GMX Pro-Flo Single- and Dual-PCI Controllers with Integrated Temperature Conditioning

Part 1059755A–02
Issued 11/07

NORDSON CORPORATION • AMHERST, OHIO • USA

Contact Us

Nordson Corporation welcomes requests for information, comments, and inquiries about its products. General information about Nordson can be found on the Internet using the following address:
http://www.nordson.com.

Address all correspondence to:

Nordson Corporation
Attn: Customer Service
555 Jackson Street
Amherst, OH 44001

Safety

Read and follow these safety instructions. Task- and equipment-specific warnings, cautions, and instructions are included in equipment documentation where appropriate.

Make sure all equipment documentation, including these instructions, is accessible to persons operating or servicing equipment.

Qualified Personnel

Equipment owners are responsible for making sure that Nordson equipment is installed, operated, and serviced by qualified personnel. Qualified personnel are those employees or contractors who are trained to safely perform their assigned tasks. They are familiar with all relevant safety rules and regulations and are physically capable of performing their assigned tasks.

Intended Use

Use of Nordson equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

Some examples of unintended use of equipment include

- using incompatible materials
- making unauthorized modifications
- removing or bypassing safety guards or interlocks
- using incompatible or damaged parts
- using unapproved auxiliary equipment
- operating equipment in excess of maximum ratings

Regulations and Approvals

Make sure all equipment is rated and approved for the environment in which it is used. Any approvals obtained for Nordson equipment will be voided if instructions for installation, operation, and service are not followed.

Personal Safety

To prevent injury follow these instructions.

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- While operating manual spray guns, make sure you are grounded. Wear electrically conductive gloves or a grounding strap connected to the gun handle or other true earth ground. Do not wear or carry metallic objects such as jewelry or tools.
- If you receive even a slight electrical shock, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.
- Obtain and read Material Safety Data Sheets (MSDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- Make sure the spray area is adequately ventilated.
- To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.

High-Pressure Fluids

High-pressure fluids, unless they are safely contained, are extremely hazardous. Always relieve fluid pressure before 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.

If you suffer a fluid injection injury, seek medical care immediately. If possible, provide a copy of the MSDS for the injected fluid to the health care provider.

The National Spray Equipment Manufacturers Association has created a wallet card that you should carry when you are operating high-pressure spray equipment. These cards are supplied with your equipment. The following is the text of this card:

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

- Go to an emergency room immediately.
- Tell the doctor that you suspect an injection injury.
- Show him this card
- Tell him what kind of material you were spraying

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.

Consultation with a plastic surgeon or a reconstructive hand surgeon may be advisable.

The seriousness of the wound depends on where the injury is on the body, whether the substance hit something on its way in and deflected causing more damage, and many other variables including skin microflora residing in the paint or gun which are blasted into the wound. If the injected paint contains acrylic latex and titanium dioxide that damage the tissue's resistance to infection, bacterial growth will flourish. The treatment that doctors recommend for an injection injury to the hand includes immediate decompression of the closed vascular compartments of the hand to release the underlying tissue distended by the injected paint, judicious wound debridement, and immediate antibiotic treatment.

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Ground all conductive equipment. Use only grounded air and fluid hoses. Check equipment and workpiece grounding devices regularly. Resistance to ground must not exceed one megohm.
- Shut down all equipment immediately if you notice static sparking or arcing. Do not restart the equipment until the cause has been identified and corrected.
- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored.
- Do not heat materials to temperatures above those recommended by the manufacturer. Make sure heat monitoring and limiting devices are working properly.
- Provide adequate ventilation to prevent dangerous concentrations of volatile particles or vapors. Refer to local codes or your material MSDS for guidance.
- Do not disconnect live electrical circuits when working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Shut off electrostatic power and ground the charging system before adjusting, cleaning, or repairing electrostatic equipment.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

Halogenated Hydrocarbon Solvent Hazards

Do not use halogenated hydrocarbon solvents in a pressurized system that contains aluminum components. Under pressure, these solvents can react with aluminum and explode, causing injury, death, or property damage. Halogenated hydrocarbon solvents contain one or more of the following elements:

Element	Symbol	Prefix
Fluorine	F	“Fluoro-”
Chlorine	Cl	“Chloro-”
Bromine	Br	“Bromo-”
Iodine	I	“Iodo-”

Check your material MSDS or contact your material supplier for more information. If you must use halogenated hydrocarbon solvents, contact your Nordson representative for information about compatible Nordson components.

Action in the Event of a Malfunction

If a system or any equipment in a system malfunctions, shut off the system immediately and perform the following steps:

- Disconnect and lock out system electrical power. Close hydraulic and pneumatic shutoff valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the system.

Disposal

Dispose of equipment and materials used in operation and servicing according to local codes.

Description

The PCI controller with integrated temperature conditioning uses signals from the robot controller and other sensors to control the gun dispensing rate. A constant bead size is maintained by adjusting the dispensing rate for changes in robot speed, material viscosity, and material delivery pressure.

The PCI controller also

- maintains a consistent dispensed volume even as the viscosity of the material varies.
- monitors the shear-thinning effects of the material and automatically adjusts the dispensing rate.
- heats, cools, and circulates conditioned water through the system.
- displays recovery procedures if operation faults are generated by the controller or gun.
- communicates faults to the robot controller.

The PCI controller has a software program configured by Nordson Corporation for your application.

See Figure 1 and refer to Table 1 for a description of the major components.

Monitoring Capabilities

In addition to controlling a Pro-Flo gun, the controller can be used to monitor or control the following system components:

- Material cut-off (MCO) module (extrude guns only)
- Proportioning valve (air-spray or swirl guns only)
- Flowmeter
- Upstream pressure transducer
- Material supply regulator

Versions

The following PCI controllers are available:

- 1-Gun/0-Temperature/1-Robot heat and cool; heat only
- 1-Gun/1-Temperature/1-Robot heat and cool; heat only
- 2-Gun/0-Temperature/1-Robot heat and cool; heat only
- 2-Gun/1-Temperature/1-Robot heat and cool; heat only
- 2-Gun/2-Temperature/2-Robot heat and cool; heat only

Theory of Operation

The robot controller outputs an analog (tool-speed) signal that is proportional to the robot speed. The controller uses this signal to adjust the dispensing rate of the gun. When the robot speeds up, the Pro-Flo gun dispenses material faster, and when the robot slows down, it dispenses material slower.

The PCI controller continuously monitors the volume of material dispensed and automatically adjusts the dispensing rate to maintain a constant bead size. The controller compensates for batch-to-batch variation in material and shear-thinning effects.

A second analog signal is output by some robot controllers and can be used to control the proportioning valve pressure in the Pro-Flo gun. More or less pressure is supplied from the proportioning valve when the robot speeds up and slows down, respectively. Precise bead-size control is achieved with independent control over the dispensing rate and delivery pressure.

Heating and Cooling Material

An RTD inside the coaxial hose senses material temperature. The PCI controller uses this temperature signal to determine whether to heat or cool the material.

If heating is required, the PCI controller enables the heater. The heater warms the water flowing through the water traced covers which warms the material. If the water exceeds the factory-set temperature, the HEATER HIGH TEMP FAULT appears on the PCI controller. The thermostat opens and disables power to the heating element.

The water chiller cools the water to the process setpoint. When cooling is required, the PCI controller opens a solenoid valve. Chilled water flows through the main water traced covers and cools the material.

Alarms

The PCI controller alerts the operator when a fault occurs by lighting the alarm tower. The fault screen on the operator interface provides a description of the fault, the appropriate corrective action to take, or how to contact Nordson Corporation for assistance. The operator has the option of stopping the system to correct the fault, or running the system in back-up mode and correcting the fault later.

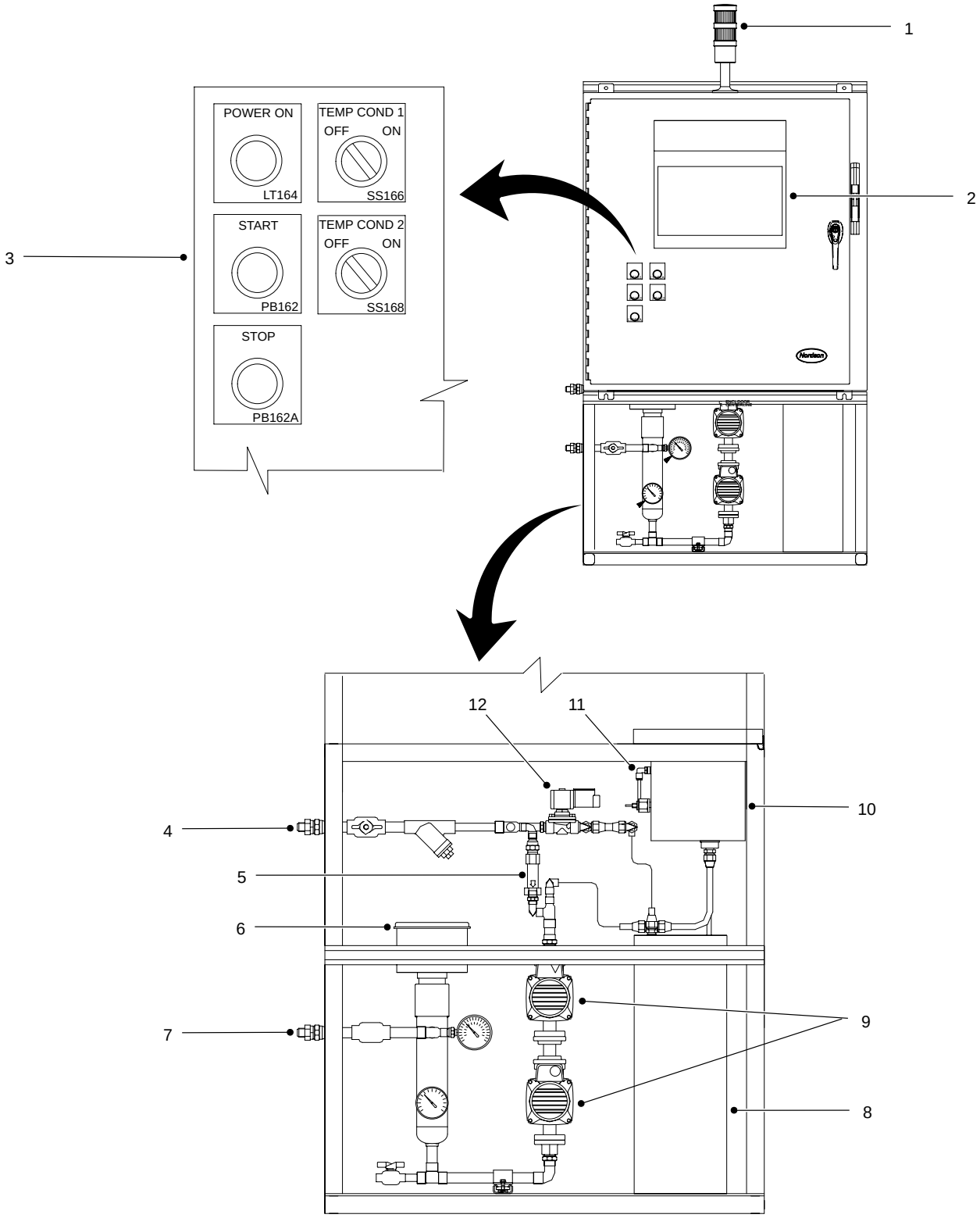


Figure 1 Typical PCI Controller

Table 1 Major Components

Item	Description
1	Alarm Tower—Alerts the operator that a fault condition exists within the system.
2	Touch Screen—Operator interface for the system. Refer to the *Operator Interface* section for more information.
3	Operator Controls: POWER ON—Main power push button. START—Enable power to the controller. STOP—Disable power to the controller. TEMP COND 1 and TEMP COND 2—Enables temperature conditioning section. **NOTE:** TEMP COND 2 is included on the 2-Gun/2-Temperature/2-Robot version.
4	From Process—Return water hose connection; $^1/_2$−in. JIC fitting.
5	Flow-setter—Located in the main water loop between the inlet and outlet of the water chiller; meters the correct amount of chilled water into the main loop when the solenoid valve opens. **NOTE:** The flow-setter should not be fully open or closed during normal operation.
6	Circulation Heater—Heats the water in the process loop. An adjustable high-temperature thermostat disables the heater circuit and lights the HEATER HIGH TEMP FAULT light when the water gets too hot, whether or not the controller sends a signal for heat.
7	To Process—Supply water hose connection; $^1/_2$−in. JIC fitting.
8	Chiller—Cools water for use in maintaining the material process setpoint temperature. The internal water reservoir uses a thermostat set at approximately 50 °F to maintain the water temperature. **NOTE:** The chiller is only available on the Heat and Cool versions.
9	Circulation Pumps—Maintain continuous water flow through the closed-loop temperature control circuit.
10	Water Reservoir—Holds water; has a float switch that enables a low water level fault and disables the pumps, heater circuit, and control circuit. **! CAUTION !** To prevent damage to the system, refer to the *Water Treatment* section for information on the types of water, corrosion inhibitors, and Biocides to use.
11	Needle Valve—Typically set at approximately $^1/_2$ gpm; provides circulation in the water reservoir to prevent stagnant water.
12	Solenoid Valve—Closes to prevent water from the main circulation loop to flow through the chiller when cooling is not required; opens when cooling is required.
Items not Shown	
Water Traced Covers—consist of layers of nylon-reinforced fabric with high-density thermal insulation. They are wrapped around the hose and zipped closed. The covers also have a series of parallel passages that contain flexible polyurethane tubing. Conditioned water from the temperature conditioning section circulates through the poly tubes, thereby maintaining the material temperature inside the hose.	
Flowmeter Assembly—includes a flowmeter, an upstream pressure transducer, and a resistance temperature detector (RTD).	
Electrical Cables—for connecting the controller to the gun, robot controller, and optional equipment.	

Water Treatment

The temperature conditioning section is constructed of the following materials. Always refer to this list if different water, corrosion inhibitors or biocides other than those listed in the following sections are used.

Black Iron Pipe	Stainless steel	Nylon
Brass	PVC Plastic	Copper
Buna Rubber	Aluminum	Polyurethane
Steel	EPDM Rubber	PTFE

Water Types

Refer to Table 2. To minimize the introduction of contaminants that may degrade system components, review these guidelines before selecting the type of water to use.

NOTE

Water types are listed in order of preference.

Corrosion Levels

To maintain proper performance, minimum levels of corrosion to aluminum and copper must be maintained. To maintain safe operation keep the corrosion levels of

- aluminum at or below 3 mil/year (0.003 in./yr).
- copper at or below 1 mil/year (0.001 in./yr).

When adding water to the system, corrosion inhibitor must be added. CorrShield MD405 corrosion inhibitor is shipped with the PCI controller. This is a Molybdate-based corrosion inhibitor that contains an Azole additive to protect copper and is used in the concentration of 1.5 ounces per gallon of water to maintain a concentration of 250–350 ppm.

The Ford Tox number for CorrShield MD 405 is 149163

The GM FID number for CorrShield MD 405 is 225484

Refer to the *Parts* section to order CorrShield MD 405.

Biocide Water Treatment

Do not use the following Biocides:

- oxidizers, such as chlorine, bromine, hydrogen peroxide, iodine, ozone, etc.
- cationic, or positively charged biocides.

Biocides for use with CorrShield MD405 are BetzDearborn Spectrus NX114. The recommended concentration of Spectrus NX114 is 150–PPM which is 0.017 oz./gal (0.5 ml/gal).

The Ford Tox Number for Spectrus NX114 is 148270.

Table 2 Water Types

Water	Description
1. Distilled	No minerals and chemicals Lacks the nutrients necessary to support biological growth and the minerals that wear away at system components Neutral nature reduces interaction with additives used to protect the system **NOTE** Distilled water is the best choice for use in the temperature conditioning section.
2. Well	Contains an abundance of minerals that can support plant and animal life Contains minerals like calcium and iron that are abrasive; accelerates wear and tear on components **NOTE** If well water is the only option available, it must be softened to reduce the mineral content.
3. City	Contains chlorine that can degrade all metals including stainless steel Hard on most non−metals Usually contains an abundance of minerals that are capable of supporting plant and animal life; accelerates wear on components
4. Weld (Tower)	Often heavily treated both for bacterial suppression and to make it more compatible with the welding and cooling tower processes Treatment process usually involves some aggressive chemicals that can degrade metals, plastics and other materials Usually contains an abundance of metals and other contaminants picked up from the welding and cooling tower processes that can interfere with the components of the temperature control system
5. DI	**! CAUTION !** Do not use DI water in this system. DI water draws free electrons from metal to normalize ion levels. This process causes degradation of metals.

Installation

WARNING

- Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.
- The robot controller contains electrical potentials that can be fatal. Disconnect and lock out electrical power before making connections.

1. Unpack the PCI controller and inspect it for dents, scratches, corrosion, or other physical damage. If there is any visible damage, call your Nordson Corporation representative immediately.
2. Install the controller as close to the robot controller as possible.

Electrical Connections

Follow these requirements:

- Hard-wire the controller to a dedicated power supply to provide safe operation and reduce interference from electrical noise.
- Install all electrical connections to local code.
- Install a locking disconnect switch or breaker in the service line ahead of any electrical equipment.

NOTE

Make sure that there is enough slack to allow for robot and gun movement. Use an extension gun cable if necessary.

Figures 2, 3, and 4 illustrate the location of the cable connections for each PCI controller. Use the System Interconnect drawing provided with the system documentation for specific cable routing.

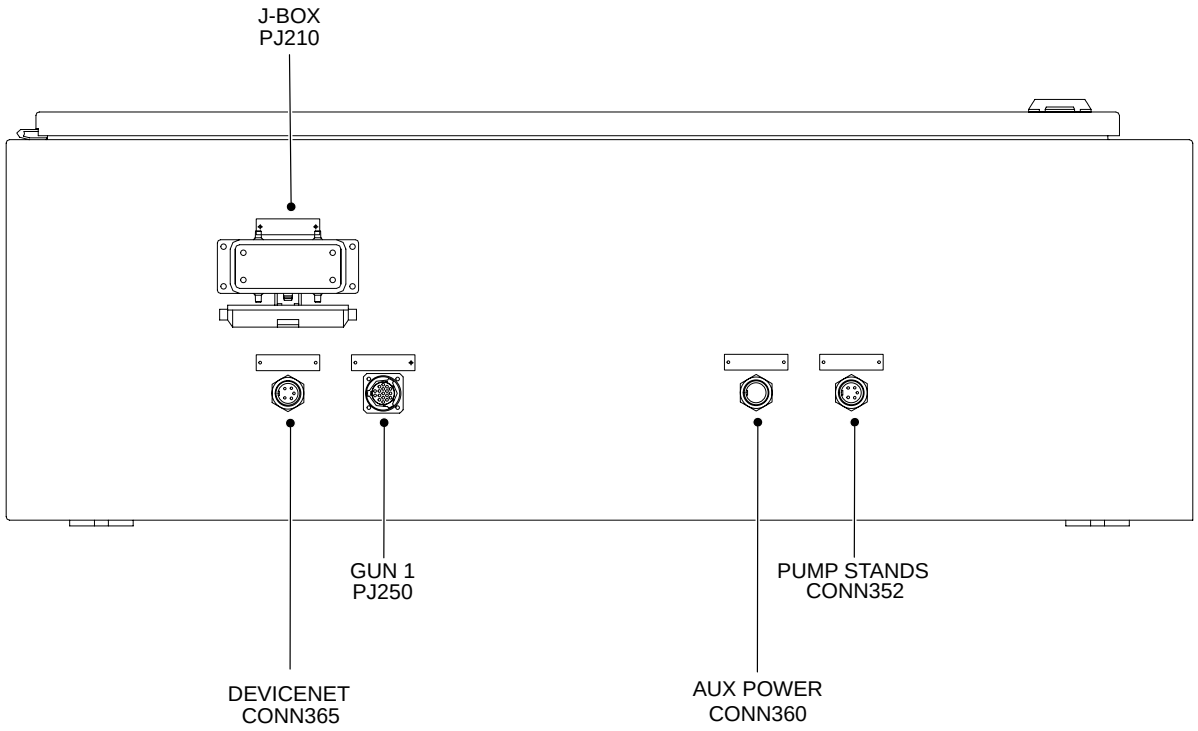


Figure 2 Cable Connections—1-Gun/0-Temperature/1-Robot and 1-Gun/1-Temperature/1-Robot

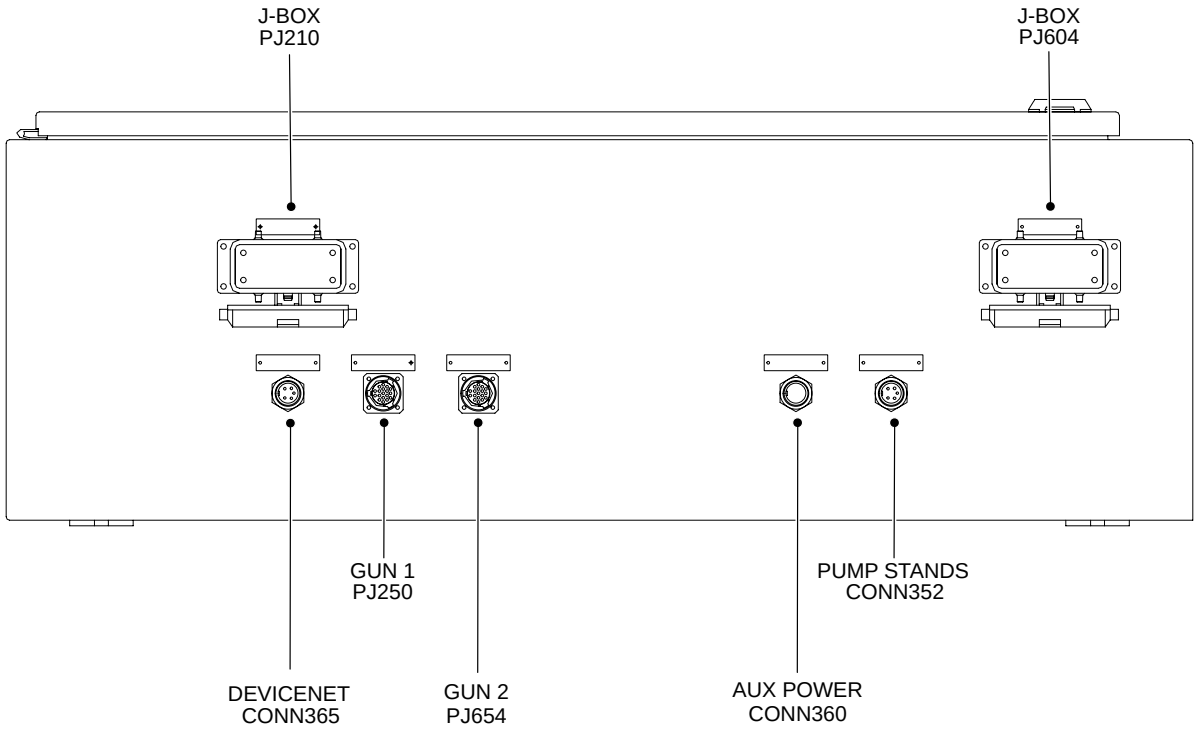


Figure 3 Cable Connections—2-Gun/0-Temperature/1-Robot and 2-Gun/2-Temperature/1-Robot

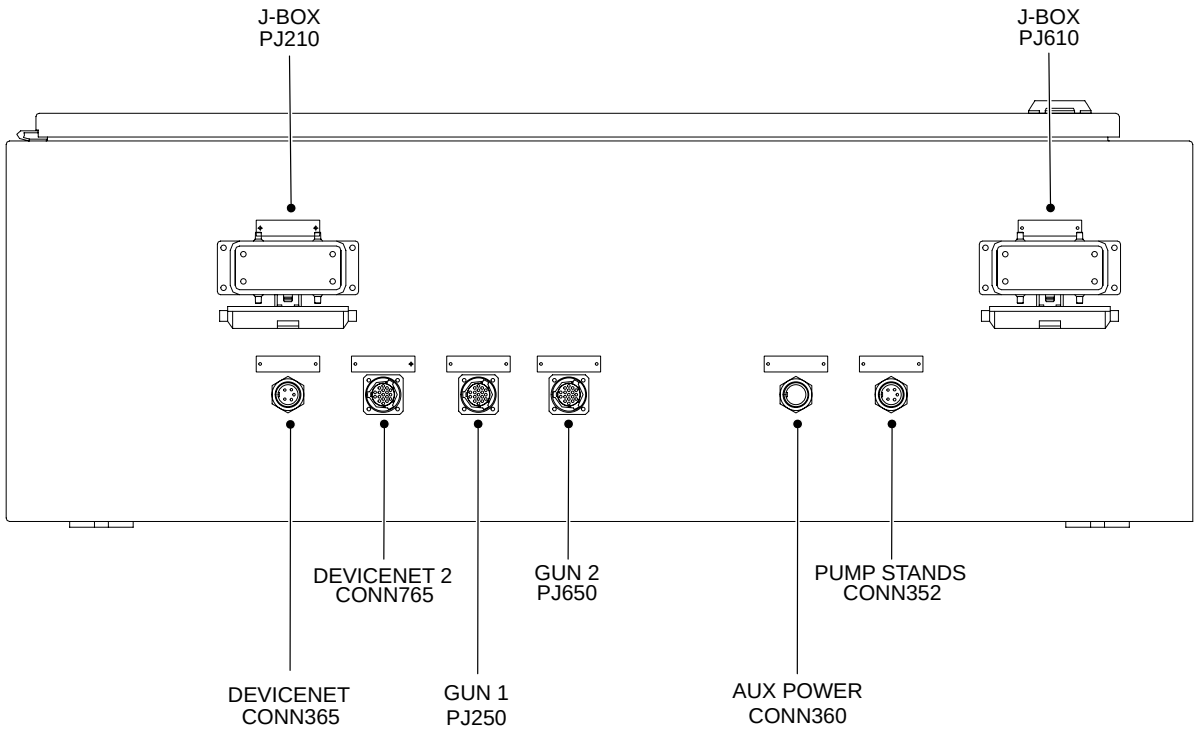


Figure 4 Cable Connections—2-Gun/1-Temperature/2-Robot

Water Hose Connections

See Figure 5. Connect the system water hoses to the From Process (1) and the To Process (2) fittings. See the System Layout drawing provided with the system documentation for hose routing.

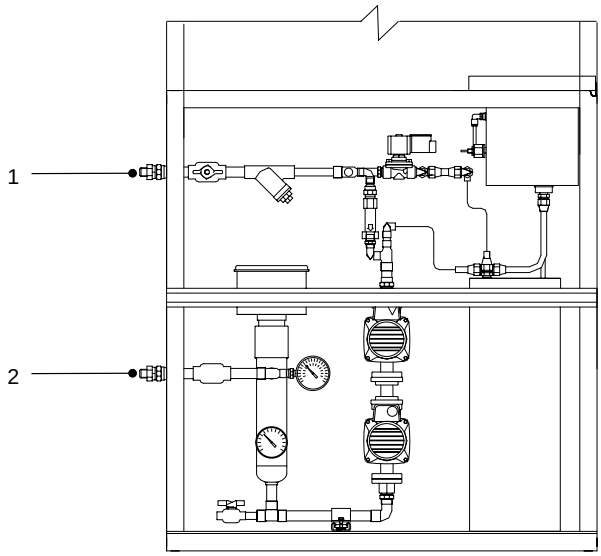


Figure 5 Typical Water Hose Connections

Configure the Robot Controller

Use the following data to configure the robot controller analog signals.

Analog #1

See Figure 6. Configure your robot controller to vary the analog #1 (or tool speed) signal from 0 to 10 Vdc over the full range of robot speed.

1. Determine the highest and lowest robot speeds to be used in production.
2. Configure the robot controller to output an analog #1 signal of +10 Vdc when the robot is moving at, or slightly above maximum speed.
3. Configure the robot controller to output the analog #1 signal of 0 Vdc when the robot is stationary.

NOTE

Figure 6 presents an example of the approximate relationship between robot speed and analog #1 voltage as a guide for the operator. A robot speed of 80% corresponds to 8 Vdc. A robot speed of 40% corresponds to 4 Vdc.

Analog #2

If your robot supplies the optional analog #2 (or tool speed #2) signal and you are using a proportioning valve in an air spray application, more precise control over air spray pressure is possible. The controller controls the proportioning valve feeding air to the gun to adjust atomizing air spray pressure for robot speed. Establish the relationship between the signal and the pressure supplied to the proportioning valve.

Configure the robot controller to output an analog #2 signal of 2, 4, 6, and 8 Vdc when the pressure supplied to the proportioning valve is 1.38, 2.76, 4.14, and 5.52 bar (20, 40, 60, and 80 psi), respectively.

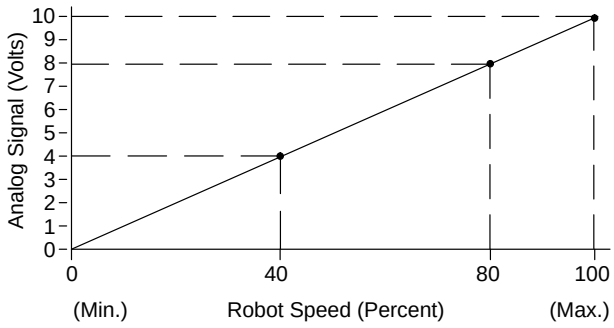


Figure 6 Relationship between Analog Signal #1 and Robot Speed

Set Timing Sequences

See Figure 7.

Adjust the timing sequence of output signals from the robot controller to suit the PCI controller. Refer to your robot controller manual for procedures to set the signal timing sequences.

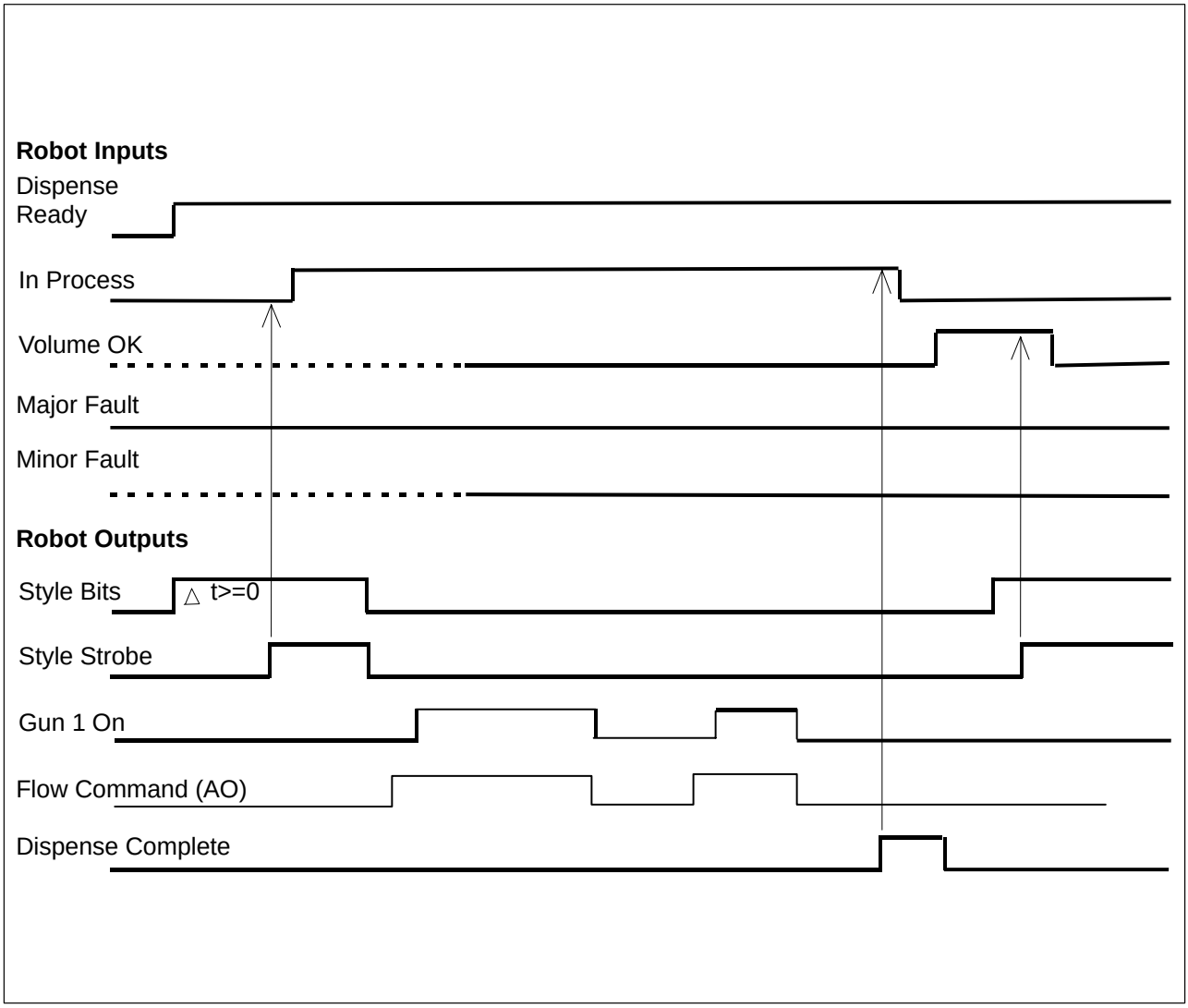


Figure 7 Normal Dispensing Cycle—Base Level Common Interface

Operator Interface and Screens

See Figure 8.

Touch the screen to select one of seven main menus (1):

- **SYSTEM STATUS**
- **VIEW FAULTS**
- **TEST POINTS**
- **SYSTEM SET-UP**
- **PROCESS DATA**
- **ONLINE MANUAL**
- **PREV. MAINT.** (Preventive Maintenance)

Refer to Table 3 for a description of the operator interface functions.

SYSTEM STATUS

See Figure 8 and refer to Table 3.

The **SYSTEM STATUS** menu is the default screen. It monitors material dispensing characteristics during production.

Touch a system component to view the

- system illustration which flashes when a fault condition occurs. To view the fault, touch the flashing part or touch the **VIEW FAULTS** button.
- status of **STYLE STROBE**, **GUN ON**, **ANALOG IN**, and **DISPENSE COMPLETE** signals.

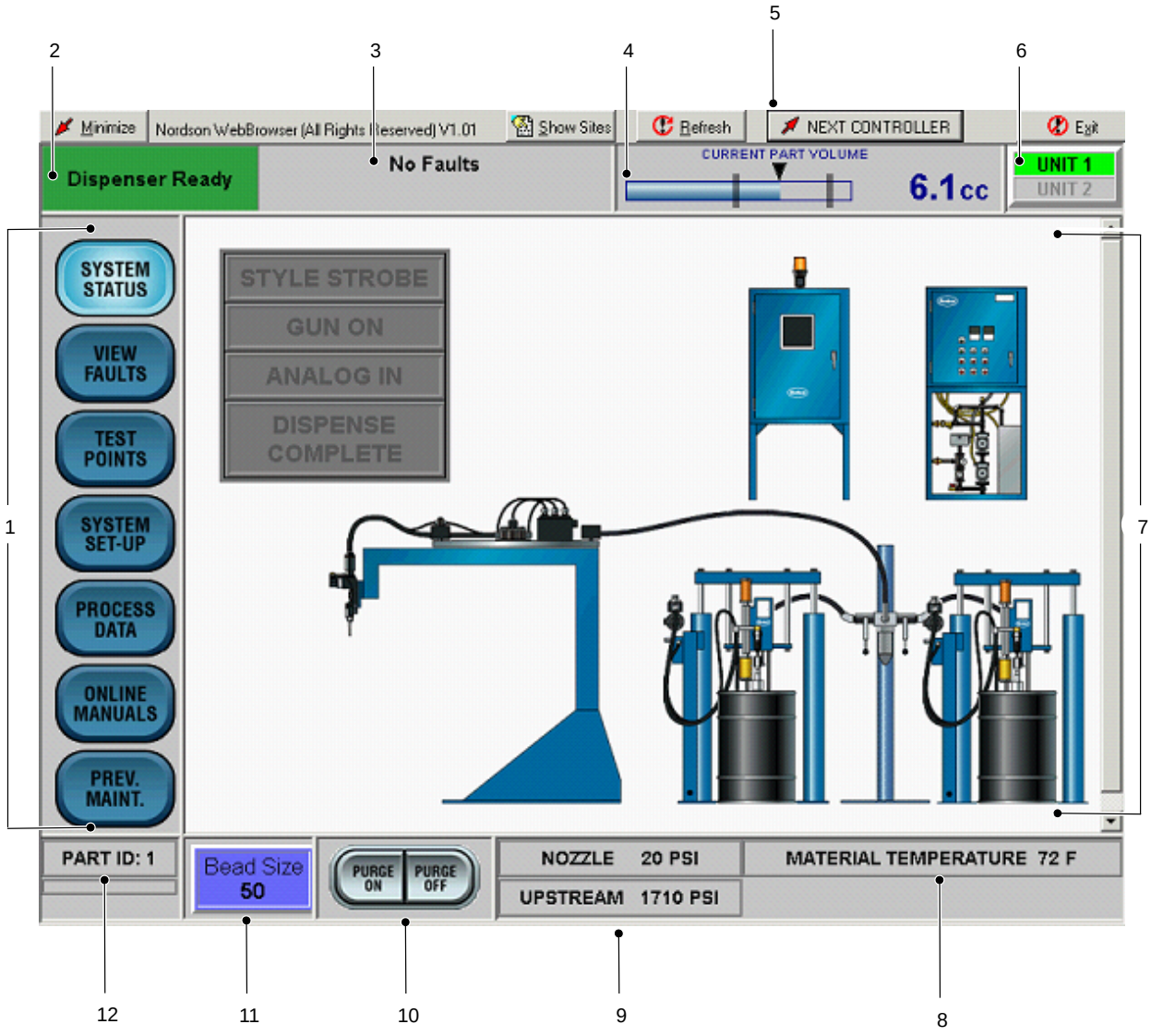


Figure 8 Typical Operator Interface (2-Gun 2-Robot Shown)

Table 3 Operator Interface Functions

Item	Description	Function
1	Menu Buttons	Set and view parameters of the application.
2	Dispenser field	Indicates the status of the dispenser: **Ready** or **Not Ready**.
3	Fault Indicator field	Displays fault messages.
4	**CURRENT PART VOLUME**	Visually indicates the percent of the job which is completed and the actual dispensed volume at the end of the part cycle.
5	**NEXT CONTROLLER**	Toggle between dispensing systems if using a Dual PCI controller.
6	**UNIT 1** **UNIT 2**	User-defined label; indicates the current operator interface that is displayed on the screen. The user-defined label can be up to 10 charaters. **NOTE:** Only **Unit 1** appears on 1-Gun 1-Robot systems.
7	**SYSTEM STATUS**	Appears as the default screen; displays the system configuration.
8	**MATERIAL TEMP**	Indicates material temperature.
9	**PRESSURE**	Indicates system operating pressures.
10	**PURGE ON** **PURGE OFF**	Starts and stops the gun purge function.
11	**BEAD SIZE**	Displays bead size. Bead size is an arbitrary number between 1 and 99. Touch **BEAD SIZE** to increase or decrease bead size.
12	**PART I.D.**	Displays the current part I.D.

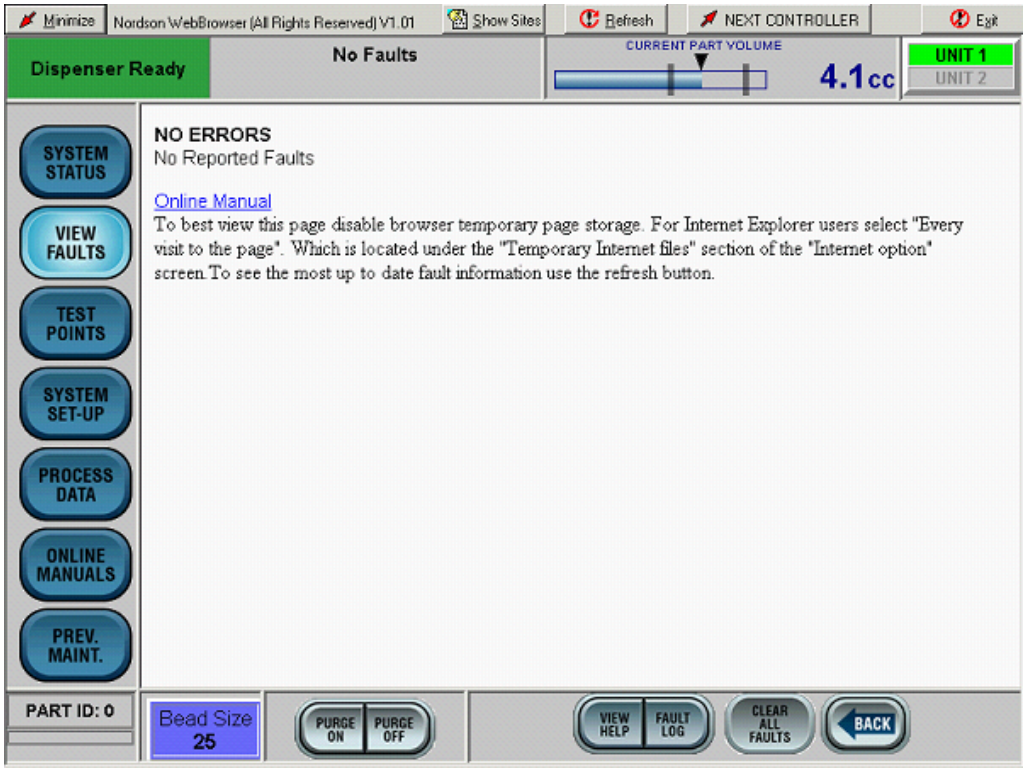
VIEW FAULTS

See Screen 1.

The **VIEW FAULTS** menu displays the description a fault and the corrective action.

NOTE: Touch any of the bold or underlined text to proceed directly to the correction.

Touch **VIEW FAULTS**>**VIEW HELP** to view the corrective action for a fault.

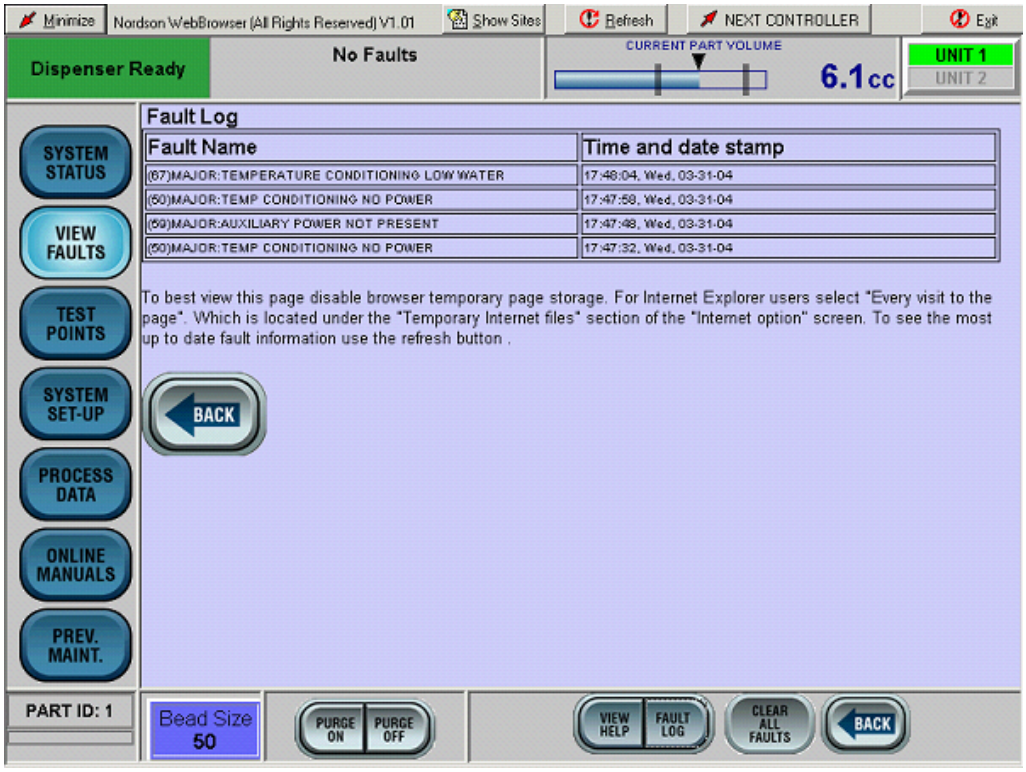


Screen 1 View Faults

See Screen 2.

Touch **VIEW FAULTS**>**FAULT LOG** to view the name of the fault and that date and time that the fault occurred.

Touch **VIEW FAULTS**>**CLEAR ALL FAULTS** to clear the fault.

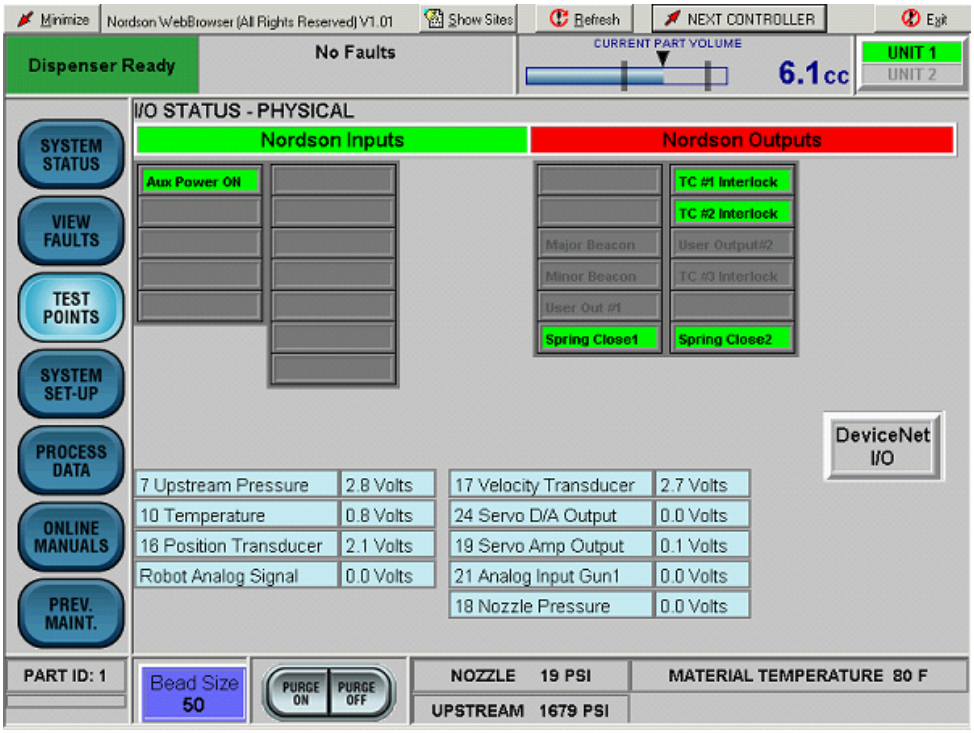


Screen 2 Fault Log

TEST POINTS

See Screen 3.

The **TEST POINTS** menus are used only by Nordson Corporation field service engineers.

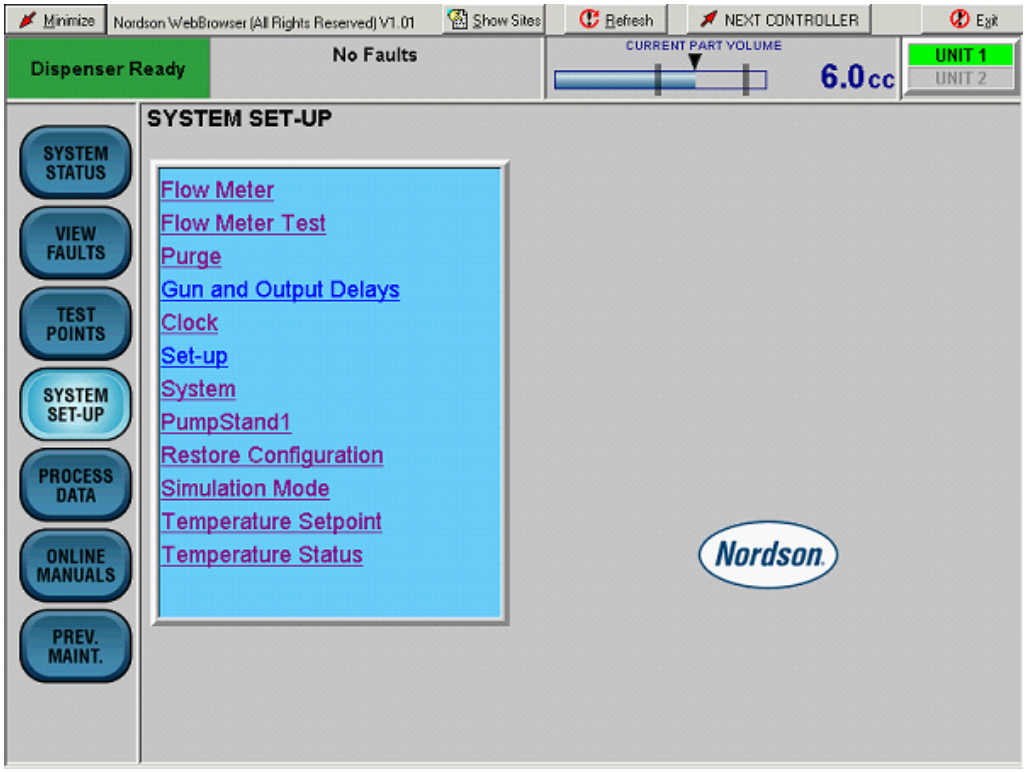


Screen 3 TEST POINTS

SYSTEM SET-UP

See Screen 4.

Use the **SYSTEM SET-UP** screen to configure the system parameters. The following paragraphs provide a description of each system parameter.



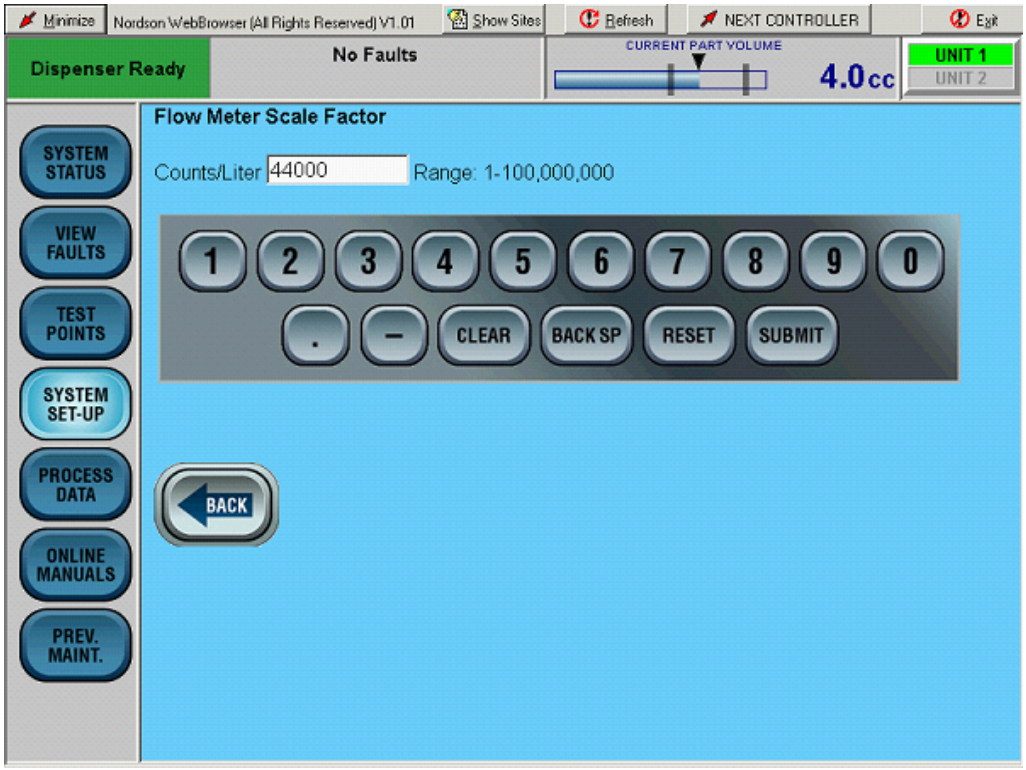
Screen 4 SYSTEM SET-UP

Flow Meter

See Screen 5.

When a new flowmeter is installed, enter its flow rate (or K-value) in counts/liter. The K-value is stamped on the side of the flowmeter body.

Touch the screen keyboard to enter counts/liter from 1−100,000,000.

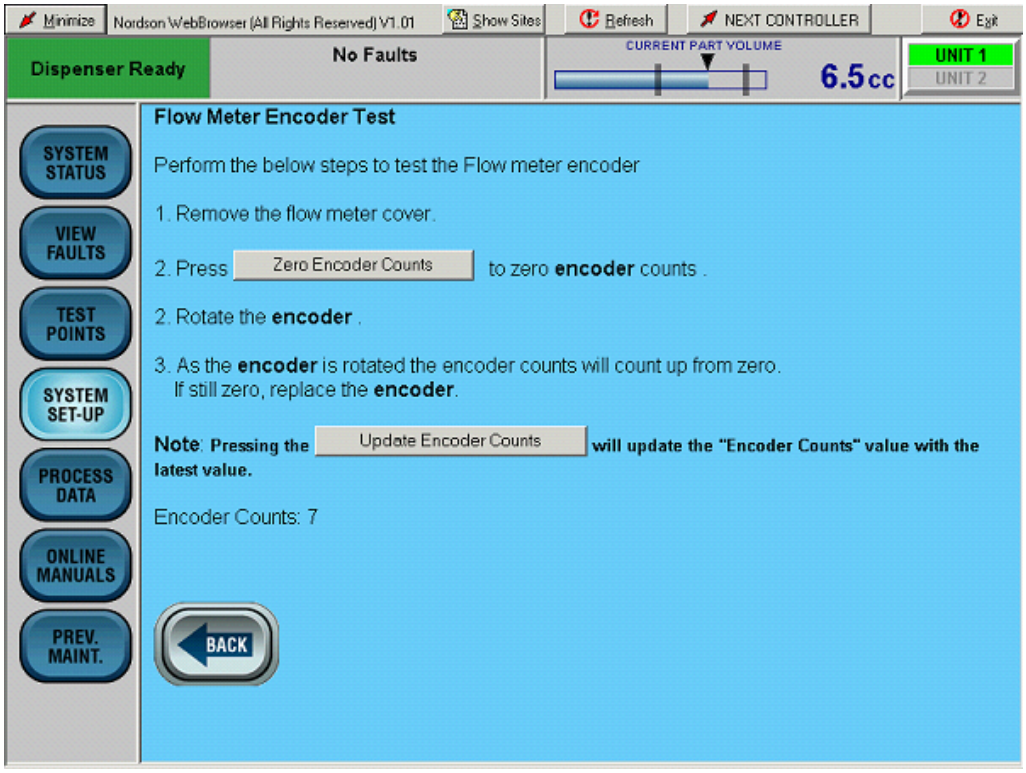


Screen 5 Flow Meter

Flow Meter Encoder Test

See Screen 6.

Follow the directions on the screen to test the flowmeter encoder.



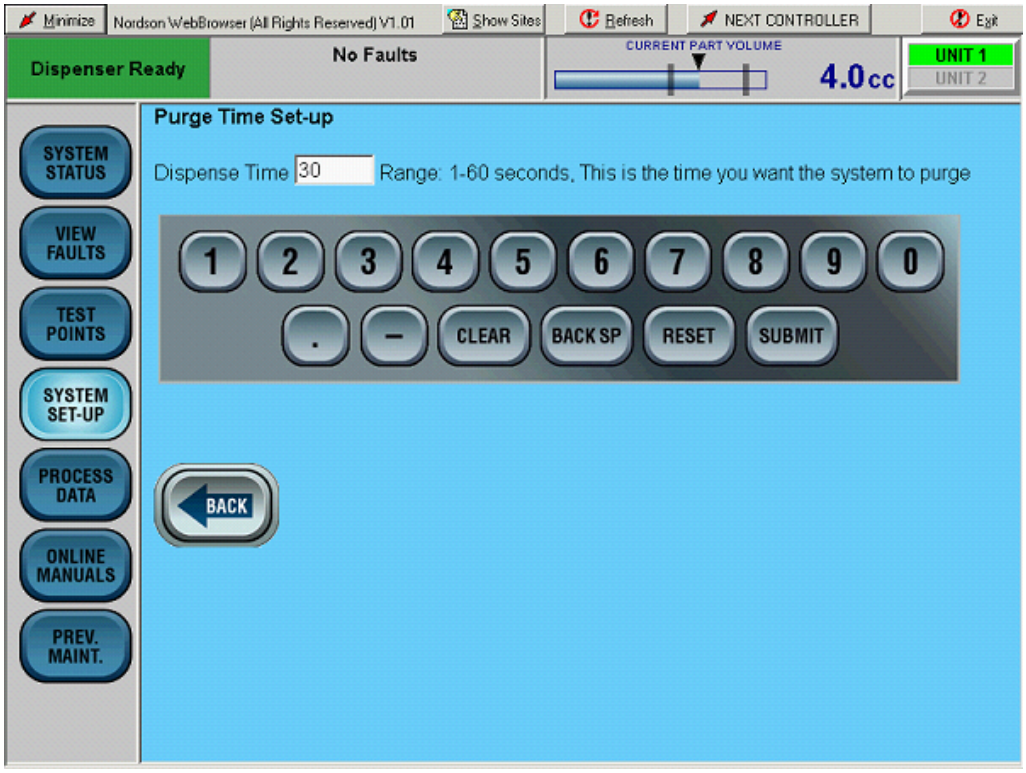
Screen 6 Flow Meter Diagnostic

Purge

See Screen 7.

Purge determines how long the gun stays open each time the **PURGE ON** button is pressed.

Touch the screen keyboard to enter a **Dispense Time** from 1−60 seconds.



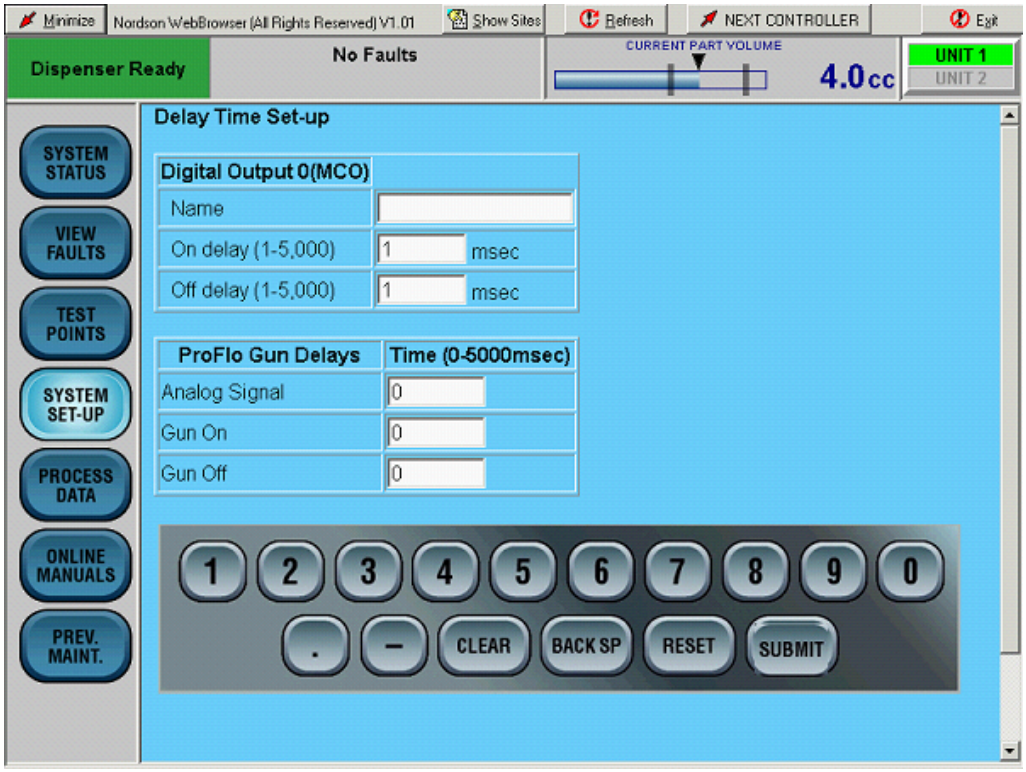
Screen 7 Purge

Gun and Output Delays

See Screen 8.

To delay the controller's reaction to robot motion, enter a **DIgital Output** delay from 1−5000 msec.

To delay the controller's reaction to the analog signal, gun-on and gun-off signals from the robot controller, and adjust the start and stop time of material dispensing, enter **Analog Signal, Gun On,** and **Gun Off** delays from 0−5000 msec.



Screen 8 Gun and Output Delays

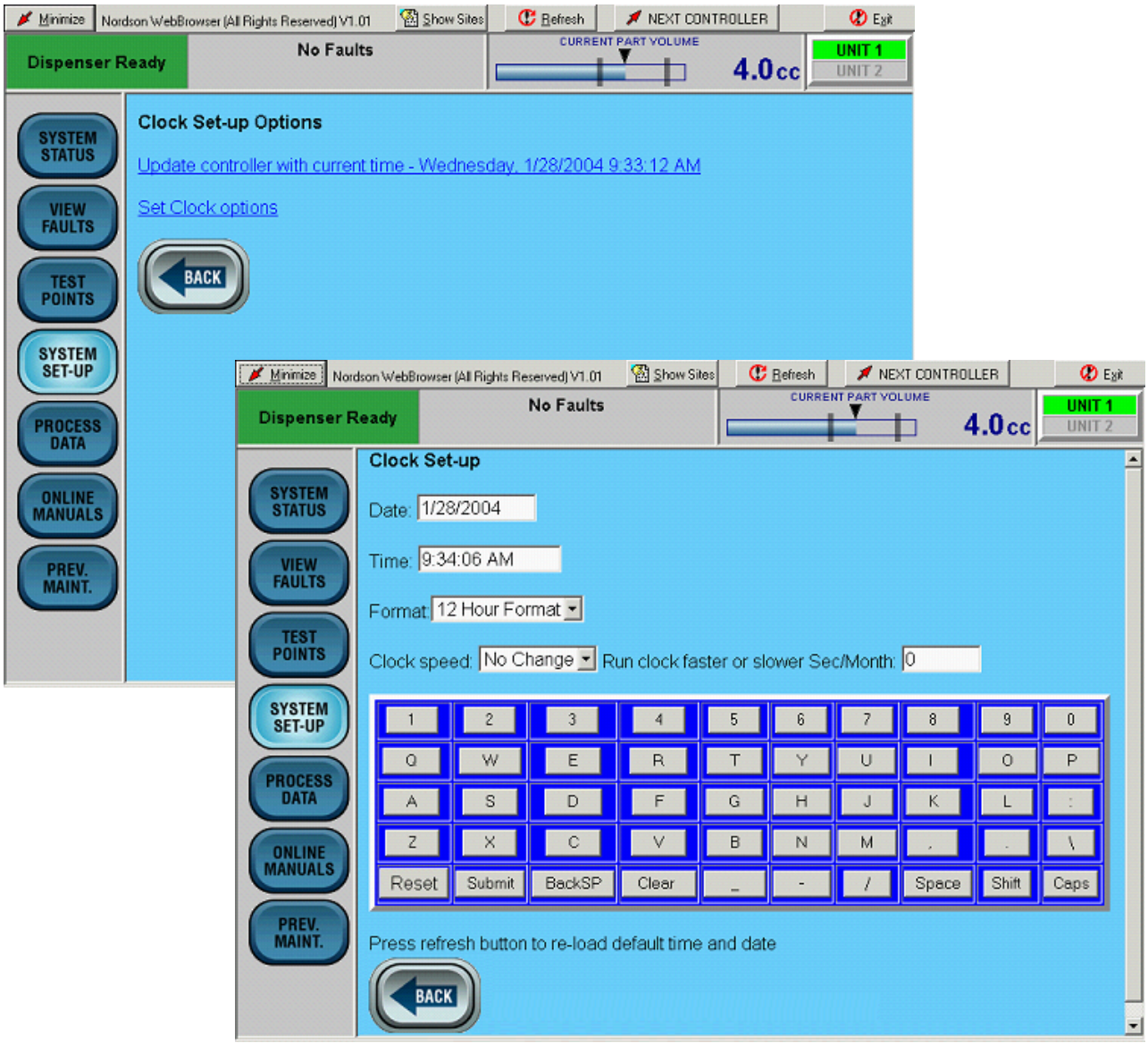
Clock

See Screen 9.

Although the time and date are set during initial setup, you may change the parameters manually or automatically.

To update the time and date automatically, touch **Update controller with current time**.

To update the time and date manually, touch **Set Clock options**. The **Clock Set-up** screen appears. Touch the screen keyboard to set the parameters.

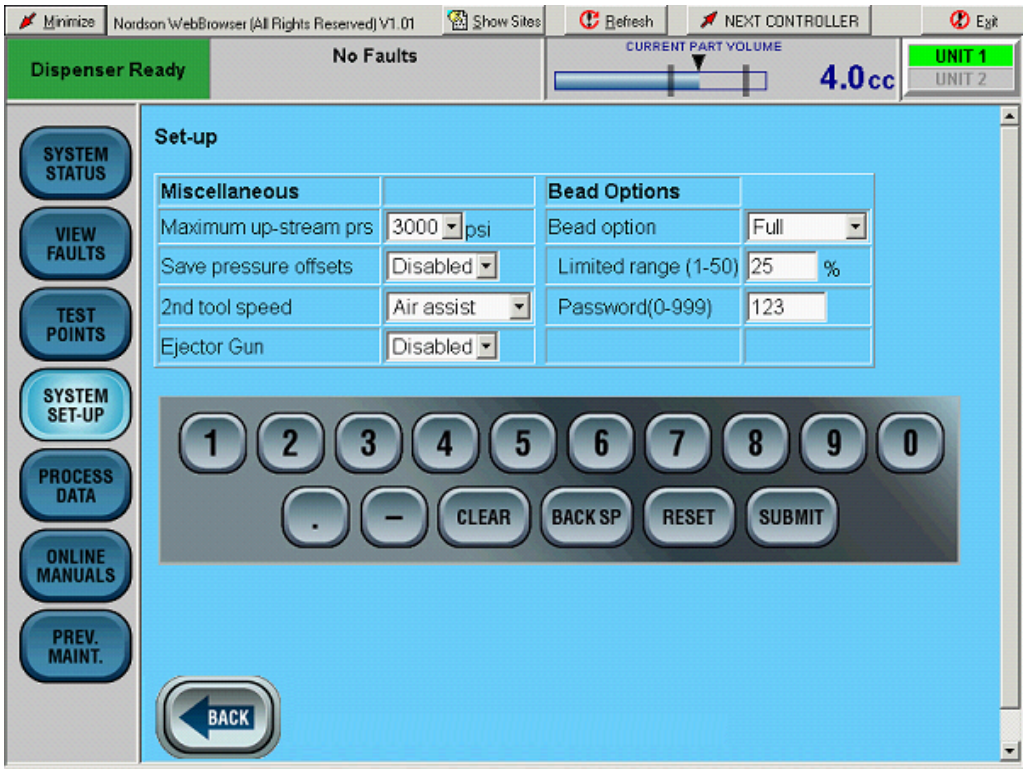


Screen 9 Clock

Set-up

See Screen 10.

Touch **Set-Up** to enter the delay times for any **Miscellaneous** digital outputs and to enter parameters for **Bead Options**.

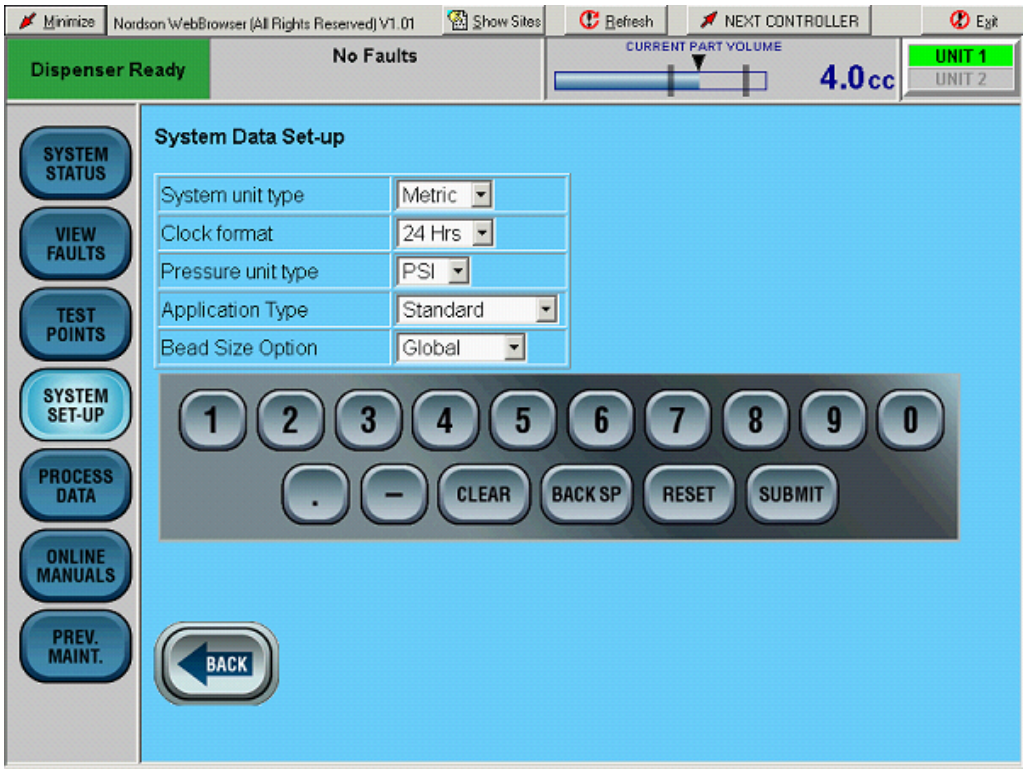


Screen 10 Set-Up

System

See Screen 11.

Touch the keyboard to select Metric or English system units; clock format; type of pressure unit; fault report location; and type of application.



Screen 11 System

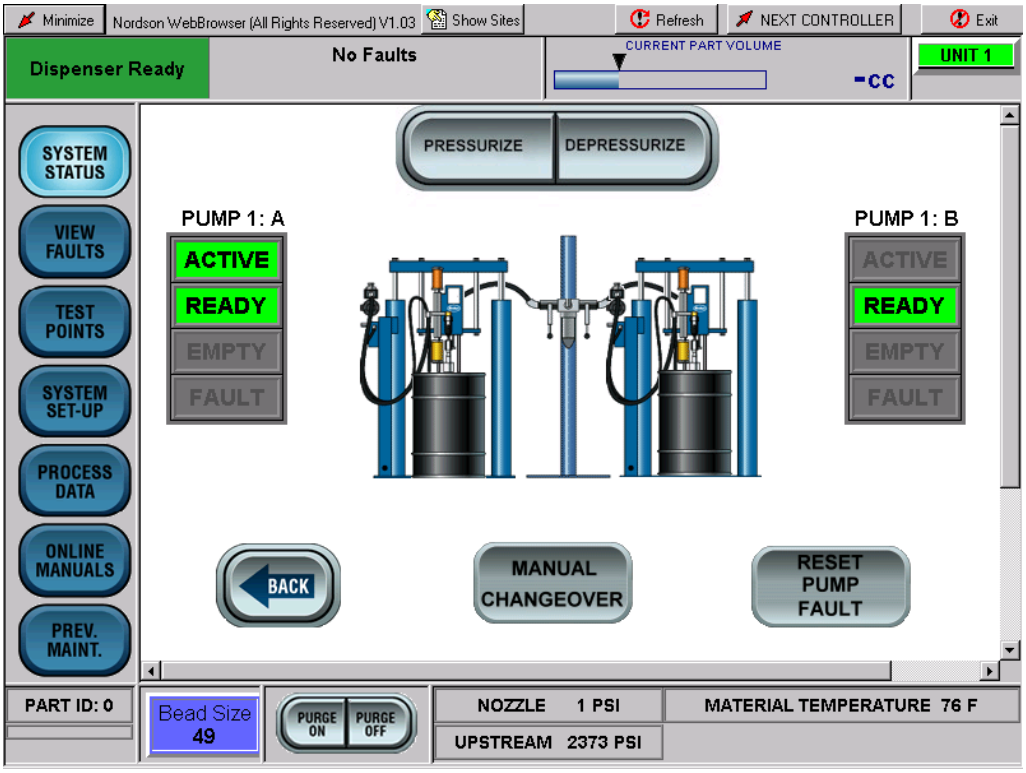
Pump Stand 1

See Screen 12.

Touch **Pump Stand 1** to view the status of the pump stand.

Touch **Pressurize Pump Stand** to pressurize the pump stand.

Touch **Depressurize Pump Stand** to depressurize the pump stand.

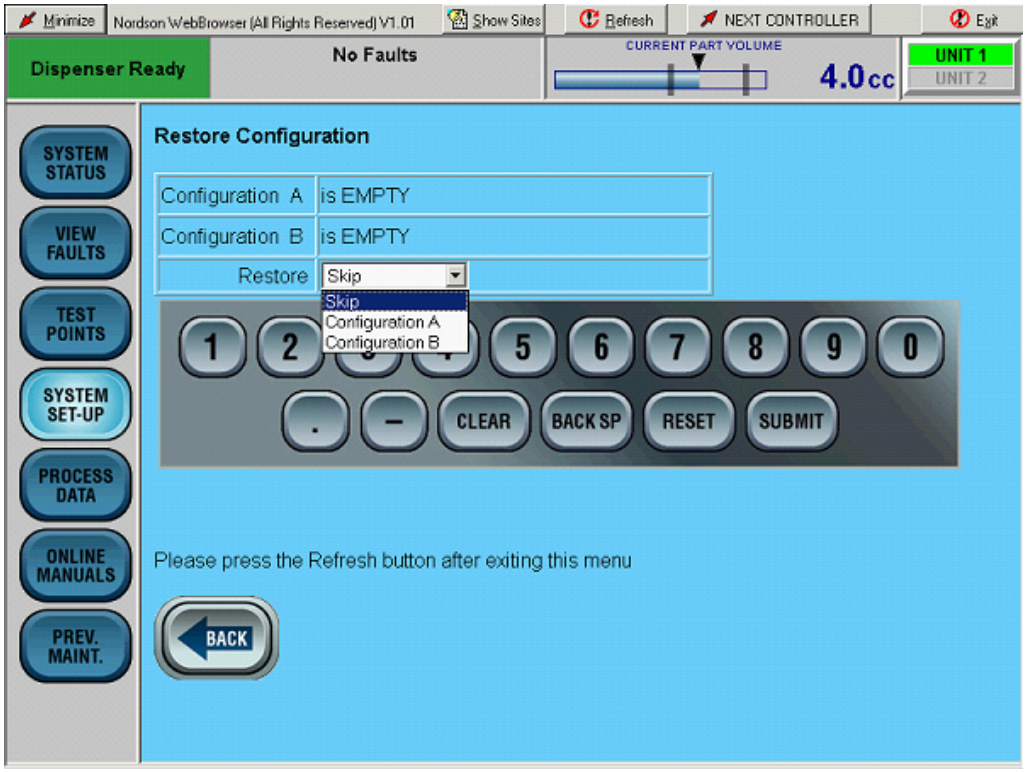


Screen 12 Pump Stand 1

Restore Configuration

See Screen 13.

Use the drop-down menu to select a previously stored configuration.



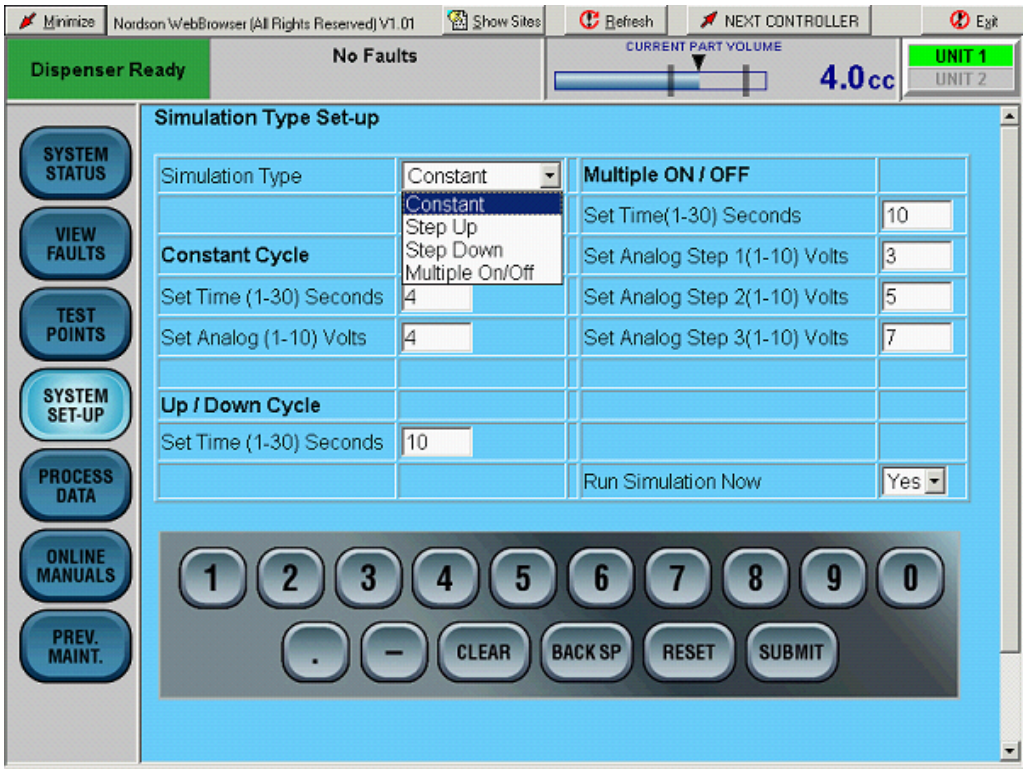
Screen 13 Restore Configuration

X

Simulation Mode

See Screen 14.

Enter the applicable data and select **Yes** from the **Run Simulation Now** field to simulate a production run without dispensing material.

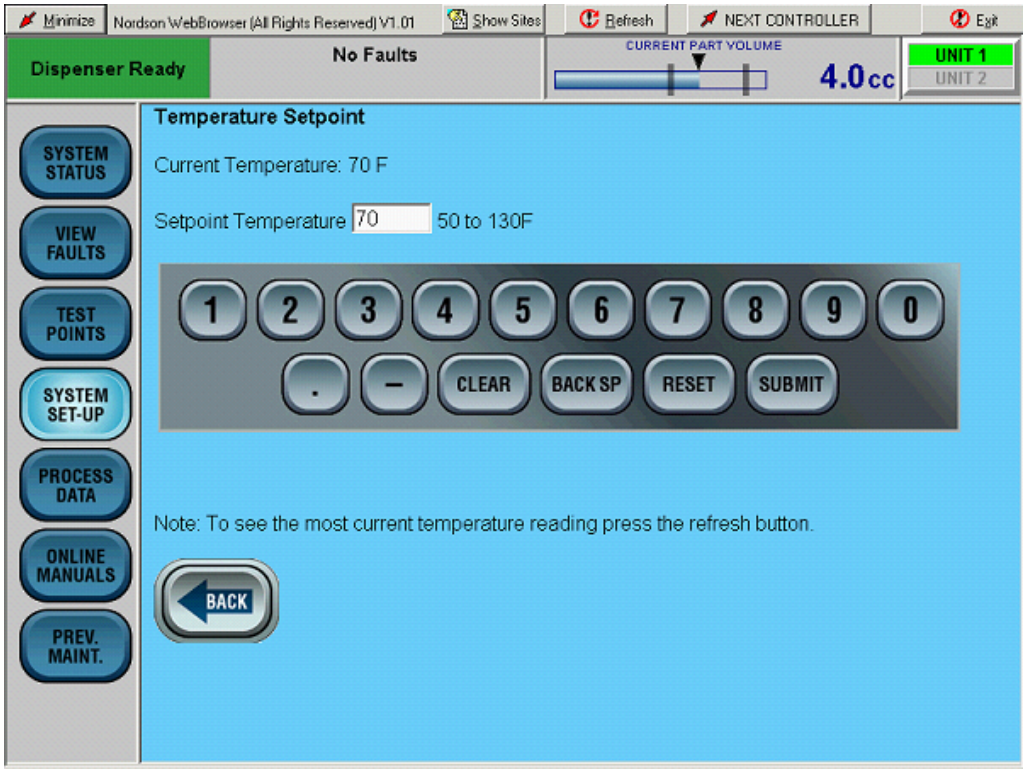


Screen 14 Simulation Mode

Temperature Setpoint

See Screen 15.

Touch **Temperature Setpoint** to view material temperature.



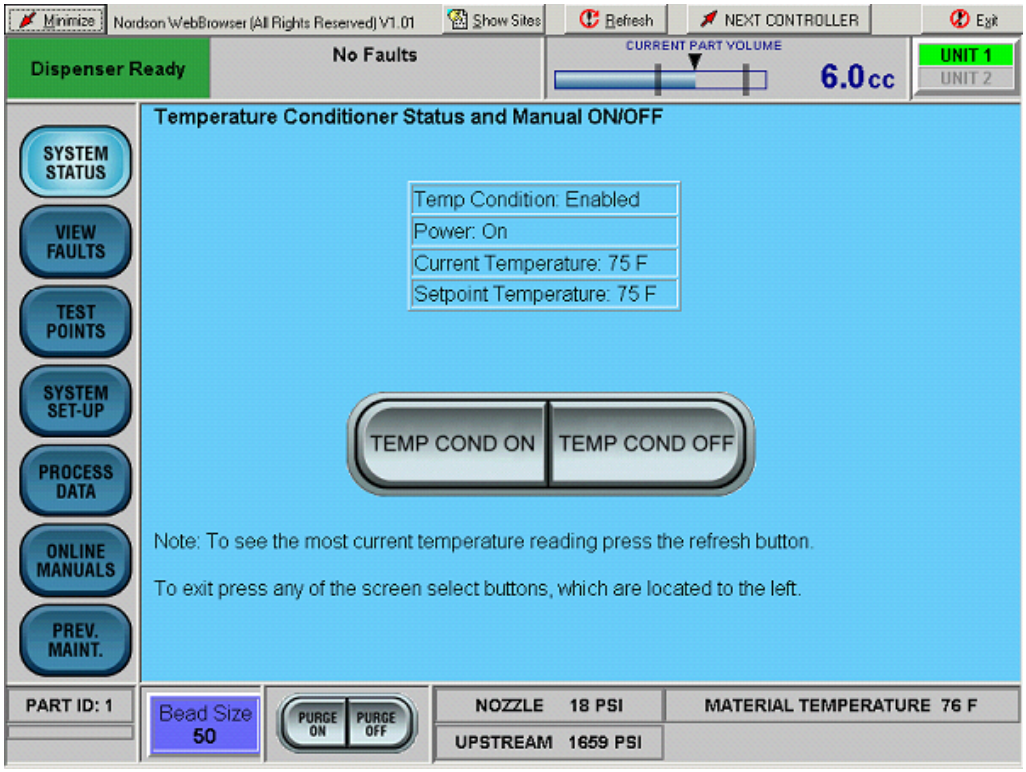
Screen 15 Temperature Setpoint

x

Temperature Status

See Screen 16.

Touch **Temperature Status** to view the status of the temperature control unit.



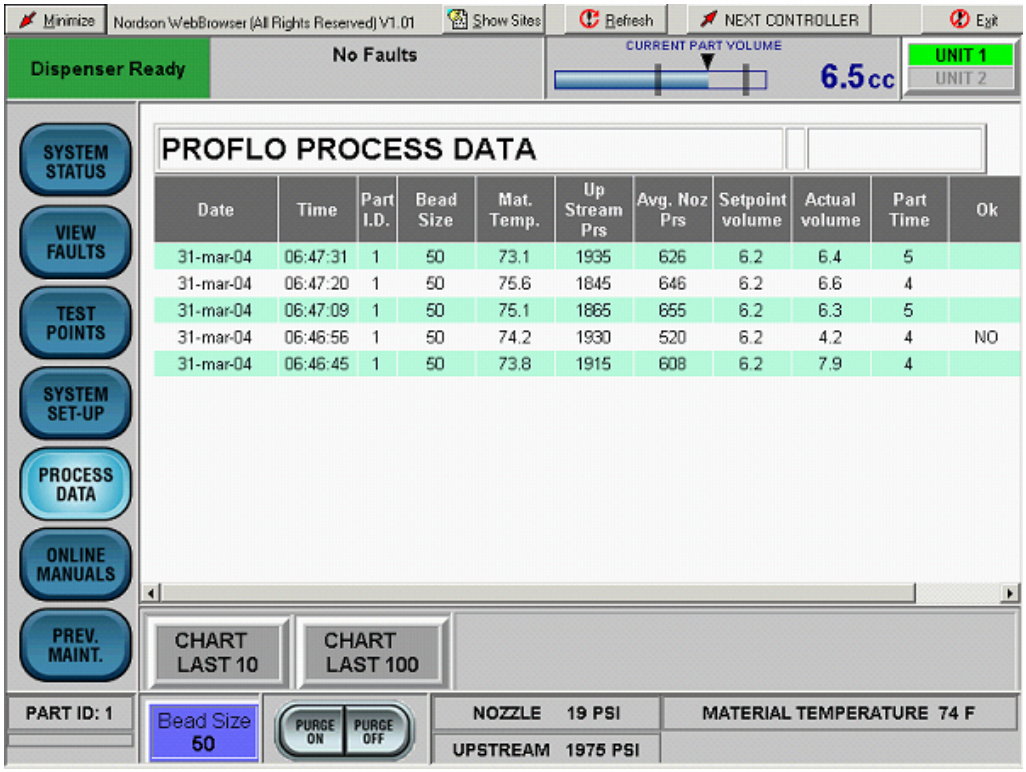
Screen 16 Temperature Control Status

x

PROCESS DATA

See Screen 17.

Touch **PROCESS DATA** to view production data.

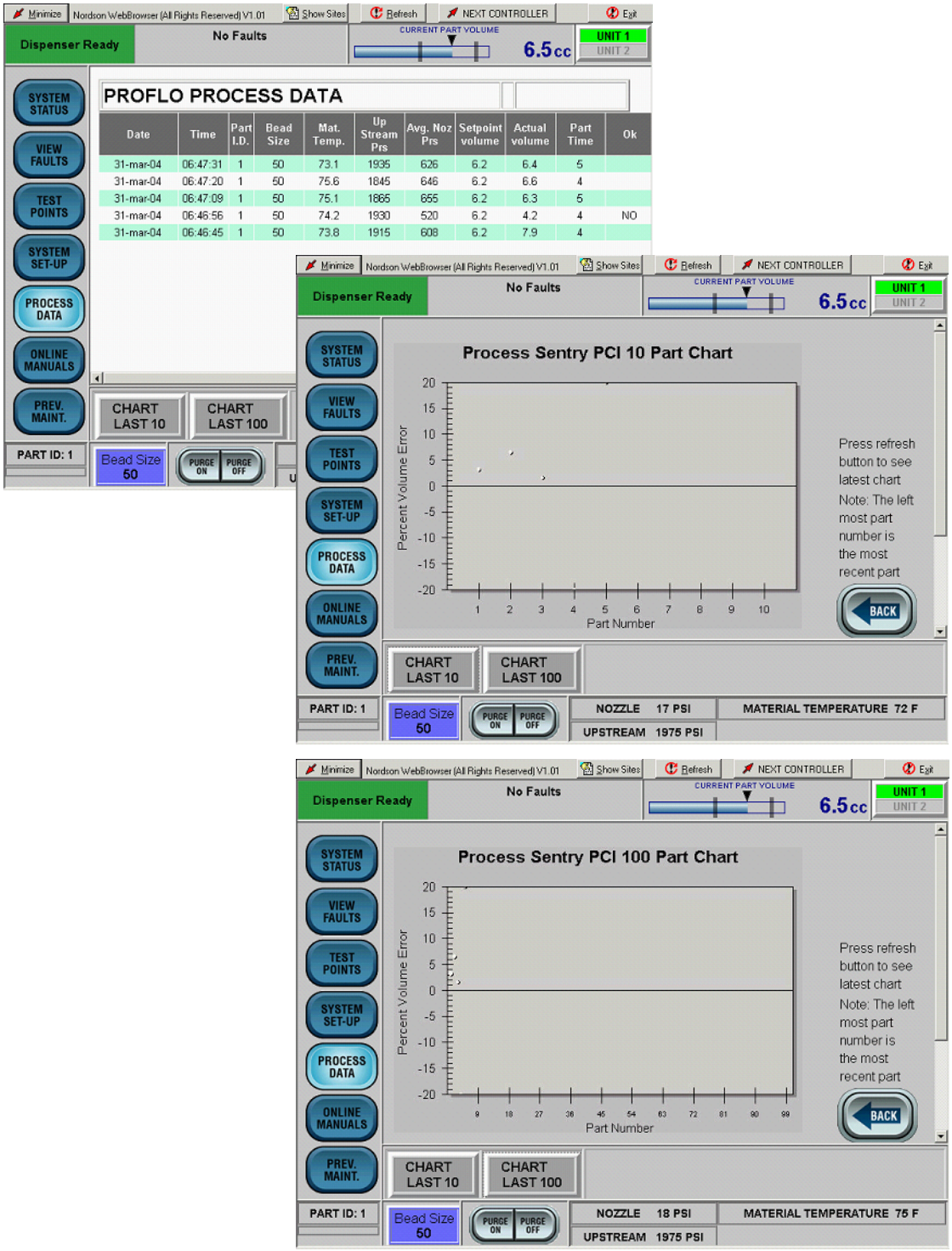


Screen 17 PROCESS DATA (Typical)

PROCESS DATA Part Charts

See Screen 18.

Touch **CHART LAST 10** to view the last 10 parts. Touch **CHART LAST 100** to view the last 100 parts.



Screen 18 PROCESS DATA Part Chart (Typical)

ONLINE MANUALS

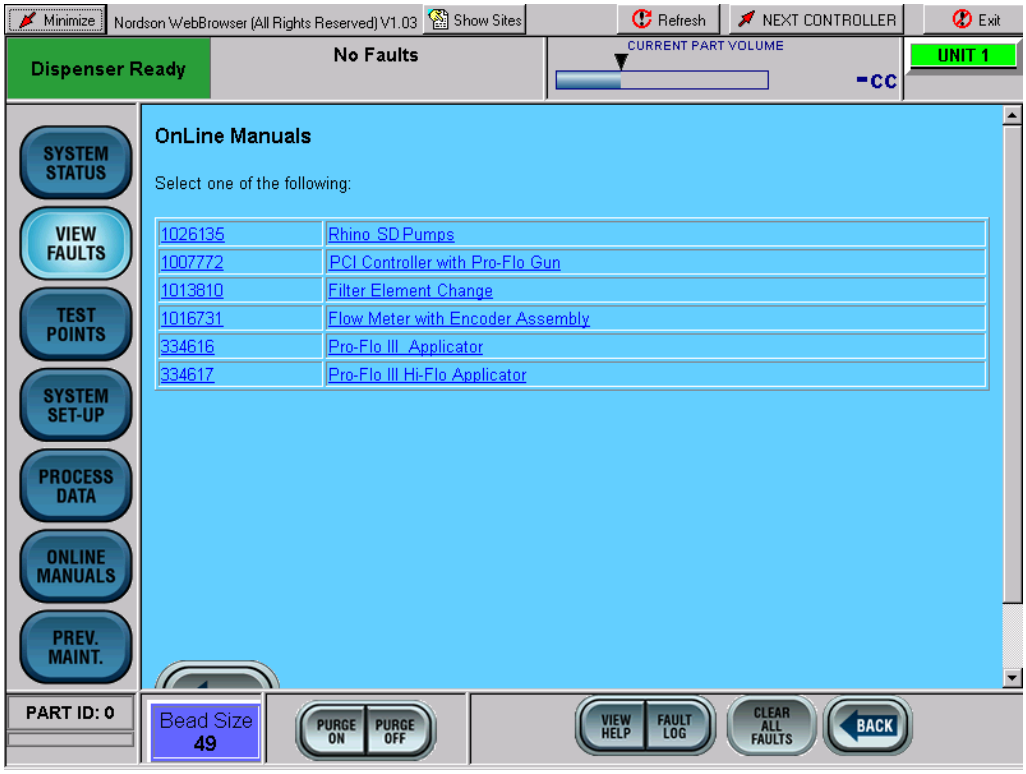
See Screen 19.

NOTE

Manuals that appear on this screen are dependent upon the system configuration. Screen 19 is a typical screen.

Touch **ONLINE MANUALS** for links to the following documentation. Touch either a part number or a manual title to access:

- Flowmeters
- Bulk pumps
- Controllers
- Guns
- Accessories/Kits

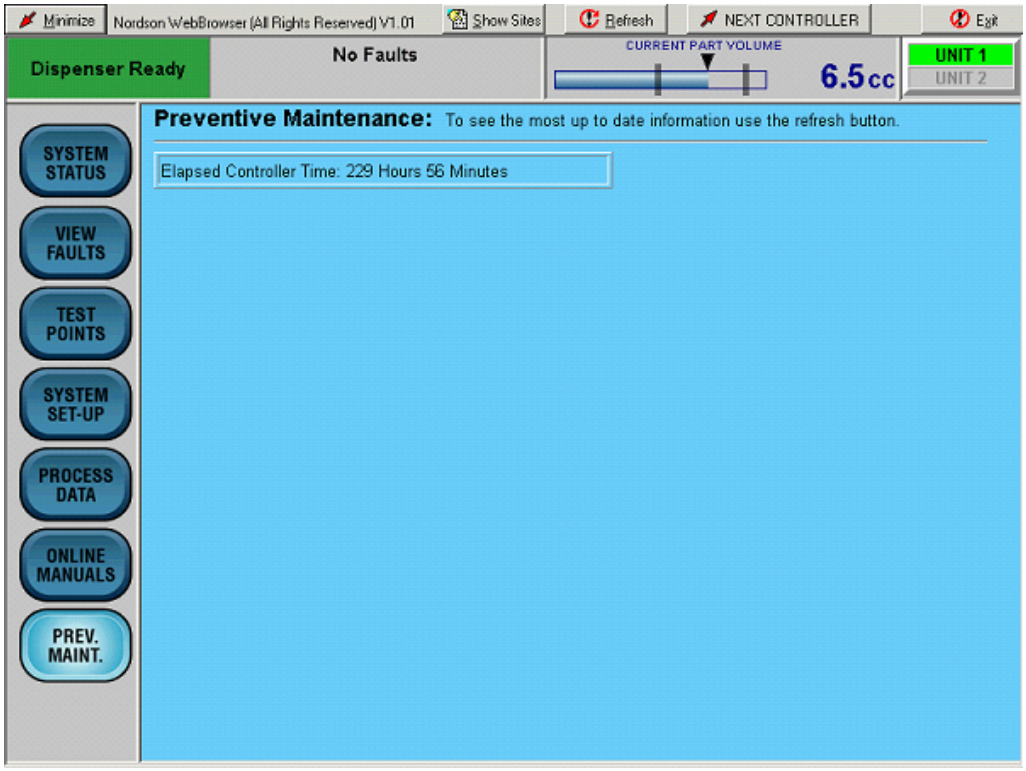


Screen 19 ONLINE MANUALS (Typical).

PREV. MAINT.

See Screen 20.

Touch **PREV. MAINT.** to view preventive maintenance data.



Screen 20 PREV. MAINT.

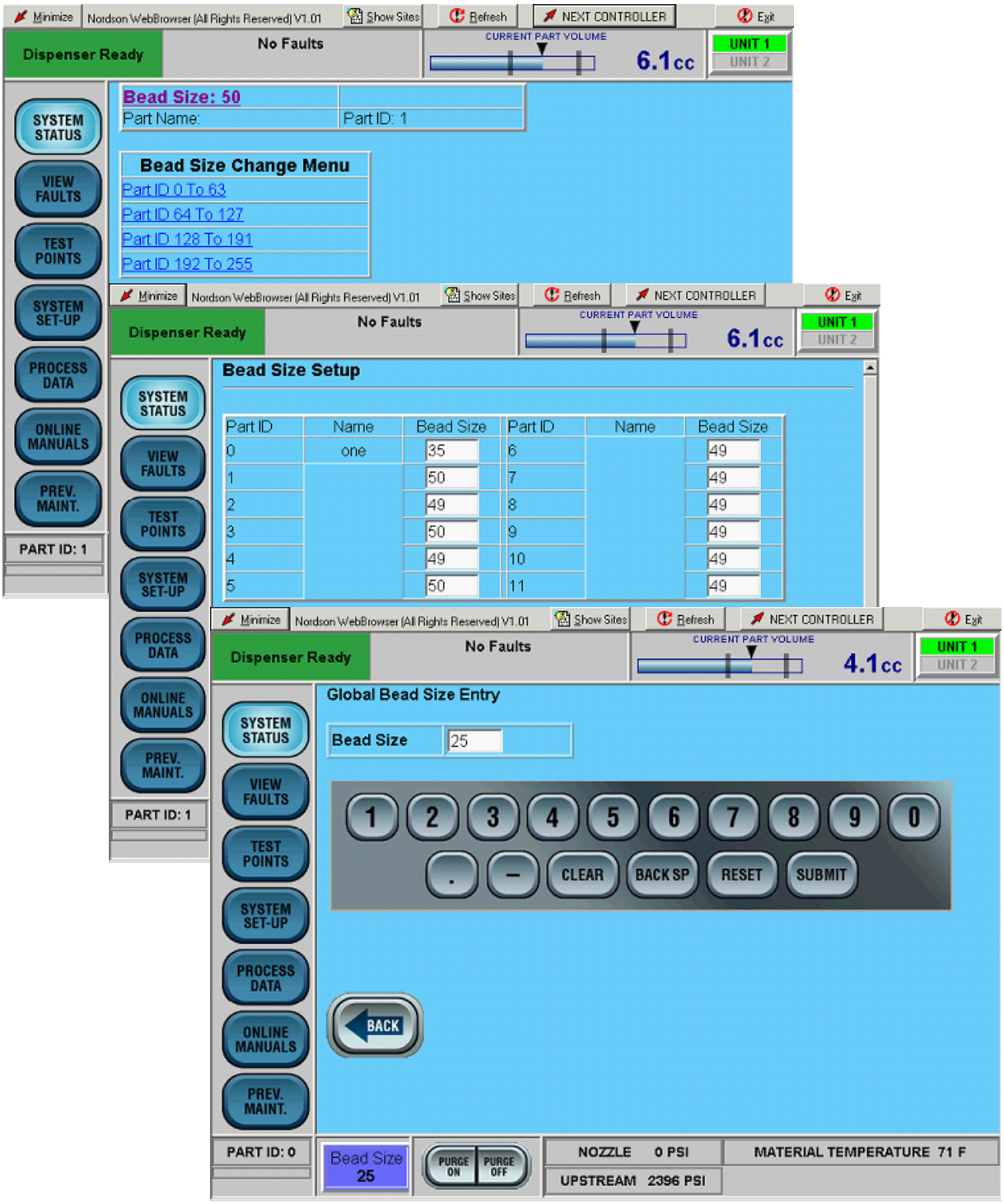
BEAD SIZE

See Screen 21. Touch **BEAD SIZE** to access the bead size screens. Bead size is an arbitrary number between 1 and 99. Bead sizes can be either by Part ID or Global.

A Part ID bead size value applies to one part. Up to 256 Part ID bead sizes can be entered.

A Global bead size value applies to all Part IDs. If the Global bead size value changes, the bead size for all Part IDs change to that value.

Touch the applicable link on the **Bead Size Menu** to access the **Bead SIze Setup** screen and change the bead sizes.



Screen 21 BEAD SIZE.

Operation

WARNING

Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

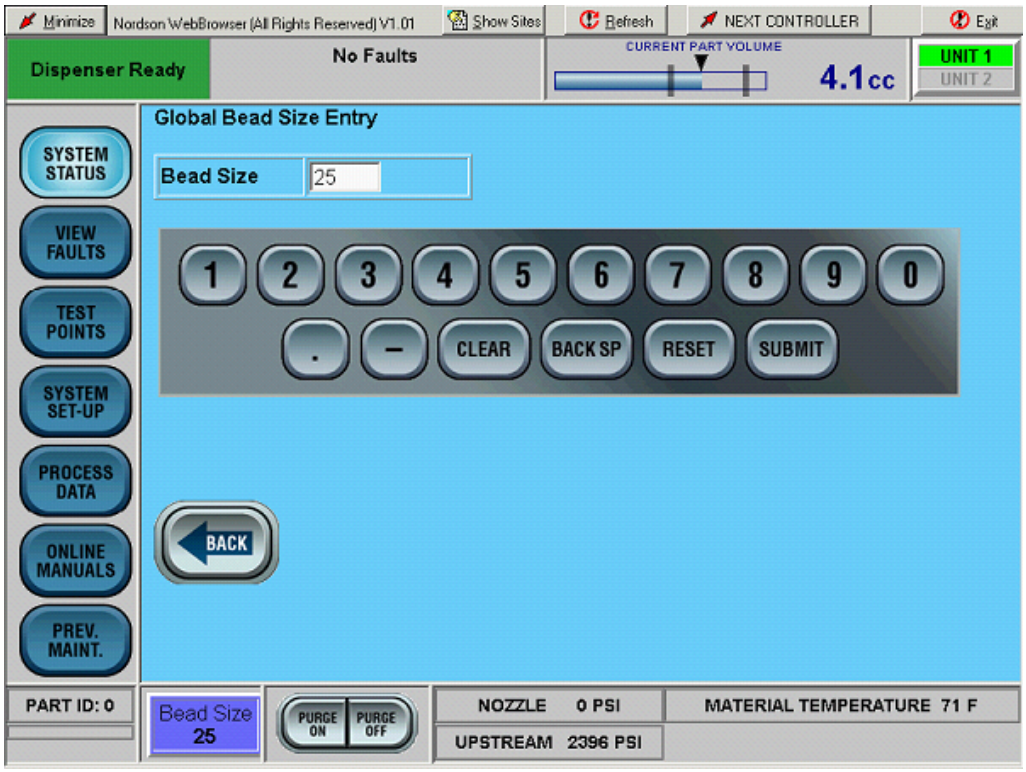
Follow the instructions given in this section to operate the PCI controller. The controller has been configured by a Nordson Corporation representative.

NOTE

- Before operating the controller, make sure that each robot is taught the proper tool path. Refer to the robot controller manual for procedures.
- When entering data, touching the field next to the corresponding parameter positions the cursor inside of the field.

See Screen 22. Some parameters require the use of the screen keyboard to enter data. When entering data, touch

- **CLEAR** to delete the current value in a field.
- **BACK SP** to backspace.
- **RESET** to restore a value.
- **SUBMIT** to save changes.



Screen 22 Typical Screen Keyboard

First-Time Startup

Only perform this procedure for new PCI controllers that have not been used in production.

1. Flush the piping system with water, drain and refill.
2. Fill the water reservoir. Refer to the *Filling the Water Reservoir* procedure in this section.
3. **Heat and Cool Versions Only**—Turn off the chiller and heater circuit breakers.
4. Power up the PCI controller. Turn the TEMP COND switch(s) to ON.
5. From the **Temperature Status** screen, touch **TEMP COND ON** to enable the temperature control and water circulation loop. The system is now circulating water.
6. Check the pressure gauge for each circuit. Normal operating pressure is between 22 to 28 psi. If the pressure is below 20 psi make sure all air is purged from system and both pumps in the circuit are operating.
7. See Figure 9. If necessary, purge the air and prime the pumps:
   a. Access the **Temperature Setpoint** screen. Set the temperature below the process value to allow the solenoid valve to open.
   b. Close the From Process return line valve (2). Disconnect the hose (3) and hold it in the reservoir (4).
   c. If the pumps are air locked, push the water reservoir float switch down to disable the pumps and allow air to exit from the system. If the pressure is above the normal range, there may be a restriction in the circulation loop such as a closed valve, pinched water line, etc.
   d. Connect the hose (3). Open the From Process return line valve (2).
8. Once the system is fully charged with water and the air has been removed from the system, turn the TEMP COND switch(s) to OFF.
9. Turn on the chiller and heater breakers.
10. Pull out on the SEALER STOP switch. Press the SEALER POWER ON switch to turn on the system.

Verify Pipe and RTD Connections

To verify proper pipe and RTD connections, test one control loop at a time.

1. Disconnect an RTD and check that an error is displayed on the correct controller.
2. Enter a set point value on the controller that is higher than ambient and observe that the
   - process temperature begins to increase
   - heat indicator on the controller is illuminated
   - thermometer reflects an increase in water temperature.
3. Reverse this procedure for cooling function.

Filling The Water Reservoir

Use the following procedure to fill the reservoir.

! CAUTION !

- Do not use DI water in this system. To prevent damage to the system, refer to the *Water Treatment* section for information on the types of water to use.
- CorrShield MD405 corrosion inhibitor must be added to the water to minimize corrosion of system components.

1. See Figure 9. Remove the cover (1) on the reservoir (4).
2. Mix 1.5 oz of Corrshield MD405 with a gallon of water. Pour this mixture into the reservoir (4).
3. Install the cover (1) onto the reservoir (4).

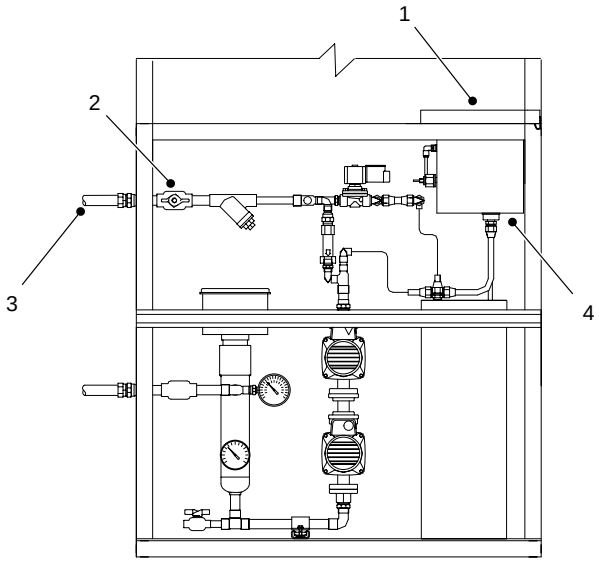


Figure 9 Filling the Water Reservoir

Startup

Startup procedures are provided in the following steps.

NOTE

Perform a material calibration if you are using a different type of material since the last production run. Only personnel with Administrator Level access can perform the material calibration procedure.

1. Turn on the controller. The controller runs a self-test to verify proper operation.
2. See Screen 23. Place a waste container under the gun (7).
3. Touch **PURGE ON** (5) to remove air from the material supply hose and nozzle.
4. Purging stops after the purge time has elapsed. If desired, press **PURGE OFF** (6) to stop purging immediately.
5. Check the correct bead size used for the part being run. Touch **BEAD SIZE** (4) to make adjustments.
6. In the **Bead Options** fields, touch the keyboard to change the values.
7. Touch **PROCESS DATA** (3) to monitor material dispensing characteristics.
8. Position the part and begin dispensing from the robot controller.

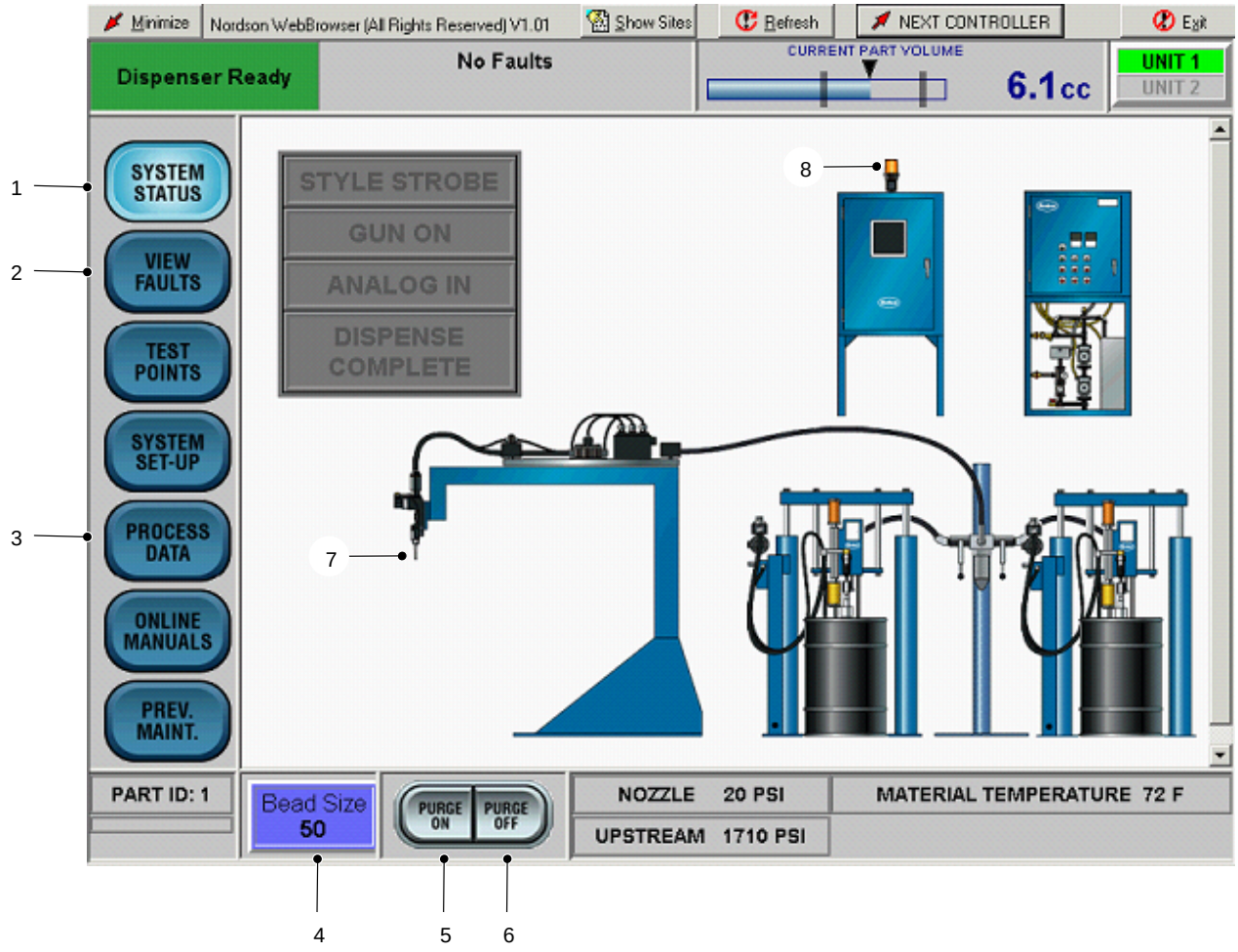
NOTE

During dispensing, the robot signal indicators illuminate when signals are received from the robot controller. During normal operation, these lights flash on and off in specific sequence.

Fault Messages

See Screen 23. If a fault is detected during operation, the alarm tower (8) red light turns on and the type of fault is indicated on the operator interface.

1. Touch **VIEW FAULTS** (2). A description of the fault appears along with the corrective action.
2. Touch any of the bold or underlined text to proceed directly to the correction.



Screen 23 Typical Operator Interface(2-Gun 2-Robot Shown)

Decode Statistical Process Control Listings

All data collected by the PCI controller is written to a file for statistical process control (SPC). Refer to Tables 4 and 5. The controller collects SPC Error Codes and SPC System Status Codes.

NOTE

Only personnel with Administrator Level access to the controller can perform the following procedure.

Follow these steps to decode an SPC Control listing:

1. Open the *SPC.dat* file:
   a. Access the *c:\nordson\serial* directory.
   b. Select either
      spc.dat for Unit 1
      or
      spc2.dat for Unit 2
   The selected file appears on the screen.
2. Subtract the largest number from the code column that yields a remainder greater than or equal to zero. This is the value of the first decoded error code.
3. If the remainder is greater than zero, subtract the largest number from the code column that yields a remainder greater than or equal to zero. This value is the second decoded error code.
4. Continue subtracting the largest possible value until a remainder of zero is obtained.

   EXAMPLE: An SPC error code of 1060 is listed. The largest code that can be subtracted is 1024. The remainder is 36. The largest code that can be subtracted from the remainder is 32. Subtracting 32 from 36 yields 4. The largest code that can be subtracted from 4 is 4. The remainder is 0 and decoding is complete. The following errors were detected:

   - 1024 — Upstream pressure transducer failed
   - 32 — Nozzle clog or down stream blockage
   - 4 — High material supply pressure

Back-Up Mode

If one of the following faults is detected, you may stop production to correct the fault or continue production in back-up mode with some sacrifice to bead dispensing characteristics:

- Gun cable
- Gun pressure transducer
- Flowmeter
- Flowmeter cable

If one of these faults is detected, the **FAULT INDICATOR** field will include a prompt to enter back-up mode. When you enter back-up mode, the **BACKUP MODE** indicator on the operator interface and the alarm tower light shuts off. You can continue production dispensing without interruption.

Once the fault is corrected, the **BACKUP MODE** indicator light shuts off after the next part is run or the gun is purged.

Table 4 SPC Error Codes

Code	Description
1	High dispensed volume
2	Low dispensed volume
4	High material supply pressure
8	Low material supply pressure
16	No material supply pressure
32	Nozzle clog or down stream blockage
64	Gun cable failure
128	Flowmeter failure
256	Nozzle pressure transducer failure
512	Flowmeter cable failure
1024	Not used
2048	DeviceNet from robot failure
4096	Robot signals out of sequence
8192	Gun or controller failure
16384	Auxiliary device failure either temperature conditioning unit or pumps
32768	Low average nozzle pressure or minimum setpoint error

Table 5 SPC System Status Codes

Code	Description
1	In Back-up
2	Deferred Back-up
4	Material Calibration has been run
8	New pressure transducer offsets have been measured
16	“a” or “n” value has been changed through the keypad
32	The “a” value changed due to a purge
64	Not used
128	New configuration file or defaults have been loaded
256	SPC data has been downloaded
512	Dispenser Ready went from low to high prior to dispense cycle
1024	Dispenser Ready was low but robot attempted to run a part
2048	Not used
4096	Not used
8192	Not used
16384	Not used
32768	Part cycle ran in Simulation Mode

Adjusting the Chilled Water Flow

Use the following procedure to adjust the chilled water flow.

See Figure 10.

1. **Heat and Cool Versions Only**—Turn off the chiller circuit breaker.
2. Access the **Temperature Setpoint** screen. Raise the temperature setpoint above the current temperature. Make sure that the solenoid valve (3) closes.

NOTE

The flo-setter adjustment screw (2) must never be fully opened or closed during normal operation.

3. Adjust the flo-setter (1) to the fully opened position and record.
4. Adjust the flo-setter (1) to $^1/_2$ gpm less than full flow.
5. Set the temperature on the **Temperature Setpoint** screen back to the original value.
6. **Heat and Cool Versions Only**—Turn on the chiller circuit breaker.

Shutdown

Turn the controller off and relieve all pressures.

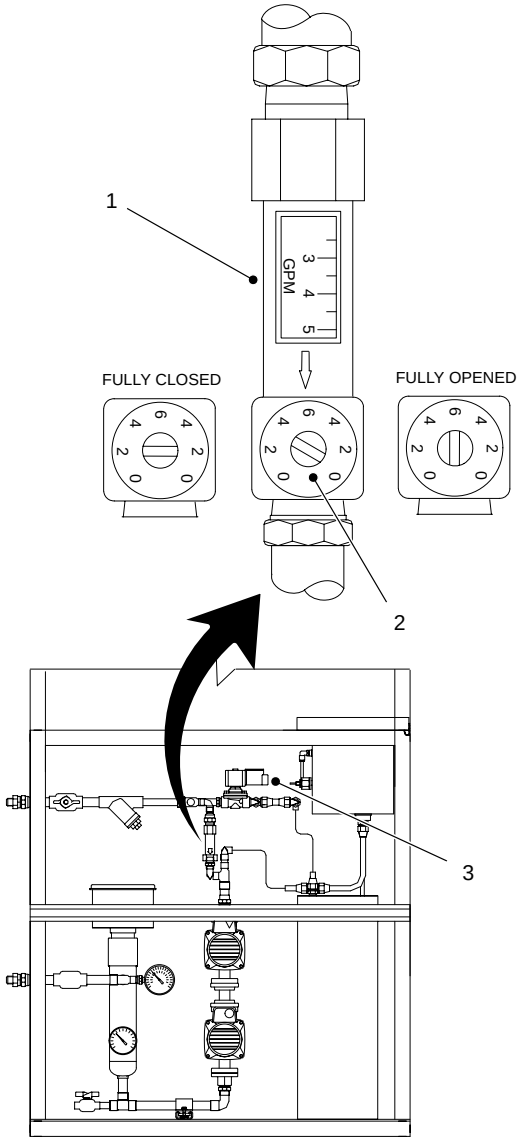


Figure 10 Adjusting the Chilled Water Flow

Shutdown

Use the following shutdown procedure to remove power from the PCI Controller:

1. See Figure 11. Touch **Minimize** (1) at the top of a screen display.
2. Touch **start** (2) on the Windows task bar to access the **Start Menu**.
3. Touch **Shut Down** (3) on the **Start Menu**.
4. Make sure that **Shut Down** is displayed in the **Shut Down Windows** field. Touch **OK** (4).
5. Turn the controller off and relieve all pressures.

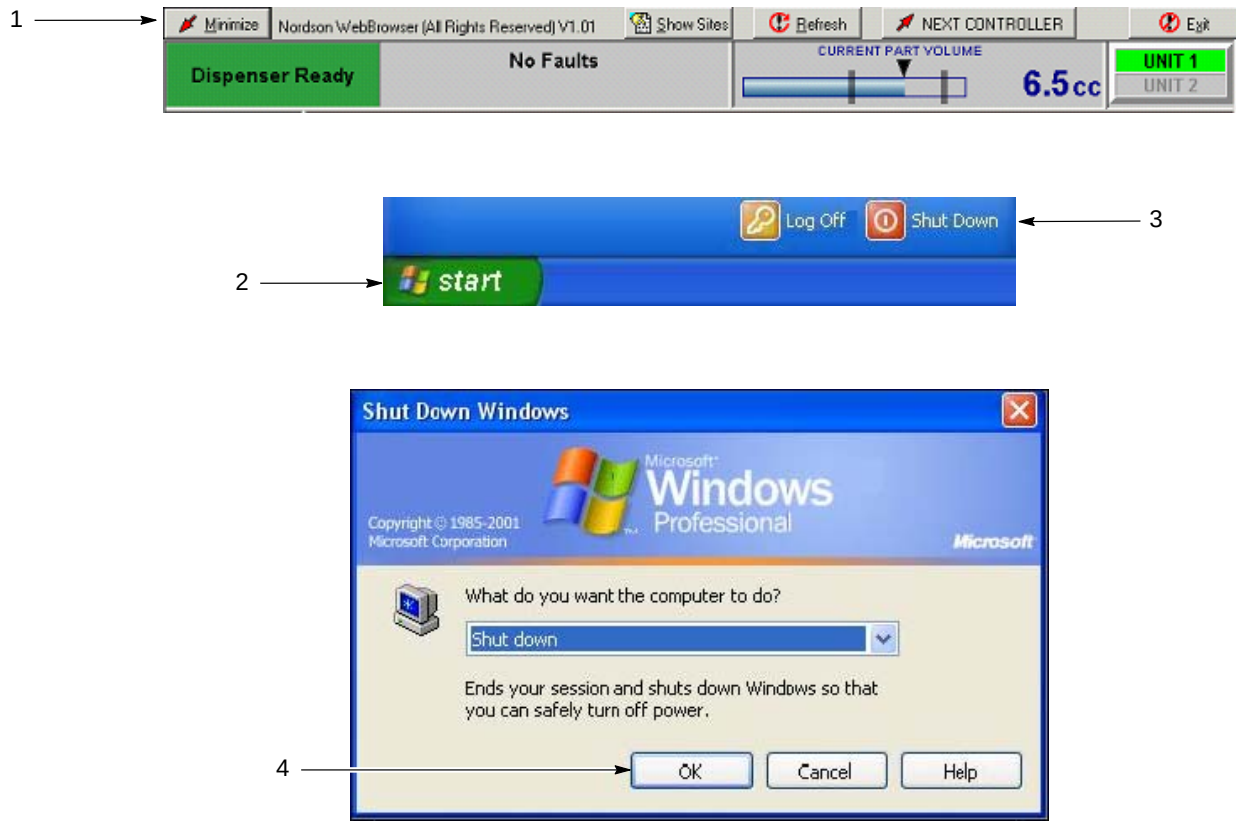


Figure 11 PCI Controller Shutdown

Maintenance

The following chart lists recommended maintenance tasks. The frequency of performing a task is dependent upon the system operating environment. Perform preventive maintenance according to your plant maintenance schedule.

WARNING

- Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.
- High pressure fluids are extremely dangerous. Do not place any part of your body in front of a dispensing device, drain, or leak in a high pressure system. A jet of high fluid can cause serious injury, toxic poisoning, or death. Relieve system and material pressure before disconnecting hoses.

Item	Task
Water Chiller	Inspect and clean the condenser coil on the water chiller. On some chiller units, airflow is from the inside to the outside of the coil; therefore inspect both sides for buildup of dust or other airborne dirt. Blowing compressed air through the coils in the opposite direction of normal airflow often can clean the coils
System Pressure	Observe the system pressure gauge. Normal operating pressure is 25 to 28 psi. Low pressure indicates a pumping problem, either a failed pump, or air in the system. High pressure indicates a flow blockage.
System Y-Strainer	Isolate the Y−strainer and remove the screen for cleaning and inspection. If the screen contains little dirt after several inspections, discontinue this check. If system pressure is high, flow blockage may be found in this strainer.
System Water	Perform a water quality test. The correct way to determine water treatment quality is to use a test kit, which is available from Nordson, part 1030974. The system was originally filled with CorrShield MD405 corrosion inhibitor water treatment. If the water quality test fails, use the following procedure to flush the system: 1. Note the temperature setting on the heater high-temperature Thermostat located in the heater electrical junction box, then reset to 0. To properly flush the water chiller, remove the chiller fuse and force the system into cooling by lowering the setpoint temperature. This will open the cooling solenoid and flow water through the chiller. 2. Flush the existing water from the system by bleeding a small amount of water to drain while adding fresh clean water to the reservoir. Continue to bleed water until the system water is clear. Once the water runs clear, close the system drain and add corrosion inhibitor per the manufacturer's recommendation, if a biocide is indicated add biocide at this time per manufacturer's recommendation. 3. Install the chiller fuse, reset the temperature setpoint on the PCI controller and reset the heater high-temperature Thermostat to its original setting. The system is now ready for operation
Water-Traced Covers	Inspect the water-traced covers for signs of wear or rubbing. Also inspect the clamping for signs of cutting or fabric tear.

Troubleshooting

This section contains troubleshooting procedures. These procedures cover only the most common problems that you may encounter. If you cannot solve the problem with the information given here, contact your local Nordson representative for help.

WARNING

Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

NOTE

Pro-Flo gun troubleshooting is included in the following table because some PCI controller problems may be system related.

Controller Problems

Problem	Possible Cause	Corrective Action
1. Gun does not dispense material	Material supply pressure low	Increase the material supply pressure. Refer to the drum unloader manual.
	Nozzle blocked	Remove and clean the nozzle. Refer to the Pro-Flo gun manual.
	Material supply hose blocked	Check the material supply hose and unblock it. Refer to the Pro-Flo gun manual.
	Signals not received from robot in proper timing sequence	Set the proper timing sequence. Refer to *Set Timing Sequences* in the *Installation* section.
	Signals not received from robot controller or sent to gun	Check the cable continuity and replace the cable if necessary. Refer to the Pro-Flo gun manual.
	Spring closures are not retracted	Verify that there is power to the controller and that the controller is on. Verify that the solenoid supply air to the gun is on. Verify that air is present at the gun and that the pressure is correct. Replace the spring closure assembly if it is defective.

Problem	Possible Cause	Corrective Action
2. Gun does not dispense material, does not open	Absent or low control air pressure	Check the supply air pressure and increase it if necessary.
	Stem binding	Remove the trimset valve and loosen the bonnet screw on a packing-type bonnet. Check and replace the stem and bonnet if necessary. Refer to the Pro-Flo gun manual.
	Actuator malfunction	Replace the gun. Refer to the Pro-Flo gun manual.
	Spring closures are not retracted	Verify that there is power to the controller and that the controller is on. Verify that the solenoid supply air to the gun is on. Verify that air is present at the gun and that the pressure is correct. Replace the spring closure assembly if it is defective.
3. Gun does not dispense material, opens fully	Trimset valve blocked	Remove and clean the trimset valve. Refer to the Pro-Flo gun manual.
4. Gun does not change dispensing rate to control bead size	Cordset damaged	Check the continuity of cordset and replace it if necessary. Refer to the Pro-Flo gun manual.
	Gun control or extension cable damaged	Check the cable continuity and replace cable if necessary. Refer to the Pro-Flo gun manual.
5. Gun does not change dispensing rate to control bead size, opens fully	Pressure transducer in controller malfunction	Check the pressure output voltage of the controller board. Contact your Nordson Corporation representative.
6. Gun dispenses early, before robot moves	Signals from robot controller timed improperly	Set the proper timing sequence. Refer to *Set Timing Sequences* in the *Installation* section.
	Gun ON or Tool Speed delay too short	Increase the parameter settings. Refer to the *Operation* section.
7. Gun dispenses after cycle, gun closed	Control air pressure low	Check the supply air pressure and increase it if necessary.
	Needle not seating	Purge the gun. Refer to the Pro-Flo gun manual.
	Stem and trimset valve seat worn	Replace the trimset valve. Refer to the Pro-Flo gun manual.
8. Dispensing delayed	Gun ON signal from robot controller timed improperly	Set the proper timing sequence. Refer to *Set Timing Sequences* in the *Installation* section.
	Gun ON delay too long	Decrease the parameter setting. Refer to the *Operation* section.
	Packing-type bonnet: Stem binding	Loosen the packing nut. Refer to the Pro-Flo gun manual.

Continued...

Problem	Possible Cause	Corrective Action
9. Bead deposition "wiggles"	Nozzle too high above work piece	Lower the nozzle. Refer to the robot controller manual.
	Material speed through nozzle too high	Decrease the bead size. Refer to *Startup* in the *Operation* section.
	Nozzle not large enough	Install a larger nozzle. Contact your Nordson Corporation representative for part numbers.
10. Unexpected bead-size change	Nozzle partially blocked	Clean the nozzle. Refer to the Pro-Flo gun manual.
	Material exceeded shelf life	Use fresh material.
11. Material leaks from bonnet	Lip-type seals: Bonnet seals worn	Replace the bonnet. Refer to the Pro-Flo gun manual.
	Packing-type: Bonnet screw loose	Tighten the bonnet screw. Refer to the Pro-Flo gun manual.
	Packing-type: Bonnet packings worn	Replace the bonnet. Refer to the Pro-Flo gun manual.

Temperature Conditioning System

Problem	Possible Cause	Corrective Action
1. Unit will not operate	Main power supply or fuses	Check the following: • supply power • main fuses • transformer fuses • control circuit breakers
2. Power on; does not operate	Temperature conditioning disabled.	Perform the following: 1. Access the **Temperature Status** screen. 2. Touch **TEMP COND ON**.
	Control breakers	Check the control breakers.
3. Unit on; no temperature control	No water in system	Make sure that the system is filled with water and primed. Refer to the *Filling The Water Reservoir* procedure
	RTD	Check RTD and replace if necessary.

Continued...

Problem	Possible Cause	Corrective Action
4. Material Temp. Range fault; material too warm	Water cooling system out of adjustment, dirty, or faulty	Perform the following steps: 1. Check the following: When cooling is required, the PCI controller cooling output should be on. This output is Output 2 on PCA405. When the PCI controller sends a cooling signal, the cooling output energizes and opens the water solenoid valve; indicated by an audible click at the solenoid valve. If the cooling light does not come on when the material is too warm, check the DeviceNet network and/or replace PCA405. If the light does come on and no audible click is heard, check the solenoid valve and/or solenoid fuse for failure. If the solenoid valve is operating and the cooling light is on, check the water flo-setter for proper adjustment. Refer to *Adjusting the Chilled Water Flow* in the *Operation* section. 2. Check the water chiller: If the problem still exists after performing step 1, the problem could be the water chiller. The water chiller uses a built−in thermostat to maintain a reservoir of cold water. When the thermostat energizes the chiller, the cooling fan blows air across the condenser coils. If the fan is not operating, check the chiller fuse located in the control panel. If the fan is operating, check the condenser coils for a buildup of dirt/dust and clean if necessary. **NOTE:** Some fans blow air from the inside to the outside; check both sides for dirt. If the fan is not operating and the fuse is good, or if the fan is operating with clean condenser coils but not cooling, a faulty water chiller is indicated. Contact Nordson for further chiller troubleshooting or replacement.

Continued...

Problem	Possible Cause	Corrective Action
5. Material Temp. Range Fault light is on: material too cool	Water heating system out of adjustment or faulty	Perform the following steps: 1. Check the following: Check the electronic controller:When heating is required, the controller heating output should be on. This output is Output 1 on PCA405. When the controller sends a heating signal, the heating output energizes and powers the water circulation heater. If the heating light does not come on when the material is too cool, check the DeviceNet network and/or replace PCA405. If the light comes on and no heating occurs, check the heater fuses located in the control panel and refer to the *Heater High Temperature Fault* in this section. 2. If the problem still exists after performing step 1, replace the circulation heater.
6. Heater High Temp. Fault light is on; system pressure above 25−28 psi	Closed valve	With the exception of the drain valve, make sure that all valves in the circuit are completely open.
	Pinched water hose, tubing, or water traced hose covers	Check to make sure that any water hose and tubing in the water traced hose covers are not pinched.
	Y−strainer clogged	Shut off power to the system and isolate the Y−Strainer. Inspect the screen in the strainer and remove any dirt. Circulation can be hindered if there is a significant amount of dirt build−up.
7. Heater High Temp. Fault light is on; system pressure below 25−28 psi	Bad pump or tripped circuit breaker	Check the breaker for each pump. If a pump is not operating the system pressure should be in the 12−15 psi range. If both pumps are getting power and the system pressure is below normal, check pumps for mechanical failure.
8. Low Water Level Fault light is on	Low water level in reservoir	Add water to reservoir.
	Leaks in water circuit	Check for leaks in the water circuit and repair.
9. Sensor Serr code appears on process controller	Broken or disconnected, or RTD lead; defective RTD	Connect the RTD lead, repair the broken RTD lead, or replace the RTD to correct the error code. This error code is self-clearing when the problem is corrected.

Cable Continuity

Cables should be checked periodically and replaced when worn or frayed. If a system malfunctions, make sure that the cable connections are tight.

! CAUTION !

Disconnect power before removing cables and testing them.

Check the cables for continuity with an ohmmeter. See the cable wiring diagrams included with your system documentation.

Repair

Repair consists of replacing the operator interface panel and the PCAs.

WARNING

- Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.
- Disconnect equipment from the line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage.

Operator Interface Panel

Perform following procedure to replace the operator interface.

1. Turn off and lock out external electrical power to the controller.
2. See Figure 12. Open the enclosure door (1).
3. Disconnect the AC (4) and Serial (5) cables from the operator interface (3).
4. Remove the mounting clips (2) securing the operator interface (3) to the enclosure door (1). Remove the operator interface from the enclosure door (1).

NOTE

Do not apply sealing compounds to the operator interface. The operator interface has a sealing gasket that forms a compression-type seal.

5. Make sure that the sealing gasket on the operator interface (3) is properly positioned.
6. Install the new operator interface (3) into the enclosure door (1).
7. Install the mounting clips (2). Using the torque sequence shown in Figure 12, tighten the mounting clips to 10 in.-lb (1.1 N•m).
8. Connect the AC (4) and Serial (5) cables to the operator interface (3).
9. Close the enclosure door (1).

Typical PCA Replacement

The Dual Pro-Flo Option PCA is used as an example in the following procedure.

WARNING

This unit contains electrostatic sensitive devices (ESD). Wear a grounding wrist strap to prevent damage to ESD parts.

1. Turn off and lock out external electrical power to the controller.
2. See Figure 12. Open the enclosure door (1).
3. Disconnect the electrical connectors (8) from the PCA (6).
4. Remove the screws (7) from the PCA (6).
5. Install the new PCA using the screws (7). Do not over tighten the screws.
6. Connect the electrical connectors (8).
7. Close the enclosure door (1).

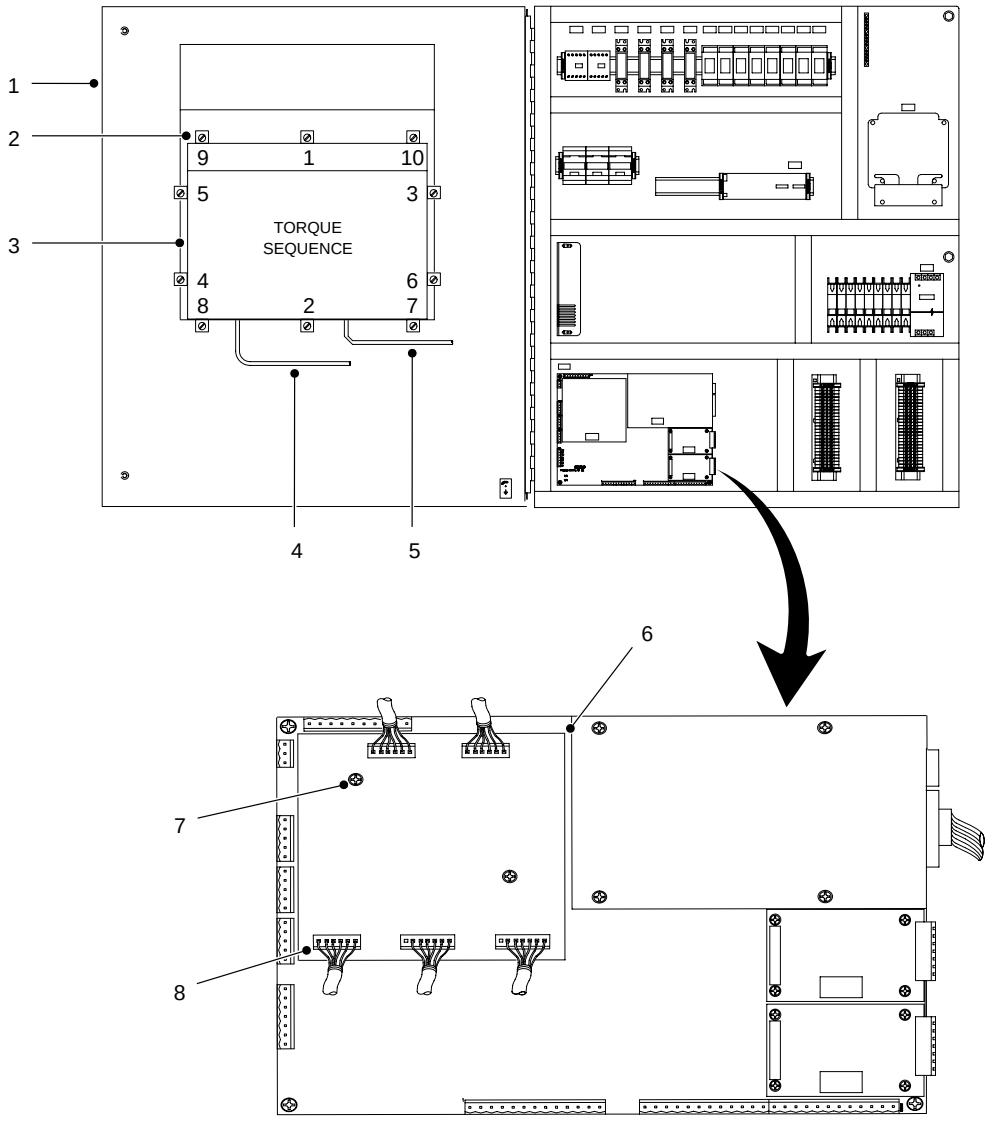


Figure 12 Typical Repairs

Restoring the PCI Controller Programs and Configuration

WARNING

Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

Use this procedure to restore the PCI controller programs and configuration:

1. See Figure 13. Open the enclosure door (1).
2. Connect a keyboard and mouse to the PC operator interface (2).
3. Turn the PC operator interface power switch (3) OFF, then to ON.
4. Close all running programs.
5. Log out as the PCI user and log in as the Administrator. Enter the password. The default password is Nordson.
6. Access the c:\ Psentry_install\ release\ loader directory. Select and run the PCILoader.exe file. Configure the communications port for Com1.
7. Locate circuit breaker CB108B on the DIN rail (4). Using circuit breaker CB108B, turn the power OFF to the PCI printed circuit board, and then to ON.

NOTE

The ps.s19 files are located in folders that are labeled by ps.s19 version number.

8. Access the c:\ Psentry_install\ controller directory. Select and load the latest ps.s19 file.
9. Exit the PS Loader.
10. See Screen 24. Open SerialCom from Start\ Programs\ Start−up\ SerialCom. Maximize the SerialCom screen (1). Select **Load Config File** (2).
11. Select the configuration to load and press **Open** (3).
12. See Figure 13. Disconnect the keyboard and mouse from the PC operator interface (2).
13. Turn the PC operator interface power switch (3) OFF, then to ON. Make sure that the
    - power to the PCI printed circuit board is ON.
    - normal Operator Interface programs (Apache, SerialCom, and the Web browser) are running on the PC.
    - web browser is maximized.
14. Close the enclosure door (1).

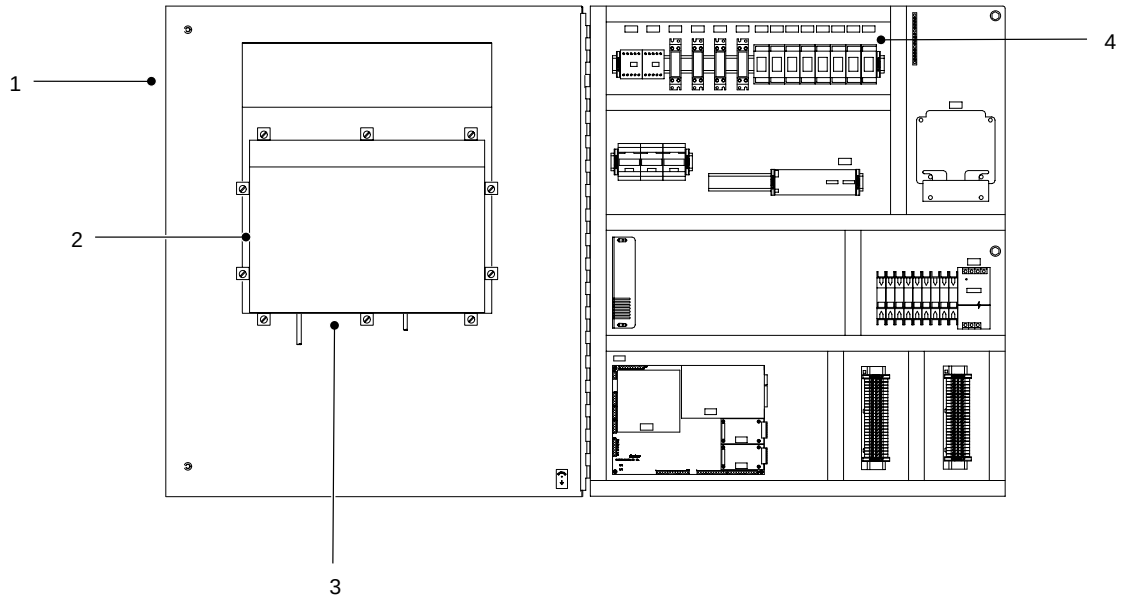
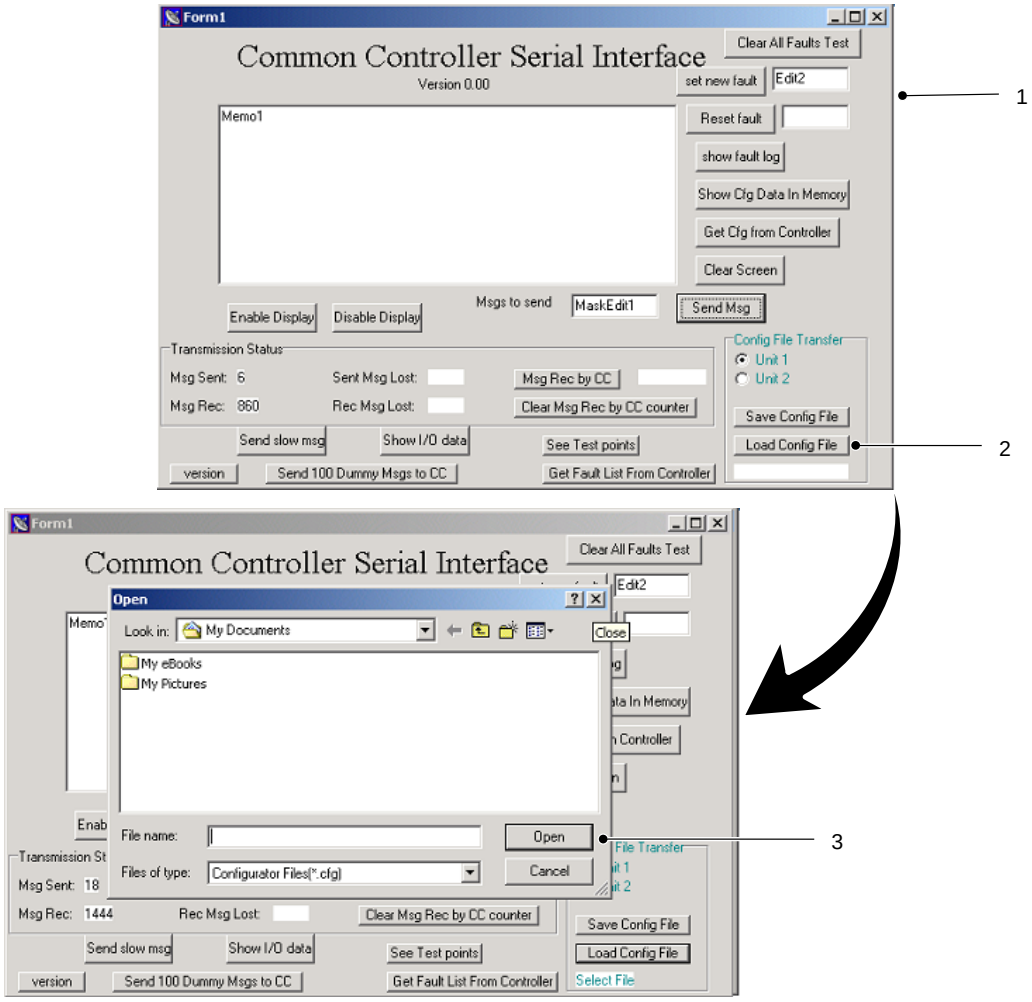


Figure 13 Accessing the Operator Interface



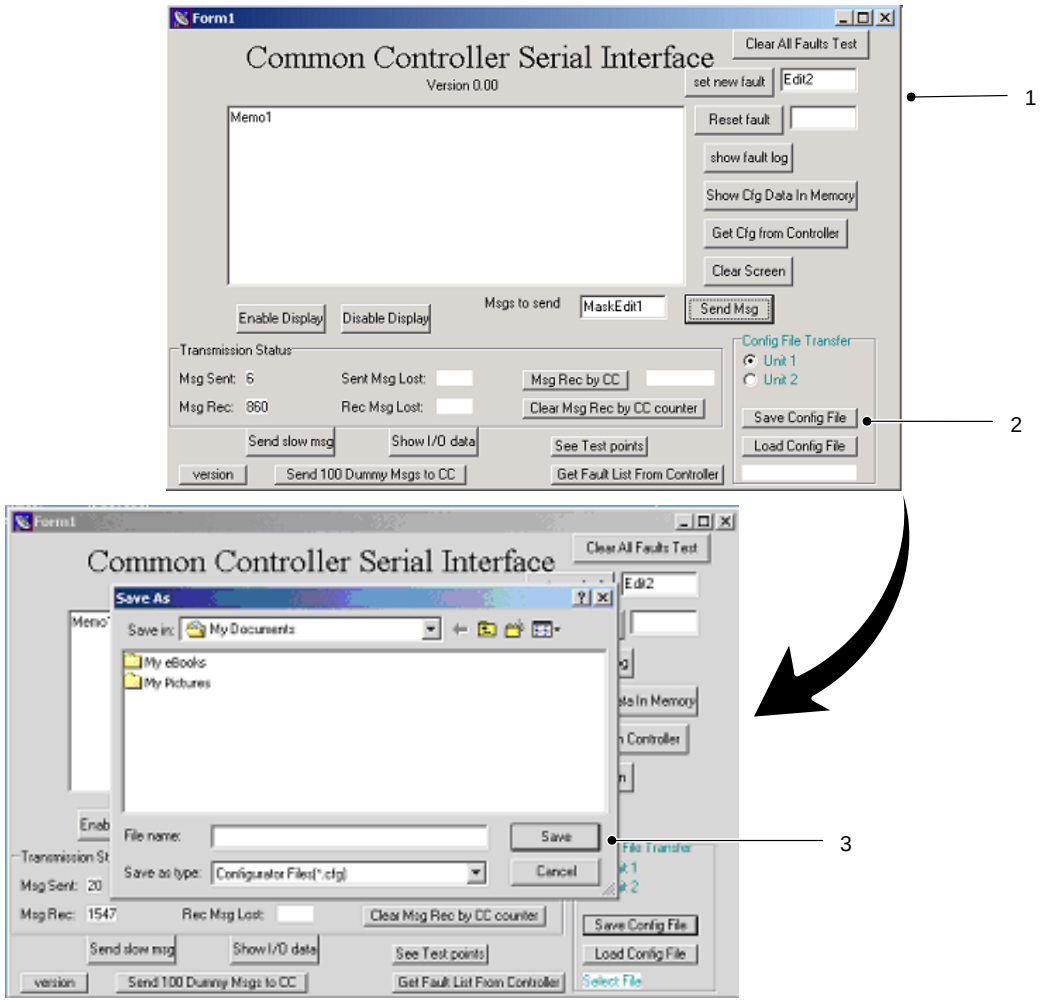
Screen 24 SerialCom Screen

Saving the PCI Controller Configuration

WARNING

Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

1. See Figure 13. Open the enclosure door (1).
2. Connect a keyboard and mouse to the PC operator interface (2)
3. Turn the PC operator interface power switch (3) OFF, then ON.
4. Close all running programs.
5. Log out as PCI user and log in as Administrator.
6. Enter password (Default is Nordson)
7. See screen 25. Open SerialCom from Start\Programs\Start−up\SerialCom screen (1). Maximize SerialCom and press **Save Config File** (2).
8. Select the location to save the file and press **Save** (3).
9. See Figure 13. Disconnect the keyboard and mouse from the PC operator interface (2).
10. Turn the PC operator interface power switch (3) OFF, then ON
11. Turn the PC operator interface power switch (3) OFF, then to ON.
12. Make sure that the
    - power to the PCI printed circuit board is ON.
    - normal Operator Interface programs (Apache, SerialCom, and the Web browser) are running on the PC.
    - web browser is maximized.
13. Close the enclosure door (1).



Screen 25 SerialCom Screen

Parts

To order parts, call the Nordson Customer Service Center or your local Nordson representative.

Single-PCI Controllers

See Figure 14 and the following parts list.

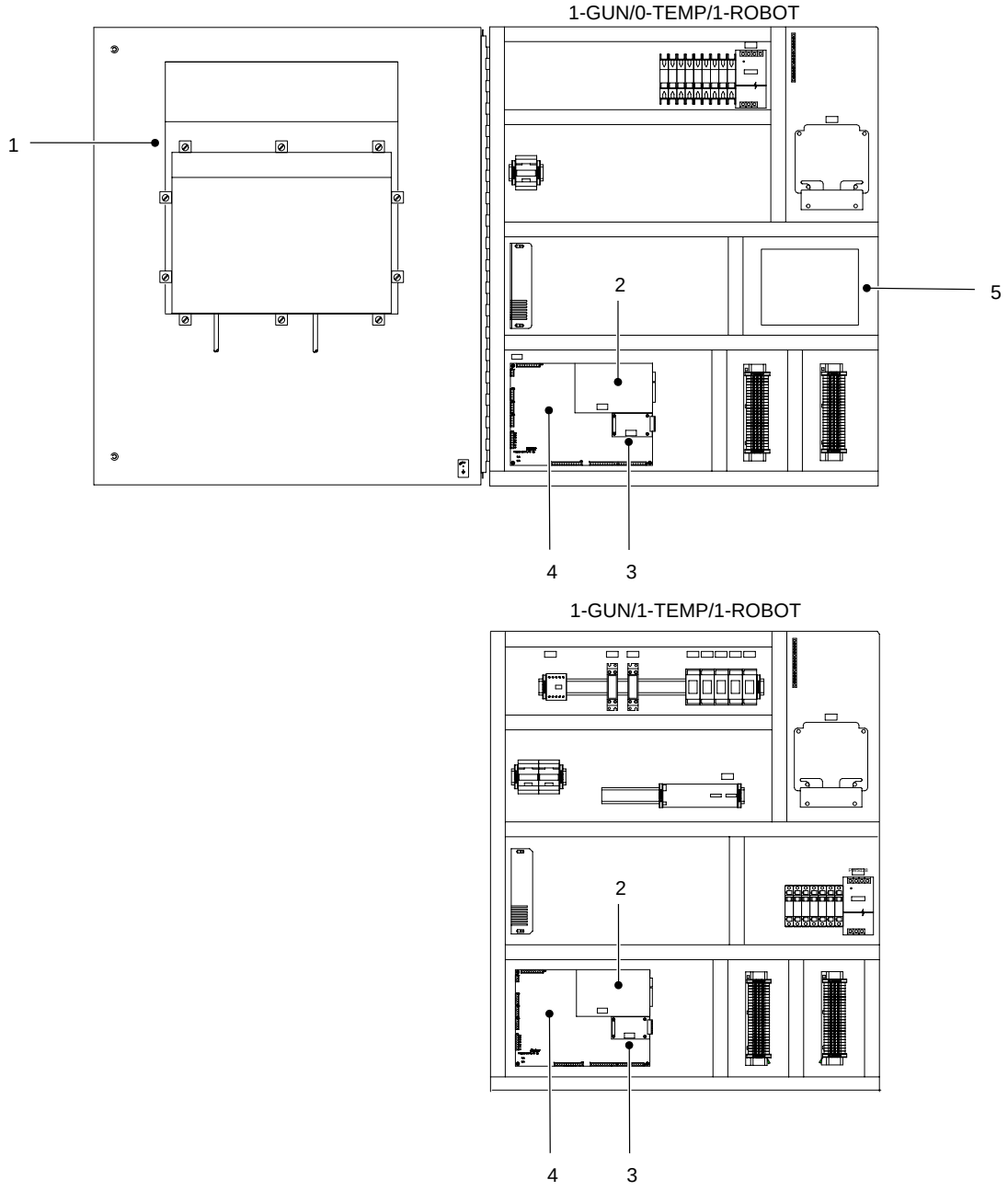


Figure 14 Single-PCI Controllers

PCI Controllers			1049032 1-Gun/0-Temp/1-Robot	1049014 1-Gun/1-Temp/1-Robot
Item	**Part**	**Description**		
1	1040541	Touch screen assembly	1	1
2	1040544	Netburner PCA	1	1
3	320255	Hybrid, UCS-ON-1, Open PCB	1	1
4	1037196	Pro-Flo optiondual PCA	1	1
5	1040546	DeviceNet Interface	1	—

Dual-PCI Controllers

See Figure 14 and the following parts list.

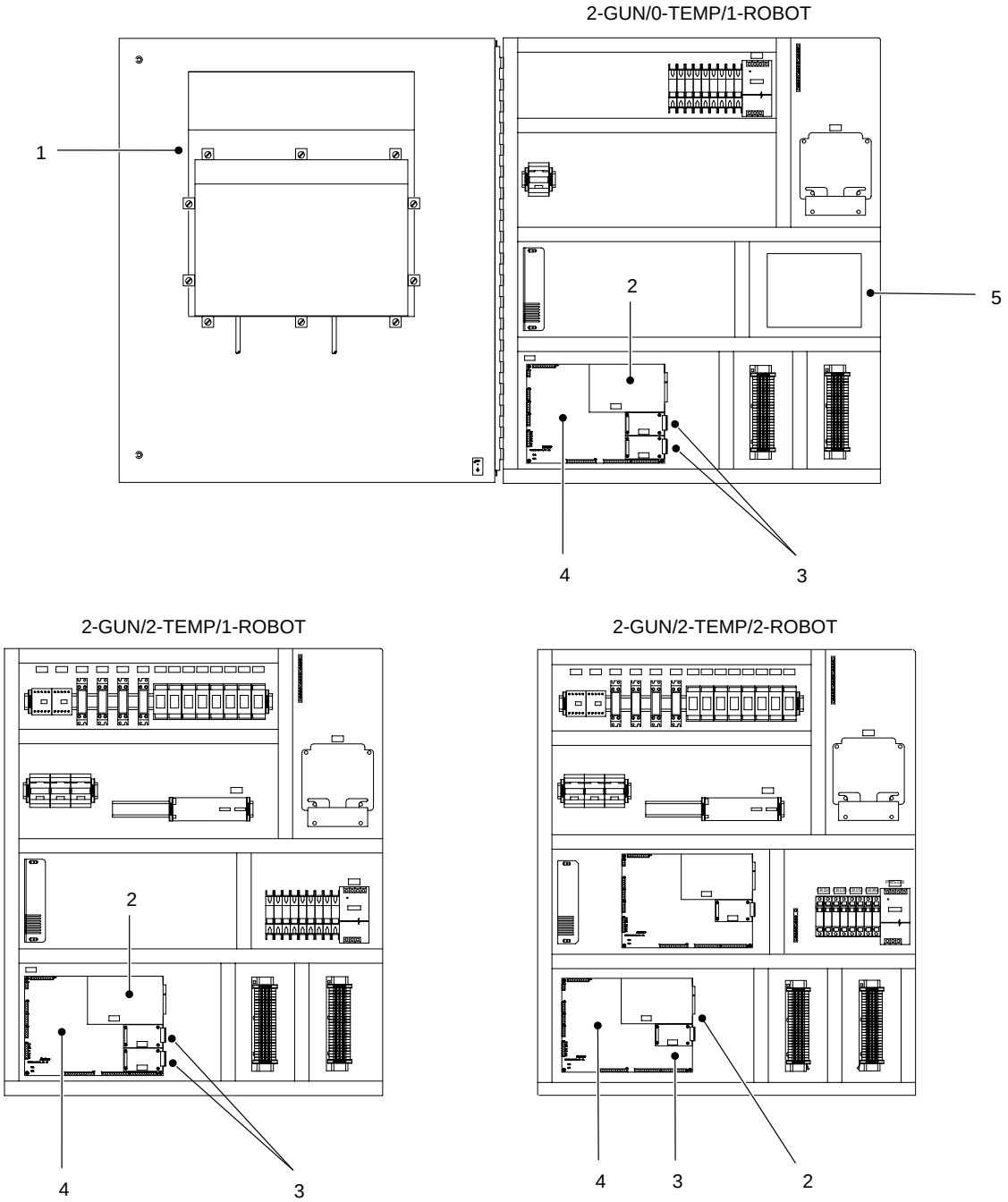


Figure 15 Dual-PCI Controllers

PCI Controllers			1049030 2-Gun/0-Temp/1-Robot	1046670 2-Gun/2-Temp/1-Robot	1049018 2-Gun/2-Temp/2-Robot
Item	Part	Description			
1	1040541	Touch screen	1	1	1
2	1040544	Netburner PCA	1	1	2
3	320255	Hybrid, Open PCB	2	2	2
4	1037196	Pro-Flo option dual PCA	1	1	2
5	1040546	DeviceNet Interface	1	—	—

Temperature Conditioning Sections

See Figure 16 and the following parts list.

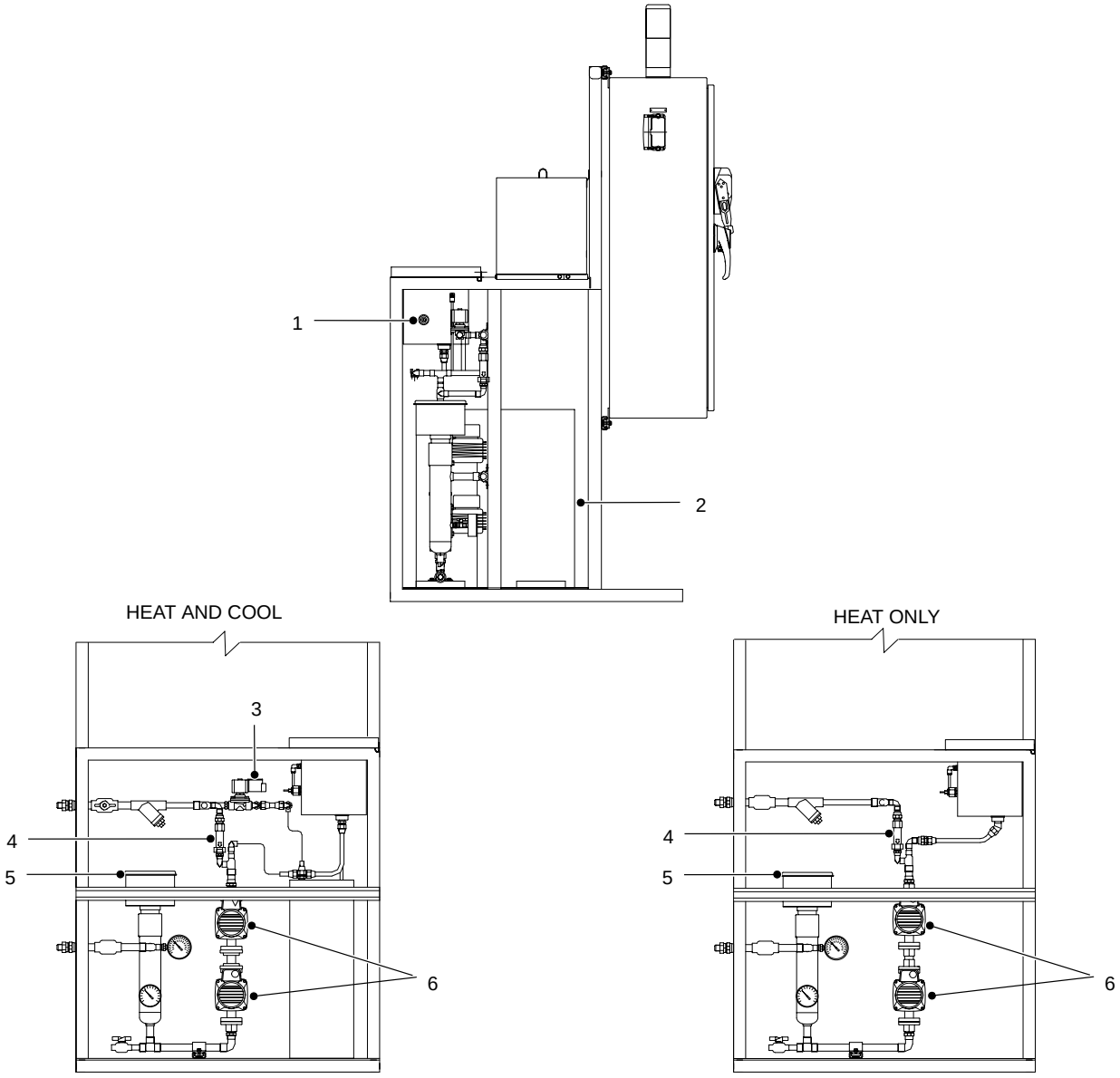


Figure 16 Temperature Conditioning Sections

Temperature Conditioning Sections			Heat and Cool 1-Channel	Heat and Cool 2-Channel	Heat Only
Item	Part	Description			
1	1042071	Float switch	1	1	1
2	221904	Chiller	1	1	—
3	252519	Solenoid valve, 24 VDC, $^{1}/_{2}$-in.	1	1	—
4	325130	Flo-setter, 4-gpm	1	2	1
5	225866	Circulation heater, 480 V	1	2	1
6	1048824	Circulation pump	2	4	2

Accessories and Kits

These accessories may be purchased separately.

Part	Description
281132	Valve, proportional assembly
1020179	Kit, MCO module, solenoid

Cables

Use this list to order replacement cables of the correct type and length.

Part	Description	Note
235876	Cable, Pro-Flo gun, sacrifice, 70 ft	
235872	Cable, Pro-Flo gun, sacrifice, 16 ft	
330299	Cable, 16 pin, 70 ft	

CorrShield MD405

NOTE

Similar products are available from other water treatment manufacturers. Concentrations may differ, therefore it is important to follow the manufacturer's recommendations for products other than Corrshield MD405.

Part	Description
1030974	BetzDearborn 2040 Molybdate Test Kit
1042028	1 pint (16 oz) bottle; treats 10.5 gallons of water
1030973	1 quart (32 oz) bottle; treats 21 gallons of water.

Specifications

Input Power: 575 V, 3 ∅, , 60 Hz, 25 A
Interface Voltage; 24 Vdc

Schematics and Wiring Diagrams

See the system documentation for the schematics and wiring diagrams that are specific to your system.

Controller	Schematic
1049032 1-Gun/0-Temperature/1-Robot	1040933
1049014 1-Gun/1-Temperature/1-Robot	1049016
1049030 2-Gun/0-Temperature/1-Robot	1049031
1046670 2-Gun/2-Temperature/1-Robot	1046671
1049018 2-Gun/2-Temperature/2-Robot	1049019