

# *FPC with Time Pressure Control - Integrated*

**Addendum to: FLOWare® Software User Guide PN 22100080D**

Part No. 22240106

Version 1.0

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*for use with:*

FLOWare® Software version 2.9.3T

*and*

*DS Series:*

Embedded FPC for Head 1, PN 22191783-0001

Embedded FPC for Head 2, PN 22191783-0002

Embedded FPC for Head 3, PN 22191783-0003

*MAX Series:*

Embedded FPC for Head 1, PN 22291185-0001

Embedded FPC for Head 2, PN 22291185-0002

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# Contents

<b>Legal</b> .....	<b>iii</b>
<b>Safety notices</b> .....	<b>iv</b>
<b>Warranty</b> .....	<b>vi</b>
<b>About this manual</b> .....	<b>1</b>
<b>System overview</b> .....	<b>1</b>
Theory of operation .....	1
Special features .....	3
Specifications .....	3
<b>System requirements</b> .....	<b>3</b>
<b>Installation</b> .....	<b>4</b>
Accessories .....	4
Installation procedures .....	4
Startup .....	5
Initial testing .....	5
Application testing .....	6
Power down procedure .....	6
<b>User interface</b> .....	<b>7</b>
Trackball .....	7
Window interface .....	7
Indicators .....	8
Controls .....	9
<b>Operating instructions</b> .....	<b>11</b>
Getting started .....	11
Set up material recipe .....	13
Set parameters .....	15
Control pressure .....	18
<b>Adjustments</b> .....	<b>19</b>
Calibrate pressure sensors .....	19
<b>Troubleshooting</b> .....	<b>22</b>
Symptoms and solutions .....	22
Error messages .....	22
Testing procedures .....	23
<b>Suggested spare parts</b> .....	<b>25</b>
<b>References</b> .....	<b>26</b>
Units of measure .....	26
Windows and fields .....	27

## Legal

### Trademarks

- GPD Global<sup>®</sup> is a registered trademark of GPD Global<sup>®</sup>, Inc.

Throughout this manual, trademarks are used. Rather than put a trademark symbol in every occurrence of a trademarked name, we state that we are using the names in an editorial fashion only and to the benefit of the trademark owner with no intention of infringement of the trademark.

### Disclaimers

GPD Global<sup>®</sup> devices are intended for the stated functions at the time of sale. GPD Global<sup>®</sup> is not liable for other uses.

<b>IMPORTANT:</b> Operation of a damaged device may cause personal injury and invalidate the warranty.			
<b>IMPORTANT:</b> L'utilisation d'une machine endommagée peut entraîner des blessures personnelles et invalider la garantie.	<b>WICHTIG</b> Die Bedienung einer beschädigten Maschine kann zu Verletzungen des Bedieners sowie zur Ungültigkeit der Garantie führen.	<b>IMPORTANTE</b> Il funzionamento di un'apparecchiatura danneggiata può causare lesioni personali e invalidare la garanzia.	<b>IMPORTANTE</b> La utilización de una máquina averiada puede provocar lesiones e invalidar la garantía.

## Safety notices



### **WARNING: High pressure fluids**

High pressure fluids are extremely hazardous unless safely contained. Always release fluid pressure prior to adjusting or servicing high pressure equipment. A jet of high pressure fluid can cut like a knife and cause serious bodily injury, amputation, or death. Fluids penetrating the skin can also cause toxic poisoning.

Any injury caused by high pressure liquid can be serious. If you are injured or even suspect an injury:

- 1 - Immediately go to an emergency room.
- 2 - Tell the doctor that you suspect an injection injury.
- 3 - Show the doctor the following Medical Alert note.
- 4 - Tell the doctor what kind of material you were dispensing.

### **Medical Alert - Airless Spray Wounds: Note to Physician**

Injection in the skin is a serious traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is a concern with some exotic coatings injected directly into the bloodstream.



### **WARNING: Appropriate use**

This equipment must be used in the manner indicated in these instructions. Use for any other purpose may cause damage to the equipment, injury, or death.



### **CAUTION: Warranty**

Any of the following that are done without the explicit and written approval of the manufacturer:

- conversions or additions,
- the use of non-original spare parts,
- repairs carried out by companies or persons that have not been authorized by the manufacturer

can lead to the warranty being rendered null and void. The manufacturer shall have no liability whatsoever for damage resulting from failure to follow the operation and maintenance instructions.



### **CAUTION: Qualifications of operating and maintenance personnel**

The owner bears the responsibility for ensuring that operating and maintenance personnel have the required qualifications. The operation and maintenance instructions must be read and understood. Comply with the relevant applicable technical and safety regulations.



### **CAUTION: Organizational measures**

The owner is to provide any personal protective equipment that is required. All the safety devices are to be checked regularly. Wear protective glasses and a protective suit for operation and cleaning to protect against any chemicals that may be sprayed out.



**CAUTION:** Equipment is electrical in nature and shock may occur if used improperly or opened while powered.

Shock, injury, and death may occur. Unplug system before any maintenance or plugging or unplugging components.

Remove the electrical power cable from the AC outlet before the 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.

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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.

## About this manual

This document provides an overview of the FPC with Time Pressure Control - Integrated (also referred to as FPC/TP controller) feature, plus setup and operating instructions for it.

## System overview

FPC with Time Pressure Control - Integrated is a self-regulated FLOWare software program enhancement that controls reservoir fluid pressure for automatically produced, consistent dispense results.

This advanced feature automatically manages a timed fluid pressure cycle for a wide range of material viscosities by applying a specified amount of air pressure to a reservoir for a specified period of time.

A fluid dispense reservoir controlled by the FPC with Time Pressure Control - Integrated can process any application for which that reservoir is compatible (e.g., patterns, dots, lines), in a wide range of material viscosities: cream solder, silver paste, epoxies, bond, oil, etc.

## Theory of operation

### General theory of operation

FPC with Time Pressure Control - Integrated is controlled by an Automated Dispense System control signal to start/stop the FPC (fluid pressure control) function applied to a reservoir. Alternatively, the start/stop function can be manually cycled for testing/setting head air pressure.

FPC with Time Pressure Control - Integrated can be run in either dot dispense mode or continuous dispense mode. When in the Run state, fluid pressure achieves the Run mode set point dictated by the current FPC with Time Pressure Control - Integrated material recipe.

FPC with Time Pressure Control - Integrated is simple to set up and use:

1. Set up:
  - a. Mount your reservoir(s) in the provided head station mount(s).
  - b. Connect the fluid pressure sensor cable (part of the Time Pressure Interface) to the interconnect panel.
  - c. Power on the FPC/TP controller via the Automated Dispense System. The FPC/TP controller powers on and off automatically with Automated Dispense System.
  - d. Set the FPC/TP controller to online state.
  - e. Verify each head position to be used is in "Connected" state.
  - f. Adjust parameters for each head position to be used and save as a material recipe.
  - g. Manually start/stop the FPC with Time Pressure Control - Integrated function for testing/setup purposes.
2. Use in FLOWare software program(s):
  - a. Each FPC with Time Pressure Control - Integrated material recipe is keyed to a material record, so the FPC with Time Pressure Control - Integrated feature will automatically run for every program that uses that material.

### Online vs offline theory

Online/Offline status for the controller can be toggled to the online and offline states via the [FPC/TP Monitor](#) (pg 27) window.

**TIP:** Numerous process settings can be edited regardless of Online/Offline status.

#### Offline

Offline status is the non-operational condition when air output is at approximately atmospheric pressure.

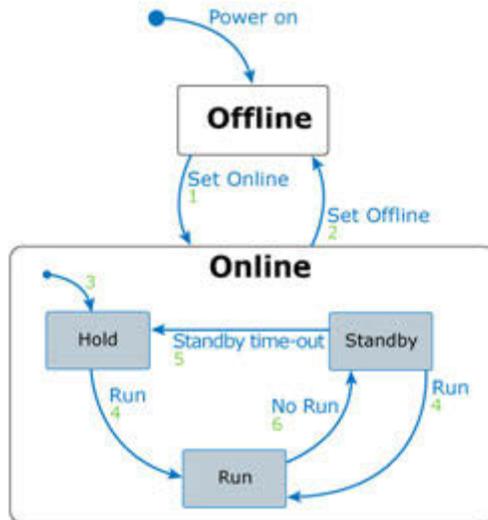
This is the safe/preferred state for any equipment/pump change while the controller remains powered on.

#### Online

The controller must be Online for activation to function.

Online status is either actively running a process (Run state) or waiting and immediately prepared to do so (Hold state/Standby state). While in any online state (Run/ Hold/Standby), the controller actively controls pressure (air output is pressurizing or “pulling” vacuum) per user defined set point(s).

**Figure 1:** Hold/Standby/Run states diagram and relationship to Online/Offline status



Item	Description	Reference
1 - Online	Online is activated by operator or Automated Dispense System.	<a href="#">Set online/offline state</a> (pg 12)
2 - Offline	Offline is activated by operator or Automated Dispense System. OR Error occurs.	<a href="#">Stop controller</a> (pg 12) <a href="#">Troubleshooting</a> (pg 22)
3 - Hold	Controller is enabled/set online. OR Standby state expires.	<a href="#">Set online/offline state</a> (pg 12) <a href="#">FPC/TP Monitor</a> (pg 27)
4 - Run	Run is activated by operator or Automated Dispense System.	<a href="#">Stop controller</a> (pg 12)
5 - Standby	Standby time-out expires.	<a href="#">FPC/TP Monitor</a> (pg 27)
6 - No Run	Run is deactivated by operator or Automated Dispense System.	<a href="#">Stop controller</a> (pg 12)

## Special features

- In addition to controlling all pneumatic aspects of a reservoir used for dot dispense or continuous/line dispense, FPC with Time Pressure Control - Integrated also provides vacuum control to prevent the fluid reservoir from dripping.
- Pneumatic pressure control of fluid reservoir is activated automatically via an Automated Dispense System material recipe or manually via the on-screen Run button.

## Specifications

The FPC/TP controller is integrated into the Automated Dispense System at the factory and controlled via a module of FLOWare software - the operating system for GPD Global automated dispense machines.

Power supply voltage . . . . . sourced from MAX Series/DS Series Automated Dispense System:

Input . . . . . 110-230 V @ 5 amps

Output . . . . . 24VDC @ 20 amps

Consumption rating . . . . . 2.0 A

Air pressure:

Input . . . . . 0-6.9 bar (0-100 psi)

Output . . . . . 5 bar (72 psi)

Operating temperatures . . . . . +10° C to +40° C (50° F to 104° F)

## System requirements

Hardware and software needed to control/run FPC with Time Pressure Control - Integrated:

- Control Software (PN 2050-0098) - factory installed software; controls the controller(s). (software is Included with controller.)
- FPC/TP controller integrated into an Automated Dispense Systems
  - DS Series:
    - Embedded FPC for Head 1 (PN 22191783-0001)
    - Embedded FPC for Head 2 (PN 22191783-0002)
    - Embedded FPC for Head 3 (PN 22191783-0003)
  - MAX Series:
    - Embedded FPC for Head 1 (PN 22291185-0001)
    - Embedded FPC for Head 2 (PN 22291185-0002)

# Installation

## Accessories

Your order may include this optional item:

- Fluid Pressure Sensor Calibration Kit - PN 22893033

For quotes and further details, contact GPD Global.

## Installation procedures

### Physical installation

The FPC/TP controller is factory installed (integrated into an Automated Dispense System), so no physical installation is required by the user.

### Interconnections

#### Prerequisites:

- **Dispensing pump** - must be mounted in a head station. Refer to the instructions for that dispensing pump.
- **FPC Pump Interface** - must be mounted on the aforementioned dispensing pump. Refer to *Mount to Pump* instructions in *FPC Pump Interface User Guide* (PN 22890001).

To connect an FPC Pump Interface to the FPC/TP controller:

1. Locate the FPC Pump Interface that you want to use with the FPC/TP controller.
2. Note the head station in which the dispensing pump with FPC Pump Interface is mounted.

For example, let's assume it's mounted in head station 1.

3. Locate the fluid pressure sensor cable for the above-mentioned FPC Pump Interface - so you can plug it in during a later step.
4. Identify which port (located on the interconnect panel of the Automated Dispense System) is associated with the FPC Pump Interface at that head station by referring to the label (similar to Figure 2) adhered to the interconnect panel.

For example: Locate **STN 1 Advanced FPC** on the interconnect panel label in Figure 2. Note that it corresponds to **E2**; this is the port for an FPC Pump Interface in head station 1.

*Figure 2: Interconnect panel label. Details differ depending on machine configuration.*

P1: STN 1 Syringe Pressure	E1: STN 1 Level Detect
P2: STN 2 Syringe Pressure	E2: STN 1 Advanced FPC
P3:	E3: STN 2 Level Detect
P4:	E4: STN 2 Advanced FPC
P5:	E5:
P6:	E6:

5. Plug the FPC Pump Interface fluid pressure sensor cable into the appropriate port.

For our example, you would plug the fluid pressure sensor cable into **E2**.

6. If multiple FPC Pump Interfaces are in use by the Automated Dispense System, repeat the above set of instructions for each head station location.

All other FPC/TP controller connections (air, power, and communications) were factory set.

## Startup

1. Power on the Automated Dispense System. The FPC/TP controller powers on with the Automated Dispense System.
2. Verify the fluid sensor is connected to the appropriate port on the Automated Dispense System interconnect panel.
3. Verify the output pressure is connected to the reservoir.

## Initial testing

To prepare the controller for operations, i.e., determine set point pressures:

1. Select a dispense mode per [Select dispense mode](#) (pg 13).
2. Verify all equipment is connected properly.
3. Perform the following tests in the order listed:
  - a. [Pressure function test](#) (pg 5)
  - b. [Vacuum/Suction function test](#) (pg 6)

### Pressure function test

---

Perform these steps to verify proper function.

**NOTE:** Use an **empty** reservoir for this procedure.

1. Enter these values in the Settings pane of the [FPC/TP Monitor](#) (pg 27) window:

Settings field	Value
Run Setpoint	10 PSI
Standby Setpoint	0 PSI
Holding Setpoint	0 PSI

2. Set the controller to online. Refer to [Set online/offline state](#) (pg 12).

Air pressure in the reservoir should be 0 PSI.

3. Click-and-hold the RUN button located in [FPC/TP Monitor](#) (pg 27).

Air pressure in the reservoir should increase to 10 PSI.

4. Release the RUN button.

Air pressure in the reservoir should return to 0 PSI.

## Vacuum/Suction function test

---

Perform these steps to verify proper function.

**NOTE:** Use an **empty** reservoir for this procedure.

1. Enter these values in the Settings pane of the [FPC/TP Monitor](#) (pg 27) window:

Settings field	Value
Run Setpoint	10 PSI
Standby Setpoint	0 PSI
Holding Setpoint	-5 PSI

2. Set the controller to online. Refer to [Set online/offline state](#) (pg 12).

Air pressure in the reservoir should be -5 PSI.

3. Click-and-hold the RUN button located in [FPC/TP Monitor](#) (pg 27).

Air pressure in the reservoir should increase to 10 PSI.

4. Release the RUN button.

Air pressure in the reservoir should return to -5 PSI (after first dropping to Standby Setpoint for the time specified in Standby Duration).

## Application testing

Perform application testing to determine the specific fluid feed pressure ideal for the material to be dispensed. Application testing is similar to initial testing except you'll use a reservoir of material and adjust parameters, as needed, to suit the material.

**NOTE:** Use a **material-filled** reservoir for this procedure.

1. Install a material-filled reservoir.
2. Perform the [Initial testing](#) (pg 5) procedures, noting how material responds and adjusting parameters accordingly.

**Table 1:** Guidelines for application testing

Fixed Element	Process	Reference
Time	To obtain a dispense in $n$ seconds, adjust pressure until desired dispense results occur in the desired amount of time.	<a href="#">Set parameters</a> (pg 15)
Pressure	To obtain a dispense at $n$ pressure, adjust time until desired dispense results occur at the desired pressure.	

## Power down procedure

Power off the Automated Dispense System. The FPC/TP controller powers on/off with the Automated Dispense System.

## User interface

FPC with Time Pressure Control - Integrated uses the same user interface features as FLOWare software plus the additional windows and functions listed below.

## Trackball

**Table 2: Additional Trackball Convention**

Term	Action
click-and-hold	Press the Click trackball button and keep it depressed for as long as you want the RUN button to be active. Releasing the Click button deactivates the RUN button.

For additional details, refer to the *User Interface* section of *FLOWare Software Guide* (PN 22100080D).

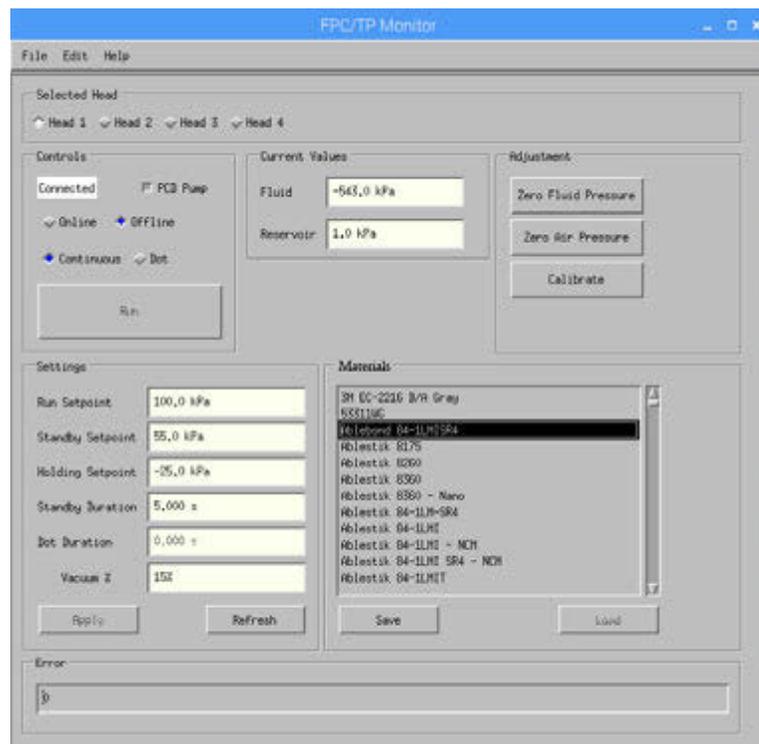
## Window interface

### Main interface

The main interface for FPC with Time Pressure Control - Integrated is used to:

- apply self-regulating FPC/TP control of reservoir fluid to selected material
- set material parameters for use with FPC/TP controller
- adjust FPC/TP controller settings, e.g., online/offline
- perform adjustments, e.g., zeroing pressure, sensor calibration
- manually cycle the air pressure for a given head station for testing/setup

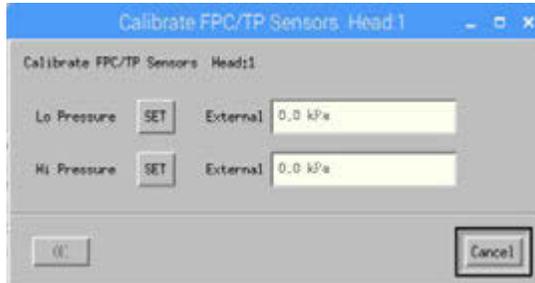
For detailed information, including field definitions, refer to [FPC/TP Monitor](#) (pg 27).



### Calibration interface

This calibration interface is used to calibrate the sensors for fluid pressure and reservoir pressure for a head station.

For detailed information, including field definitions, refer to [Calibrate FPC/TP Sensors Head:n](#) (pg 30).



### Indicators

#### Connected / Not Connected

These indicators display in the Controls pane of the [FPC/TP Monitor](#) (pg 27) window.

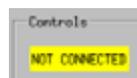
##### Connected

This indicator identifies when the FPC/TP controller is functional and the selected head is set up and ready to use the controller.



##### Not Connected

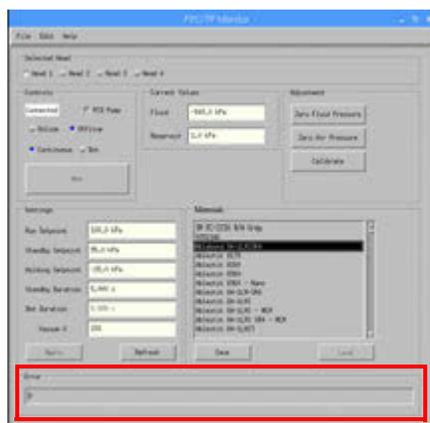
This indicator identifies when the FPC/TP controller is unavailable.



Either no controller has been installed for the selected head or a controller communication error has occurred for the selected head.

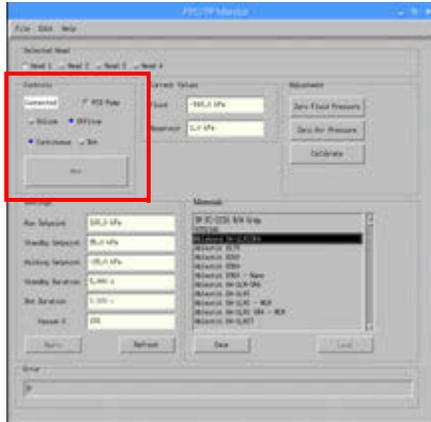
### Error message

If an error occurs, an error message displays in Error pane. Refer to [Error messages](#) (pg 28).



## Controls

This section identifies and describes the purpose of each software control for the FPC/TP controller. All of these controls are located in the Controls pane of the [FPC/TP Monitor](#) (pg 27) window.



## PCD Pump

The PCD Pump toggle button setting affects the following parameters:

- Run Setpoint pressure
- Standby Setpoint pressure
- Hold Setpoint pressure

The PCD Pump toggle button also determines which type of pressure the above parameters control:

### Reservoir pressure

Select the PCD Pump button to control *reservoir* pressure.

### Fluid pressure

Deselect the PCD Pump button to control *fluid* pressure.

## Online / Offline

Use these toggle buttons to activate or deactivate the controller. For details, refer to [Online vs offline theory](#) (pg 2).

### Online

Click to take the controller online. Online activates pressure control. Upon activation, holding set point pressure is achieved.

### Offline

Click to take the controller offline. Offline disables pressure control. Head station achieves atmospheric pressure.

## Continuous / Dot

Use these toggle buttons to select a dispense mode.

### Continuous

Click to select continuous/line dispense mode. The controller runs as long as you manually hold RUN button.

### Dot

Click to select dot dispense mode. Runs for the period of time you define in the Dot Duration field.

## Run

Use the RUN button to pressurize the selected head station to Run Setpoint pressure.

**TIP:** The currently selected dispense mode ([Continuous / Dot](#) (pg 10)) affects how long the controller will run.

# Operating instructions

## Getting started

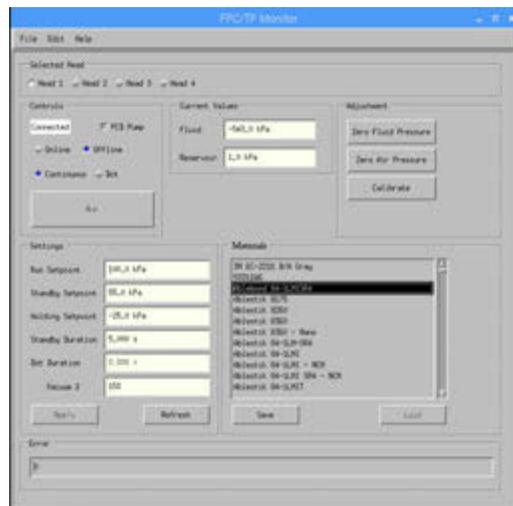
### Power on/off

The FPC/TP controller powers on/off automatically with the Automated Dispense System.

### Open FPC/TP Monitor window

To use FPC with Time Pressure Control - Integrated, you have to access the FPC/TP Monitor window:

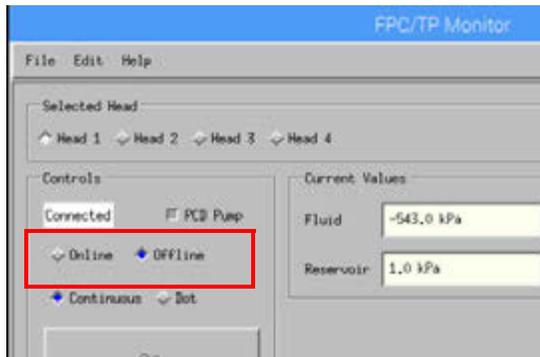
1. Go to the main menu bar in FLOWare software.
2. Click on Machine Controls > FPC Monitor. The FPC/TP Monitor window displays.



For additional information about this window and definitions for all fields and controls contained within the window, refer to [FPC/TP Monitor](#) (pg 27).

## Set online/offline state

Set the controller to an online or offline state using the Online/Offline toggle buttons in the Controls pane of the [FPC/TP Monitor](#) (pg 27) window.



When the box is active (blue), the controller is in that state.

**TIP:** Numerous process settings can be edited regardless of Online/Offline status.

**TIP:** The controller powers up in the offline state. It must be set online in order to run the controller (control fluid or reservoir pressure).

## Pressurize head (run recipe)

When activated, the RUN button controls (to Run Setpoint pressure) the pressure to the selected head station.

To pressurize selected head, i.e., run recipe:

1. Verify the controller is Online.
2. Press the RUN button. Results depend on the currently selected dispense mode:
  - For Dot mode, click the RUN button once. The recipe will run.
  - For Continuous mode, click-and-hold the RUN button. The recipe will run until you release the RUN button.

## Stop controller

To stop fluid pressure control, click the Offline button.

## Purge needle tip

To purge material from a pump needle tip:

1. [Select head](#) (pg 13).
2. Set the input air pressure to a setting sufficient to purge material from the needle tip. Activate the purge function per the *Material Purge Options* section of *FLOware Software Guide* (PN 22100080D).

## Change dispensing parts/equipment

Prior to making any equipment changes (replacing reservoir/needle/syringe, etc.), set the controller to Offline state.



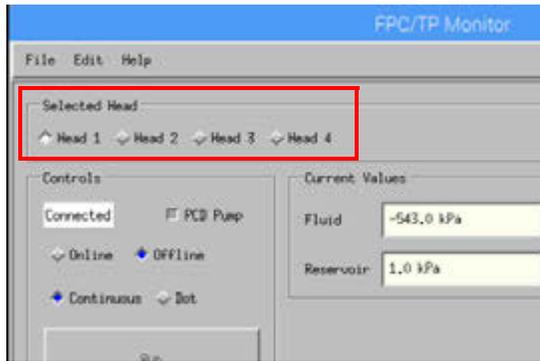
**CAUTION:** All hardware setup must be complete prior to setting the controller Online (i.e., air output in line with the fluid pressure sensor).

## Set up material recipe

Setting up a material recipe allows you to set up a group of parameters that will be associated with a specific material.

### Select head

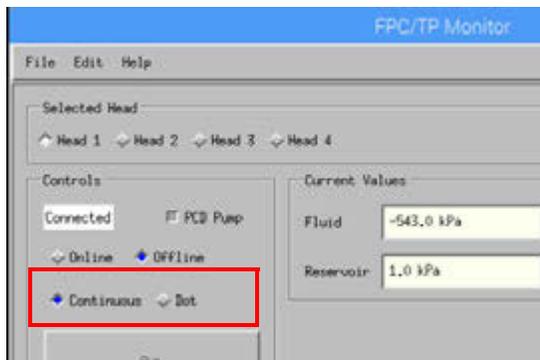
Select the desired head station position to be used for the dispense process.



**NOTE:** Only heads that are connected can be used. For more information, refer to [Connected / Not Connected](#) (pg 8).

### Select dispense mode

You can set the controller to either a continuous dispense mode or dot dispense mode using the Continuous/Dot toggle buttons in the Controls pane of the [FPC/TP Monitor](#) (pg 27) window.



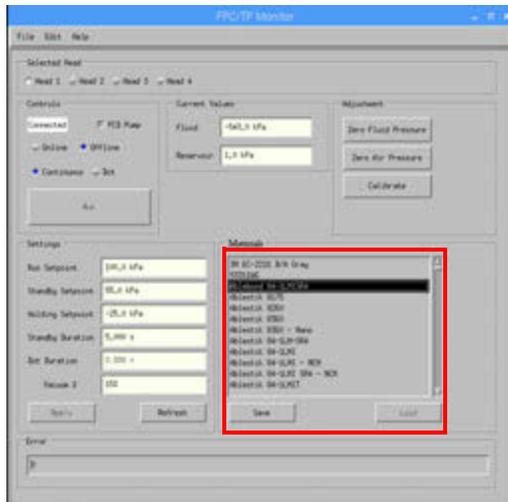
To select dispense mode, click on desired dispense mode:

- **Dot** - dot mode
- **Continuous** - continuous mode

## Load material

Loading the selected material retrieves previously saved parameters for that material.

To load the existing parameters for the material highlighted in the Materials list, either press the LOAD button or double-click on the material.



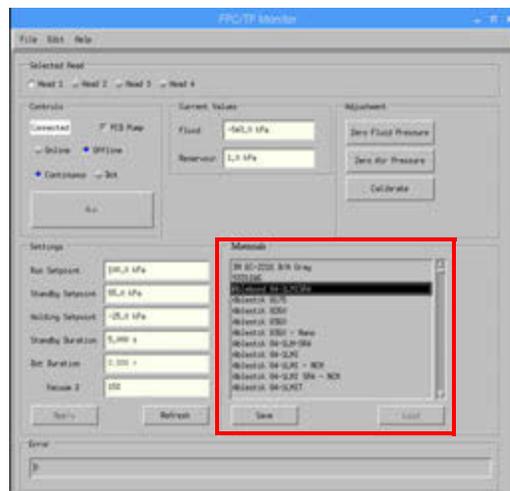
## Edit material

You can use the FPC/TP Monitor window to edit FPC/TP related parameters for a material, but you cannot add or delete materials using this window. To add or delete a material record in the materials library, refer to *Materials Library* in the *References* section of *FLOWare Software Guide* (PN 22100080D).

**TIP:** Numerous process settings can be edited regardless of the Online/Offline status of the controller.

To edit a material:

1. Highlight desired material in the Materials list to select it.



2. Modify desired parameters. For details, refer to [Set parameters](#) (pg 15)
3. Click the SAVE button to save the material record.

## Set parameters

**NOTE:** Parameter values can be set regardless of controller Online/Offline status, as long as head is "Connected".

**TIP:** To use a a unit of measure other than the default, refer to [Units of measure](#) (pg 26).

### Dispense time

Setting the duration of a dispense depends on which dispense mode is currently selected plus the following factor(s):

- Dot mode - value of the Dot Duration field
- Continuous mode - length of time you maintain pressure on the RUN button before releasing it

### Air Pressure

To set air pressure:

1. Modify the set point pressure parameters:
  - Run Setpoint
  - Standby Setpoint
  - Holding Setpoint
2. Set the controller to Online.

Holding Setpoint pressure will be achieved, and Run Setpoint pressure will be achieved when you press the RUN button.

### Vacuum

To set the amount of vacuum, as a percentage, present when set point pressure is being held per Holding Setpoint, set a value in the Vacuum % field.

### Standby time

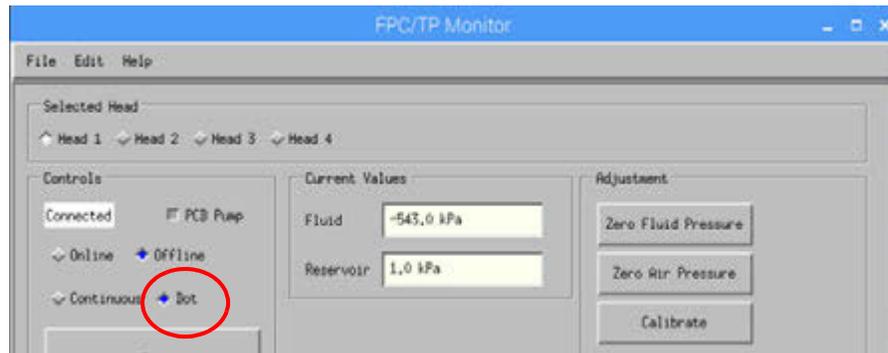
To set the amount of time the controller remains in standby, set a value in the Standby Duration field.

## Reservoir pressure and duration parameters

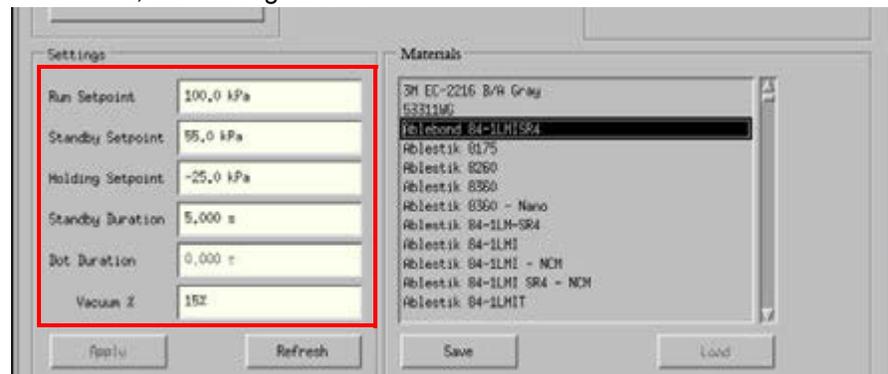
**TIP:** The values for set points and duration can be set regardless of controller Online/Offline status, as long as head is “Connected”.

### Dot dispense parameters

1. Select the Dot mode.



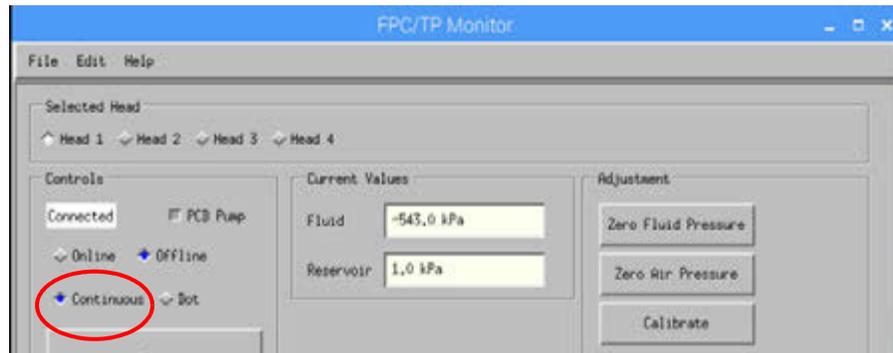
2. As needed, edit setting values:



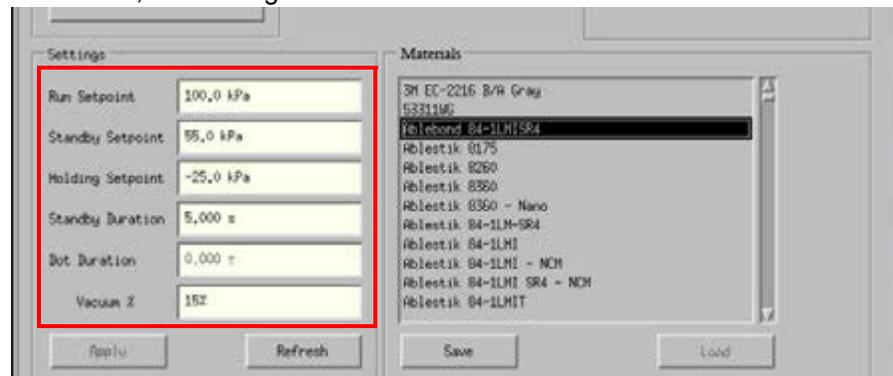
3. Click the SAVE button to save changes.

## Continuous/line dispense parameters

1. Select the Continuous mode.



2. As needed, edit setting values:



3. Click the SAVE button to save changes.

## Control pressure

The current state of the [PCD Pump](#) (pg 9) control determines which type of pressure, reservoir or fluid, is controlled during this procedure.

To control reservoir pressure or fluid pressure, i.e., run the controller:

1. Perform [Startup](#) (pg 5).
2. Perform [Initial testing](#) (pg 5).
3. To control the reservoir or fluid pressure:
  - a. Verify the correct holding pressure value is set in the Holding Setpoint field for the current material.

The holding set point for fluid pressure will be achieved when the controller is set to Online.

- b. To control the reservoir pressure or fluid pressure to the amount of pressure specified in the Run Setpoint field, select the action appropriate for the currently selected mode:
      - Dot mode: click the RUN button
      - Continuous mode: click-and-hold the RUN button

Run set point fluid pressure is achieved.

4. To halt control at Run Setpoint pressure, select the action appropriate for the currently selected mode:
        - Dot mode: stops automatically when Dot Duration is achieved
        - Continuous mode: release the RUN button

Control pressure returns to Holding Setpoint pressure when the run is complete.

# Adjustments

## Calibrate pressure sensors

The calibration process is performed by calibrating against 2 points:

- Calibration point atmospheric pressure - the 0 pressure point
- Calibration point at maximum pressure - the maximum input supply pressure to the controller per [Specifications](#) (pg 3)

### Equipment/Tools required:

- Fluid Pressure Sensor Calibration Kit, PN 22893033
- OR

- High precision pressure gauge with kPa output display
- Syringe (empty)
- Tubing
- Air fittings
- Valve or cap (to seal end of Time Pressure Interface)

### Prerequisite:

System should be “dry” (free of fluids/material) to perform the calibration procedure; i.e., replace reservoir/syringe with a clean, dry, empty one.

To calibrate the fluid pressure sensor (located on the Time Pressure Interface):

## I - Prepare system

Follow the steps below to prepare the system for calibration.



Wear approved safety eye protection when operating or working near the system.

1. Seal the **output** pressure system by replacing the needle with a manual valve (Figure 3).

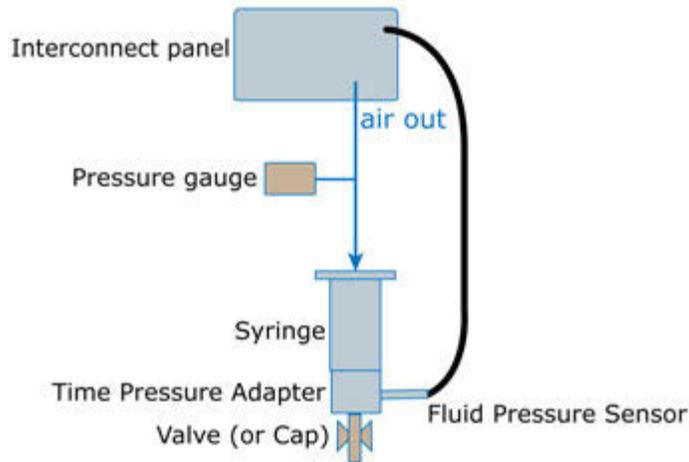
By temporarily sealing the system at the point where dispense fluid is output, the pneumatic system can easily be both (1) exhausted to atmospheric pressure, and (2) is capable of being completely sealed.



**CAUTION: Seal the output pressure system.** If the pressure system is not properly sealed, loose system fittings can be propelled from the system at high speed when the air output pressure fully pressurizes during the calibration process.

2. Attach a pressure gauge to the output pressure source (Figure 3).

**Figure 3:** Pneumatic system temporarily sealed for sensor calibration procedure.



## II - Initiate calibration

To start the calibration procedure:

1. From the main menu bar, click Machine Controls > FPC Monitor. The FPC/TP Monitor window displays.
2. Click the CALIBRATE button. The Calibrate FPC/TP Sensors Head:n window displays.

**NOTE:** The sensor calibration process can be safely aborted at any time by clicking CANCEL.

## III - Reset pressure to zero

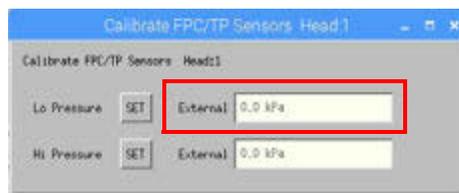
To purge air pressure:

1. Click the SET button (located next to Lo Pressure).

Air pressure will purge from the controller system.

2. Wait for the air pressure to be purged.
3. Manually open the calibration kit exhaust valve.
4. Note the reading on the pressure gauge provided with calibration kit.
5. **REQUIRED:** Enter the pressure gauge reading in the Lo Pressure External field.

**NOTE:** You MUST enter the pressure gauge reading even if the value to be entered is already displayed in the Lo Pressure External field.



6. Manually close the calibration kit exhaust valve.

## IV - Adjust pressure to maximum

To calibrate the sensors at the maximum pressure:

1. Click the SET button (located next to Lo Pressure).

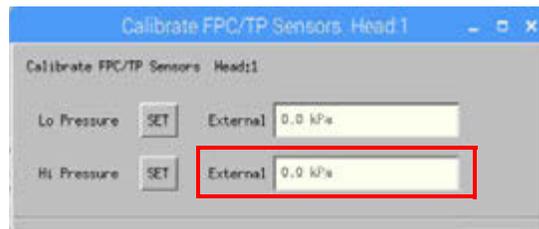


**CAUTION:** The head pneumatic system will pressurize quickly. If the pressure system is not properly sealed, loose system fittings can be propelled from the system at high speed.

The pneumatic system for the selected head will pressurize.

**NOTE:** The system must be completely sealed; leaks will prevent the system from pressurizing completely.

2. Wait for the pneumatic system for the selected head to pressurize.
3. Note the reading on the pressure gauge provided with calibration kit.
4. When pressure is stable, enter the pressure gauge reading in the Hi Pressure External field.



5. Click OK to confirm calibration or click CANCEL to abort the calibration.

## V - Verify calibration

To verify calibration:

1. With the calibration kit still in place, close the calibration kit exhaust valve.
2. Set air pressure to various set points, as noted in the following steps, and compare the value displayed by the pressure gauge to the values displayed.
  - a. Set the value of Holding Setpoint to 0.
  - b. Click the APPLY button.
  - c. Set the head to online.
  - d. Modify the Holding Setpoint to various values, comparing each to the value displayed by the pressure gauge.

**NOTE:** Compared values should be within  $\pm 0.5$  PSI of each other.

- e. Set the Holding Setpoint field to 0.
- f. Click the APPLY button.
- g. Set the head to offline.

**NOTE:** If the sensor does not operate as expected, perform the [Testing procedures](#) (pg 23). If testing does not resolve the problem, the sensor may need to be replaced. Contact GPD Global to verify whether or not the problem requires sensor replacement.



**IMPORTANT:** If the sensor needs to be replaced, calibrate the new sensor prior to returning the controller to operation.

# Troubleshooting

## Symptoms and solutions

### Symptom

Error message displays: -101 PID error occurred

The controller does not achieve set point pressure when operated manually via RUN button in [FPC/TP Monitor](#) (pg 27) window.

**Problem:** Air pressure is not available to the controller due to its removal from the Automated Dispense System.

**Action:** Release the Emergency Stop and/or Motion Stop buttons, and/or close the system hood on the Automated Dispense System.

**Problem:** Air pressure to the Automated Dispense System is inadequate.

**Action:** Increase the air supply pressure to the Automated Dispense System.

### Symptom

**Problem:** The pressure value reported by the fluid pressure sensor (located on the Time Pressure Interface) is noticeably different than expected. For example, when the fluid pressure sensor is exposed to atmosphere pressure, the reading is not close to zero (0).

#### Action:

Determine whether or not the sensor responds to the controller by comparing readings per [Compare pressure readings](#) (pg 23). If the problem is not resolved, perform the [Test controller function](#) (pg 23) procedure.

## Error messages

The following chart defines the error messages that may display in the Error pane of the [FPC/TP Monitor](#) (pg 27) window and how to resolve each error.

**NOTE:** Any error message displayed applies only to the currently selected head station position.

No.	Description	Problem	Solution
-101	PID error occurred	The controller does not achieve set point pressure when operated manually via RUN button in <a href="#">FPC/TP Monitor</a> (pg 27) window.	<p>If air pressure is not available to the controller due to its removal from the Automated Dispense System, release the Emergency Stop and/or Motion Stop buttons, and/or close the system hood on the Automated Dispense System.</p> <p>If air pressure to the Automated Dispense System is inadequate, increase the air supply pressure to the Automated Dispense System.</p>

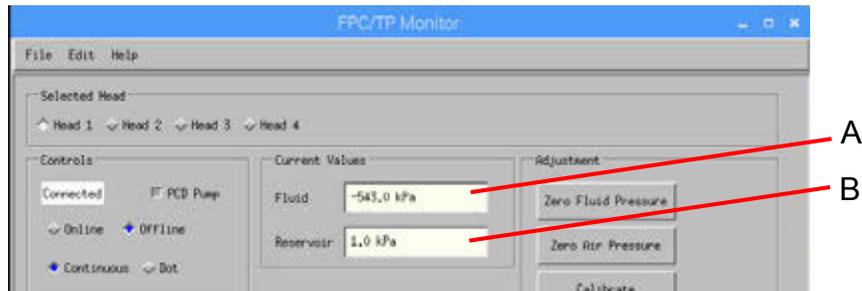
## Testing procedures

### Compare pressure readings

To compare the pressure reading reported by the fluid pressure sensor to that of another pressure gauge:

1. Set up the hardware in the same dry pneumatic configuration as described in [Calibrate pressure sensors](#) (pg 19).
2. Compare the fluid pressure readings to the external pressure gauge.
3. Also compare the fluid pressure readings to the reservoir pressure (Figure 4, Item A) reading displayed in the Calibrate FPC/TP Sensors Head:n window.

**Figure 4:** Fluid pressure reading (A) and reservoir pressure reading (B).



**NOTE:** Because this test is performed with a dry pneumatic system, the two pressure readings (Figure 4, Items A and B) should be the same value consistently.

**NOTE:** If pressure readings differ significantly, perform the [Calibrate pressure sensors](#) (pg 19) procedure.

### Test controller function

To test the fluid pressure sensor for proper function:

1. Disconnect the air cap from the reservoir (syringe).
2. Gripping only the hex fitting portion with a wrench, gently remove the fluid pressure sensor from the Time Pressure Interface.



**CAUTION:** Do not grasp, twist, or rotate sensor spring relief or cable, or damage will occur.

3. Set air pressure to a low setting (5 psi). Air should flow from the air cap.
4. **Gently** cover the fluid pressure sensor with a finger tip and **slowly** increase finger tip pressure.



**CAUTION:** DO NOT exert more pressure on the sensor after air flow has ceased as this will damage the sensor. Pressing harder on the sensor will not produce better results.

Air flow from the air cap should cease when the process value is equal to the set point.

**NOTE:** If air flow continues without interruption, the sensor may need to be calibrated per [Calibrate pressure sensors](#) (pg 19).

**Configuration**

To configure the controller, set values for Standby state and Hold state per [Reservoir pressure and duration parameters](#) (pg 16).

## Suggested spare parts

<b>Description</b>	<b>Part No.</b>	<b>Qty</b>
Coupling Insert for Reservoir Air Cap	2675-0180	4
Reservoir Air Cap, 3 cc	10/3083	2
Reservoir Air Cap, 5 cc	10/1514	2
Reservoir Air Cap, 10 cc	10/1515	2
Reservoir Air Cap, 30 cc	10/1542	2
Temperature Fuse, 2A	4300-0118	2

## References

### Units of measure

The currently selected units of measure display on the screen next to a corresponding value.

Values with multiple units (e.g., kPa | PSI) can be selected by the user.

**Figure 5:** *Units of measure*

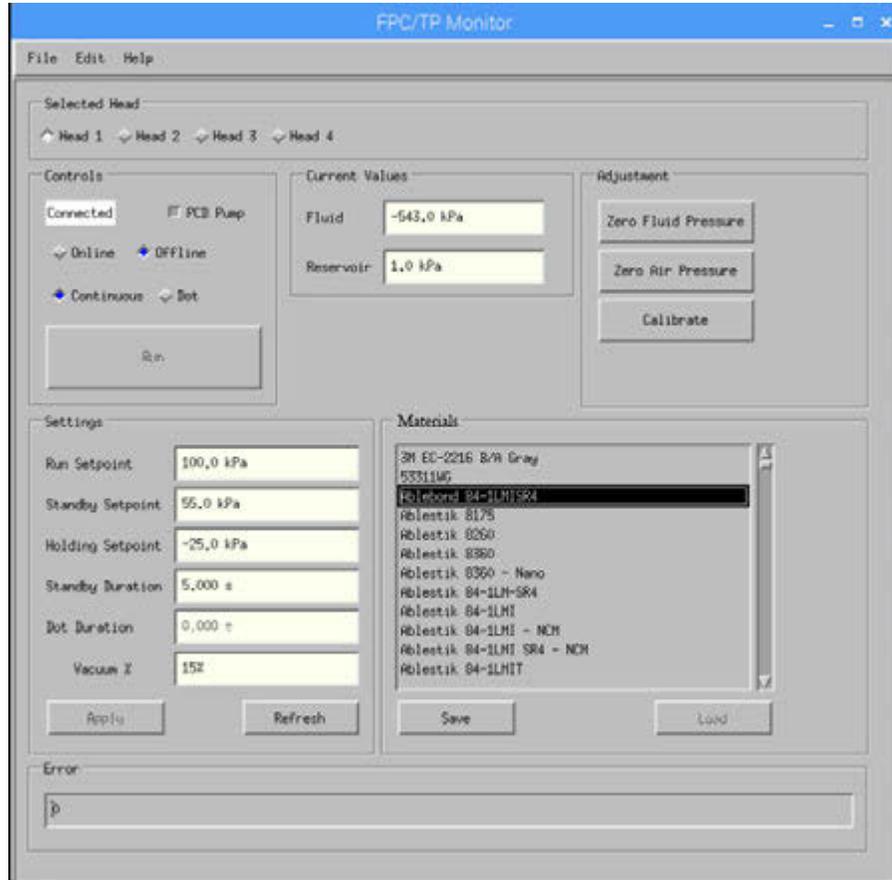
Aspect	Valid Units	Description
Time	s ms	seconds milliseconds
Pressure	kPa (default) psi	kilo pascal pounds force per square inch

To change units of measure, follow the standard method detailed in the *Numeric Entry* section of *FLOware Software Guide* (PN 22100080D).

## Windows and fields

### FPC/TP Monitor

To access FPC/TP Monitor, go to the main menu bar and click on Machine Controls > FPC Monitor.



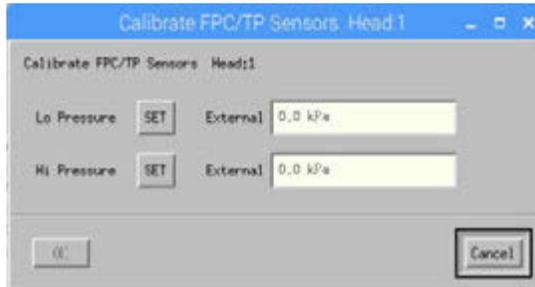
Element		Description
menu bar	File	<ul style="list-style-type: none"> <li>• <b>Open</b> - not currently functional; future feature.</li> <li>• <b>Exit</b> - exits this window.</li> </ul>
	Edit	Not currently functional; future feature.
	Help	Not currently functional; future feature.
Selected Head	Head1 Head2 Head3 Head4	Head station positions for the FPC/TP controller.  If a head station position is unavailable (disabled in the current configuration), the “Not Connected” indicator (in the Controls pane) will display if you select the “used” button for that head station.

Element		Description
Controls	Connected Not Connected	Indicates the current state of the controller: <ul style="list-style-type: none"> <li>• <b>Connected</b> - FPC/TP Monitor controller is functional and the selected head is set up to use the controller.</li> <li>• <b>Not Connected</b> - FPC/TP Monitor controller is not enabled, no controller is installed in machine for selected head, or controller is experiencing a communication error for the selected head.</li> </ul>
	PCD Pump	Determines which type of pressure (air pressure or material pressure) will be controlled: <ul style="list-style-type: none"> <li>• <b>Selected</b> - the set point pressure (in Current Values pane) controls <b>reservoir</b> (air) pressure.</li> <li>• <b>Not selected</b> - the set point pressure (in Current Values pane) controls <b>fluid</b> (material) pressure. To use this selection, a PCD Pump must be physically mounted in the currently selected head station position.</li> </ul>
	Online Offline	Toggles controller to either active or inactive state: <ul style="list-style-type: none"> <li>• <b>Online</b> - controller is put into the Online state. This action activates pressure control. Upon activation, holding set point pressure is achieved.</li> <li>• <b>Offline</b> - controller is put into the Offline state. This action disables pressure control. Head station achieves atmospheric pressure.</li> </ul>
	Continuous Dot	Dispense modes. The currently selected dispense mode controls the dispense when the current material recipe is run. <ul style="list-style-type: none"> <li>• <b>Continuous</b> - selects continuous/line dispense mode.</li> <li>• <b>Dot</b> - selects dot dispense mode.</li> </ul>
	RUN	Manually activates the controller, pressurizing the selected head to Run Setpoint pressure. Duration is dependent on which dispense mode is selected: <ul style="list-style-type: none"> <li>• When in Dot mode, controller runs for the amount of time specified in the Dot Duration field.</li> <li>• When in Continuous mode, controller runs until the RUN button is released.</li> </ul>
Current Values	Fluid	Current fluid pressure near the needle tip.
	Reservoir	Current reservoir air pressure.
Adjustment	ZERO FLUID PRESSURE	Press to adjust the fluid pressure currently measured to zero (0).
	ZERO AIR PRESSURE	Press to adjust the pressure currently measured by the reservoir sensor to zero (0).
	CALIBRATE	Press to open the window that allows you to calibrate the fluid pressure sensor and the reservoir pressure sensor for the currently selected Head. For details, refer to <a href="#">Calibrate FPC/TP Sensors Head:n</a> (pg 30) and <a href="#">Calibrate pressure sensors</a> (pg 19)

Element		Description
Settings	Run Setpoint	Set point pressure for Run state. <ul style="list-style-type: none"> <li>• Active when the Run state is active.</li> <li>• Occurs when a run command/signal is sent to the controller.</li> <li>• Duration is dependent on which dispense mode is selected: <ul style="list-style-type: none"> <li>Dot - runs for the amount of time specified in Dot Duration.</li> <li>Continuous - runs until the RUN button is released.</li> </ul> </li> </ul>
	Standby Setpoint	Set point pressure for Standby state: <ul style="list-style-type: none"> <li>• Occurs after deactivation of a run command/signal.</li> <li>• Remains active for the period of time displayed in the "Standby Duration" parameter.</li> </ul>
	Holding Setpoint	Set point pressure for Holding state: <ul style="list-style-type: none"> <li>• Initial and idle states</li> <li>• Occurs when the Standby state expires.</li> </ul>
	Standby Duration	The amount of time the controller remains in Standby state when the Standby state is active.
	Dot Duration	The amount of time the controller remains in Run state when the Run state is active. <p><b>NOTE:</b> This field is only applicable to and active when Dot dispense mode is selected. Selecting the Continuous dispense mode disables this field.</p>
	Vacuum%	Controls the amount of vacuum (as a percentage) present when the set point pressure is being held.
	APPLY	Commits all modified parameters to the controller, making them active.
	REFRESH	Populates all active parameters in the input fields; i.e., if you change parameter(s) but did not click APPLY, clicking REFRESH changes them back to the active values.
Materials	list of materials	The names of the currently available materials as determined by the FLOWare software program are displayed here. <p>Locate and then select the material to which you want to apply the FPC/TP Monitor feature.</p>
	SAVE	Saves all current parameters to the currently selected material.
	LOAD	Loads the parameters from the currently selected material.
Error		In the event of a problem, error messages display here. For details, refer to <a href="#">Error messages</a> (pg 22).

### Calibrate FPC/TP Sensors Head:n

To access the Calibrate FPC/TP Sensors Head:n window, click the CALIBRATE button in the FPC/TP Monitor window.



Element	Description
Calibrate FPC/TP Sensors - Head: n	Indicates the head station position to be calibrated.
Lo Pressure	Atmospheric pressure.
SET	Press to exhaust the sensors to atmospheric pressure level.
External	Atmospheric pressure (as measured by calibration gauge during the <a href="#">Calibrate pressure sensors</a> (pg 19) procedure) is entered here.
Hi Pressure	Maximum input air pressure supplied to FPC/TP controller.
SET	Press to set the sensors to maximum air pressure.
External	Maximum pressure (as measured by calibration gauge during the <a href="#">Calibrate pressure sensors</a> (pg 19) procedure) is entered here.
OK	Saves changes and exits this window.
CANCEL	Exits this window without saving changes.