Servo Pump Controller User Guide

Version 2.1
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Part No. 22940001

for use with:

Control Software version 1.12.02
on
Servo Pump Controller - Full Control model, PN 22991005

prepared by GPD Global® Documentation Department

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Contents

Safety Notices

CAUTION: Before the system can be operated it must be correctly connected to the pump motor.

CAUTION: Do not attempt to operate the motor driven pump unless the cables are connected securely.

CAUTION: Permanent damage to the Servo Pump Controller will occur if the cables are connected improperly.

CAUTION: Remove the electrical power cable from the AC outlet before the Servo Pump Controller cover is opened. Only qualified personnel should remove the cover; there are no user-serviceable parts inside.

Warranty

General Warranty. Subject to the remedy limitation and procedures set forth in the Section “Warranty Procedures and Remedy Limitations,” GPD Global warrants that the system will conform to the written description and specifications furnished to Buyer in GPD Global’s proposal and specified in the Buyer’s purchase order, and that it will be free from defects in materials and workmanship for a period of one (1) year. GPD Global will repair, or, at its option, replace any part which proves defective in the sole judgment of GPD Global within one (1) year of date of shipment/invoice. Separate manufacturers’ warranties may apply to components or subassemblies purchased from others and incorporated into the system. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES,EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Limitations. GPD Global reserves the right to refuse warranty replacement, where, in the sole opinion of GPD Global the defect is due to the use of incompatible materials or other damages from the result of improper use or neglect.

This warranty does not apply if the GPD Global product has been damaged by accident, abuse, or has been modified without the written permission of GPD Global.

Items considered replaceable or rendered unusable under normal wear and tear are not covered under the terms of this warranty. Such items include fuses, lights, filters, belts, etc.

Warranty Procedures and Remedy Limitations. The sole and exclusive remedy of the buyer in the event that the system or any components of the system do not conform to the express warranties stated in the Section “Warranties” shall be the replacement of the component or part. If on-site labor of GPD Global personnel is required to replace the non-warranted defective component, GPD Global reserves the right to invoice the Buyer for component cost, personnel compensation, travel expenses and all subsistence costs. GPD Global’s liability for a software error will be limited to the cost of correcting the software error and the replacement of any system components damaged as a result of the software error. In no event and under no circumstances shall GPD Global be liable for any incidental or consequential damages; its liability is limited to the cost of the defective part or parts, regardless of the legal theory of any such claim. As to any part claimed to be defective within one (1) year of date of shipment/invoice, Buyer will order a replacement part which will be invoiced in ordinary fashion. If the replaced part is returned to GPD Global by Buyer and found by GPD Global in its sole judgment to be defective, GPD Global will issue to Buyer a credit in the amount of the price of the replacement part. GPD Global’s acceptance of any parts so shipped to it shall not be deemed an admission that such parts are defective.

Specifications, descriptions, and all information contained in this manual are subject to change and/or correction without notice.

Although reasonable care has been exercised in the preparation of this manual to make it complete and accurate, this manual does not purport to cover all conceivable problems or applications pertaining to this machine.

Overview

The Servo Pump Controller provides control for operating any of the GPD Global fluid dispensing pumps with a servo motor.

About this Manual

This user guide provides a controller overview and set up and operating instructions.

For details about communicating with the controller and programming it, refer to the *Servo Pump Controller Programmer Guide* PN 22940003.

Function

The Servo Pump Controller controls all motor aspects of a GPD Global pump for dot dispense and continuous dispense. Control is exerted through either the front panel, a foot pedal, or an external controller. The controller maintains a single recipe while under power. Some remote programming and control functions are available. Temperature control of a heated needle and a heated reservoir are also available.

Applications

With the Servo Pump Controller controlling a GPD Global fluid dispense pump, the pump can process any application for which that pump is compatible.

Scope of Supply:

- Servo Pump Controller, PN 22991005
- Power Cable, PN 10/1400
- User Guide, PN 22940001
- Programmer Guide, PN 22940003

Features

- Provides control for operating GPD Global servo-controlled pumps.
- Provides on/off control of a regulated input pressure to the fluid reservoir.
- Provides internal air regulation to pressure the supply syringe. The minimum/maximum settings do not control air pressure, but they do create a flag on the main if air pressure is above/below setting values. Values are available for capture.
- Provides temperature control for heating the pump body.
- Provides temperature control for heating the pump reservoir.
- Provides dot dispensing and continuous dispensing mode options for GPD Global servo controlled pumps.

Accessory

Foot pedal, PN 22995001

Controller Set Up

Communications

Control over servo controller communications is exerted through either:

- the Run button,
- a foot pedal, or
- an external controller.

Run Button

To use the Run button located on the front panel, press the Run button to run the pump. Release the Run button to stop the pump. Refer to Controls (pg 3).

Foot Pedal

To use a foot pedal instead of the Run button:

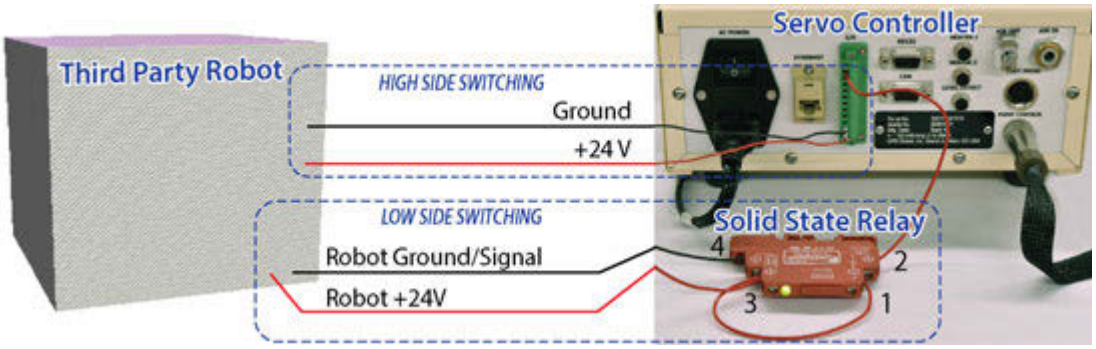
1. Obtain the optional foot pedal Accessory (pg 1).
2. Locate the Foot Pedal connection on the rear panel. Refer to Connections (pg 4).
3. Plug the foot pedal into the Foot Pedal connection.
4. Depress the foot pedal to run the pump. Release the foot pedal to stop the pump.

External Control via I/O

An external robot can initiate the pump start/stop or execute the currently displayed program via a user-supplied cable and foot pedal, a 24V signal, and a solid state relay (or dry contact). The pump signals from the controller may be monitored by the robot.

REQUIRED: External robot must have 24V output

Figure 1: *Use either High or Low side switching to connect the controller to a third party robot.*



To use an external robot:

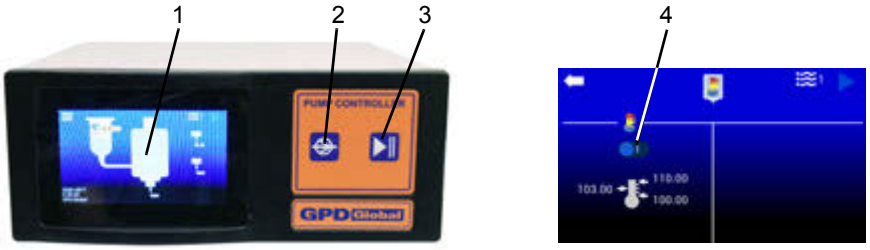
1. Route ground from controller I/O 11 to robot.
2. Route 24V from controller I/O 12 to robot.
3. To monitor controller pump signals, connect robot to controller output pins 6 (Ready), 7 (Busy), and 8 (Fault). Output voltage for pins 6, 7, 8 is equal to voltage on pins 11 and 12.

4. Implement one of the following switching methods:

Switching Method	Set Up Procedure
High Side switching	Route a 24V trigger from controller I/O 2 to robot.
Low Side switching	Requires customer-supplied solid state relay and wiring. 1. Jumper solid state relay 3 to 1. 2. Route solid state relay 2 to controller I/O 2. 3. Route robot ground/signal to solid state relay 4. 4. Route robot 24V to solid state relay 3.

Controls

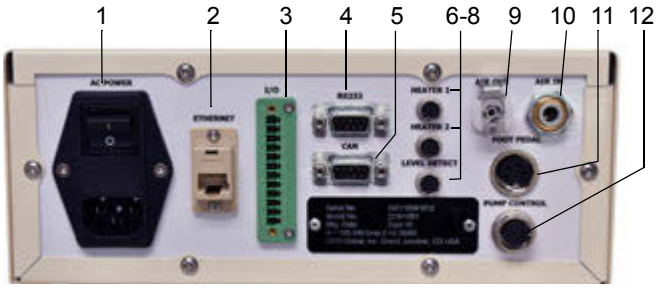
Figure 2: *Controller front panel and sample touch screen window*



1	Touch Screen	User interface.
2	Run button	Push button (or foot pedal) to run the pump. Release button (or foot pedal) to stop the pump. Power cycles: current recipe details are retained through power cycle.
3	Online/Offline button	Toggles the controller between online and offline states.
4		On/Off toggle switch used in some touch screen windows. Slide or press the icon to change its state.

Connections

Figure 3: *Controller rear panel*



1	AC Power	Turns on/off device power. Also acts as fuse holder and power cord connector.
2	Ethernet	Network connector for external data acquisition/streaming. Connect to external computer or controller. (RJ45)
3	I/O	Connector for external inputs/outputs. Connect to external PLC or controller.
4	RS232	Serial communication connector. Connect to external computer or controller. (D-sub 9)
5	CAN	Monitors pump motor. Connect to a computer. Sub (D-sub 9)
6	Heater 1	Controls external heater 1. (5 Pin)
7	Heater 2	Controls external heater 2. (5 Pin)
8	Level Detect	Connection for Level Detect / Reservoir Mixer. (6 pin)
9	Air Out	Air to reservoir toggles on/off.
10	Air In	Connector for externally regulated air source.
11	Foot Pedal	Foot pedal / pump on. (4 pin)
12	Pump Control	Pump connection. (20 pin)

Also refer to rear panel details in the *Connector Pin Outs* section of the *Servo Pump Controller Programmer Guide* (PN 22940002).

Position & Viewing Angle

The Servo Pump Controller is designed for table top use. It can be stacked vertically with other control boxes from GPD Global.

To change the viewing angle of the touch screen, adjust the bail that flips up/down (on bottom of the controller).

Touchscreen Calibration

Calibration of the touchscreen occurs once – it begins automatically on first start up – after you have upgraded the controller firmware. To complete the calibration process, you'll touch the screen three separate times in separate locations.

You'll know when the touch screen calibration procedure has been initiated because the following image displays on the screen:

To calibrate the touchscreen:

NOTE: Pressing the blue circle imprecisely causes all future screen touches to be inaccurate, thus the emphasis on precisely touching the center of the dot.

TIP: If the **first or second** calibration touches are undesired/accidental, you can restart the calibration procedure by powering off the controller (rear panel power switch) and powering it back on. The calibration procedure will begin again.

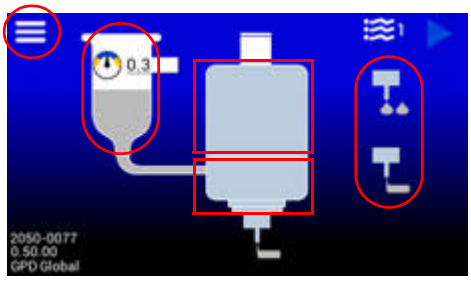
1. Touch #1 - Notice the blue circle positioned in the top left of the calibration screen. Precisely touch (press and release) the center of the blue circle. The blue circle will move (i.e. right middle).
2. Touch #2 - Again, precisely touch the center of the blue circle. The blue circle will move (i.e. bottom middle).
3. Touch #3 - Again, precisely touch the center of the blue circle. Calibration is now complete and the controller automatically boots up normally.

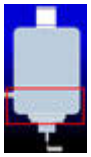
Controller Interface

Navigation

The back arrow returns the display to the previous window. A back arrow is located on all windows *except* the Home window.

Home window navigation controls:



	Menu - opens Menu (pg 15).
	Reservoir settings - opens Reservoir Settings (pg 18).
	Pump parameters - opens the pump parameters window based on selected dispense mode. • If dots is currently selected, press the pump body to open Dot Dispense Parameters (pg 16). • If continuous is the current selection, press the pump body to open Continuous Dispense Parameters (pg 17).
	Pump body - Opens Pump Body Settings (pg 19).
	Dispense mode - press this set of icons to toggle between dot dispense and continuous dispense modes. An image matching the currently selected dispense mode displays at the base of the pump body.

A unique icon identifies each of the parameters and settings windows.

	Menu (pg 15)
	Dot Dispense Parameters (pg 16)
	Continuous Dispense Parameters (pg 17)
	Reservoir Settings (pg 18)
	Pump Body Settings (pg 19)
	Pump / Motor Configuration (pg 20)

Keypad for Numeric Input

Use the numeric keypad to change parameter values, setting values, and select a different recipe.

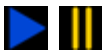
- To display the keypad, press any icon associated with a value or any value associated wtih an icon.
- To close the keypad, press the “X” in the upper right-hand corner of the keypad.

Decimal places

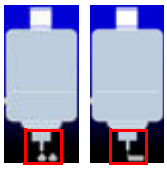
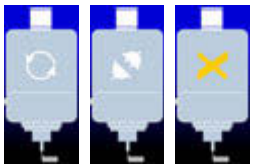
Parameter and setting values display decimal places when appropriate. If you try to enter decimal places where they are not used/displayed, the decimal portion of your entry will be ignored.

Status Indicators

All windows use these status indicators:

	Pump connection status: • online • offline
	Current recipe - the displayed value represents the current recipe number.
	Value state - field background color indicates value state: • within (white) the set range. • outside (amber) the set range.

Note these additional status indicators used by the Home window:

	Dispense mode - nozzle image matching the currently selected dispense mode displays at the base of the pump body: • Dot dispense mode = nozzle dispensing dots • Continuous dispense mode = nozzle dispensing a line
	Pump status: • Pump is running, busy, work-in-progress. • Pump is disconnected. • Pump is experiencing an error condition.
	Warning indicator. This indicator generates an error output.

Controller Operations

Power On

Turn on the power switch located on the rear panel. The pump connection status indicator displays: 

Power Off

To turn off the controller, turn off the power switch located on the rear panel.

Run Pump

There are three (3) methods of running the pump:

- Run button on the front panel
- Foot pedal connected to rear panel
- Signal via the I/O connector on rear panel

To run a pump:

1. Verify the following conditions:
   a. Pump is plugged into the controller.
   b. Controller is powered on.
2. Select a recipe. Details here: Select Recipe (pg 10).
3. Verify all parameters are set. Details here: Set Parameters (pg 11).
4. Select a dispense mode. Details here: Navigation (pg 6).
5. Run the pump:
   a. Verify the  indicator is displayed. Details here: Status Indicators (pg 9)
   b. Press and hold the Run button or depress and hold the foot pedal to run the pump.
   c. To stop the pump, release the Run button or foot pedal.

Select Recipe

Recipes can be assigned using a value from 1-30. Current recipe details are retained through a power cycle.

To change to a different recipe:

1. Press the  icon. A keypad displays.
2. Enter a different recipe number.

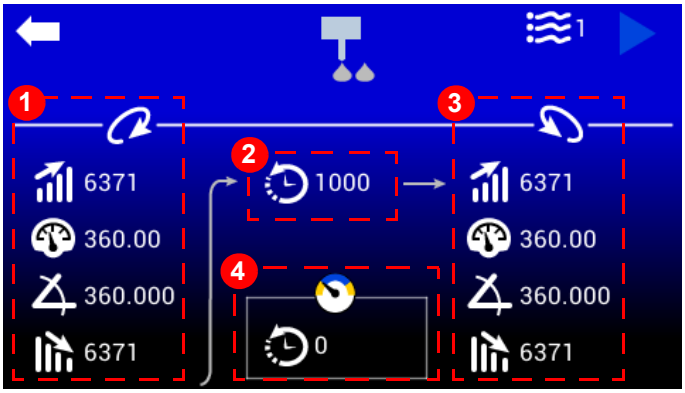
Set Parameters

Guidelines

- Parameters can be set regardless of controller Online/Offline status.
- Parameters are defined here: Windows (pg 14).
- If using glove or stylus to enter values on touch screen, capacitive type glove/stylus is required.

Dispense Parameter Areas

The general process flow of a dispense is reflected in the layout of all dispense type windows. The Dot Dispense Parameters window is shown here as an example.



1	Parameters for the **forward dispense** portion of a dot dispense.
2	Parameter for the **delay between forward and reverse** portions of a dot dispense.
3	Parameters for the **reverse dispense** portion of a dot dispense.
4	**Disable Air Delay** - length of time the air remains on after the pump turns off. This delay occurs after the reverse dispense operation. If all reverse rotation values are set to 0, then the Disable Air Delay begins after the forward operation. Default = 0. *Recommendation for robot-controlled setups*: To avoid unnecessary cycling of air and hardware (and if your process allows it), match the amount of time to process from one dispense to the next with the value for “delay between forward and reverse” (Item 2).

Clear Error Conditions

Error Condition

To clear an error condition, press the Online/Offline button twice to cycle the controller to its online state.

Disconnect Condition

To clear a pump disconnect condition:

1. Plug the pump into the controller. An error condition occurs.
2. Clear the error per Error Condition (pg 12).

Programming Controller

Program via RS232 Interface

To use the RS232 interface to program the controller:

1. Power off the controller.
2. Plug an RS232 connector into the controller.
3. For programming, use the ASCII Commands and ASCII Command Set reference material provided in the *RS232 Programming* section of the *Servo Pump Controller Programmer Guide* (PN 22940002).

Program via Ethernet

To use the Ethernet interface to program the controller:

1. Power off the controller.
2. Plug an Ethernet connector into the controller.
3. For programming, use the Process Image Data and Process Image Type reference material provided in the *Modbus TCP/IP Programming* section of the *Servo Pump Controller Programmer Guide* (PN 22940002).

Specifications

Dimensions (W x D x H) . . . . . 247.65 mm x 279.4 mm x 101.6 mm (9.75” x 11” x 4”)
Weight. . . . . 4.27 kg (9.42 lb)

Power supply voltage . . . . . input: 120/240 V, 50/60 Hz, Single Phase
Consumption rating. . . . . 150 VA / 2.0 A

User interface . . . . . Touch Screen with Servo Pump Controller software
Communication cables . . . . . controller to pump (standard): 2 meter, high flex. Other lengths available.
External trigger signal . . . . . +5 to 24 V / dry contact

Air pressure:
- Input . . . . . 0-6.9 bar (0-100 psi)
- Output . . . . . 0-4.1 bar (0-60 psi)

Air tube diameter:
- Input port. . . . . 6 mm
- Output port . . . . . 4 mm

Air pressure regulation . . . . . Digital Precision: 0-415 kPa (0-60 psi)

Heater . . . . . drives two 24VDC 23W heaters
External input . . . . . PLC, robotic controller, foot switch
Pump compatibility . . . . . Precision Auger Pump, PCD H Series Pumps
Operating temperatures . . . . . +10° C to +40° C (50° F to 104° F)

Housekeeping

Maintenance

Periodically wipe the external surfaces of the controller with a clean, dry, soft cloth.

Spare Parts

Applicable to all models:

Description	Part No.	Qty
Temperature Fuse F1 and F2, 2A	4300-0118	2

References

- Units of Measure (pg 13)
- Windows (pg 14)

Units of Measure

The following units are used unless otherwise specified.

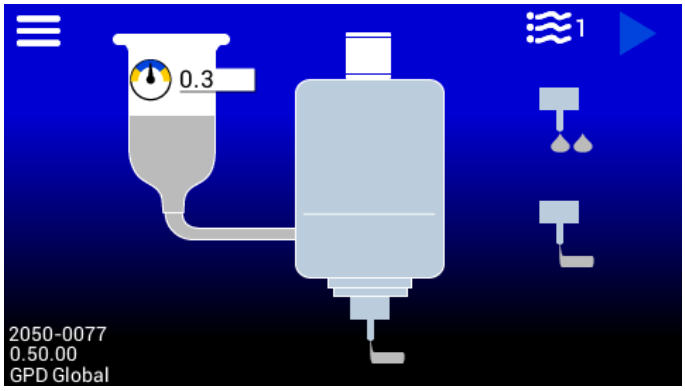
Rotation	Degrees (angle)
Speed	Degrees (angle) n/s
Acceleration/Deceleration	Degrees (angle) n/s²
Time	Milliseconds
Pressure	kPa
Temperature	Celsius

Windows

Home

Use the Home window to:

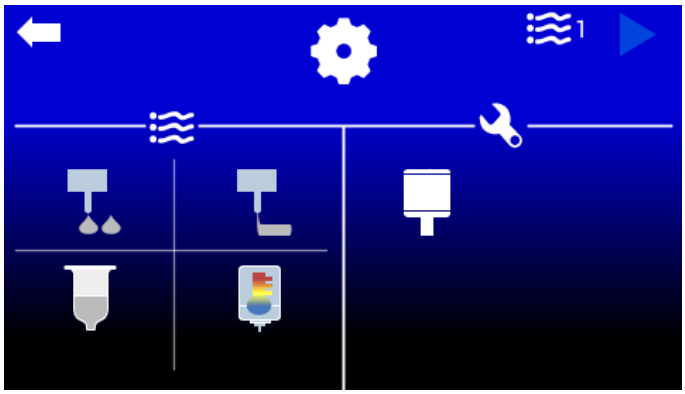
- determine pump connection status
- monitor actual reservoir pressure
- monitor actual reservoir temperature
- monitor actual pump body temperature
- select a dispense mode
- select a recipe
- access the settings window for the current dispense mode
- access the menu window



	Pump reservoir. Value indicates the current pressure measured by pressure sensor.
	Pump body. The currently selected dispense mode is indicated at the base of the pump body. For example, the pump body image shown at left indicates continuous dispense mode.
 	Dispense modes - icons are located to the right of the pump body. Pressing an icon selects that mode and displays the mode icon at the base of the pump body. Selects dot dispense mode. Selects continuous dispense mode.
	Reservoir temperature. Value indicates actual current temperature of temperature controller.
	Pump body temperature Value indicates actual current temperature of temperature controller.
	Recipe selection. Press to select recipe. The number of the selected recipe displays. By default, the recipe dispenses in the dispense mode displayed at the base of the pump body.

Menu

Use the Menu window to navigate to parameters and settings windows.

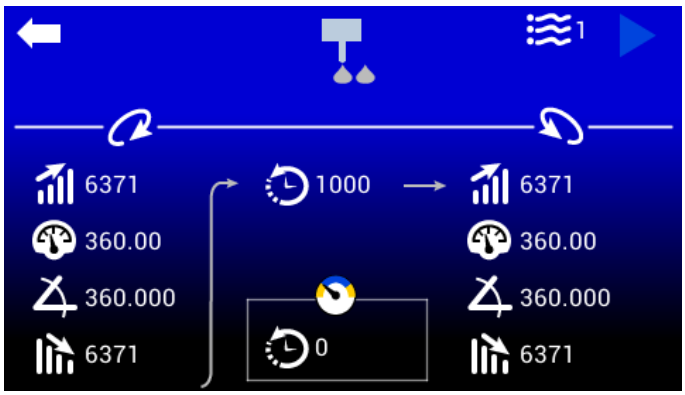


	Settings window.
	Recipe parameter categories.
	Opens Dot Dispense Parameters (pg 16) window.
	Opens Continuous Dispense Parameters (pg 17) window.
	Opens Reservoir Settings (pg 18) window.
	Opens Pump Body Settings (pg 19) window.
	Hardware parameters categories.
	Opens Pump / Motor Configuration (pg 20) window.

Parameters

Dot Dispense Parameters

Use this window to edit dot dispense parameter values.

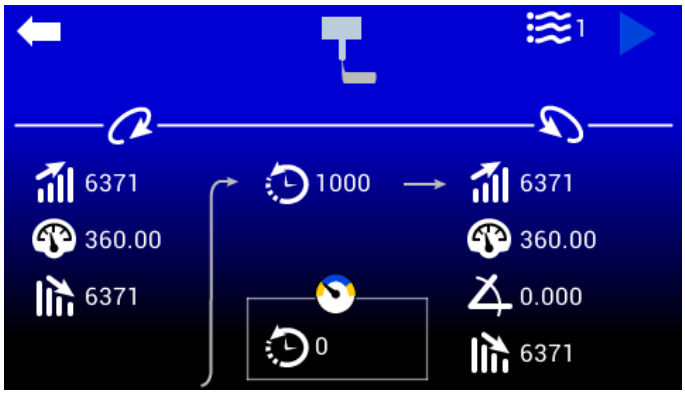


	Dot parameters window.
	Forward Rotation* parameters.
	Acceleration. Used to drive the pump motor. Degrees (angle) n/s^2
	Speed. Used to drive the pump motor. Degrees (angle) n/s
	Deceleration. Used to drive the pump motor. Degrees (angle) n/s^2
	Time / Delay. Milliseconds
	Reverse Rotation* parameters.
	Acceleration. Used to drive the pump motor. Degrees (angle) n/s^2
	Speed. Used to drive the pump motor. Degrees (angle) n/s
	Angle. Degrees (angle)
	Deceleration. Used to drive the pump motor. Degrees (angle) n/s^2
	Delay for Pressure Off.
	Time / Delay. Milliseconds

* Rotation - the amount of rotation of the auger driven by the motor (+ forward, - reverse).

Continuous Dispense Parameters

Use this window to edit continuous dispense parameter values. \



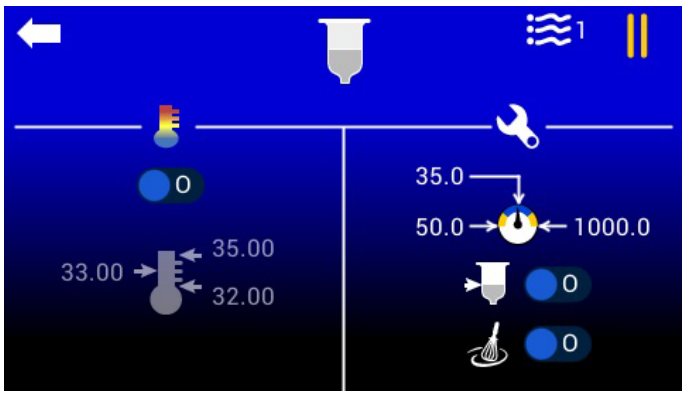
	Continuous dispense parameters window.
	Forward Rotation* parameters.
	Acceleration. Used to drive the pump motor. Degrees (angle) n/s^2
	Speed. Used to drive the pump motor. Degrees (angle) n/s
	Deceleration. Used to drive the pump motor. Degrees (angle) n/s^2
	Time / Delay. Milliseconds
	Reverse Rotation* parameters.
	Acceleration. Used to drive the pump motor. Degrees (angle) n/s^2
	Speed. Used to drive the pump motor. Degrees (angle) n/s
	Angle. Degrees (angle)
	Deceleration. Used to drive the pump motor. Degrees (angle) n/s^2
	Delay for Pressure Off.
	Time / Delay. Milliseconds

* Rotation - the amount of rotation of the auger driven by the motor (+ forward, - reverse).

Settings

Reservoir Settings

Use this window to edit reservoir settings.



	Reservoir settings window.
	Current temperature settings for temperature control.
 	Toggles heater on/off. Heater is turned on. Heater is turned off.
	Enter values for reservoir temperature (Celsius) settings here: • Set point value = arrow on left • Upper limit value = arrow at top right • Lower limit value = arrow at bottom right Temperature values and icon appear gray when this option is turned off.
	Hardware settings.
	Enter values for min/max air pressure and air pressure set point: • Air pressure set point (kPa) = arrow on top • Minimum / low air pressure as measured by pressure sensor (kPa) = arrow at left • Maximum / high air pressure as measured by pressure sensor (kPa) = arrow at right
	Toggles the reservoir level detect on/off.
	Toggles the reservoir mixer on/off.

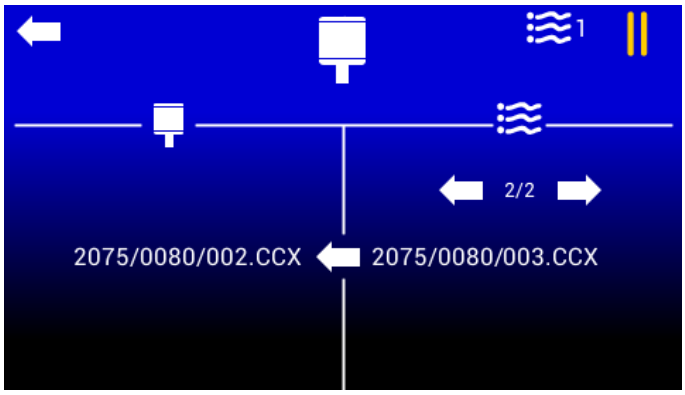
Pump Body Settings

Use this window to edit pump body settings.

	Pump body settings window.
	Current temperature settings for temperature control.
 	Toggles heater on/off. Heater is turned on. Heater is turned off.
	Enter values for pump body temperature (Celsius) settings here: • Set point value at left arrow. • Upper limit value at top right arrow. • Lower limit value at bottom right arrow. Temperature values and icon appear gray when this option is turned off.

Pump / Motor Configuration

Use this window to edit pump selection and motor configuration.



	Pump / Motor settings window.
	Displays the currently active configuration. For example: 2075/0080/002.CCX
	Allows: • navigating through a list of possible configurations • setting the active configuration
	Press the arrow located on the center divider line to set the configuration displayed in the right pane as the currently active configuration in the left pane. For example, 2075/0080/003.CCX is shown in the right pane. Pressing the center divider line causes the left pane to also display 2075/0080/003.CCX and set this configuration as the currently active configuration.
	Press the left/right arrows to cycle through the list of possible configuration. The numerals between the arrows (2/2) indicate which configuration is selected from the total configuration count.

Available Configurations:

2075/0080/002.CCX - for use with Precision Auger Pump

2075/0080/003.CCX - for use with PCD3 Pump