operation).

Color-Coded Stops	Tube ID (mm)	Ismatec Size	IPC 45 RPM		IPC 11.25 RPM	
			Min Flow Rate mL/min	Max Flow Rate mL/min	Min Flow Rate mL/min	Max Flow Rate mL/min
 ORANGE/BLACK	0.13	-9	0.0016	0.16	0.00039	0.039
 ORANGE/RED	0.19	-10	0.0027	0.27	0.00066	0.068
 ORANGE/BLUE	0.25	-12	0.0041	0.41	0.00099	0.101
 ORANGE/GREEN	0.38	-14	0.0090	0.90	0.00220	0.225
 ORANGE/YELLOW	0.51	-18	0.0155	1.55	0.00380	0.388
 ORANGE/WHITE	0.64	-22	0.0237	2.37	0.00580	0.593
 BLACK/BLACK	0.76	-24	0.0331	3.31	0.00810	0.828
 ORANGE/ORANGE	0.89	-26	0.0450	4.50	0.01100	1.125
 WHITE/WHITE	1.02	-28	0.0572	5.72	0.01399	1.431
 RED/RED	1.14	-30	0.0695	6.95	0.01700	1.738
 GREY/GREY	1.33	-32	0.0900	9.00	0.02200	2.250
 YELLOW/YELLOW	1.42	-34	0.1063	10.63	0.02599	2.658
 YELLOW/BLUE	1.52	-36	0.1227	12.27	0.03000	3.068
 BLUE/BLUE	1.65	-38	0.1431	14.31	0.03499	3.579
 GREEN/GREEN	1.85	-40	0.1759	17.59	0.04300	4.398
 PURPLE/PURPLE	2.03	-42	0.2127	21.27	0.05200	5.318
 PURPLE/BLACK	2.29	-44	0.2577	25.77	0.06300	6.443
 PURPLE/WHITE	2.79	-48	0.3641	36.41	0.08899	9.101
 BLACK/WHITE	3.17	-49	0.4500	45.00	0.11000	11.25

Tubing Material

Material	Appearance	Temperature	Advantages	Application
Tygon® E-Lab	Clear	-50 to 74°C	<ul style="list-style-type: none"> - Clear - Economical 	<ul style="list-style-type: none"> - Acids, alkalies, and viscous fluids
Tygon® E-LFL	Clear	-50 to 74°C	<ul style="list-style-type: none"> - Pharmaceutical grade - Longest flex life of all Tygon® 	<ul style="list-style-type: none"> - Acids, alkalies, viscous fluids, and pharmaceuticals
Puri-Flex®	Translucent	-60 to 260°C	<ul style="list-style-type: none"> - Excellent biocompatibility - Weldable 	<ul style="list-style-type: none"> - Sterile fluids
Puri-Sil (Platinum Cured)	Translucent	-60 to 260°C	<ul style="list-style-type: none"> - Very low leaching of organic compounds 	<ul style="list-style-type: none"> - Sterile fluids
Puri-Prene	Opaque, beige	-50 to 130°C	<ul style="list-style-type: none"> - Long pump life - Less drift over time 	<ul style="list-style-type: none"> - Acids, alkalies, and general purpose
Viton® FDA Compliant	Opaque, black	-20 to 205°C	<ul style="list-style-type: none"> - Resists most chemicals 	<ul style="list-style-type: none"> - Acids, alkalies, solvents, and viscous fluids
PharMed® BPT Tubing	Opaque, beige	-50 to 130°C	<ul style="list-style-type: none"> - Pharmaceutical grade 	<ul style="list-style-type: none"> - Acids, alkalies, sterile fluids, and viscous fluids
Puri-Clear	Clear	-45 to 74°C	<ul style="list-style-type: none"> - Clear for easy flow monitoring - Broad chemical resistance - Nontoxic, nonaging, nonoxidizing - High elastic memory material handles viscous materials and holds a vacuum well 	<ul style="list-style-type: none"> - Pharmaceutical, biotech, and general-purpose lab applications - Sterile filling and processing, cell harvest and media process systems, filtration, fermentation, and cell and tissue culture transport
PharmaPure	White, opaque	-67 to 135°C	<ul style="list-style-type: none"> - Nontoxic and non-hemolytic - Biocompatible - Long life even under pressure - Very low spallation, low gas permeability, and low extractables 	<ul style="list-style-type: none"> - Excellent for viscous fluid transfer - Peristaltic pump applications requiring extremely high purity
Solva	Yellow, translucent	-30 to 85°C	<ul style="list-style-type: none"> - Resistant to ozone and UV light - Resistant to cracking, swelling, and hardening 	<ul style="list-style-type: none"> - Ideal for chromatography applications and for the transfer of fuels, distillates, lubricants, and glycol-based coolants
Versilon™ 2001	Clear	-77 to 57°C	<ul style="list-style-type: none"> - Best chemical resistance of any Tygon® Formulation - Plasticizer-free 	<ul style="list-style-type: none"> - Compatible with some organics - Chemical transfer

Barb Adapter Fitting

Color-Coded Stops		Tube ID (mm)	Ismatec Size	Ismatec Straight Connectors (Stainless Steel & PETG) 2/PK	Polypropylene Hose Barb (10/pk)
	ORANGE/BLACK	0.13	-9	MFLX34002-09	–
	ORANGE/RED	0.19	-10	MFLX34002-10	–
	ORANGE/BLUE	0.25	-12	MFLX34002-12	–
	ORANGE/GREEN	0.38	-14	MFLX34002-14	–
	ORANGE/YELLOW	0.51	-18	MFLX34002-18	–
	ORANGE/WHITE	0.64	-22	MFLX34002-22	–
	BLACK/BLACK	0.76	-24	MFLX34002-24	–
	ORANGE/ORANGE	0.89	-26	MFLX34002-26	–
	WHITE/WHITE	1.02	-28	–	1/16" Hose Barb MFLX40612-43
	RED/RED	1.14	-30	–	
	GREY/GREY	1.33	-32	–	
	YELLOW/YELLOW	1.42	-34	–	
	YELLOW/BLUE	1.52	-36	–	
	BLUE/BLUE	1.65	-38	–	3/32" Hose barb MFLX50622-46
	GREEN/GREEN	1.85	-40	–	
	PURPLE/PURPLE	2.03	-42	–	
	PURPLE/BLACK	2.29	-44	–	
	PURPLE/WHITE	2.79	-48	–	1/8" Hose Barb MFLX40612-47
	BLACK/WHITE	3.17	-49	–	

Tubing Part Numbers











Ordering new tubing requires a Tubing Part Number. The Tubing Part Number is made up of a nine character prefix (Catalog Number) and a two digit suffix (Tubing ID Number). Using the table on the following page, determine the prefix by locating the required Tubing Type and its corresponding Catalog Number (for example, MFLX96449-). Then, determine the suffix by locating the two digit Tubing ID Number (for example, -12). Finally, combine the prefix and the suffix for a complete Tubing Part Number (for example, MFLX96449-12).

NOTE:










- A length of Two-Stop Tubing is 40.6 cm (16")
- A length of Tubing Extension is 15.2 m (50 ft)
- A length of Flared Tubing is 40.6 cm (16")

Tubing Part Numbers Table

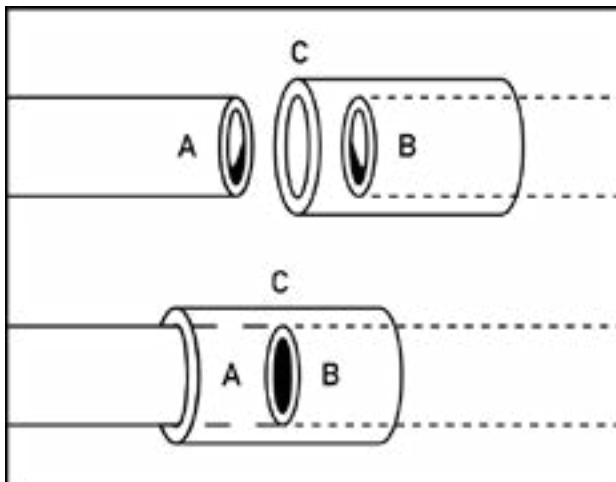
(the table is continued on the following page)

			Ismatec Size	-9	-10	-12	-14	-18	-22	-24	-26	-28	-30
			Tube ID	0.13	0.19	0.25	0.38	0.51	0.64	0.76	0.89	1.02	1.14
			Color Code										
Tubing Type		QTY	Catalog Number	Tube ID Number									
E-LFL	2-STOP	12	MFLX96449-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
	Extension	1	MFLX06449-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
PharMed® BPT	2-STOP	12	MFLX95723-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
	Extension	1	MFLX95809-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
Chem- Durance Bio	2-STOP	12	MFLX96327-	–	–	–	-14	-18	–	-24	-26	–	-30
	Extension	1	MFLX96329-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
E-Lab	2-STOP	12	MFLX96460-	-09	-10	-12	-14	-18	-22	-24	-26	-28	-30
	Extension	1	MFLX06460-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
E-Food	2-STOP	12	MFLX96457-	–	–	-12	–	-18	–	–	-26	–	-30
	Extension	1	MFLX06457-	–	-10	-12	–	-18	–	–	-26	–	-30
Viton®	2-STOP	12	MFLX97628-	–	–	–	–	-18	-22	-24	-26	-28	-30
	Extension	1	MFLX97632-	–	–	–	–	-18	-22	-24	-26	-28	-30
Puri-Sil	2-STOP	12	MFLX95422-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
	Extension	1	MFLX95412-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
Puri-Flex®	2-STOP	12	MFLX96518-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
	Extension	1	MFLX96418-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
Puri-Prene	2-STOP	12	MFLX05635-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
	Extension	1	MFLX05637-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
Puri-Clear LL	2-STOP	12	MFLX95663-	-09	-10	-12	-14	-18	-22	-24	-26	-28	-30
	Extension	1	MFLX95679-	-09	-10	-12	-14	-18	-22	-24	-26	-28	-30
	Flared	12	MFLX97616-	-09	-10	-12	-14	-18	-22	-24	-26	-28	-30
Versilon™ 2001	2-STOP	12	MFLX96465-	–	–	–	-14	–	-22	–	–	-28	–
	Extension	12	MFLX96467-	–	–	–	-14	–	-22	–	–	-28	–
Solva	2-STOP	12	MFLX95606-	-09	-10	-12	-14	-18	-22	-24	-26	-28	-30
	Extension	1	MFLX95712-	–	-10	-12	-14	-18	-22	-24	-26	-28	-30
	Flared	12	MFLX95598-	-09	-10	-12	-14	-18	-22	-24	-26	-28	-30

Tubing Part Numbers Table (continued)

			Ismatec Size	-32	-34	-36	-38	-40	-42	-44	-48	-49
			Tube ID	1.33	1.42	1.52	1.65	1.85	2.03	2.29	2.79	3.17
			Color Code									
Tubing Type		QTY	Catalog Number	Tube ID Number								
E-LFL	2-STOP	12	MFLX96449-	–	-34	-36	–	-40	-42	–	–	–
	Extension	1	MFLX06449-	-32	-34	-36	-38	-40	-42	-44	-48	–
PharMed® BPT	2-STOP	12	MFLX95723-	-32	-34	-36	-38	-40	-42	-44	-48	–
	Extension	1	MFLX95809-	-32	-34	-36	-38	-40	-42	-44	-48	–
Chem- Durance Bio	2-STOP	12	MFLX96327-	–	-34	-36	–	–	-42	–	–	–
	Extension	1	MFLX96329-	-32	-34	-36	-38	-40	-42	-44	-48	–
E-Lab	2-STOP	12	MFLX96460-	-32	-34	-36	-38	-40	-42	-44	-48	-49
	Extension	1	MFLX06460-	-32	-34	-36	-38	-40	-42	-44	-48	-49
E-Food	2-STOP	12	MFLX96457-	–	-34	–	–	–	-42	–	-48	–
	Extension	1	MFLX06457-	–	-34	–	–	–	-42	–	-48	–
Viton®	2-STOP	12	MFLX97628-	-32	-34	-36	-38	-40	-42	-44	-48	–
	Extension	1	MFLX97632-	-32	-34	-36	-38	-40	-42	-44	-48	–
Puri-Sil	2-STOP	12	MFLX95422-	-32	-34	-36	-38	-40	-42	-44	-48	–
	Extension	1	MFLX95412-	-32	-34	-36	-38	-40	-42	-44	-48	–
Puri-Flex®	2-STOP	12	MFLX96518-	-32	-34	-36	-38	-40	-42	-44	-48	–
	Extension	1	MFLX96418-	-32	-34	-36	-38	-40	-42	-44	-48	–
Puri-Prene	2-STOP	12	MFLX05635-	-32	-34	-36	-38	-40	-42	-44	-48	–
	Extension	1	MFLX05637-	-32	-34	-36	-38	-40	-42	-44	-48	–
Puri-Clear LL	2-STOP	12	MFLX95663-	-32	-34	-36	-38	-40	-42	-44	-48	-49
	Extension	1	MFLX95679-	-32	-34	-36	-38	-40	-42	-44	-48	-49
	Flared	12	MFLX97616-	–	–	–	–	–	–	–	–	–
Versilon™ 2001	2-STOP	12	MFLX96465-	–	–	-36	–	–	-42	–	-48	–
	Extension	12	MFLX96467-	–	–	-36	–	–	-42	–	-48	–
Solva	2-STOP	12	MFLX95606-	-32	-34	-36	-38	-40	-42	-44	-48	-49
	Extension	1	MFLX95712-	-32	-34	-36	-38	-40	-42	-44	-48	–
	Flared	12	MFLX95598-	–	–	–	–	–	–	–	–	–

Tube Splicing



Required Items:

- A length of extension tubing. **NOTE:** The tubes being joined should be made of similar material and have the same inner and outer diameters.
 - A small piece of tubing approximately 5cm long. **NOTE:** This piece of tubing should have an inner diameter approximately equal to the outer diameter of the tubes being joined and be made of similar material.
 - Suitable solvent or sealant. **NOTE:** Use a ketone type solvent to splice Tygon® or Viton® tubing, an RTV adhesive for silicone tubing, and tetrahydrofuran for PharMed® tubing.
1. Bring together one end of a length of color-coded tubing (A) and one end of a length of extension tubing (B).
 2. Center the small 5cm piece of tubing (C) over the ends of the two tubes being joined. **NOTE:** This is to provide a guide when applying the solvent. Do not insert the tubes (A and B) into the small piece of tubing (C) until instructed in the next step.
 3. With the small piece of tubing (C) centered over the joint, apply solvent or sealant to the outside of tubing (B) and slide tubing (C) onto (B). Repeat the process for tubing (A) to join the tubing permanently. If future tubing changes are necessary, then apply solvent or sealant only to tubing (B) and (C).

Tube Loading



CAUTION: Turn the pump off before removing or installing cassettes and tubing. Fingers or loose clothing could get caught in the pump rollers.

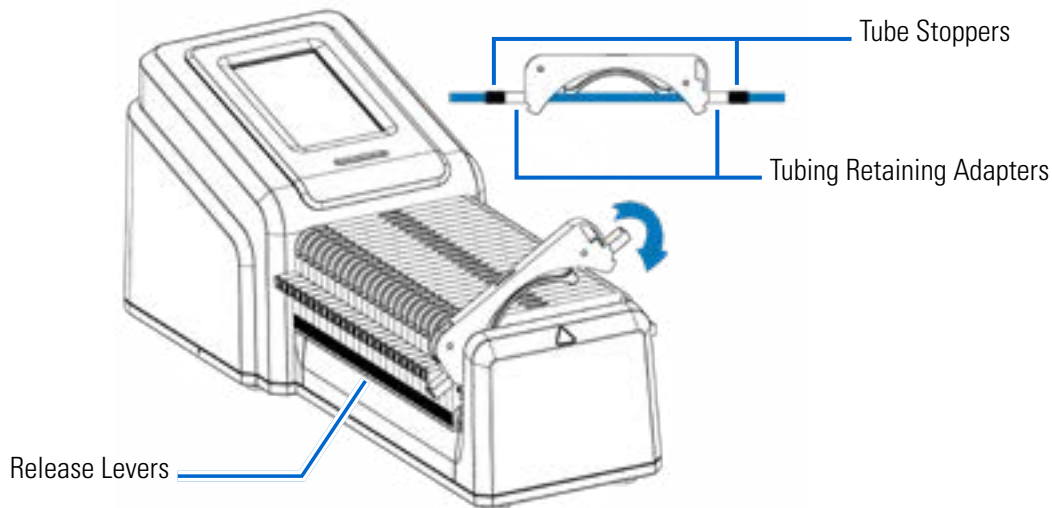
The IPC pumps use Click'n'go tube cassettes for easy loading and unloading, and to allow for tubes with different diameters and materials to be used on the same pump. See also "[Accessories](#)" on page 5-2.

NOTE:

- Reset the Tube Life Timer when changing tubes (see "[Tube Life Timer](#)" on page 2-12).
- Check to confirm that the rollers are clean and free of defects.

- Tubing should be clean and routed so that the bend radii are at a minimum of four (4) times the outside tube diameter and are as short as possible.
- Use the appropriate tube diameter for the required flow rate and viscosity.

Loading Tubing



1. Switch off the pump.
2. Press the release levers located on each side of the pump and then lift the cassette from the pump.
3. If required, insert a tubing retaining adapter into each of the slots located on the sides of the cassette, ensuring the adapter is securely seated and sitting level with the bottom of the slot. **NOTE:** Tubing retaining adapters are supplied with the pump and need to be fitted to the cassettes before loading onto the pump.
4. Insert the two-stop tubing into the cassette:
 - a. Insert the tube into one of the adapters so that the first tube stopper is level with the end of the adapter.
 - b. Allow the tubing to hang freely to prevent twisting.
 - c. Carefully stretch the tubing through the remaining adapter so the second tube stopper is level with the end of the adapter.
5. Insert the cassette back into the pump ensuring the notches on both sides of the cassette click into place. **CAUTION:** Before operating the pump, all cassettes must be loaded into the pump.

NOTE:

- Once the tube has been loaded, the new tube size will need to be selected from the Tube Size Screen. The Tube Size Screen can be accessed from any of the Mode Run Screens.
- It is recommended that new tubing is calibrated to ensure accurate flow rate and fluid dispensing (for further information see "[Tube Calibration](#)" on page 2-22).
- It is recommended that new tubing is recalibrated after 3-4 hours of operation to ensure accuracy is maintained (for further information see "[Tube Calibration](#)" on page 2-22).

- Over time, wear on tubing from normal pump operation can affect flow rate and fluid dispensing. Recalibrate tubing regularly to maintain accuracy (for further information see "[Tube Calibration](#)" on page 2-22).
- When the pump is idle it is recommended that you release pressure from the tubing to protect it from unnecessary strain and prolong its service life. **To release tube pressure:** Press one of the cassette release levers and raise the cassette slightly so that the tubing is released from the roller-head. **CAUTION:** Siphoning Effect: When pressure is released from the tubing, fluid can flow back to the reservoir.
- For applications with a high differential pressure (1 bar / 15 psi), the use of a cassette with a pressure lever is recommended. **NOTE:** See "[Accessories](#)" on page 5-2 for information on available optional pressure lever cassettes.

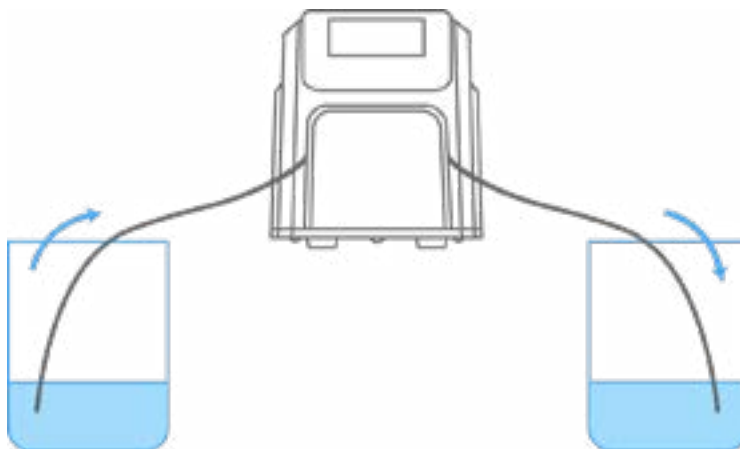
PRIMING THE PUMP

It is recommended that you prime the pump before use. Priming the pump draws fluid through the tubing and eliminates air pockets from the system.





CAUTION: Turn the pump off before removing or installing tubing. Fingers or loose clothing could get caught in the pump rollers.

Example Flow System



To prime the pump:

1. If required, load the tubing into the cassette and pump (for further information see "[Tubing](#)" on page 2-13).
2. Insert the tube inlet into the supply fluid.
3. Insert the tube outlet into an appropriate container.
4. Switch the pump on using the power switch located at the rear of the pump. **NOTE:** If User Management is enabled you will be prompted for a username and password (For further information see "[User Management](#)" on page 2-9).
5. Navigate to the Continuous, Time or Volume Mode screens.
6. Press and hold PRIME  until there are no bubbles visible in the tubing, or until consistent fluid is dispensed from the tube. Priming will stop when PRIME  is released.

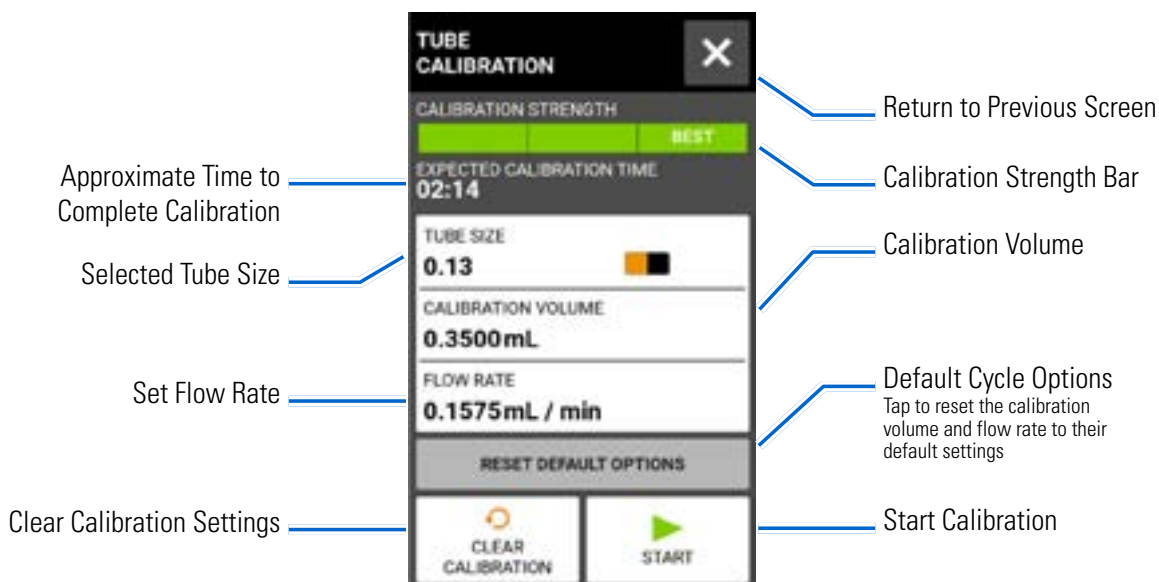
TUBE CALIBRATION

To ensure accurate dispensing of fluids, tube calibration should be performed whenever fluids, flow rate, or tubing is changed. Tube calibration can be accessed from any of the Mode Run Screens.

NOTE:

- Over time, wear on tubing from normal pump operation can affect flow rate and fluid dispensing. Recalibrate tubing regularly to maintain accuracy.
- It is recommended that new tubing is recalibrated after 3-4 hours of operation to ensure flow rate and fluid dispensing accuracy is maintained.

Tube Calibration Screen

















General Preparation:

- Confirm the correct tubing has been selected and is properly loaded into the pump (for further information see "[Tubing](#)" on page 2-13).
- Confirm all fluids and containers are ready.

To calibrate tubing:






1. Insert the tube inlet into the supply fluid.
2. Insert the tube outlet into a suitable container. **NOTE:** The container should be graduated or placed on a scale for increased accuracy. If using a scale, an acceptable weight to volume conversion for water is: 1 gram = 1 mL.
3. Switch the pump on using the power switch located at the rear of the pump. **NOTE:** If User Management is enabled you will be prompted for a username and password (For further information see "[User Management](#)" on page 2-9).

4. Navigate to the Continuous, Time or Volume Mode Run screens.
5. Tap DIRECTION to select either clockwise  or counterclockwise  flow direction.
6. Press and hold PRIME  to prime the pump. Priming will stop when PRIME  is released.
7. Tap TUBE SIZE. The Tube Size Screen will be displayed.
 - a. Select the desired tube size from the list of available options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to previous screen.
8. Tap CALIBRATE . The Tube Calibration Screen will be displayed.
9. Tap CALIBRATION VOLUME. The Calibration Volume Screen will be displayed.
 - a. Enter the desired calibration volume using the onscreen keypad. **NOTE:** The default volume or greater will ensure the best calibration.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the previous screen.
10. Tap FLOW RATE. The Calibration Flow Rate Screen will be displayed.
 - a. Enter the desired flow rate using the onscreen keypad.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the previous screen. **NOTE:** The pump will adjust the displayed flow rate after calibration is complete.
11. Tap START  to begin calibration. **NOTE:** Calibration progress will be displayed on the touchscreen.
12. When calibration is complete use the onscreen keypad to enter the measured volume of fluid from the tube outlet container.
13. Tap CONFIRM  to complete calibration and return to the Mode Run Screen. Calibration Complete  should now be displayed to indicate that calibration has been completed for the current tube size, tube volume, and flow rate.

NOTE:

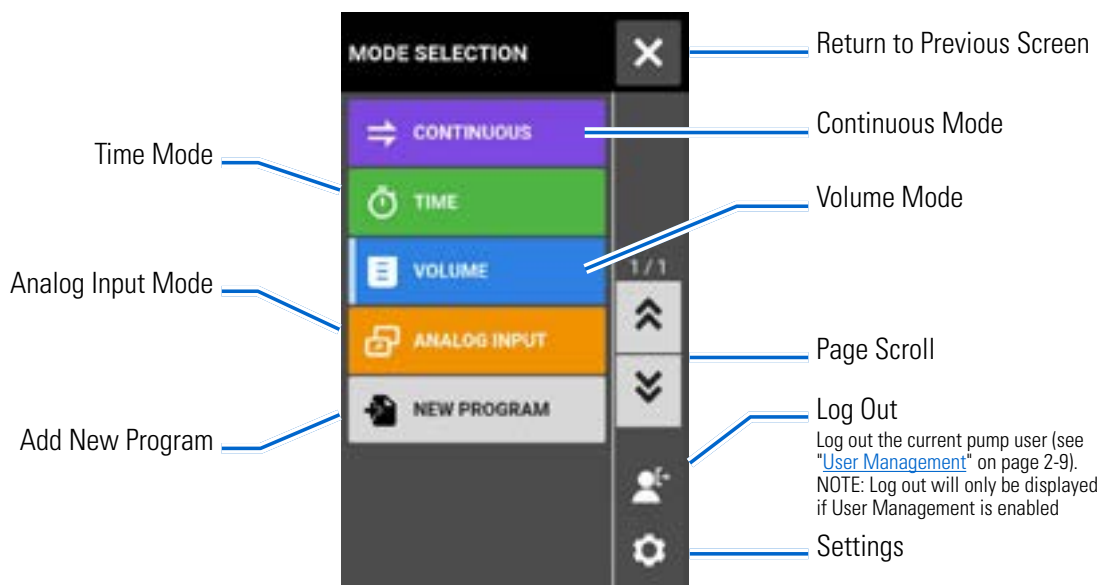
- The estimated accuracy for the selected calibration settings is shown in the Calibration Strength Bar on the Tube Calibration Screen. Calibration accuracy can be improved by using a larger calibration volume and/or altering the flow rate.
- Calibration settings are retained and transferred to other mode screens when entering or leaving the Tube Calibration Screen.
- If the pump is stopped during calibration the calibration will be discarded and the Mode Run Screen will be displayed. Empty the container before restarting the procedure.
- The time that tube calibration takes to complete is dependent on the selected flow rate. The expected calibration time is displayed on the touchscreen during calibration.
- Minimum and maximum flow rates will change after calibration due to a recalculation of the volume of fluid per pump revolution.
- Steps 9–13 can be repeated as necessary to optimize the accuracy of the tubing calibration.

SECTION 3: LOCAL OPERATION

	WARNING: Tube breakage may result in fluid being sprayed from the pump. Use appropriate measures to protect operator and equipment.
	CAUTION: Turn the pump off before removing or installing cassettes and tubing. Fingers or loose clothing could get caught in the pump rollers.
	CAUTION: To avoid injury from the pump rollers, ensure all cassettes are loaded onto the pump before operation.
	CAUTION: Hot Surface. Do not touch.
	CAUTION: To avoid electrical shock, the power cord protective grounding conductor must be connected to ground. Not for operation in wet locations as defined by EN61010-1.

MODE SELECTION SCREEN

The Mode Selection Screen allows access to the four basic operation modes (CONTINUOUS, TIME, VOLUME, and ANALOG INPUT) as well as the New Program Screen and user defined programs. The Mode Selection Screen can be accessed from any of the mode screens by tapping the MODE NAME BANNER.



Tap the desired mode or program to access individual mode or program screens.












CONTINUOUS MODE

In Continuous Mode the pump will operate at a selected rpm and/or flow rate until stopped by the user.

Continuous Mode Run Screen

The Continuous Mode Run Screen is accessed by selecting CONTINUOUS from the Mode Selection Screen.




- A. **MODE NAME BANNER:** Tap the Mode Name Banner to return to the Mode Selection Screen.
- B. **CUMULATIVE VOLUME:** Displays the current cumulative volume of fluid that has been pumped. **To reset the cumulative volume:** Tap CUMULATIVE VOLUME RESET , then tap CONFIRM  to reset the cumulative volume to zero, or CANCEL .
- C. **FLOW RATE:** Displays the current flow rate in the unit of measurement selected by the user. Tap to access the Flow Rate Screen.
- D. **CALIBRATE:** Tap to access the Calibration Screen (for further information see "[Tube Calibration](#)" on page 2-22). Once calibration has been completed for the current tube size Calibration Complete  will be displayed.
- E. **TUBE LIFE TIMER:** If enabled, the Tube Life Timer will display a countdown timer that tracks the operational life of the pump tubes. Tap to access the Tube Life Timer Screen (for further information see "[Tube Life Timer](#)" on page 2-12).
- F. **TUBE SIZE:** Tap to access the Tube Size Screen.
- G. **START/STOP:** Tap START to begin operation. Once operation has commenced STOP  will be displayed.
- H. **FLOW DIRECTION:** Tap DIRECTION to select either clockwise  or counterclockwise .
- I. **SCREEN LOCK:** Locking the screen disables all touchscreen functions. **To lock the screen:** Tap UNLOCKED . The icon will change to LOCKED . **To unlock the screen:** Tap LOCKED  and then tap CONFIRM. The icon will change to UNLOCKED .













- J. PRIME: Press and hold to prime the pump (for further information see "[Priming the Pump](#)" on page 2-21).
- K. SETTINGS: Tap to access the Settings Menu Screen (for further information see "[Settings](#)" on page 2-5).

Continuous Mode Operation

General Preparation:

- Confirm the correct tubing has been selected and is properly loaded into the pump (for further information see "[Tubing](#)" on page 2-13).
- Confirm all fluids and containers are ready.
- Switch the pump on using the power switch located at the rear of the pump. **NOTE:** If User Management is enabled you will be prompted for a username and password (For further information see "[User Management](#)" on page 2-9). The touchscreen display will revert to the previously used operation mode.
- Confirm that the tubing has been calibrated by checking that Calibration Complete  is displayed on the Continuous Mode Run Screen (for further information see "[Tube Calibration](#)" on page 2-22).
- If required, prime the pump before operation (for further information see "[Priming the Pump](#)" on page 2-21).

To operate the pump in Continuous Mode:



1. Tap CONTINUOUS from the Mode Selection Screen. The Continuous Mode Run Screen will be displayed.
2. If required, tap CUMULATIVE VOLUME RESET  to reset the display to zero.
3. Tap FLOW RATE. The Flow Rate Screen will be displayed.
 - a. Tap UNITS to access the Flow Units Screen and select the desired flow unit from the available list. **NOTE:** Tap SCROLL  to view additional unit options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Flow Rate Screen.
 - c. Tap FLOW and enter the desired flow rate (within the displayed range) using the onscreen keypad.
 - d. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Continuous Mode Run Screen.
4. Tap TUBE SIZE. The Tube Size Screen will be displayed.
 - a. Select the desired tube size from the list of available options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Continuous Mode Run Screen.
5. If required, tap CALIBRATE to calibrate the pump for the selected tube and flow rate.
6. Tap DIRECTION to select either clockwise  or counterclockwise  flow direction.
7. Tap START . The pump will commence operation at the flow rate and direction shown.
8. Tap STOP  when the pump operation is no longer required. **NOTE:** In Continuous Mode the pump will continue to operate at the displayed flow rate and direction until stopped.

Saving Continuous Mode Settings as a New Program


Changes made to mode parameters can be saved as a new program for easier access to frequently used settings.

NOTE: If User Management is enabled only users with authorization can create and modify programs (for further information see "[User Management](#)" on page 2-9).

To save mode parameters to a new program:

1. If required, edit the Continuous Mode settings as desired.
2. Tap MODE NAME BANNER to return to the Mode Selection Screen.
3. Tap NEW PROGRAM.
4. Tap CONTINUOUS. The Continuous New Program Screen will be displayed with the last settings used in the Continuous Mode.
5. Tap PROGRAM1. If required, delete the characters using the back arrow on the onscreen keypad and then enter the desired program name (up to 8 characters).
6. Tap CONFIRM  to save or DELETE  to cancel.

NOTE:

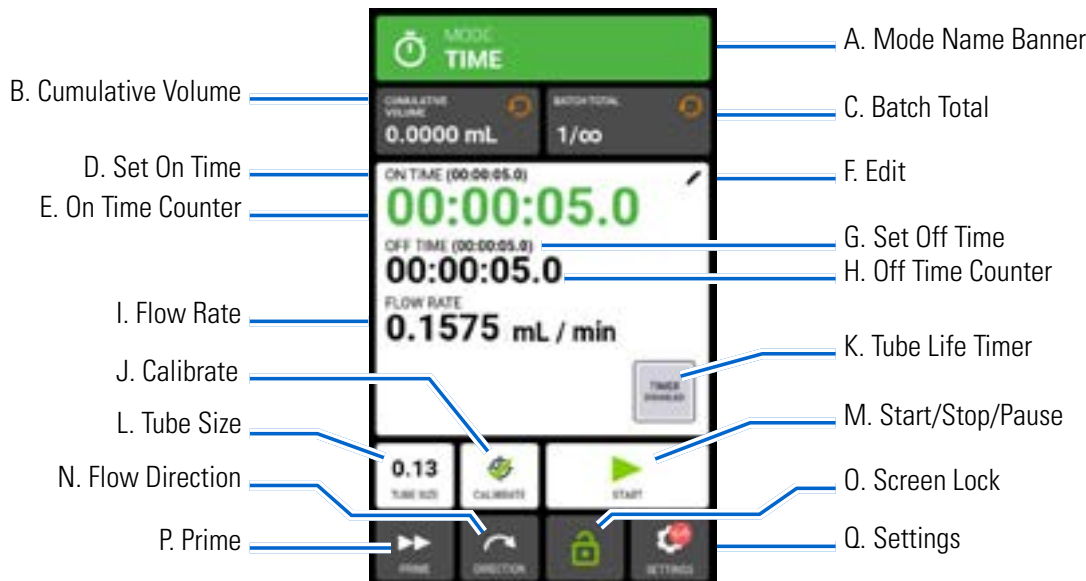
- Once saved, new programs are added in alphabetical order to the bottom of the Mode Selection Screen.
- If there are more programs stored than will fit on one screen, tapping SCROLL  will display additional pages.








TIME MODE

In Time Mode the pump will operate at a selected rpm and/or flow rate for a selected time and batch total. At the completion of the selected time or batch total the pump will automatically stop.

Time Mode Run Screen

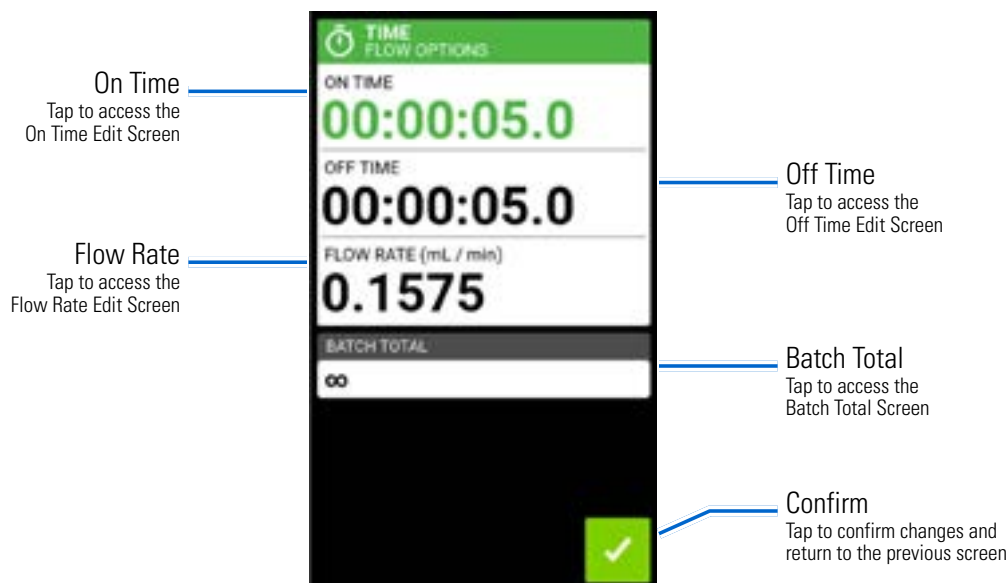
The Time Mode Run Screen is accessed by selecting TIME from the Mode Selection Screen.



- A. **MODE NAME BANNER:** Tap the Mode Name Banner to return to the Mode Selection Screen.
- B. **CUMULATIVE VOLUME:** Displays the current cumulative volume of fluid that has been pumped. **To reset the cumulative volume:** Tap CUMULATIVE VOLUME RESET , then tap CONFIRM  to reset the cumulative volume to zero, or CANCEL .
- C. **BATCH TOTAL:** Displays the number of dispenses that have been completed in the current batch. **To reset the batch total:** Tap BATCH RESET , then tap CONFIRM  to reset the batch total to zero, or CANCEL .
- D. **SET ON TIME:** Displays the set dispense operation time.
- E. **ON TIME COUNTER:** Displays a countdown of the set dispense time during operation.
- F. **EDIT:** Tap to access the Flow Options Screen. From the Flow Options Screen changes can be made to flow rate, flow units, on time, off time, and batch total.
- G. **SET OFF TIME:** Displays the set duration of time the pump pauses between each dispense operation.
- H. **OFF TIME COUNTER:** Displays a countdown of the set off time during operation.
- I. **FLOW RATE:** Displays the current flow rate in the unit of measurement selected by the user.
- J. **CALIBRATE:** Tap to access the Calibration Screen (for further information see "[Tube Calibration](#)" on page 2-22). Once calibration has been completed for the current tube size Calibration Complete  will be displayed.

- K. TUBE LIFE TIMER: If enabled, the Tube Life Timer will display a countdown timer that tracks the operational life of the pump tubes. Tap to access the Tube Life Timer Screen (for further information see "[Tube Life Timer](#)" on page 2-12).
- L. TUBE SIZE: Tap to access the Tube Size Screen.
- M. START/STOP/PAUSE: During operation, the display will change from START ► to PAUSE || STOP/RESET ■.
- N. FLOW DIRECTION: Tap DIRECTION to select either clockwise ↻ or counterclockwise ↺ flow direction.
- O. SCREEN LOCK: Locking the screen disables all touchscreen functions. **To lock the screen:** Tap UNLOCKED 🗝. The icon will change to LOCKED 🔒. **To unlock the screen:** Tap LOCKED 🔒 and then tap CONFIRM. The icon will change to UNLOCKED 🗝.
- P. PRIME: Press and hold to prime the pump (for further information see "[Priming the Pump](#)" on page 2-21).
- Q. SETTINGS: Tap to access the Settings Menu Screen (for further information see "[Settings](#)" on page 2-5).


Time Flow Options Screen
























Time Mode Operation



General Preparation:

- Confirm the correct tubing has been selected and is properly loaded into the cassette and pump (for further information see "[Tubing](#)" on page 2-13).
- Confirm all fluids and containers are ready.
- Switch the pump on using the power switch located at the rear of the pump. **NOTE:** If User Management is enabled you will be prompted for a username and password (For further information see "[User Management](#)" on page 2-9). The touchscreen display will revert to the previously used operation mode.

- Confirm that the tubing has been calibrated by checking that Calibration Complete  is displayed on the Time Mode Run Screen (for further information see "[Tube Calibration](#)" on page 2-22).
- If required, prime the pump before operation (for further information see "[Priming the Pump](#)" on page 2-21).

To operate the pump in Time Mode:



1. Tap TIME from the Mode Selection Screen. The Time Mode Run Screen will be displayed.
2. Tap EDIT  to access the Time Flow Options Screen.
3. Tap ON TIME to set the amount of time for each pump operation. The On Time Edit Screen will be displayed.
 - a. Tap HR, MIN, SEC or TENTHS and enter the desired time using the onscreen keypad.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Time Flow Options Screen.
4. Tap OFF TIME to set the amount of time the pump will pause between each operation. The Off Time Edit Screen will be displayed. **NOTE:** If the off time is set to 0 (zero) the pump will require a start input (from either the touchscreen or a remote input) to start the next dispense.
 - a. Tap HR, MIN, SEC or TENTHS and enter the desired time using the onscreen keypad.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Time Flow Options Screen.
5. Tap FLOW RATE. The Flow Rate Edit Screen will be displayed.
 - a. Tap UNITS to access the Flow Units Screen and select the desired flow unit from the available list. **NOTE:** Tap SCROLL  to view additional unit options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the previous screen.
 - c. Enter the desired flow rate using the onscreen keypad.
 - d. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Time Flow Options Screen.
6. Tap BATCH TOTAL to adjust the number of dispenses in each batch cycle. The Batch Total Screen will be displayed.
 - a. Enter the desired number of dispenses in a batch using the onscreen keypad. **NOTE:** If required, tap INFINITE  to select an infinite number of dispense cycles. If infinite is selected, the pump will run continuously.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Time Flow Options Screen.
7. Tap CONFIRM  to return to the Time Mode Run Screen.
8. Tap TUBE SIZE. The Tube Size Screen will be displayed.
 - a. Select the desired tube size from the list of available options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Time Mode Run Screen.
9. Tap DIRECTION to select either clockwise  or counterclockwise  flow direction.
10. Tap START . The pump will now operate until the batch total is completed or until PAUSE  or STOP  is tapped.

11. If required, adjustments can be made to any of the Time Mode option settings during operation. To make any adjustments:
 - a. Tap PAUSE  and then repeat steps 2–9 above.
 - b. Tap CONTINUE  to complete the pump operation once the desired changes have been made.


Saving Time Mode Settings as a New Program

Changes made to mode parameters can be saved as a new program for easier access to frequently used settings. **NOTE:** If User Management is enabled only users with authorization can create and modify programs (for further information see "[User Management](#)" on page 2-9).

To save mode parameters to a new program:

1. If required, edit the Time Mode settings as desired.
2. Tap MODE NAME BANNER to return to the Mode Selection Screen.
3. Tap NEW PROGRAM.
4. Tap TIME. The Time New Program Screen will be displayed with the last settings used in the Time Mode.
5. Tap PROGRAM1. If required, delete the characters using the back arrow on the onscreen keypad and then enter the desired program name (up to 8 characters).
6. Tap CONFIRM  to save or DELETE  to cancel.

NOTE:

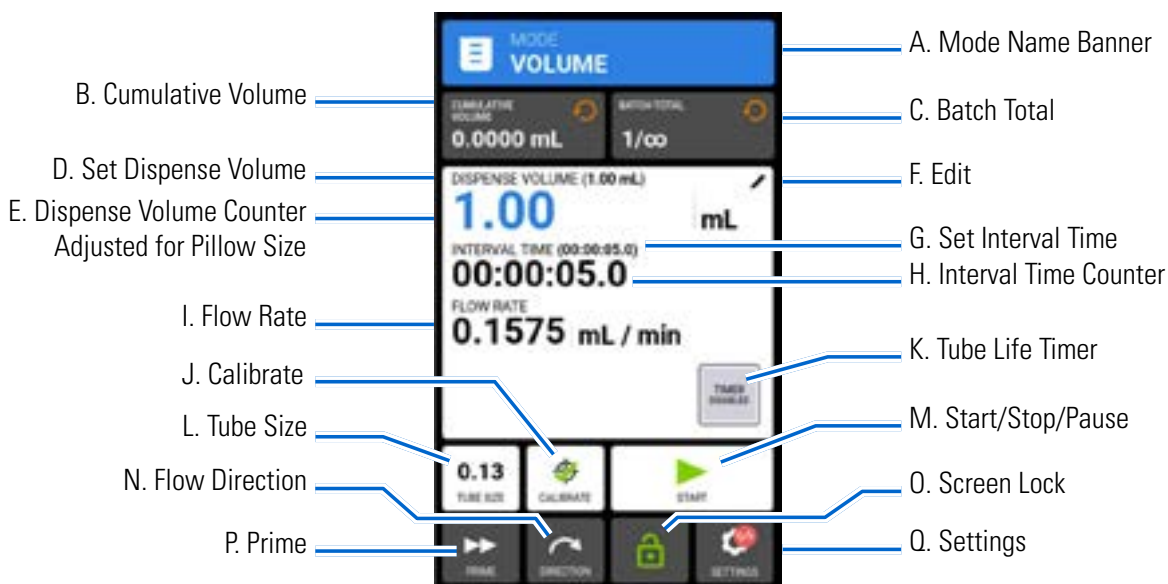
- Once saved, new programs are added in alphabetical order to the bottom of the Mode Selection Screen.
- If there are more programs stored than will fit on one screen, tapping SCROLL  will display additional pages.








VOLUME MODE

In Volume Mode the pump will operate at a selected rpm and/or flow rate until a selected volume of fluid has been pumped. When the selected volume has been dispensed the pump will automatically stop.

Volume Mode Run Screen

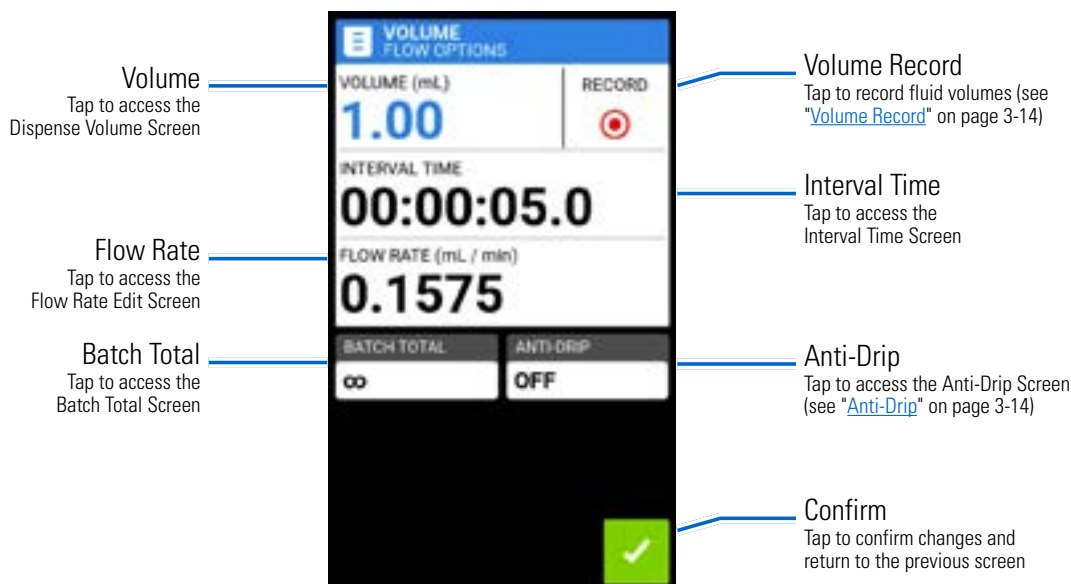
The Volume Mode Run Screen is accessed by selecting VOLUME from the Mode Selection Screen.



- A. **MODE NAME BANNER:** Tap the Mode Name Banner to return to the Mode Selection Screen.
- B. **CUMULATIVE VOLUME:** Displays the current cumulative volume of fluid that has been pumped. **To reset the cumulative volume:** Tap CUMULATIVE VOLUME RESET , then tap CONFIRM  to reset the cumulative volume to zero, or CANCEL .
- C. **BATCH TOTAL:** Displays the number of dispenses that have been completed in the current batch. **To reset the batch total:** Tap BATCH RESET , then tap CONFIRM  to reset the batch total to zero, or CANCEL .
- D. **SET DISPENSE VOLUME:** Displays the selected volume of fluid for dispensing.
- E. **DISPENSE VOLUME COUNTER:** Displays a countdown of the fluid volume during operation.
- F. **EDIT:** Tap to access the Flow Options Screen. From the Flow Options Screen adjustments can be made to dispense volume, interval time, flow rate, anti-drip functions, and batch total. **NOTE:** Edit is inactive during operation.
- G. **SET INTERVAL TIME:** Displays the set time the pump pauses between dispenses.
- H. **INTERVAL TIME COUNTER:** Displays a countdown of the set interval time during operation.
- I. **FLOW RATE:** Displays the current flow rate in the unit of measurement selected by the user.
- J. **CALIBRATE:** Tap to access the Calibration Screen (for further information see "[Tube Calibration](#)" on page 2-22). Once calibration has been completed for the current tube size, Calibration Complete  will be displayed.

- K. TUBE LIFE TIMER: If enabled, the Tube Life Timer will display a countdown timer that tracks the operational life of the pump tubes. Tap to access the Tube Life Timer Screen (for further information see "[Tube Life Timer](#)" on page 2-12).
- L. TUBE SIZE: Tap to access the Tube Size Screen.
- M. START/STOP/PAUSE: During operation, the display will change from START ► to PAUSE || STOP/RESET ■.
- N. FLOW DIRECTION: Tap DIRECTION to select either clockwise ↻ or counterclockwise ↺ flow direction.
- O. SCREEN LOCK: Locking the screen disables all touchscreen functions. **To lock the screen:** Tap UNLOCKED 🗝. The icon will change to LOCKED 🔒. **To unlock the screen:** Tap LOCKED 🔒 and then tap CONFIRM. The icon will change to UNLOCKED 🗝.
- P. PRIME: Press and hold to prime the pump (for further information see "[Priming the Pump](#)" on page 2-21).
- Q. SETTINGS: Tap to access the Settings Menu Screen (for further information see "[Settings](#)" on page 2-5).


Volume Flow Options Screen



















Volume Mode Operation










General Preparation:

- Confirm the correct tubing has been selected and is properly loaded into the cassette and pump (for further information see "[Tubing](#)" on page 2-13).
- Confirm all fluids and containers are ready.
- Switch the pump on using the power switch located at the rear of the pump. **NOTE:** If User Management is enabled you will be prompted for a username and password (For further information see "[User Management](#)" on page 2-9). The touchscreen display will revert to the previously used operation mode.

- Confirm that the tubing has been calibrated by checking that Calibration Complete  is displayed on the Volume Mode Run Screen (for further information see "[Tube Calibration](#)" on page 2-22).
- If required, prime the pump before operation (for further information see "[Priming the Pump](#)" on page 2-21).

To operate the pump in Volume Mode:

1. Tap VOLUME from the Mode Selection Screen. The Volume Mode Run Screen will be displayed.
2. Tap EDIT  to access the Volume Flow Options Screen.
3. Tap VOLUME. The Dispense Volume Screen will be displayed.
 - a. Enter the desired volume using the onscreen keypad. **NOTE:** If the volume of fluid is unknown the pump can record fluid dispense volumes (for further information see "[Volume Record](#)" on page 3-14).
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume Flow Options Screen.
4. Tap INTERVAL TIME to set the amount of time the pump will pause between each operation. The Interval Time Screen will be displayed. **NOTE:** If the interval time is set to 0 (zero) the pump will require a start input (from either the touchscreen or a remote input) to start the next dispense.
 - a. Tap HR, MIN, SEC or TENTHS and enter the desired time using the onscreen keypad.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume Flow Options Screen.
5. Tap FLOW RATE. The Flow Rate Edit Screen will be displayed.
 - a. Tap UNITS to access the Flow Units Screen and select the desired flow unit from the available list. **NOTE:** Tap SCROLL  to view additional unit options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the previous screen.
 - c. Enter the desired flow rate using the onscreen keypad.
 - d. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume Flow Options Screen.
6. Tap BATCH TOTAL to adjust the number of dispenses in each batch cycle. The Batch Total Screen will be displayed.
 - a. Enter the desired number of dispenses in a batch using the onscreen keypad. **NOTE:** If required, tap INFINITE  to select an infinite number of dispense cycles. If infinite is selected, the pump will run continuously.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume Flow Options Screen.
7. If required, tap ANTI-DRIP. The Anti-Drip Screen will be displayed (for further information see "[Pillow Volume](#)" on page 3-12).
 - a. Tap ON or OFF to enable or disable the Anti-Drip feature.
 - b. Enter the desired degrees of reverse rotation using + and -.
 - c. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume Flow Options Screen.
8. Tap CONFIRM  to return to the Volume Mode Run Screen.



9. Tap TUBE SIZE. The Tube Size Screen will be displayed.
 - a. Select the desired tube size from the list of available options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume Mode Run Screen.
10. Tap DIRECTION to select either clockwise  or counterclockwise  flow direction.
11. Tap START . The pump will now operate until the batch total is completed or until PAUSE  or STOP  is tapped.
12. If required, adjustments can be made to any of the Volume Mode option settings during operation. To make any adjustments:
 - a. Tap PAUSE  and then repeat steps 2–10 above.
 - b. Tap CONTINUE  to complete the pump operation once the desired changes have been made.

Saving Volume Mode Settings as a New Program


Changes made to mode parameters can be saved as a new program for easier access to frequently used settings.

NOTE: If User Management is enabled only users with authorization can create and modify programs (for further information see "[User Management](#)" on page 2-9).

To save mode parameters to a new program:

1. If required, edit the Volume Mode settings as desired.
2. Tap MODE NAME BANNER to return to the Mode Selection Screen.
3. Tap NEW PROGRAM.
4. Tap VOLUME. The Volume New Program Screen will be displayed with the last settings used in the Volume Mode.
5. Tap PROGRAM1. If required, delete the characters using the back arrow on the onscreen keypad and then enter the desired program name (up to 8 characters).
6. Tap CONFIRM  to save or DELETE  to cancel.

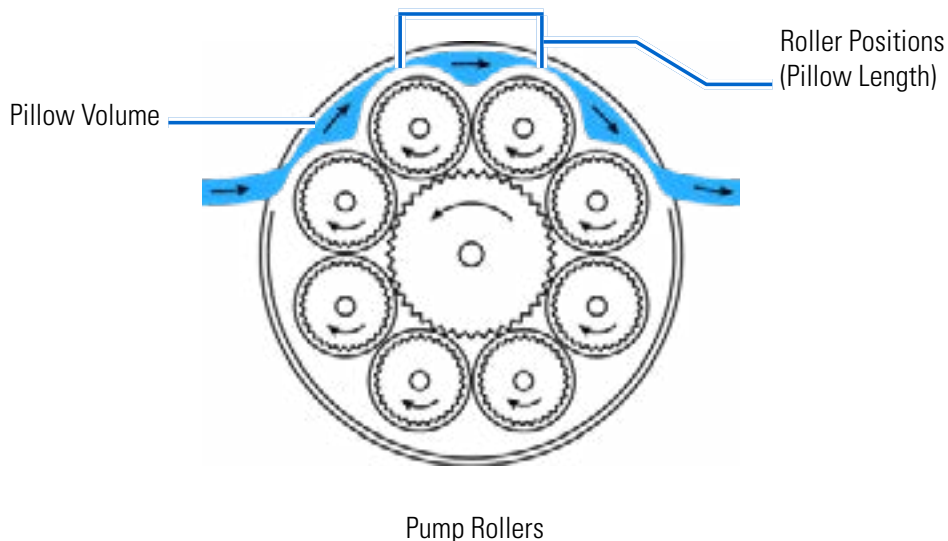
NOTE:

- Once saved, new programs are added in alphabetical order to the bottom of the Mode Selection Screen.
- If there are more programs stored than will fit on one screen, tapping SCROLL  will display additional pages.

Pillow Volume

The IPC pumps have an integrated roller positioning system to improve repeatability and precision. When the pump is stopped during operation, it will complete dispensing a full pillow volume before stopping. The pillow volume is the volume of fluid between two roller positions. The IPC pump head features an eight-roller design and therefore each pillow is 1/8 of a full revolution. All dispenses are performed in increments of this pillow volume. For volumes that fall outside of this range, the pump will automatically round up or down to the nearest pillow length to match most closely the desired dispense volume.

For optimal accuracy and precision, choose a tubing inner diameter (ID) for a dispense volume of at least 8 revolutions (64 pillows), as shown in the table on the following page.






Recommended Dispense Values Table

Tube ID	Color-Code	Uncalibrated ml/rev	Nominal Volume Per Pillow (ml) (8 pillows per rev)		Recommended Minimum Dispense Volume for Best Accuracy	
			ml	µl	ml	µl
0.13		0.0035	0.00044	0.44	0.03	28.4
0.19		0.0060	0.00075	0.75	0.05	48.0
0.25		0.0091	0.00114	1.14	0.07	72.7
0.38		0.0200	0.00250	2.50	0.16	160.0
0.51		0.0345	0.00432	4.32	0.28	276.4
0.64		0.0527	0.00659	6.59	0.42	421.8
0.76		0.0736	0.00920	9.20	0.59	589.1
0.89		0.100	0.0125	12.50	0.80	800.0
1.02		0.127	0.0159	15.91	1.02	1018.2
1.14		0.155	0.0193	19.32	1.24	1236.4
1.33		0.200	0.0250	25.00	1.60	1600.0
1.42		0.236	0.0295	29.55	1.89	1890.9
1.52		0.273	0.0341	34.09	2.18	2181.8
1.65		0.318	0.0398	39.77	2.55	2545.5
1.85		0.391	0.0489	48.86	3.13	3127.3
2.03		0.473	0.0591	59.09	3.78	3781.8
2.29		0.573	0.0716	71.59	4.58	4581.8
2.79		0.809	0.1011	101.14	6.47	6472.7
3.17		1.000	0.1250	125.00	8.00	8000.0

Anti-Drip

The Anti-Drip feature minimizes drips after fluid has been dispensed by reversing the pump direction to draw fluid back from the end of the tubing. Fluid drip can be caused by numerous factors, including tube size, tube orientation, and the viscosity of the fluid.


To enable or disable the Anti-Drip feature:

1. Tap VOLUME from the Mode Selection Screen. The Volume Mode Screen will be displayed.
2. Tap EDIT . The Volume Flow Options Screen will be displayed.
3. Tap ANTI-DRIP. The Anti-Drip Screen will be displayed.
4. Tap ON or OFF to enable or disable ANTI-DRIP.
5. Enter the desired degrees of reverse rotation using + and -.
6. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume Mode Screen.










Volume Record

The Volume Record feature can be used to record unknown fluid volumes.

General Preparation:

- Confirm the correct tubing has been selected and is properly loaded into the pump (for further information see "[Tubing](#)" on page 2-13).
- Confirm all fluids and containers are ready.
- Confirm that the tubing has been calibrated by checking that Calibration Complete  is displayed on the Volume Mode Run Screen (for further information see "[Tube Calibration](#)" on page 2-22).
- If required, prime the pump before operation (for further information see "[Priming the Pump](#)" on page 2-21).

To record a fluid volume:

1. Tap VOLUME from the Mode Selection Screen. The Volume Mode Run Screen will be displayed.
2. Tap EDIT  to access the Volume Flow Options Screen.
3. Tap RECORD . The Record Dispense Screen will be displayed.
4. Tap FLOW RATE to make adjustments to the flow rate. The Flow Rate Screen will be displayed.
 - a. Enter the desired flow rate using the onscreen keypad.
 - b. Tap UNITS to access the Flow Units Screen and select the desired flow unit from the available list.
NOTE: Tap SCROLL  to view additional unit options.
 - c. Tap CONFIRM  to save changes or CANCEL  to discard changes and return to the Flow Rate Screen.
 - d. Tap CONFIRM  to save changes or CANCEL  to discard changes and return to the Record Dispense Screen.
5. Tap START . The pump will now begin operation while recording the fluid volume.
6. If required, adjustments can be made to flow rate during operation. To make adjustments:
 - a. Tap STOP  and then repeat step 4 above.

- b. Tap START ► to complete the pump operation once the desired changes have been made. **NOTE:** If required, tap STOP ■ and then CANCEL ✕ to discard recording and return to the Volume Flow Options Screen.
7. Tap STOP ■ when the desired volume of fluid has been pumped. The recorded dispense volume will now be displayed under VOLUME.
8. Tap CONFIRM ✓ to save or CANCEL ✕ to discard recording and return to the Volume Flow Options Screen. If saved, the recorded dispense volume will now be displayed under VOLUME.
9. Tap CONFIRM ✓ . The Volume Mode Run Screen will be displayed.












CUSTOM PROGRAM MODES

Custom programs allow users to create easily accessible programs for frequently used pump mode settings.


NOTE: If User Management is enabled only users with authorization can create and modify programs (for further information see "[User Management](#)" on page 2-9).

Adding a New Program: Continuous Mode

To add a new Continuous Mode program:



1. Tap NEW PROGRAM from the Mode Selection Screen. The New Program Screen will be displayed.
2. Tap CONTINUOUS. The Continuous New Program Screen will be displayed.
3. Tap PROGRAM1. If required, delete the characters using the back arrow on the onscreen keypad and then enter the desired program name (up to 8 characters).
4. Tap FLOW RATE to access the Flow Rate Screen.
 - a. Tap UNITS to access the Flow Units Screen and select the desired flow unit from the available list.
NOTE: Tap SCROLL  to view additional unit options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Flow Rate Screen.
 - c. Enter the desired flow rate using the onscreen keypad.
 - d. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Continuous New Program Screen.
5. Tap TUBE SIZE. The Tube Size Screen will be displayed.
 - a. Select the desired tube size from the list of available options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Continuous New Program Screen.
6. Tap DIRECTION to select either clockwise  or counterclockwise  flow direction.
7. Tap CONFIRM  to save or DELETE  to cancel..

















NOTE:

- Once saved, new programs are added in alphabetical order to the bottom of the Mode Selection Screen.
- If there are more programs stored than will fit on one screen, tapping SCROLL  will display additional pages.


Adding a New Program: Time Mode

To add a new Time Mode program:

1. Tap NEW PROGRAM from the Mode Selection Screen. The New Program Screen will be displayed.
2. Tap TIME. The Time New Program Screen will be displayed.
3. Tap PROGRAM1. If required, delete the characters using the back arrow on the onscreen keypad and then enter the desired program name (up to 8 characters).
4. Tap ON TIME to set the amount of time for each pump operation. The On Time Edit Screen will be displayed.
 - a. Tap HR, MIN, SEC or TENTHS and enter the desired time using the onscreen keypad.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Time New Program Screen.

5. Tap OFF TIME to set the amount of time the pump will pause between each operation. The Off Time Edit Screen will be displayed. **NOTE:** If the off time is set to 0 (zero) the pump will require a start input from the touchscreen to start the next dispense.
 - a. Tap HR, MIN, SEC or TENTHS and enter the desired time using the onscreen keypad.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Time New Program Screen.
6. Tap FLOW RATE. The Flow Rate Screen will be displayed.
 - a. Tap UNITS to access the Flow Units Screen and select the desired flow unit from the available list. **NOTE:** Tap SCROLL  to view additional unit options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the previous screen.
 - c. Enter the desired flow rate using the onscreen keypad.
 - d. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Time New Program Screen.
7. Tap TUBE SIZE. The Tube Size Screen will be displayed.
 - a. Select the desired tube size from the list of available options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Time New Program Screen.
8. Tap DIRECTION to select either clockwise  or counterclockwise  flow direction.
9. Tap BATCH TOTAL to adjust the number of dispenses in each batch cycle. The Batch Total Screen will be displayed.
 - a. Enter the desired number of dispenses in a batch using the onscreen keypad. **NOTE:** If required, tap INFINITE  to select an infinite number of dispense cycles. If infinite is selected, the pump will run continuously.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Time New Program Screen.
10. Tap CONFIRM  to save or DELETE  to cancel.





















NOTE:

- Once saved, new programs are added in alphabetical order to the bottom of the Mode Selection Screen.
- If there are more programs stored than will fit on one screen, tapping SCROLL  will display additional pages.


Adding a New Program: Volume Mode

To add a new Volume Mode program:

1. Tap NEW PROGRAM from the Mode Selection Screen. The New Program Screen will be displayed.
2. Tap VOLUME. The Volume New Program Screen will be displayed.
3. Tap PROGRAM1. If required, delete the characters using the back arrow on the onscreen keypad and then enter the desired program name (up to 8 characters).
4. Tap VOLUME. The Dispense Volume Screen will be displayed.
 - a. Enter the desired volume using the onscreen keypad. **NOTE:** If the volume of fluid is unknown the pump can record fluid dispense volumes (for further information see "[Volume Record](#)" on page 3-14).









- b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume New Program Screen.
5. Tap INTERVAL TIME to set the amount of time the pump will pause between each operation. The Interval Time Screen will be displayed. **NOTE:** If the interval time is set to 0 (zero) the pump will require a start input from the touchscreen to start the next dispense.
 - a. Tap HR, MIN, SEC or TENTHS and enter the desired time using the onscreen keypad.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume New Program Screen.
6. Tap FLOW RATE. The Flow Rate Edit Screen will be displayed.
 - a. Tap UNITS to access the Flow Units Screen and select the desired flow unit from the available list. **NOTE:** Tap SCROLL  to view additional unit options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the previous screen.
 - c. Enter the desired flow rate using the onscreen keypad.
 - d. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume New Program Screen.
7. Tap TUBE SIZE. The Tube Size Screen will be displayed.
 - a. Select the desired tube size from the list of available options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume New Program Screen.
8. Tap DIRECTION to select either clockwise  or counterclockwise  flow direction.
9. Tap BATCH TOTAL to adjust the number of dispenses in each batch cycle. The Batch Total Screen will be displayed.
 - a. Enter the desired number of dispenses in a batch using the onscreen keypad. **NOTE:** If required, tap INFINITE  to select an infinite number of dispense cycles. If infinite is selected, the pump will run continuously.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume New Program Screen.
10. If required, tap ANTI-DRIP. The Anti-Drip Screen will be displayed (for further information see "[Pillow Volume](#)" on page 3-12).
 - a. Tap ON or OFF to enable or disable the Anti-Drip feature.
 - b. Enter the desired degrees of reverse rotation using + and -.
 - c. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Volume New Program Screen.
11. Tap CONFIRM  to save or DELETE  to cancel.

NOTE:


- Once saved, new programs are added in alphabetical order to the bottom of the Mode Selection Screen.
- If there are more programs stored than will fit on one screen, tapping SCROLL  will display additional pages.

Adding a New Program: Analog Input Mode


To add a new Analog Mode program:

1. Tap NEW PROGRAM from the Mode Selection Screen. The New Program Screen will be displayed.
2. Tap ANALOG INPUT. The Analog Input New Program Screen will be displayed.
3. Tap PROGRAM1. If required, delete the characters using the back arrow on the onscreen keypad and then enter the desired program name (up to 8 characters).
4. Tap INPUT. The Analog Type Screen will be displayed.
5. Tap the desired analog type from the available list.
6. If using either ANALOG: VOLTAGE or ANALOG: CURRENT:
 - a. Select the desired current or voltage operating range from the available list.
 - b. Tap CONFIRM  to save or CANCEL  to cancel and return to the Analog Input New Program Screen.
7. Tap TUBE SIZE. The Tube Size Screen will be displayed.
 - a. Select the desired tube size from the list of available options.
 - b. Tap CONFIRM  to save or CANCEL  to discard changes and return to the Analog Input New Program Screen.
8. Tap DIRECTION to select either clockwise  or counterclockwise  flow direction.
9. Tap CONFIRM  to save or DELETE  to cancel.


NOTE:

- Once saved, new programs are added in alphabetical order to the bottom of the Mode Selection Screen.
- If there are more programs stored than will fit on one screen, tapping SCROLL  will display additional pages.




Using Program Modes

Custom programs will appear in alphabetical order at the bottom of the Mode Selection Screen. If there are more programs stored than will fit on one screen, tapping SCROLL  will display additional pages.


General Preparation:

- Confirm the correct tubing has been selected and is properly loaded into the pump (for further information see "[Tubing](#)" on page 2-13).
- Confirm all fluids and containers are ready.
- Switch the pump on using the power switch located at the rear of the pump. **NOTE:** If User Management is enabled you will be prompted for a username and password (For further information see "[User Management](#)" on page 2-9). The touchscreen display will revert to the previously used operation mode.
- Confirm that the tubing has been calibrated by checking that Calibration Complete  is displayed on the Mode Run Screen (for further information see "[Tube Calibration](#)" on page 2-22).
- If required, prime the pump before operation (for further information see "[Priming the Pump](#)" on page 2-21).

To use a program:

1. Select the desired program from the Mode Selection Screen. The Program Run Screen will be displayed.
2. Tap START  to begin the pump operation using the displayed program settings.
3. If required, Tap PAUSE  or STOP  during operation. **NOTE:** The pump cannot be paused during Continuous Mode operation.



NOTE:

- Tap EDIT  to view the settings of the selected program.
- Individual settings cannot be edited from the Program Run Screen.

Editing a Program

NOTE: If User Management is enabled only users with authorization can create and modify programs (for further information see "[User Management](#)" on page 2-9).

To edit a program:

1. Tap EDIT , located next to the desired program name on the Mode Selection Screen or from any of the Program Run Screens (**NOTE:** If there are more programs stored than will fit on one screen, tap SCROLL  to display additional pages). The Program Edit Screen will be displayed.
2. Edit the settings for the selected mode as desired. For instructions on editing individual mode settings see:
 - "[Adding a New Program: Continuous Mode](#)" on page 3-16.
 - "[Adding a New Program: Time Mode](#)" on page 3-16.
 - "[Adding a New Program: Volume Mode](#)" on page 3-17.
 - "[Adding a New Program: Analog Input Mode](#)" on page 3-19.




NOTE: Once the individual mode settings have been edited and saved the Program Edit Screen will be displayed.

3. Tap CONFIRM  to save or DELETE  to cancel and return to the previous screen.

Deleting a Program

NOTE: If User Management is enabled only users with authorization can delete a program (For further information see "[User Management](#)" on page 2-9).

To delete a program:

1. Tap EDIT  , located next to the desired program name on the Mode Selection Screen or from any of the Program Run Screens (**NOTE:** If there are more programs stored than will fit on one screen, tap SCROLL  to display additional pages). The Program Edit Screen will be displayed.
2. Tap DELETE PROGRAM .
3. Tap DELETE to delete the program and return to the Mode Selection Screen or CANCEL to return to the previous screen.

SECTION 4: REMOTE OPERATION

ANALOG INPUT MODE



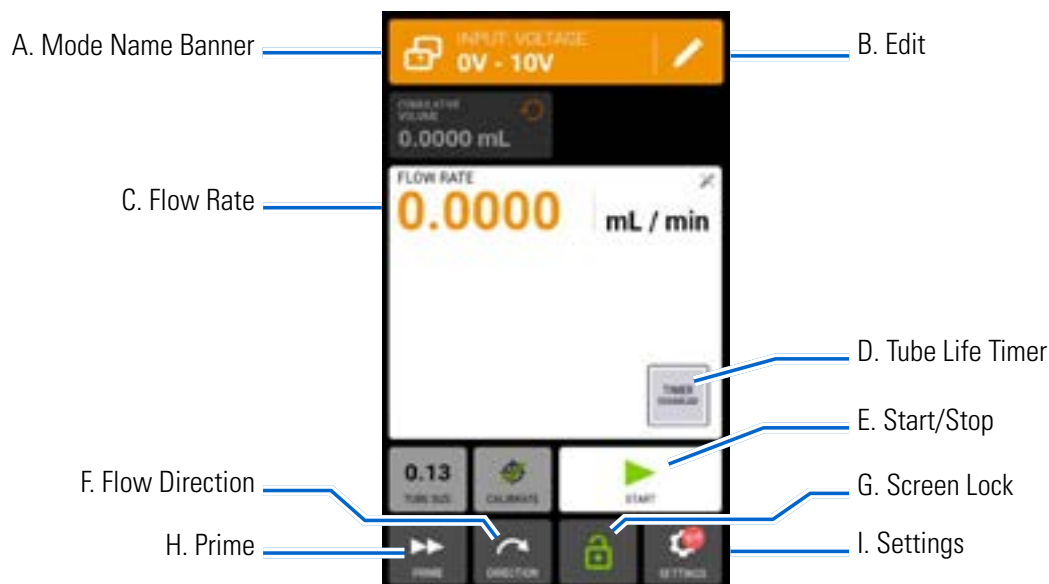
CAUTION: Power must be turned off before connecting the external analog control cable to prevent damage to the pump.





The pump can be controlled and monitored through the DB-25 female connection port. For further information see "[DB-25 Connection](#)" on page 4-34, or visit www.avantorsciences.com/masterflex.





Analog Input Mode Run Screen

The Analog Input Mode Run Screen will be displayed on the touchscreen during analog input operation. The screen displays the currently selected operation dispense settings from an external remote control device. The Analog Input Mode Run Screen is accessed by selecting ANALOG INPUT from the Mode Selection Screen.

NOTE: Not all touchscreen options are available during remote operation.




- A. **MODE NAME BANNER:** Displays the Mode Name as well as the currently selected input type (ANALOG CURRENT or ANALOG VOLTAGE). Tap the Mode Name Banner to return to the Mode Selection Screen.
- B. **EDIT:** Tap to access the Analog Input Mode Edit Screen.
- C. **FLOW RATE:** Displays the current flow rate in the unit of measurement selected by the user.
- D. **TUBE LIFE TIMER:** If enabled, the Tube Life Timer will display a countdown timer that tracks the operational life of the pump tubes. Tap to access the Tube Life Timer Screen (for further information see "[Tube Life Timer](#)" on page 2-12).
- E. **START/STOP:** During operation, the display will change from START  to STOP .
- F. **FLOW DIRECTION:** Tap DIRECTION to select either clockwise  or counterclockwise  flow direction.




- G. SCREEN LOCK: Locking the screen disables all touchscreen functions. **To lock the screen:** Tap UNLOCKED . The icon will change to LOCKED . **To unlock the screen:** Tap LOCKED  and then tap CONFIRM. The icon will change to UNLOCKED .
- H. PRIME: Press and hold to prime the pump (for further information see "[Priming the Pump](#)" on page 2-21).
- I. SETTINGS: Tap to access the Settings Menu Screen (for further information see "[Settings](#)" on page 2-5).

Analog Input Operation


General Preparation:

- Confirm the correct tubing has been selected and is properly loaded into the cassette and pump (for further information see "[Tubing](#)" on page 2-13).
- Confirm all fluids and containers are ready.
- Switch the pump on using the power switch located at the rear of the pump. **NOTE:** If User Management is enabled you will be prompted for a username and password (For further information see "[User Management](#)" on page 2-9). The touchscreen display will revert to the previously used operation mode.
- Confirm that the tubing has been calibrated by checking that Calibration Complete  is displayed on the Analog Input Mode Run Screen (for further information see "[Tube Calibration](#)" on page 2-22).
- If required, prime the pump before operation (for further information see "[Priming the Pump](#)" on page 2-21).
- Confirm that the pump is connected to the appropriate equipment through the DB-25 female connection port on the rear of the pump.

To operate analog input control and monitoring:

1. Tap ANALOG INPUT from the Mode Selection Screen. The Analog Input Mode Run Screen will be displayed.
2. Tap EDIT . The Analog Input Mode Edit Screen will be displayed.
3. Tap the desired analog input type from the available list.
4. Select the desired current or voltage operating range from the available list.
5. Tap CONFIRM  to save or CANCEL  to cancel and return to the previous screen.



NOTE:

- Tap STOP  on the pump touchscreen to override the remote control device and immediately stop the pump operation. **NOTE:** If locked, the screen will need to be unlocked before the pump operation can be stopped.
- See www.avantorsciences.com/masterflex for further information on using analog input remote control and monitoring.


Saving Analog Input Mode Settings as a New Program

Changes made to mode parameters can be saved as a new program for easier access to frequently used mode settings. **NOTE:** If User Management is enabled only users with authorization can create and modify programs (for further information see "[User Management](#)" on page 2-9).

To save mode parameters to a new program:

1. If required, edit the Analog Input Mode settings as desired.
2. Tap MODE NAME BANNER to return to the Mode Selection Screen.
3. Tap NEW PROGRAM.
4. Tap ANALOG INPUT. The Analog Input New Program Screen will be displayed with the last settings used in the Analog Input Mode.
5. Tap PROGRAM1. If required, delete the characters using the back arrow on the onscreen keypad and then enter the desired program name (up to 8 characters).
6. Tap CONFIRM  to save or DELETE  to cancel.

NOTE:

- Once saved, new programs are added in alphabetical order to the bottom of the Mode Selection Screen.
- If there are more programs stored than will fit on one screen, tapping SCROLL  will display additional pages.

MASTERFLEXLIVE™

The IPC pumps can be monitored through the MasterflexLive™ website using an Ethernet or Wi-Fi connection. MasterflexLive™ can be accessed from any suitable digital device connected to the internet, such as a laptop, tablet, smartphone or desktop computer. See www.avantorsciences.com/emdocs/masterflexlive-user-guide.pdf and www.avantorsciences.com/masterflex for further information.

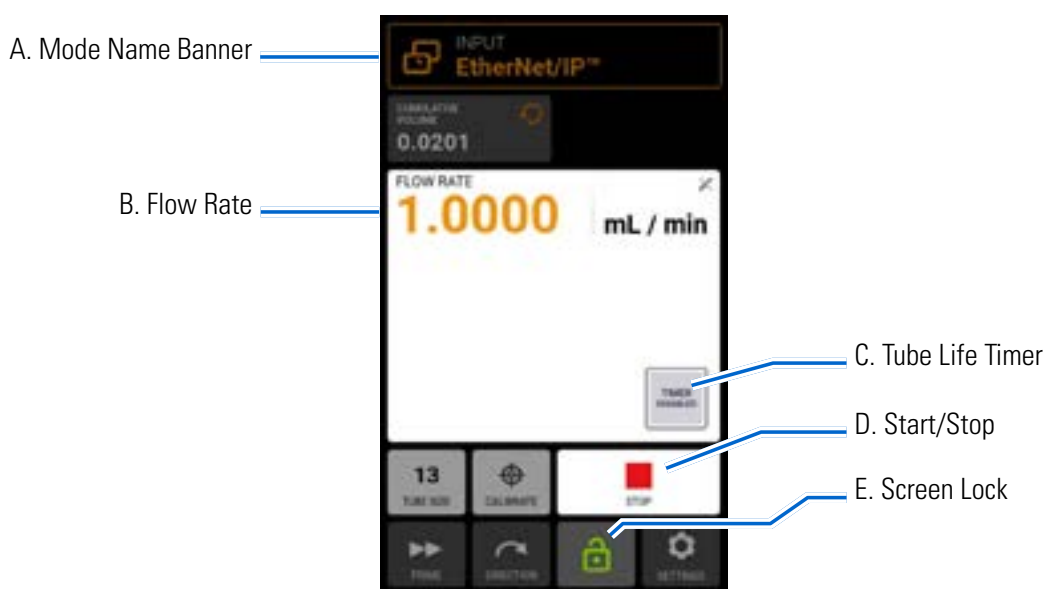
ETHERNET/IP MODE

In EtherNet/IP mode, the pump can be operated in Continuous, Volume, and Time modes. The pumps are equipped with EtherNet/IP for real-time control via a programmable logic controller (PLC). The .EDS command file is available for download on the ODVA website: <https://marketplace.odva.org/products/1923-masterflex?lang=en>. For further information on EtherNet/IP see www.odva.org.

EtherNet/IP Run Screen

The EtherNet/IP Run Screen will be displayed on the touchscreen during EtherNet/IP input operation. The screen displays the currently selected operation dispense settings from an external remote control device.

NOTE: Not all touchscreen options are available during remote operation.







- A. **MODE NAME BANNER:** Displays the currently selected input type.
- B. **FLOW RATE:** Displays the current flow rate in the unit of measurement selected by the user.
- C. **TUBE LIFE TIMER:** If enabled, the Tube Life Timer will display a countdown timer that tracks the operational life of the pump tubes. Tap to access the Tube Life Timer Screen (for further information see "[Tube Life Timer](#)" on page 2-12).
- D. **START/STOP:** During operation, the display will change from START ► to STOP ■.
- E. **SCREEN LOCK:** Locking the screen disables all touchscreen functions. **To lock the screen:** Tap UNLOCKED 🗝️. The icon will change to LOCKED 🔒. **To unlock the screen:** Tap LOCKED 🔒 and then tap CONFIRM. The icon will change to UNLOCKED 🗝️.

EtherNet/IP Setup



General Preparation:

- Ensure that the pump, PLC, and computer are all connected to the same network.
- Ensure the IP address of the computer is within the subnet mask range of the PLC and the pump.
- The default addressing method for the pump is DHCP. Static IP addresses may be assigned through the Ethernet Settings menu (see "[Ethernet Settings](#)" on page 2-8).

To assign a static IP address:

1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. SCROLL  through the Settings Menu Screen pages and tap ETHERNET SETTINGS. The Ethernet Settings Screen will be displayed.
3. Tap STATIC to manually edit settings using the onscreen keypad.
4. Tap CONFIRM  to save or CANCEL  to discard any changes.

To enable EtherNet/IP:

1. Tap SETTINGS  from any of the mode screens. The Settings Menu Screen will be displayed.
2. SCROLL  through the Settings Menu Screen pages and tap EtherNet/IP. The EtherNet/IP Screen will be displayed.
3. Tap the ENABLE toggle to select either ON or OFF.
4. Tap ACCEPT to enable EtherNet/IP or CANCEL.

Once the EtherNet/IP has been configured and enabled, you can view the pump from your PLC. To enable remote control, you must configure the pump from your PLC using the bit "Pump1:0.Toggle_Remote_Local_Control_1_to_0".

NOTE:

- The bit may need to be toggled twice as it only changes state from Local/Remote on a 1 to 0 transition.
- Once enabled, the EtherNet/IP Run Screen will be displayed on the touchscreen.

Masterflex EtherNet/IP

Input Data: 56 bytes of input data from pump to PLC

Bytes	Data Type	Description
0 – 3	32-BIT INT	Pump Status Bit 0: Status OK Bit 1: Pump Running Bit 2: Dispense Running Bit 3: Tube Uncalibrated Bit 4: Head Open Bit 5: Reserved Bit 6: Flow Direction CCW Bit 7: Remote Control Bit 8-31: Reserved
4	BYTE	Dispense Mode (NOTE: See the IPC Pumps Dispense Mode Correlation Table on the following page)
5	BYTE	Tube Size (NOTE: See the IPC Pumps Tube Size Index Correlation Table on the following page)
6	BYTE	Flow Units (NOTE: See the IPC Pumps Flow Units Index Correlation Table on the following page)
7	BYTE	Reserved Pad
8 – 11	FLOAT	Cumulative Volume
12 – 15	FLOAT	Remaining Dispense Volume
16 – 19	FLOAT	Remaining Dispense On Seconds
20 – 23	FLOAT	Remaining Dispense Off Seconds
24 – 27	32-BIT INT	Batch Count Current
28 – 31	32-BIT INT	Batch Count Total
32 – 35	FLOAT	Minimum Flow Rate
36 – 39	FLOAT	Current Flow Rate
40 – 43	FLOAT	Maximum Flow Rate
44 – 45	16-BIT INT	Remaining Dispense On Time Days
46	BYTE	Remaining Dispense On Time Hours
47	BYTE	Remaining Dispense On Time Minutes
48	BYTE	Remaining Dispense On Time Seconds
49	BYTE	Remaining Dispense On Time Tenths
50 – 51	16-BIT INT	Remaining Dispense Off Time Days
52	BYTE	Remaining Dispense Off Time Hours
53	BYTE	Remaining Dispense Off Time Minutes
54	BYTE	Remaining Dispense Off Time Seconds
55	BYTE	Remaining Dispense Off Time Tenths

IPC Pumps Flow Units Index Correlation Table

When getting/setting flow unit through EtherNet/IP, the unit has to be specified as an index number using this table.

Index	Flow Unit
1	mL/min
2	mL/hr
3	L/day
4	Oz/min
5	Oz/hr
6	uL/min
7	uL/hr
8	RPM
9	%

IPC Pumps Dispense Mode Correlation Table

When getting/setting dispense modes through EtherNet/IP, the mode has to be specified as an index number using this table.

Index	Dispense Mode
0	Continuous
1	Time
2	Volume

IPC Pumps Tube Size Index Correlation Table

When getting/setting tube sizes through EtherNet/IP, the tube size has to be specified as an index number using this table.

Index	Tube Size	Index	Tube Size
1	0.13	14	1.14
2	0.19	15	1.22
3	0.25	16	1.33
4	0.38	17	1.42
5	0.44	18	1.52
6	0.51	19	1.65
7	0.57	20	1.75
8	0.64	21	1.85
9	0.76	22	2.03
10	0.89	23	2.29
11	0.95	24	2.54
12	1.02	25	2.79
13	1.09	26	3.17

Output Data Table: 28 bytes of output data from PLC to pump

Bytes	Data Type	Description
0	BYTE	Pump Control Bit 0: Run/Pause (1 = RUN, 0 = PAUSE) Bit 1: Stop and Reset Dispense (1 to 0 Transition) Bit 2: Toggle Remote/Local Control (1 to 0 Transition) Bit 3: Clear Cumulative Volume (1 to 0 Transition) Bit 4: Reserved Bit 5: Reserved Bit 6: Set Flow Direction CCW (1 = CCW, 0 = CW) Bit 7: Reserved
1	BYTE	Dispense Mode
2	BYTE	Tube Size
3	BYTE	Flow Units
4	BYTE	Reserved Pad
5	BYTE	Cumulative Volume
6	BYTE	Remaining Dispense Volume
7	BYTE	Remaining Dispense On Seconds
8 – 11	FLOAT	Remaining Dispense Off Seconds
12 – 15	FLOAT	Batch Count Current
16 – 19	FLOAT	Batch Count Total
20 – 23	FLOAT	Minimum Flow Rate
24 – 27	32-BIT INT	Current Flow Rate

SERIAL COMMUNICATIONS MODE

In Serial Communications Mode, the pump can be operated in Continuous Mode. The IPC pumps are equipped with a USB-A port and a 9-pin RS232 DB-9 port for real-time control through serial commands using a computer. For further information see "[Analog Input Mode](#)" on page 4-22, or visit www.avantorsciences.com/masterflex. **NOTE:** A USB-A to USB-A serial cable is required if using USB (See "[Accessories](#)" on page 5-2 for ordering information).

Serial Communication Ports



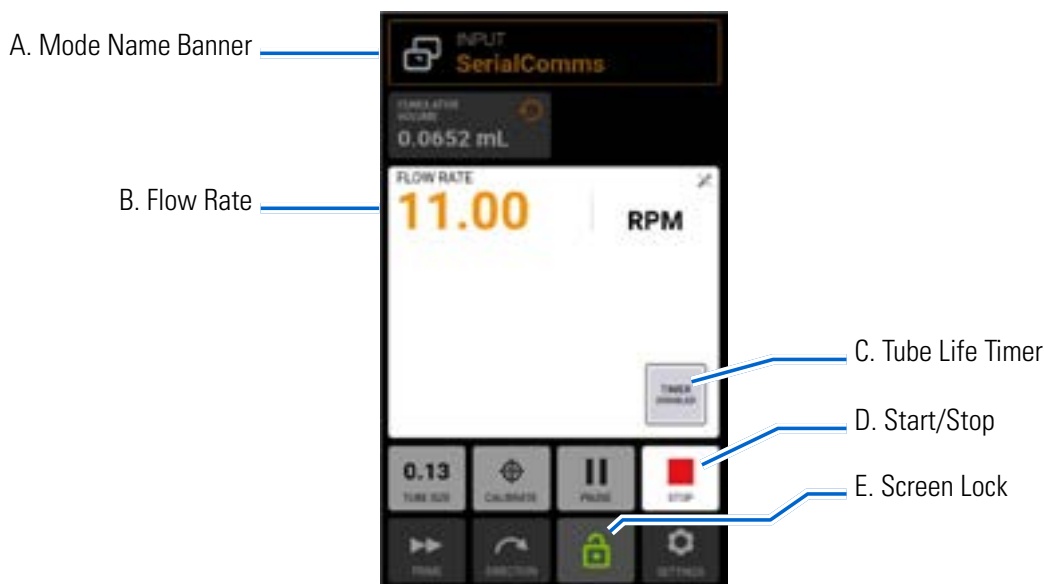
DB-9 Serial Communication Port









USB-A Port

SerialComms Run Screen

The SerialComms Run Screen will be displayed on the touchscreen during serial communications input operation. The screen displays the currently selected settings from an external remote control device. **NOTE:** Not all touchscreen options are available during remote operation.



- A. MODE NAME BANNER: Displays the currently selected input type.
- B. FLOW RATE: Displays the current flow rate in the unit of measurement selected by the user.
- C. TUBE LIFE TIMER: If enabled, the Tube Life Timer will display a countdown timer that tracks the operational life of the pump tubes. Tap to access the Tube Life Timer Screen (for further information see "[Tube Life Timer](#)" on page 2-12).

- D. START/STOP: During operation, the display will change from START  to STOP .
- E. SCREEN LOCK: Locking the screen disables all touchscreen functions. **To lock the screen:** Tap UNLOCKED . The icon will change to LOCKED . **To unlock the screen:** Tap LOCKED  and then tap CONFIRM. The icon will change to UNLOCKED .

Serial Communications Setup

General Preparation:

- Download and install a suitable terminal application, such as PuTTY, onto your computer.
- Ensure that the pump and computer are connected through either the USB port using a USB-A to USB-A serial cable, or the 9-pin DB-9 port using an RS232 DB-9 modem cable (see "[Accessories](#)" on page 5-2 for available accessories).
- Ensure that the computer is configured to send ASCII serial messages at 115200 baud rate.

Setting the pump address:


Each command string must begin with the pump address (1–8). It is factory set at 1 and can be changed using the address change command @ (see the Serial Interface Command Set Table below). The address will be stored permanently (even after the pump has been switched off). The assignment of the address enables the user to control up to 8 pumps via one interface.


Enabling/disabling Serial Communications Remote Mode:

When not in Serial Communications Remote Mode the pump will only respond to the address set (@) and serial remote mode enable (RE) commands. To enter Serial Communications Remote Mode the control device needs to send the enable command (see the Serial Interface Command Set Table below), this will trigger the Serial Communications Mode and the SerialComms Run Screen will be displayed on the touchscreen.



Serial Communications Commands

Command Structure

Example Command	1 R 20 
Command Structure	(Address) (Serial Command) (Command Parameter) (ASCII 13 Carriage Return)

The first character of the ASCII serial command string is the address, this is followed by the characters for the serial command (see the Serial Interface Command Set Table below). Some commands have an additional parameter following the command character for setting values. The command string is completed by a carriage return (ASCII 13)  which initiates the processing of the command. The serial commands settings are at 115200 baud rate, 8 bit, 1 stop bit, no parity.

Command acknowledgment:

- The pump confirms valid serial commands by returning an asterisk *
- Incorrect serial command strings will be returned with a hash #
- If the pump is not in Serial Communications mode then the pump will respond with tilde ~
- {value} +   for get command responses

Serial Interface Command Set Table

Command	Function / Description	Example (NOTE: 13 is carriage return ASCII 13)	Response	Note
Serial Communications Setup				
@	<ul style="list-style-type: none"> - Set serial communications address for pump, from 1 to 8. The default serial address is 1 - Each pump must be allocated an individual address, this address is used as the first character in serial commands 	Set current address to 2: @2		
RE_	<ul style="list-style-type: none"> - Enable/Disable serial remote mode - Toggle serial communications remote mode, use 1 = enable and 0 = disable after the RE command 	Enable: 1RE1 Disable: 1RE0		
Controlling the Pump				
H	Start Pump (Response (-) under command G, in case of error message)	1H 13	*	Valid
I	Stop pump dispensing	1I 13	*	
J	Change pump revolution to clockwise direction	1J 13	*	
K	Change pump revolution to counterclockwise direction	1K 13	*	
RC	<ul style="list-style-type: none"> - Get current pump status - Returns three integers (0,0,0); pump serial address, running status 1 = dispensing and 0 = not dispensing, pump direction 1 = counterclockwise and 0 = clockwise 	1RC 13	1, 0, 1 13 10	
Inquiring and Setting Parameters				
S	Get speed in % of max rotation speed	1S 13	53.2 13 10	
S_ _ _ (_)	<ul style="list-style-type: none"> - Set speed in % of max rotation speed - To set a pump speed in percent, enter S followed by 5 digits that represent the percent to one decimal point, for example, 00500 is 50.0% 	1S0063 13	*	XX.X%
R_ _ _ (_)	<ul style="list-style-type: none"> - Set pump speed in RPM - To set a pump speed RPM within the pump range, enter R followed by 3 or more digits that represent the RPM with two decimal points, for example, 10000 is 100.00 	1R030050 13	*	Divide by 100 to get the 2 digit decimal => 300.50
R	Get pump speed in RPM	1R 13	4000.12 13 10	

Section 4: Remote Operation

RA	<ul style="list-style-type: none"> - Set flow unit index table 00-32 - To set a flow rate unit index add the two digit index after the RA command. To get the current index just enter RA - See Flow Units Index Correlation Table below 	IRA00 13	*	
RA	Get flow unit return unit index from 00 to 32	1RA 13	01 13 10	
RB	Get current cumulative volume in revolutions	1RB 13	4.983 rev 13 10	
:	Get current cumulative volume	1: 13	4.983 ml 13 10	
W	Reset Cumulative Volume	1W 13	*	

IPC Pumps Flow Units Index Correlation Table

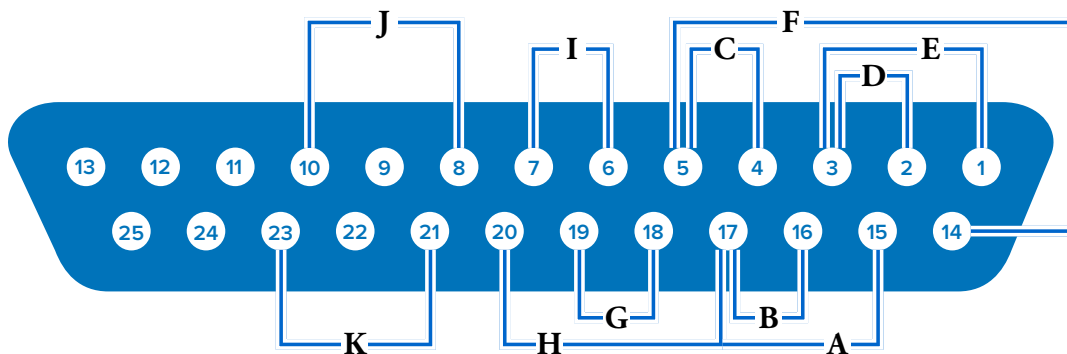
Index	Flow Unit
01	mL/min
02	mL/hr
03	L/day
04	Oz/min
05	Oz/hr
06	uL/min
07	uL/hr
08	RPM
09	%

ELECTRICAL CONNECTIONS



CAUTION: Power must be turned off before connecting the external analog control cable to prevent damage to the pump.

DB-25 Connection



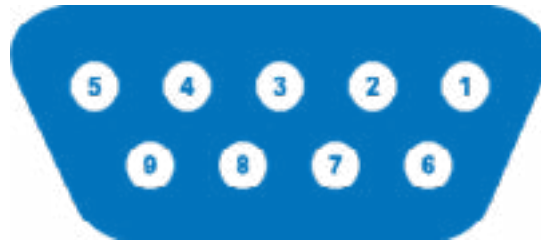
Contact Arrangements:

Pin No.	Description	Pin No.	Description
1	Speed Control Voltage Input (0–10 V)	14	Speed Signal Voltage Output (0–10 V)
2	Speed Control Current Input (0–20 mA)	15	Start/Stop Input
3	Speed Control Input Reference	16	CW/CCW Input
4	Speed Signal Current Output (0–20 mA)	17	Start/Stop, CW/CCW, Prime Reference
5	Speed Signal Output Reference	18	Tach Output Reference
6	Motor Running Relay Output (N.O.)	19	Tach Output (Open Collector)
7	Motor Running Relay Output Common	20	Prime Input
8	Open Head Sensor Relay Output (N.O.)	21	General Alarm Relay Output Common
9	Not Used	22	Not Used
10	Open Head Sensor Relay Output Common	23	General Alarm Relay Output (N.O.)
11–13	Not Used	24–25	Not Used

Wiring Scheme:

A	Start/Stop	G	Tach Output
B	CW/CCW	H	Prime
C	Output (0–20 mA, 4–20 mA)	I	Motor Running (N.O.)
D	Input (0–20 mA, 4–20 mA)	J	Open Head Sensor (N.O.)
E	Input (0–10 V)	K	General Alarm
F	Output (0–10 V)		



DB-9 Connection




Contact Arrangements:

Pin No.	Description
1	Not Used
2	Transmitting: Tx
3	Receiving: Rx
4	Not Used
5	Ground
6	Not Used
7	Not Used
8	Not Used
9	Not Used



SECTION 5: SERVICE & MAINTENANCE

	CAUTION: Replace the power supply only with one of the same type and rating.
	CAUTION: Unplug the pump power cable from the mains power outlet when cleaning or performing maintenance on the pump.

FIRMWARE UPDATES



If the pump is connected to the internet, updates can be downloaded directly onto the pump. **NOTE:** When new updates are available for your device, the update available  icon will be displayed at the top of the Settings Menu Screen.

To update the pump while connected to the internet:

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages to locate **DEVICE INFORMATION**.
3. Tap **DEVICE INFORMATION**. The Device Information Screen will be displayed.
4. Tap **CHECK FOR UPDATES** and follow the onscreen prompts.

If the pump is not connected to the internet, updates must be downloaded onto a USB drive before installing onto the pump. Visit www.avantorsciences.com/masterflex to download the latest updates for your device.



To install updates from a USB drive:

1. Insert the USB drive containing the updates into the USB-A port on the rear of the pump.
2. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
3. **SCROLL**  through the Settings Menu Screen pages to locate **DEVICE INFORMATION**.
4. Tap **DEVICE INFORMATION**.
5. Tap **CHECK FOR UPDATES** and follow the onscreen prompts.

RESTORE FACTORY SETTINGS

NOTE: Factory reset will erase all settings, including custom programs.

To restore the pump to the original factory defaults:

1. Tap **SETTINGS**  from any of the mode screens. The Settings Menu Screen will be displayed.
2. **SCROLL**  through the Settings Menu Screen pages to locate **DEVICE INFORMATION**.
3. Tap **DEVICE INFORMATION**.
4. Tap **FACTORY RESET** and follow the onscreen prompts.

CLEANING THE PUMP



CAUTION: Unplug the pump power supply cable from the mains power outlet when cleaning or performing maintenance on the pump.

If required, the pump may be wiped clean using a soft cloth lightly moistened with either isopropyl or ethyl alcohol.

NOTE:

- Do not use water, chlorine or any perfumed or aromatic cleaning agents on the pump.
- Care should be taken with the pump touchscreen to avoid scratching or otherwise damaging the surface. Do not wipe with dry or abrasive material.
- Do not operate the pump with water on the surface of the touchscreen.
- Any damage caused by improper cleaning will be the sole responsibility of the customer.

ACCESSORIES

Pump Accessories

To purchase accessories or for further information visit www.avantorsciences.com/masterflex. The following accessories are available for Masterflex® Ismatec® Multichannel Peristaltic Pumps:

Description	Part Number
USB Serial Cable USB-A TO USB-A	MFLX78006-90
RS-232 Serial Cable DB9 F/F	MFLX22050-54
Replacement Click'n'go Cassette – POM 1/EA	MFLX78001-95
Replacement Tubing Retaining Adapters 8/PK	MFLX07618-69
Optional POM Pressure Lever Cassette 4/PK (includes tubing retaining adapters)	MFLX78001-91
Optional PVDF Pressure Lever Cassette 4/PK (includes tubing retaining adapters)	MFLX78001-97
DB25 Male Connector (for creating cables)	MFLX07523-94
Cable Assembly for Remote Control, DB25(M) Connector	MFLX07523-95
Footswitch, Momentary Start/Stop, DB25, 6-ft Cable	MFLX07523-92

TROUBLESHOOTING

For further assistance, or for issues that cannot be resolved, see "[Technical Assistance](#)" on page 5-7.

Symptom	Cause	Remedy
<ul style="list-style-type: none"> - Motor does not rotate - Display does not light 	<ul style="list-style-type: none"> - No power 	<ol style="list-style-type: none"> 1. Check that the power cord is securely plugged into the pump 2. Check that the power cord is plugged into the mains power outlet and that the power is switched on 3. Check the power cord for any visible signs of damage and replace if defective
<ul style="list-style-type: none"> - Pump does not rotate during analog operation - The display does not light up during analog operation 	<ul style="list-style-type: none"> - Defective analog control or setting error 	<ol style="list-style-type: none"> 1. Switch the pump off 2. Check that the DB-25 connection cable is fully inserted into the pump port 3. Switch on the pump 4. If the motor still does not rotate, select ANALOG INPUT from the Mode Selection Screen and/or the Settings Menu Screen and verify that the settings are correct 5. For further information see "Analog Input Mode" on page 4-22
<ul style="list-style-type: none"> - Weak calibration strength displayed on the calibration strength bar 	<ul style="list-style-type: none"> - Poor calibration volume and/or flow rate 	<ul style="list-style-type: none"> - Calibration accuracy can be improved by using a larger calibration volume and/or altering the flow rate
<ul style="list-style-type: none"> - Touchscreen unresponsive 	<ul style="list-style-type: none"> - Wearing thick latex gloves can make the screen less responsive 	<ul style="list-style-type: none"> - Remove gloves before using the touchscreen. NOTE: Consult your company or laboratory safety guidelines before removing any personal protective equipment

ERROR DEFINITIONS

System Error:

If a system error occurs, a pump error code will be displayed on the pump touchscreen.

Before contacting customer support, check to ensure that all tubing has been installed correctly in the cassettes and that each cassette has been properly installed into the pump. Then switch the pump off and on again. If the error persists, make a note of the error code and then contact Masterflex/Avantor or your authorized representative for support.

SPECIFICATIONS

OUTPUT

Speed:	IPC 45 RPM Models	0.45 to 45 RPM
	IPC 11.25 RPM Models	0.11 to 11.25 RPM
Torque Output, Max Continuous:	All Models	90 oz-in
Speed Control Accuracy:	All Models	±1.0% F.S.
Display:	All Models	800 x 480 LCD w/ LED Backlight
Outputs:	All Models	Voltage speed output (0-10VDC @ 1 k Ω min)
		Current speed output (4-20 mA @ 0-600 Ω)
		Motor running relay (Closed when running, 1 A max @ 24 VDC)
		General alarm relay (Closed when error is displayed, 1 A @ 24 VDC)
	IPC 45 RPM Models	Tach output (120 - 11988 Hz, 50% Duty Cycle)
	IPC 11.25 RPM Models	Tach output (105 - 10489 Hz, 50% Duty Cycle)

INPUT

Supply Voltage Limits:	All Models	90 to 260 Vrms @ 50/60 Hz (Universal Input)
Max Current:	All Models	1.3 A @ 115 VAC; 0.6 A @ 230 VAC
Inputs:	All Models	Start/Stop, Prime, CW/CCW (Contact closure)
		Current input (0-20 mA @ 249 Ω ; ± 50 V common mode range)
		Voltage input (0-10 VDC @ 10 k Ω ; ± 50 V common mode range)
		RJ45 Ethernet
		USB, Type A (5 VDC @ 0.5 A)

CONSTRUCTION

Dimensions (L x W x H):

	8Ch	351.2 mm x 193.7 mm x 200.5 mm 5.4 kg
	12Ch	391.2 mm x 193.7 mm x 200.5 mm 6.1 kg
	16Ch	431.2 mm x 193.7 mm x 200.5 mm 6.8 kg
	24Ch	511.2 mm x 193.7 mm x 200.5 mm 8.2 kg
Enclosure Rating:	All Models	IP31 per IEC 60529

ENVIRONMENT

Operating Temperature:	All Models	0 °C to 40 °C (32 °F to 104 °F)
Storage Temperature:	All Models	-25 °C to 65 °C (-13 °F to 149 °F)
Humidity (Non-Condensing):	All models	10% to 90%
Altitude:	All Models	Less than 2000 m
Pollution Degree:	All models	Pollution Degree 2 (Indoor use, lab, office)
Chemical Resistance:	All Models	Exposed material is painted aluminum and ABS plastic, anodized aluminum, 303/304 stainless steel rollers assembly, POM tube cassettes

COMPLIANCE

	All Models	UL 61010-1 US/CAN For CE mark: EN61010-1, Low Voltage Directive ETSI EN 301 489-1, EMC Directive EN50581, RoHS Directive
	Pump Head	EN809, Machinery Directive

TECHNICAL ASSISTANCE

If you have any questions about the use of this product contact the manufacturer or authorized seller.

PRODUCT RETURN

Like all pumps, the IPC pumps contain components that will wear over a period of time. To limit charges and delays contact the seller or manufacturer for authorization and shipping instructions before returning the product, either within or outside of the warranty period. When returning the product please state the reason for the return. For your protection, pack the product carefully and insure it against possible damage or loss. Any damages resulting from improper packaging are your responsibility.

WARRANTY

Visit www.avantorsciences.com/masterflex for warranty information.

DISPOSAL

Please retain packaging materials until the product warranty ends. Afterwards please discard of any packaging materials in an environmentally friendly manner and according to local regulations.

Once the useful life of the product has ended, please ensure proper disposal according to local laws. Plastic and electronic components should be disposed of at a recycling facility. Please refer to local regulations regarding proper disposal.



MASTERFLEX[®]

ISMATEC[®]

US & Canada only

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Outside US & Canada

1-847-549-7600 | 1-847-381-7050

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