Instructions

PrecisionFlo XL™

309374 rev.R

Electronically controlled fluid dispensing packages

- **Pneumatically or electrically operated fluid regulators**
- **EasyKey® Keypad or TouchScreen interface**

Maximum Working Pressures of packages ordered through the PrecisionFlo XL configurator:

Maximum Fluid Feed Pressure

5000 psi (34.5 MPa, 345 bar) Ambient and Temperature Conditioned

3000 psi (20.7 MPa, 207 bar) Electrically Heated (hoses)

Maximum Working Air Pressure

120 psi (0.83 MPa, 8.3 bar) All Pneumatic Components

Read warnings and instructions.

C ETL LISTED US

Certified to CAN/CSA C22.2 Conforms to UL 3121–1

PROVEN QUALITY. LEADING TECHNOLOGY.

CE

GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440–1441

Table of Contents

Warnings

Warning Symbol

⚠ WARNING

This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

Caution Symbol

CAUTION

This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

⚠ WARNING

SKIN INJECTION HAZARD

Spray from the dispensing device, hose leaks, or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Fluid splashed in the eyes or on the skin can also cause serious injury.

- Fluid injected into the skin might look like just a cut, but it is a serious injury. **Get immediate surgical treatment.**
- Do not point the dispensing device at anyone or at any part of the body.
- Do not put hand or fingers over the front of the dispensing device.
- Do not stop or deflect fluid leaks with your hand, body, glove, or rag.
- Follow the **Pressure Relief Procedure** on page 24 whenever you are instructed to: relieve pressure; stop dispensing; clean, check, or service the equipment; or install or clean a spray tip or nozzle.
- Tighten all the fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.
- Always wear eye protection and protective clothing when installing, operating, or servicing this dispensing equipment.

TOXIC FLUID HAZARD

Hazardous fluids or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, swallowed, or inhaled.

- Know the specific hazards of the fluid you are using. Read the fluid manufacturer's warnings. Follow the fluid manufacturer's recommendations.
- Provide fresh air ventilation to avoid the buildup of vapors from the fluid being dispensed.
- Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
- Wear the appropriate protective clothing, gloves, eyewear, and respirator.

⚠ WARNING

INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture, malfunction, or start unexpectedly and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, warnings, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call the distributor closest to you. See the **Graco Information** on page 176 for information.
- Only use the PrecisionFlo XL fluid modules with the PrecisionFlo XL control unit.
- Only use a dispensing device appropriate for the fluid and application method, and capable of operating at the highest possible fluid supply pressure the module may experience.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check the equipment daily. Repair or replace worn or damaged parts immediately.
- Do not disassemble the PrecisionFlo XL metering valve motor. The motor contains powerful magnets, which could attract metal objects and create a hazardous condition if the motor end plates are removed. Contact your Graco distributor for motor service.
- Do not exceed the maximum working pressure of the lowest rated system component.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco ambient hoses to temperatures above 180°F (82°C) or below –40°F (–40°C).
- Do not use the hoses to pull the equipment.
- Use only fluids that are compatible with the equipment wetted parts. See the **Technical Data** sections of all the equipment manuals. Read the fluid manufacturer's warnings.
- Comply with all applicable local, state and national fire, electrical and other safety regulations.
- Do not touch the metal heat sink on the metering valve when the surface is hot.
- Do not cover the PrecisionFlo XL linear metering valve; the motor needs air ventilation for cooling.
- Do not attempt to modify the programming of the module. Any modification of the programming could result in serious injury or damage to the module.

MOVING PARTS HAZARD

Moving parts, such as the fluid needle, can pinch fingers.

- Do not operate the equipment with the guard removed.
- Keep clear of any moving parts when starting or operating the equipment.

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

Improper grounding, poor air ventilation, open flames, or sparks can cause a hazardous condition and result in fire or explosion and serious injury.

- Ground the equipment and the object being sprayed. See **Grounding the Control Assembly** on page 19.
- If there is any static sparking or you feel an electric shock while using the equipment, **stop dispensing immediately**. Do not use the equipment until you have identified and corrected the problem.
- Make sure all electrical work is performed by a qualified electrician only.
- Have any checks, installation, or service to electrical equipment performed by a qualified electrician only.
- Make sure all electrical equipment is installed and operated in compliance with applicable codes.
- Do not install the PrecisionFlo XL module in a hazardous area, as defined in Article 500 of the National Electrical Code (USA).
- Turn off power to the PrecisionFlo XL module before disconnecting **any** cables connected to the control unit or other components.
- Disconnect electrical power at the main switch before servicing the equipment.
- Keep the dispensing area free of debris, including solvent, rags, and gasoline.
- Before operating the equipment, extinguish all open flames or pilot lights in the dispense area.
- Do not smoke in the dispensing area.
- Disconnect the electrical cables from the PrecisionFlo XL metering valve before servicing the valve.
- Keep liquids away from the electrical components

Model Identification

PrecisionFlo XL

Graco's PrecisionFlo XL is an electronically controlled fluid regulating package designed to meter and dispense adhesives and sealants. Your equipment was likely ordered as a configured package to fit your application. The configuration was picked from the categories in the tables, pages 7–11.

Model Number Identification

On your control unit, there is an ID plate with a model number on it. See pages 7–11 for explanations of each code letter and to define what equipment was ordered as part of the configured package from Graco. Where applicable, reference is given to other instruction forms in your package binder.

NOTE: The configurator form no. is 302489.

Code A: Configuration

- ☐ **1** PrecisionFlo XL Module
- ☐ **2** Electrical enclosure only

Code B: Enclosure

- ☐ **N** Back plane only
- ☐ **1** Rotary switch power disconnect
- ☐ **2** Knife switch power disconnect

Code C: Cables

- ☐ **N** None
- ☐ **1** Included

Code D: User Interface

- ☐ **N** None
- ☐ **1** Standard EasyKey™
- ☐ **2** Advanced TouchScreen
- ☐ **3** Remote mounted advanced TouchScreen

Code E: Primary Voltage

- ☐ **1** 100–120 VAC
- ☐ **2** 200–240 VAC
- ☐ **3** 400–480 VAC

Code F: Robot I/O Interface

- ☐ **1** 24 VDC
- ☐ **2** 120 VAC
- ☐ **3** DeviceNet
- ☐ **4** InterBus
- ☐ **5** ProfiBus
- ☐ **6** ControlNet

Code G: Temperature Control

- ☐ **N** None
- ☐ **1** Temp. conditioned (50 Hz) heat and cool
- ☐ **2** Temp. conditioned (50 Hz) heat only
- ☐ **3** Temp. conditioned (60 Hz) heat and cool
- ☐ **4** Temp. conditioned (60 Hz) heat only
- ☐ **5** Electrically heated (50/60 Hz)

Code H: Language

- ☐ **1** English
- ☐ **2** French
- ☐ **3** German
- ☐ **4** Italian
- ☐ **5** Japanese
- ☐ **6** Korean
- ☐ **7** Portuguese
- ☐ **8** Spanish

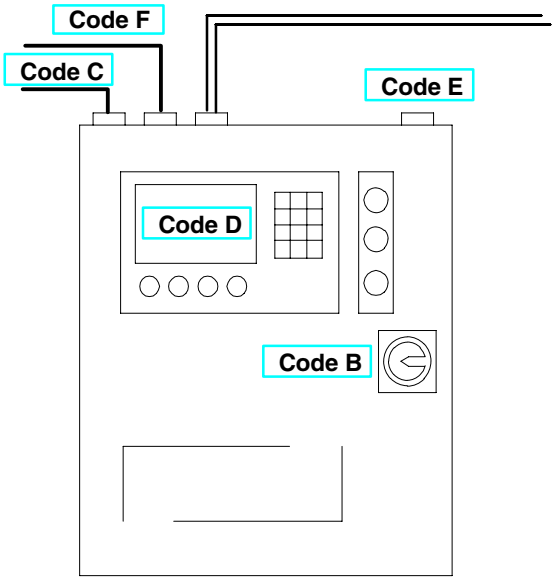


Fig. 1

Code	Code Description	Option	Description	Form No.
A	Configuration	1	PrecisionFlo XL Module	*
		2a	Electrical Enclosure Only	*
		2b	Electrical Enclosure Only (with Swirl or Electric Regulator)	*
B	Enclosure	N	Back Plane Only	*†
		1	Rotary Switch Power Disconnect	*†
		2	Knife Switch Power Disconnect	*†
C	Cables	N	No Cables Included	
		1	All Cables Included	*†
	–F (Robot I/O)	1 or 2	Analog and Digital	*†
		3–6	N/A	
	–J (Fluid Regulator, #1)	1 or 2	Operation	*†
		3–5	Operation and Motor Power	*†
	–P (PrecisionSwirl, #1	1 or 2	Swirl	*†
	–S (Fluid Regulator, #2)	1 or 2	Operation	*†
	–Y (PrecisionSwirl, #2)	1 or 2	Swirl	*†
D	User Interface	N	None	*
		1	EasyKey™	
		2	TouchScreen	
		3	Remote TouchScreen	
E	Primary Voltage	1	110–120 VAC	*†
		2	220–240 VAC	*†
		3	400–480 VAC	*†
F	Robot I/O Interface	1	24 VDC	*†
		2	120 VAC	*†
		3	DeviceNet	*†
		4	InterBus	*†
		5	ProfiBus	*†
		6	ControlNet	*†
G	Temperature Conditioning	N	None	
		1	Temp. conditioned (50 Hz) heat and cool	‡
		2	Temp. conditioned (50 Hz) heat only	‡
		3	Temp. conditioned (60 Hz) heat and cool	‡
		4	Temp. conditioned (60 Hz) heat only	‡
		5	Electrically heated (50/60 Hz)	*†
H	Language	1	English	
		2	French	
		3	German	
		4	Italian	
		5	Japanese	
		6	Korean	
		7	Portuguese	
		8	Spanish	

* 309374 † 309364 ‡ St. Clair manual

Model Number

PFLOXL–F–	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
Code	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	V	W	X	Y	Z

Code J: Fluid Regulator

Pneumatic Regulator

- ☐ **1** Low viscosity, 1/2 in. (12.7 mm) cartridge regulator
- ☐ **2** Medium/high viscosity, 3/4 in. (19 mm) mastic regulator

PrecisionFlo Electric Regulator

- ☐ **3** Low viscosity
- ☐ **4** Medium/high viscosity
- ☐ **5** Medium/high viscosity – integrated regulator

Code K: Flow Meter

- ☐ **N** None
- ☐ **1** Spur gear
- ☐ **2** Helical gear
- ☐ **3** Coriolis, mass flow (remote mounted)

Code L: Supply Hose

- ☐ **N** None
- ☐ **1** 10 ft (3 m), 1 in. (25.4 mm)
- ☐ **2** 20 ft (6 m), 1 in. (25.4 mm)

Code M: Dispense Hose

- ☐ **N** None
- ☐ **1** 6 ft (1.8 m), 1/2 in. ID
- ☐ **2** 6 ft (1.8 m), 5/8 in. ID
- ☐ **3** 10 ft (3 m), 1/2 in. ID
- ☐ **4** 10 ft (3 m), 5/8 in. ID

Code N: Dispense Valve/Applicator

- ☐ **N** None
- ☐ **1** Compact AutoPlus
- ☐ **2** EnDure
- ☐ **3** 1K Ultra-Lite (45° outlet)

Code P: PrecisionSwirl™

- ☐ **N** None
- ☐ **1** Narrow pattern
- ☐ **2** Wide pattern

Code R: PrecisionSwirl Extension Cable

- ☐ **N** None
- ☐ **1** 6 ft (1.8 m)
- ☐ **2** 9 ft (2.7 m)
- ☐ **3** 15 ft (4.6 m)

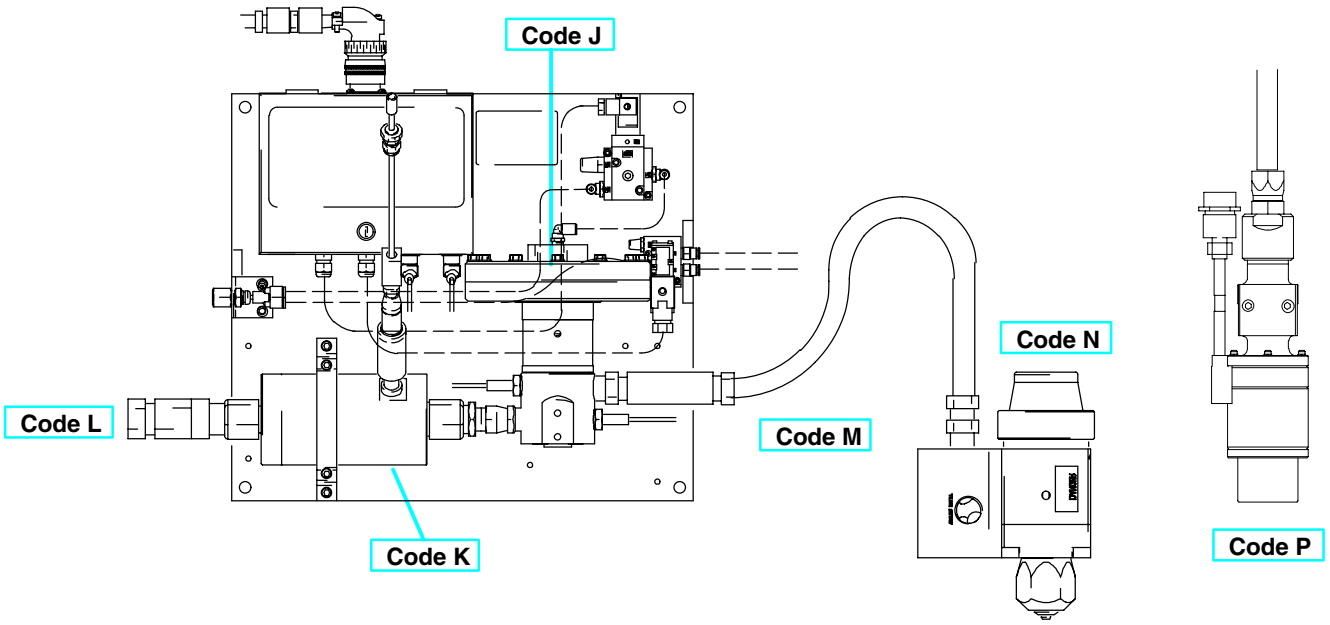


Fig. 2

Code	Code Description	Option	Description	Form No.
J	Fluid Regulator	1	Pneumatic, 1/2 in. Cartridge	308647
		2	Pneumatic, 3/4 in. Mastic	307517
		3	Electric, Low Viscosity	308601
		4	Electric, Medium/High Viscosity	308601
		5	Electric, Medium/High Viscosity with Integrated Pneumatic Mastic Regulator	308601
K	Flow Meter	N	None	
		1	Spur Gear	308778
		2	Helical Gear	309834
		3	Non-intrusive Mass Flow, Coriolis Style	309374
L	Supply Hose	N	None	
		1a	10 ft (3 m) long, 1 in. ID, Ambient	309374
		1b	10 ft (3 m) long, 1 in. ID, Electric Heat	Accessories
		2a	20 ft (6 m) long, 1 in. ID, Ambient	Section
		2b	20 ft (6 m) long, 1 in. ID, Temperature Conditioning	
		2c	20 ft (6 m) long, 1 in. ID, Electric Heat	
M	Dispense Hose	N	None	
		1a	6 ft (1.8 m) long,1/2 in. ID, Ambient	309374
		1b	6 ft (1.8 m) long, 1/2 in. ID, Temperature Conditioning	Accessories Section
		1c	6 ft (1.8 m) long, 1/2 in. ID, Electric Heat	
		2a	6 ft (1.8 m) long, 5/8 in. ID, Ambient	
		2b	6 ft (1.8 m) long, 5/8 in. ID, Temperature Conditioning	
		2c	6 ft (1.8 m) long, 5/8 in. ID, Electric Heat	
		3a	10 ft (3 m) long, 1/2 in. ID, Ambient	
		3b	10 ft (3 m) long, 1/2 in. ID, Temperature Conditioning	
		3c	10 ft (3 m) long, 1/2 in. ID, Electric Heat	
		4a	10 ft (3 m) long, 5/8 in. ID, Ambient	
		4b	10 ft (3 m) long, 5/8 in. ID, Temperature Conditioning	
		4c	10 ft (3 m) long, 5/8 in. ID, Electric Heat	
N	Dispense Valve	N	None	
		1	AutoPlus	308813
		2a	EnDure, Ambient or Temperature Conditioned	309376
		2b	EnDure, Electric Heat	309376
		3	1K Ultra-Lite	308876
P	PrecisionSwirl	N	None	
		1	Narrow Pattern	310554
		2	Wide Pattern	310554
R	PrecisionSwirl Extension Cable	N	None	
		1	6 ft (1.8 m)	309374
		2	9 ft (2.7 m)	Accessories
		3	15 ft (4.6 m)	Section

Code S: Fluid Regulator

Pneumatic Regulator

- ☐ **1** Low viscosity, 1/2 in. (12.7 mm) cartridge regulator
- ☐ **2** Medium/high viscosity, 3/4 in. (19 mm) mastic regulator

Code T: Flow Meter

- ☐ **N** None
- ☐ **1** Spur gear
- ☐ **2** Helical gear
- ☐ **3** Coriolis, mass flow (remote mounted)

Code V: Supply Hose

- ☐ **N** None
- ☐ **1** 10 ft (3 m), 1 in. (25.4 mm)
- ☐ **2** 20 ft (6 m), 1 in. (25.4 mm)

Code W: Dispense Hose

- ☐ **N** None
- ☐ **1** 6 ft (1.8 m), 1/2 in. ID
- ☐ **2** 6 ft (1.8 m), 5/8 in. ID
- ☐ **3** 10 ft (3 m), 1/2 in. ID
- ☐ **4** 10 ft (3 m), 5/8 in. ID

Code X: Dispense Valve/Applicator

- ☐ **N** None
- ☐ **1** Compact AutoPlus
- ☐ **2** EnDure
- ☐ **3** 1K Ultra-Lite (45° outlet)

Code Y: PrecisionSwirl™

- ☐ **N** None
- ☐ **1** Narrow pattern
- ☐ **2** Wide pattern

Code Z: PrecisionSwirl Extension Cable

- ☐ **N** None
- ☐ **1** 6 ft (1.8 m)
- ☐ **2** 9 ft (2.7 m)
- ☐ **3** 15 ft (4.6 m)

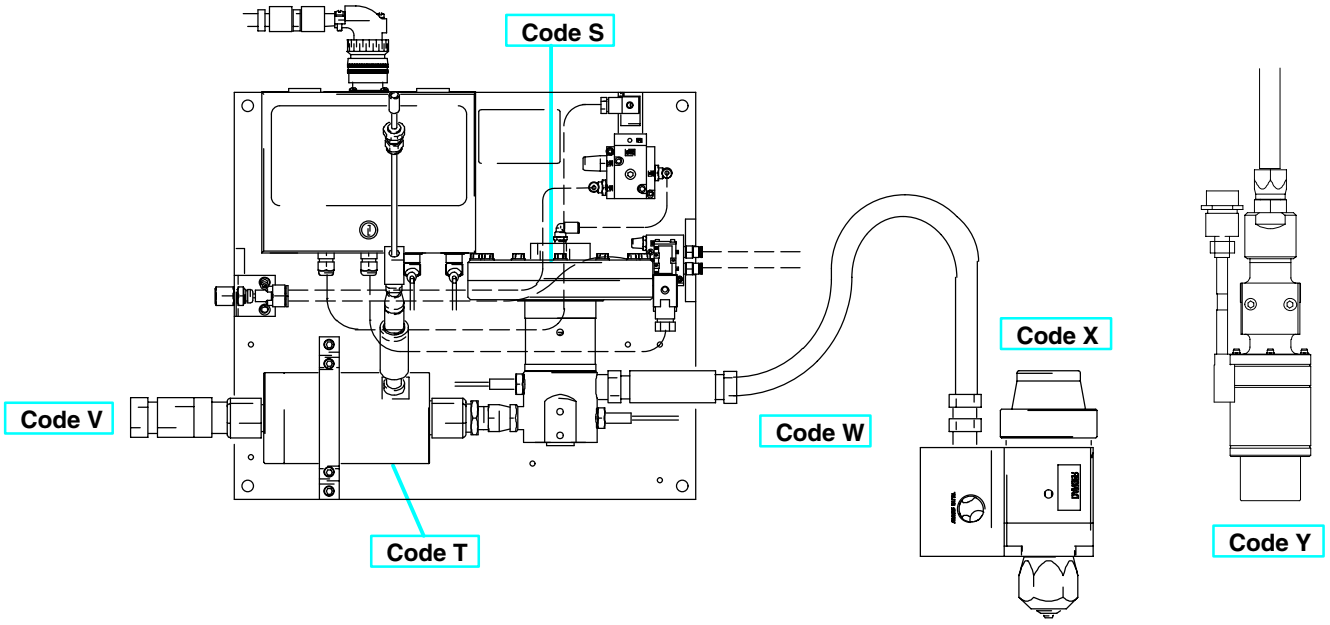


Fig. 3

Code	Code Description	Option	Description	Form No.
S	Fluid Regulator	1	Pneumatic, 1/2 in. Cartridge	308647
		2	Pneumatic, 3/4 in. Mastic	307517
T	Flow Meter	N	None	
		1	Spur Gear	308778
		2	Helical Gear	309834
		3	Non-intrusive Mass Flow, Coriolis Style	309374
V	Supply Hose	N	None	
		1	10 ft (3 m) long, 1 in. ID, Ambient	309374 Accessories Section
		2	20 ft (6 m) long, 1 in. ID, Ambient	
W	Dispense Hose	N	None	
		1	6 ft (1.8 m) long,1/2 in. ID, Ambient	309374 Accessories Section
		2	6 ft (1.8 m) long, 5/8 in. ID, Ambient	
		3	10 ft (3 m) long, 1/2 in. ID, Ambient	
		4	10 ft Long, 5/8” ID, Ambient	
X	Dispense Valve	N	None	
		1	AutoPlus	308813
		2	EnDure, Ambient	309376
		3	1K Ultra-Lite	308876
Y	PrecisionSwirl	N	None	
		1	Narrow Pattern	310554
		2	Wide Pattern	310554
Z	PrecisionSwirl Extension Cable	N	None	
		1	6 ft (1.8 m)	309374 Accessories Section
		2	9 ft (2.7 m)	
		3	15 ft (4.6 m)	

Overview

What This Manual Includes

This manual provides detailed information on the PrecisionFlo XL control unit and operation of the PrecisionFlo XL system only. Specific information on the fluid module or material conditioning systems, for example, is contained in other instruction forms supplied with each component, as part of the PrecisionFlo XL system.

Instruction Manual Conventions

Reference numbers (10) and letters (A) in parentheses in this manual refer to the numbers and letters in the illustrations.

Unless otherwise specified, the step-by-step procedures in this manual must be performed in numerical order. Procedures that contain a list preceded by bullets can be performed in any order.

Abbreviations and Acronyms

Abb.:	Stands For:
COM	common
FM	flow meter
GND	ground
MP	motor power
msec	milliseconds
MS	motor signal (pressure sensor)
OP	operations cable
psi	pounds per square inch
PVC	Poly Vinyl Chloride
PWM	pulse width modulation
SPC	Statistical Process Control
V	volts
VAC	volts AC
VDC	volts DC

PrecisionFlo XL Definitions

Refer to pages 13–15.

Component	Description
Control Unit	The PrecisionFlo XL control unit contains the electronics used to control the fluid module and PrecisionSwirl Orbiter if used.
PrecisionFlo XL System	The control unit, fluid module, and all cables and sensors used to measure and control the fluid application.
Controller	An external electronic (robotic) system having some control interaction via electronic signals with the PrecisionFlo XL system.
TouchScreen and EasyKey	TouchScreen and EasyKey are the two types of interfaces used to set up, display, operate and monitor the PrecisionFlo XL system.
Fluid Module	The fluid module includes components that control and monitor fluid dispensing, such as a fluid metering valve, flow meter, and regulator.

Typical PrecisionFlo XL Configuration

Fig. 4 shows the major components in a typical PrecisionFlo XL installation.

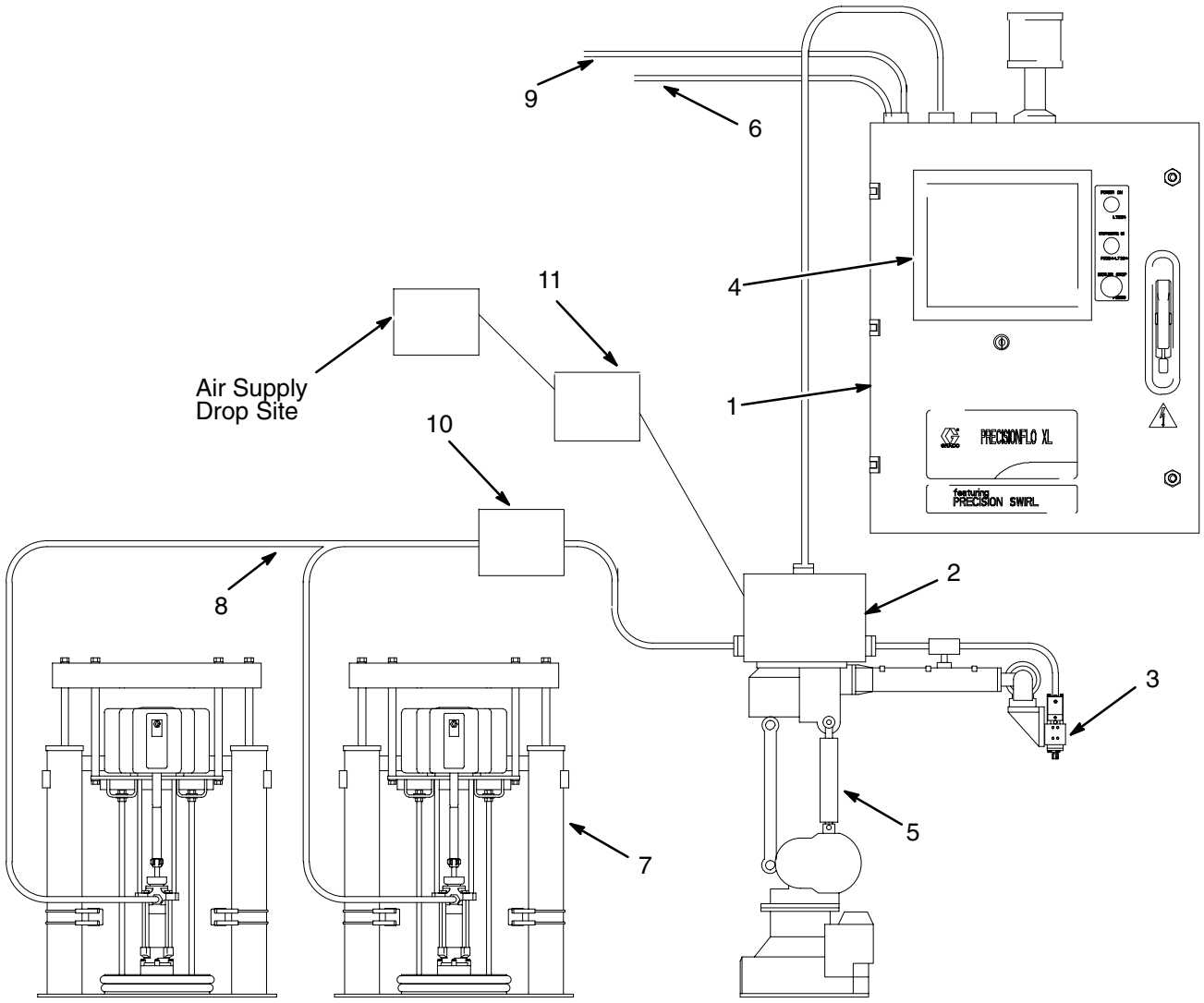
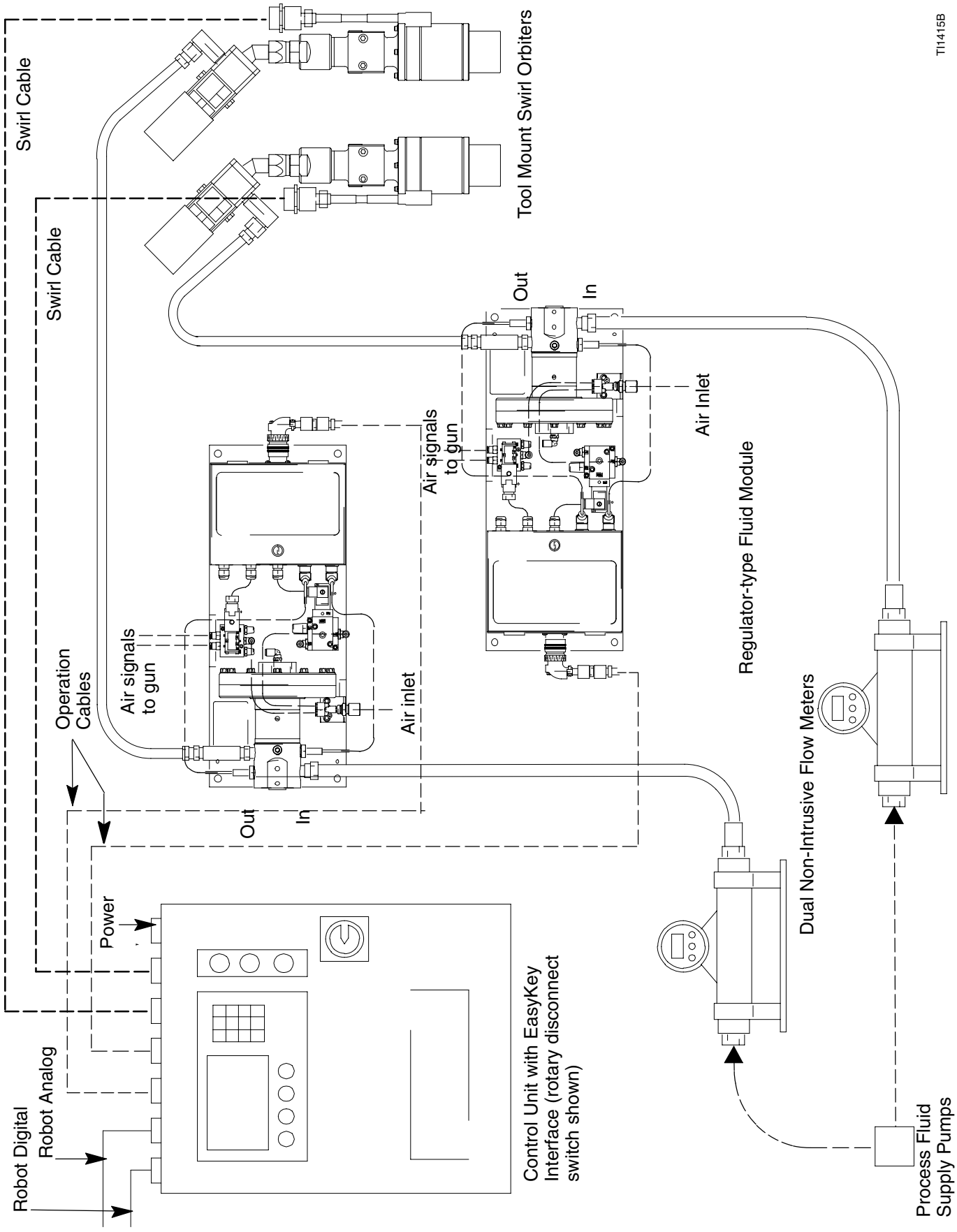


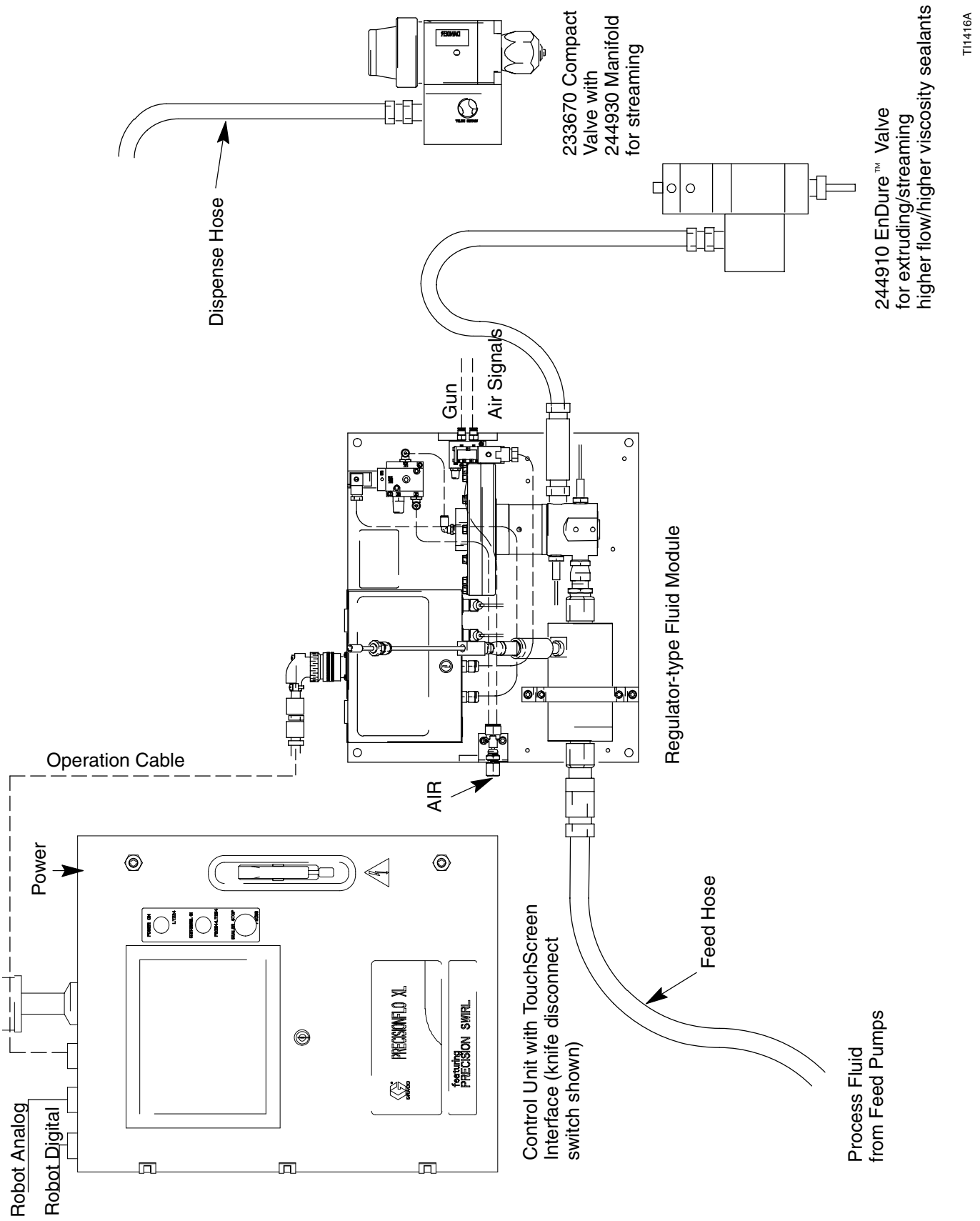
Fig. 4

No.	Description
1	Control Unit
2	Fluid Module
3	Applicator/Dispense Gun
4	User Interface
5	Sealer Robot
6	Robot Digital Interface Cable (RDR)
7	Fluid Supply System
8	Fluid Supply Header
9	Robot Analog Cable (RAR)
10	Filter Module
11	Filter Assembly

Sound Deadener Package with Dual Flow Meters and Swirl Orbiters



Pneumatic Regulator Package for Extrusion or Streaming



Installation

Overview

The basic steps to install a Graco PrecisionFlo XL system are shown below. See the separate component manuals listed for detailed information.

Installation Steps	Manual
1. Mount XL control unit 2. Ground XL control unit.	309374, pg. 17 pg. 19
3. Mount fluid plate.	309375
4. Mount applicator. 5. Ground applicator.	*
6. Connect cables between the XL control unit and:	309364 – plus –
a. Junction box of the fluid module(s).	309375
b. Robot or cell controller.	309374, pg. 20 309364
c. Swirl Orbiters (if installed).	310558
d. Metering valve with linear motor (if installed).	309384
7. Check ground continuity.	309374, pg. 21
8. Connect air and fluid lines.	309374, pg. 22
a. Connect fluid lines between fluid module(s) and applicator(s). Connect fluid supply line (and air if needed) to module.	309375 *
b. Plumb filter assembly near air drop site that will be used for fluid metering assembly.	*
c. Connect other fluid and air lines to additional system components as instructed in their manuals.	*
9. Connect control unit to power source.	309374, pg. 23

* *A number of applicators can be used with the system. Refer to the manual for your applicator.*

Before Beginning Installation

- Have all system and component documentation available during installation.
- See component manuals for specific data on component requirements.
- Electrical schematics are in manual 309364. A copy of control schematics is inside the control enclosure.
- Be sure all accessories are adequately sized and pressure-rated to meet system requirements.
- Use the Graco PrecisionFlo XL control unit only with the PrecisionFlo XL fluid module.

Mounting Control Unit

⚠ WARNING

ELECTROCUTION HAZARD
Installing and servicing this equipment requires access to parts which could cause an electric shock or other serious injury. Have only qualified electricians access the control unit enclosure.

⚠ WARNING

EQUIPMENT MISUSE HAZARD
The PrecisionFlo XL control unit weighs approximately 110 lbs (50 kg) and should never be moved or lifted by one person. Use adequate personnel and support devices when mounting, moving, or handling the control unit to prevent equipment damage or personal injury.

If your PrecisionFlo XL is equipped with integrated temperature-conditioning, it is on a floor stand frame. Bolt this stand securely to the floor to avoid tipping.

1. Select a location for the PrecisionFlo XL control unit that allows adequate space for installation, service, and use of the equipment. See Fig. 5. If you are using the remote display and the Precision-Flo XL control unit will be mounted away from the operator, the robot controller must be wired to the “Remote Start” and “Remote Stop” functions. These are normally controlled by the push buttons on the PrecisionFlo XL control unit. See pages 89 and 94.
   - Mount the control unit so that the disconnect handle is readily accessible and located 54–67 in. (1.4–1.7 m) above the floor.
   - For best viewing, the control display should be 60–64 in. (1.5–1.6 m) from the floor.
   - Ensure all fluid lines, cables, and hoses easily reach the components they will be connected to.
   - Ensure there is sufficient clearance around the control unit to run fluid lines and cables to other components.
   - Ensure there is safe and easy access to an appropriate electrical power source. The National Electric Code requires 3 ft. (0.91 m) of open space in front of the assembly enclosure.
   - Ensure the mounting surface can support the weight of the control unit and the cables attached to it.
2. Secure the PrecisionFlo XL control unit with four 3/8 in. bolts through the 0.44 in. (11 mm) diameter holes in the mounting tabs.

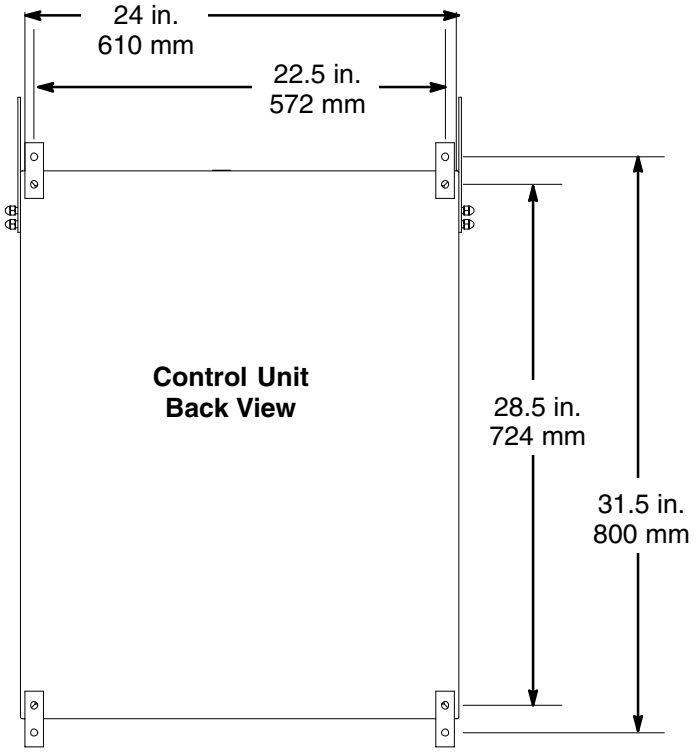


Fig. 5

Temperature Control Packages

See page 147 for additional information on the optional Temperature Control Package.

Temperature-Conditioned Package

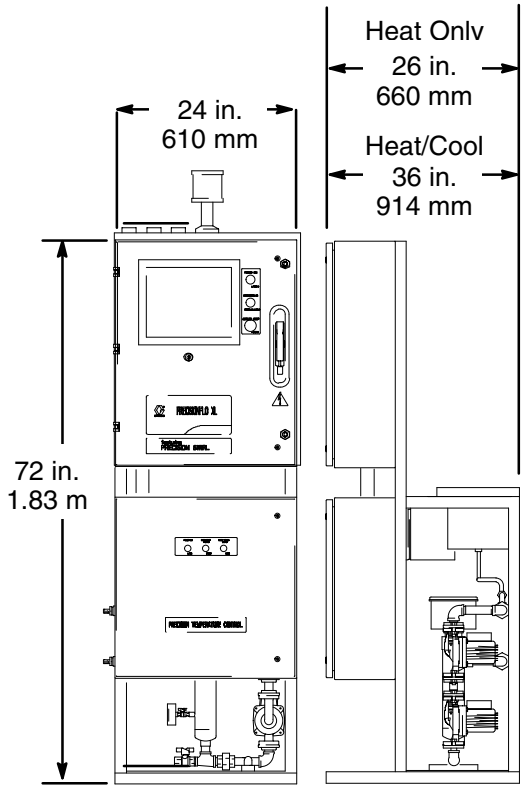


Fig. 6 TI1484A

Temperature conditioned units are free-standing but must be bolted to the floor.

Electric Heat Package

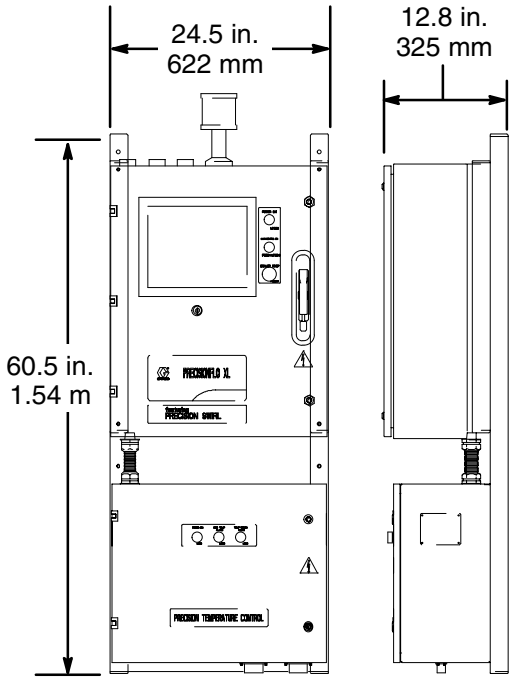


Fig. 7 TI1484A

Electric heat units have the two control boxes integrated onto a subframe. The frame assembly must be mounted with the electrical disconnect 54-67 in. (1.4-1.7 m) from the floor.

Electrical Connections

Follow these precautions when grounding, connecting cables, connecting to a power source or making other electrical connections.

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire, explosion, or electric shock:

- The PrecisionFlo XL control unit must be electrically connected to a true earth ground; the ground in the electrical system may not be sufficient.
- All wires used for grounding must be 12 AWG minimum.
- A qualified electrician must complete all grounding and wiring connections.
- Refer to your local code for the requirements for a “true earth ground” in your area.
- Also read and follow the warnings on pages 3–5.

CAUTION

If power and grounding connections are not done properly, the equipment will be damaged and the warranty voided.

Grounding Control Unit

CAUTION

To avoid control voltage differences, ensure that the robot and PrecisionFlo XL equipment are grounded to the same point.

Connect a ground wire from the ground point in the PrecisionFlo XL control enclosure to a true earth ground. See Fig. 8. A 10 AWG, 25 ft (7.6 m) long ground wire with clamp, Part No. 222011, is supplied.

NOTE: The PrecisionFlo XL fluid module is grounded to the control unit, using cables provided with the module.

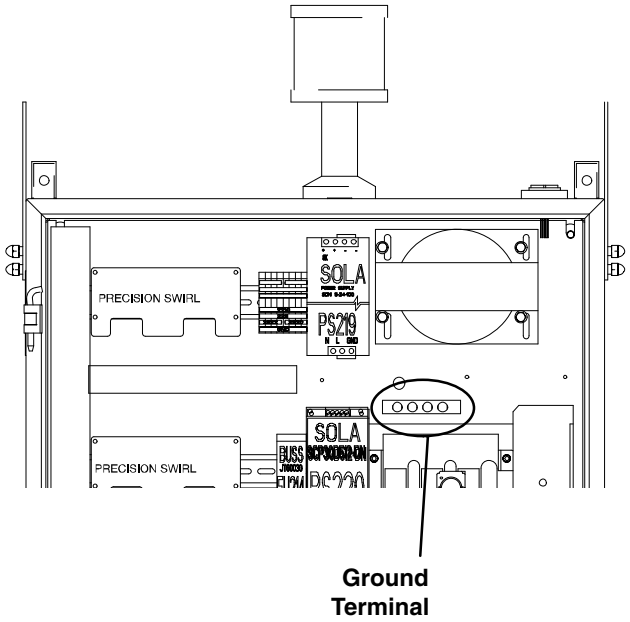


Fig. 8

Connecting Cables

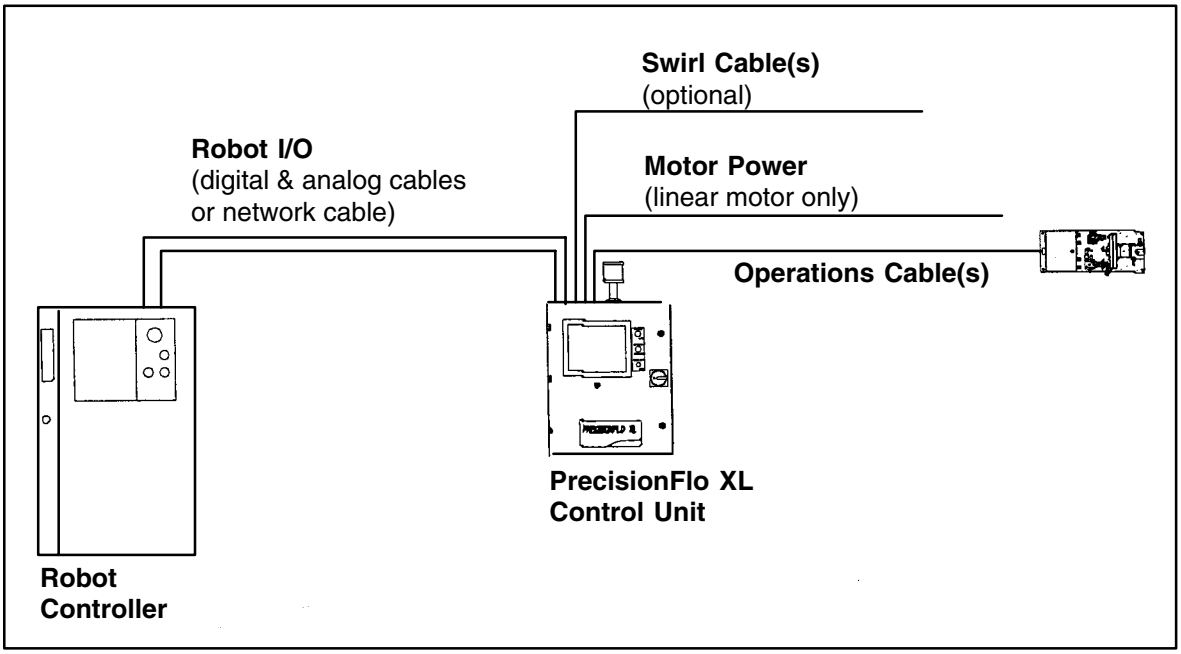


Fig. 9

CAUTION

Route cables carefully. Avoid pinching and premature wear due to excessive flexing or rubbing. Cable life is directly related to how well they are supported.

NOTE: See page 138 for cable part numbers and lengths. Descriptions of the cables follow steps 1–3, below.

Connect the cables as instructed below.

1. Connect digital and analog cables or a network cable from the robot/cell controller to the PrecisionFlo XL control unit.
2. Connect the operation cable(s) from the fluid module(s) to the mating connectors on the PrecisionFlo XL.
3. Connect cables from any installed options to the appropriate connectors on the PrecisionFlo XL. (See the instruction forms associated with those options for detailed information.)

NOTE: Digital and analog cables are not terminated on the robot end. The installer needs to configure the proper connectors for the robot/cell controller being used. Refer to **PrecisionFlo XL I/O Interface** on page 89 and also on form 309364 for schematics.

Interface Cables

Digital and Analog Cables — If your model is configured with discrete I/O, digital and analog robot I/O cables were likely supplied as part of your package. The Digital cable is larger than the analog cable and it communicates I/O commands between the PrecisionFlo XL and a robot or cell controller. The Analog cable communicates speed commands between the controllers.

Network Cable — If Network I/O is used, one network cable communicates both the robot digital I/O and analog speed commands between the PrecisionFlo XL and a robot or cell controller. This cable is not supplied by Graco.

Fluid Module Cables

Operations Cable — This cable carries signals between the fluid module(s) and PrecisionFlo XL. The applicator solenoid, V/P valve, pressure transducer and flow meter signals are carried through this cable. There is one cable per fluid module.

Motor Power Cable — This cable supplies power to the linear motor (when used) from the PrecisionFlo XL. The motor requires a higher DC voltage signal that cannot be combined with signals in the Operations Cable.

Swirl Cable — This cable connects between the PrecisionFlo XL and the PrecisionSwirl extension cable if a PrecisionSwirl Orbiter is installed. The cable provides power to the orbiter and carries orbiter speed information back to the PrecisionFlo XL.

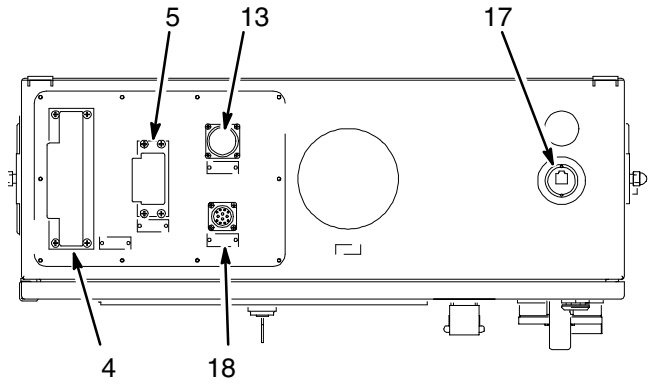


Fig. 10 Control Unit – Top View TI1555A

Ref No.	Description
4	External Interface Cable (Robot Digital)
5	External Interface Cable (Robot Analog)
13	Operations Cable Connector
–	Motor Power Cable Connector *(not on this configuration)*
17	Remote Display Connector/Ethernet Connection (TouchScreen option only)
18	Swirl Cable Connector (optional)

Checking Ground Continuity

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire, explosion, or electric shock, the resistance between the supply unit components and true earth ground must be less than 0.25 ohms.

Have a qualified electrician check the resistance between:

- true earth ground and the panel ground lug
- the application device and the robot
- the fluid module and the robot
- the metering valve and the robot
- each supply system component and true earth ground.

The resistance must be less than 0.25 ohms. If the resistance is greater than 0.25 ohms, a different ground site may be required. Do not operate the system until the problem is corrected.

Connecting Fluid and Air Lines

CAUTION

Route all fluid and air lines carefully. Avoid pinching and premature wear due to excessive flexing or rubbing. Hose life is directly related to how well they are supported.

Follow the instructions in your separate component manuals to connect air and fluid lines. General guidelines are provided below.

- The PrecisionFlo XL fluid module should be installed on the robot or in another appropriate place, as close as practical to the dispense valve.
- Connect a fluid line between the fluid module outlet and the dispense device.
- If you are using two fluid control plates and two guns, be sure each device is clearly labeled 1 or 2.
- Connect a fluid line to the flow meter fluid inlet or regulator inlet if your system does not have a flow meter.
- If using a remote mount coriolis-type flow meter:
  - The flow meter must be mounted stationary. It cannot move on the robot.
  - Connect a fluid line from the flow meter to the regulator inlet. The hose should be as short as practical.
  - Connect 120 VAC power to the flow meter.
  - Connect the meter signal to the fluid module.
- Air must be clean and dry, between 60–120 psi. Flush air line before plumbing in air filter assembly (234967). Plumb in air filter assembly near air drop site (upstream of fluid plate module). Adding an air regulator to this line will provide more consistent dispense valve response times.
- Connect an air supply line to the 1/4 npt inlet port on the fluid module(s) air supply inlet.
- Connect 4 mm or 5/32 in. OD air lines from the applicator's solenoid valve to the applicator.

Connecting to Power Source

⚠ WARNING

ELECTRIC SHOCK HAZARD
Do not connect the PrecisionFlo XL control unit to a power source unless you are a trained electrician.

Have a qualified electrician connect the PrecisionFlo XL control assembly to a grounded electrical source that has the required service ratings, as shown in the Power Requirement tables below.

To connect control unit to power source:

1. Remove a hole plug to use one of the pre-cut enclosure holes or, if necessary for your installation, create an opening in the control assembly enclosure. Protect interior components from metal chips when cutting or drilling.

2. Using the appropriate gauge wire, connect electrical power to the disconnect inside the control enclosure.

3. Use NEMA 4 cord grip to seal the area where wires enter the enclosure.

Power Requirements:

Without Heat or Temp. Conditioning Option G–N			
VAC:	90 – 120	200 – 240*	400 – 480*
Phase:	1	1	1
Hz:	50/60	50/60	50/60
Full Load Amps.	8	4.2	2.1

* When ordered with transformer

With Temperature Conditioning Option G–1 (50 Hz) Heat/Cool			
VAC:	N/A	200 – 240	400 – 480
Phase:	N/A	1	1
Hz:	N/A	50	50
Full Load Amps.	N/A	25.1	12.6

With Temperature Conditioning Option G–2 (50 Hz) Heat Only			
VAC:	N/A	200 – 240	400 – 480
Phase:	N/A	1	1
Hz:	N/A	50	50
Full Load Amps.	N/A	18.8	9.5

With Temperature Conditioning Option G–3 (60 Hz) Heat/Cool			
VAC:	N/A	200 – 240	400 – 480
Phase:	N/A	1	1
Hz:	N/A	60	60
Full Load Amps.	N/A	25.1	12.6

With Temperature Conditioning Option G–4 (60 Hz) Heat Only			
VAC:	N/A	200 – 240	400 – 480
Phase:	N/A	1	1
Hz:	N/A	60	60
Full Load Amps.	N/A	18.8	9.5

With Electric Heat Option G–5			
VAC:	N/A	200 – 240	400 – 480
Phase:	N/A	1	1
Hz:	N/A	50/60	50/60
Full Load Amps.	N/A	18.8	9.5

Operation

Pressure Relief Procedure

⚠ WARNING

The PrecisionFlo XL module pressure must be manually relieved to prevent the module from starting or spraying accidentally. To reduce the risk of serious injury, including fluid injection, splashing in the eyes or on the skin, or injury from moving parts, always follow the **Pressure Relief Procedure** whenever you:

- are instructed to relieve the pressure
- check, adjust, or service any of the system equipment
- shut off the pump or dispense device
- or install or clean the spray tip

This procedure describes how to relieve pressure for the PrecisionFlo XL system.

1. Shut off the fluid supply to the fluid module.
2. Shut off power and air to the fluid supply systems.
3. Place a waste container beneath the fluid drain valve, which is located at the filter. Place a waste container beneath the dispense device.
4. Slowly open the drain valve, located at each filter, to relieve fluid pressure. Close valve when pressure gauge reads zero.
5. In Manual Dispense mode, touch and hold the Dispense Gun 1 key, which opens the regulator and the dispensing device, until the fluid stops flowing from them. Repeat for Gun 2 if installed. Refer to page 29 for procedures on dispensing in Manual mode.
6. If the dispense device cannot be actuated from the control unit, refer to Fig. 11 and perform the following steps to open the dispense device and relieve fluid pressure:
   a. Manually actuate the plunger on the solenoid, that opens the dispense device, to relieve fluid pressure.
   b. Continue actuating the plunger until all pressure is purged from the system between the needle and the dispense device before proceeding to the next step.

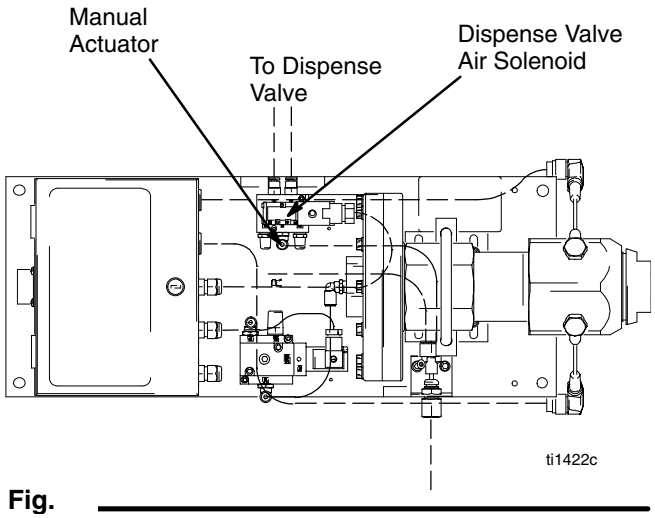


Fig.

If you have followed the steps above and still suspect that a valve, hose, or dispense nozzle is clogged or pressure has not been fully relieved, very slowly remove the dispense tip, clean the orifice, and continue relieving pressure.

If this does not remove the obstruction, very slowly loosen the hose end coupling and relieve pressure gradually, then loosen the coupling completely. Clear the valves or hose. Do not pressurize the system until the blockage is cleared.

Safety Reminder

Follow the precautions below and the warnings that begin on page 3.

⚠ WARNING

FLUID INJECTION HAZARD
Wear eye protection and protective clothing when installing, operating, or servicing the system.

COMPONENT RUPTURE HAZARD
Never exceed the maximum air or fluid working pressure rating of the lowest rated component in the system.

Do not pressurize the system or dispense until you have verified the system is ready and it is safe to do so.

Ensure all hose connections are secure.

MOVING PARTS HAZARD
Ensure all personnel are clear of moving parts before operating equipment.

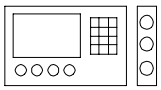
PrecisionFlo XL User Interface

There are two types of user interface available with the PrecisionFlo XL control unit:

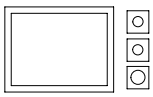
- EasyKey User Interface
- TouchScreen User Interface

For screen-captures of the screens and your selection options, see page 44 for the EasyKey interface and page 60 for the TouchScreen interface.

Procedures for operating and configuring the system depend on the type of interface used. Where procedures differ, the name of the user interface, along with its icon, heads the procedure:



EasyKey Interface



TouchScreen Interface

EasyKey User Interface Overview

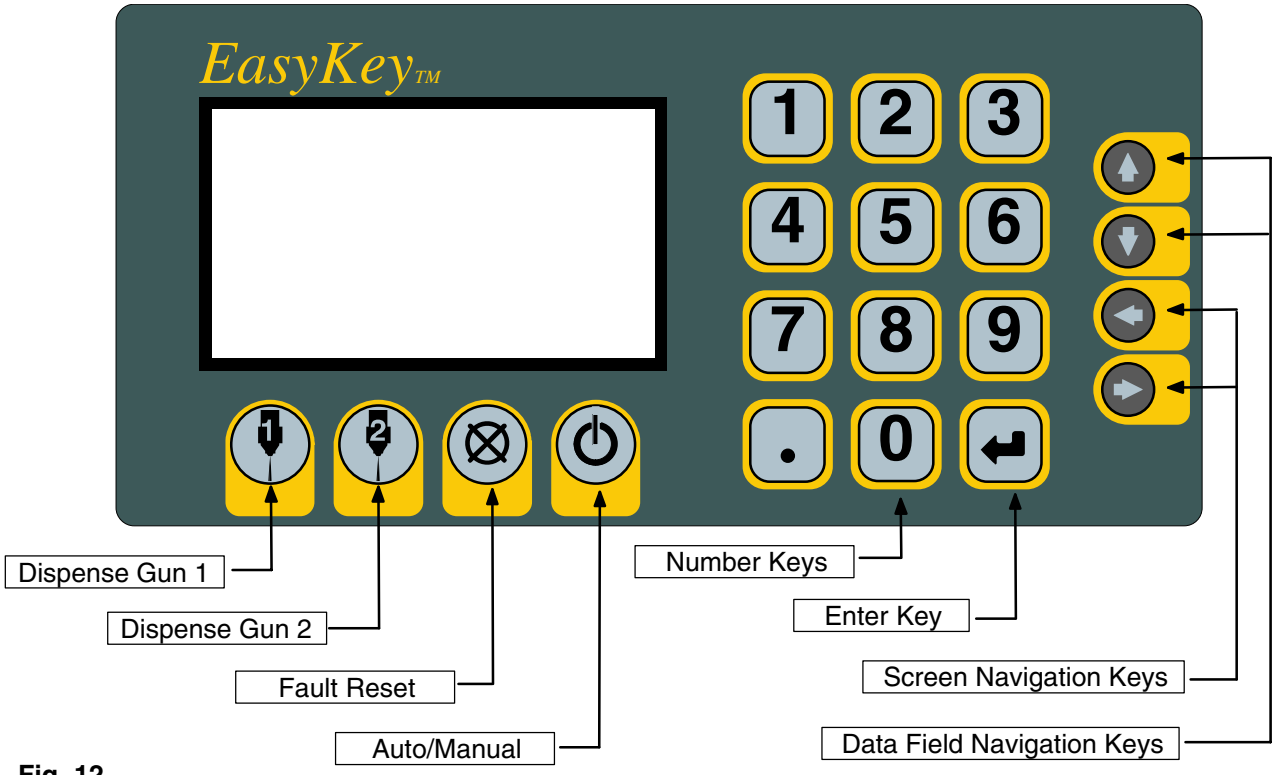


Fig. 12

Key Groups

There are three groups of keys on the PrecisionFlo XL user interface.

- **Action Keys —** perform an action when they are pressed. Dispense Gun 1, Dispense Gun 2, Fault Reset, and Auto/Manual. See Action Keys at right.
- **Numeric Entry Keys —** are used to enter variable data into the controller.
- **Navigation Keys —** are used to navigate between and within the different user screens.

Action Keys

- **Dispense Gun 1 —** is used for functions related to the *primary* regulator and dispense gun, including Manual Dispense, Autotune, and Flow Calibration.
- **Dispense Gun 2 —** is used for functions related to the *secondary* regulator and dispense gun, including Manual Dispense, Autotune, and Flow Calibration.
- **Fault Reset —** is used to reset a fault generated on the control once the fault has been corrected.
- **Auto/Manual —** is used to change the mode of operation between Automatic and Manual.

TouchScreen User Interface Overview

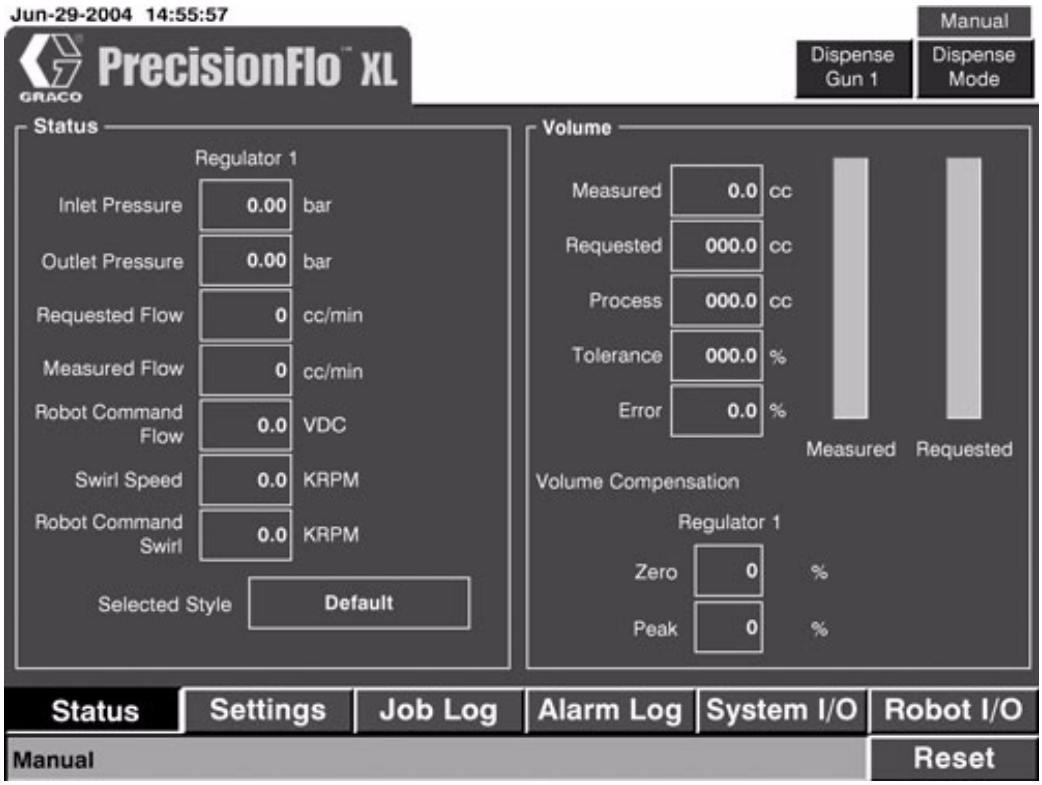


Fig. 13

The TouchScreen interface allows you to make selections by touching the screen. Use your index finger to move the TouchScreen cursor to any location on the screen. The cursor appears in the form of an arrow (⇨).

A keypad appears when you touch a data field that requires you enter numerical information.

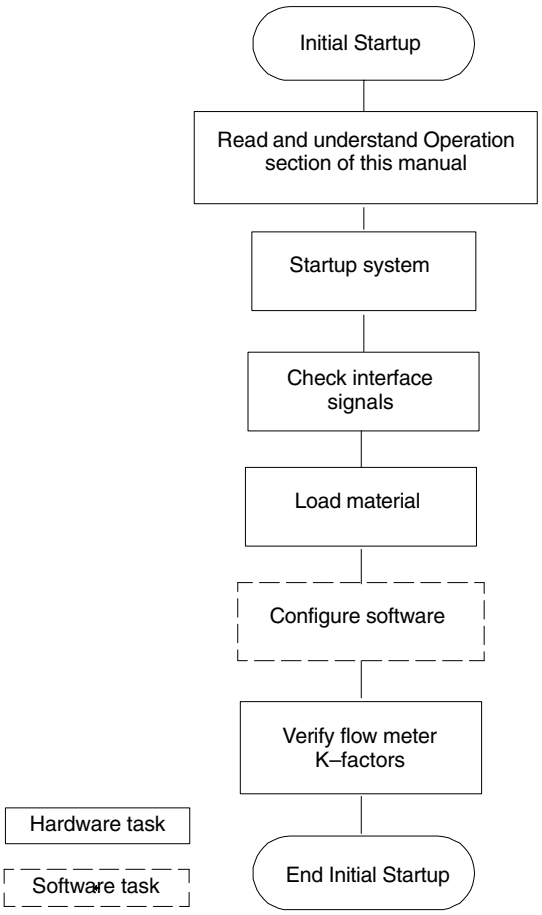


Fig. 14

Starting the System

Initial Startup

1. Make sure you have installed and made all the proper connections to and from the PrecisionFlo XL control assembly enclosure. Make sure fittings are tight.

2. Read and understand the Operation and Software Configuration sections of this manual.

3. Continue startup with step 2 below.

Standard Startup

NOTE: See Tables 1 and 2, page 28, for information on the PrecisionFlo XL control unit buttons, switches, and indicator lights.

1. Carefully inspect the entire system for signs of leakage or wear. Replace or repair any worn or leaking components before operating the system.

2. Turn on air and electrical power to the system.

3. Turn on the main electrical disconnect (2) to supply power to the PrecisionFlo XL module. See Fig. 15.

   The user interface becomes active, showing first a diagnostic message and then the first screen. The Power On indicator light (3) turns on.

4. **Check Interface Signals:** If this is a new installation, power each of the system inputs and verify that the input is being received.

   With the TouchScreen interface, select the **Module I/O** tab, or the **Robot I/O** tab, to view the status of all inputs and outputs. *With the EasyKey interface,* check the status of LED lights on the robot I/O board, using the table on page 114.

5. Turn on material supply system.

6. Press and hold the Master Start button (1) for two seconds to turn on power to the PrecisionFlo XL drive circuitry. The Control On indicator light (4) turns on.

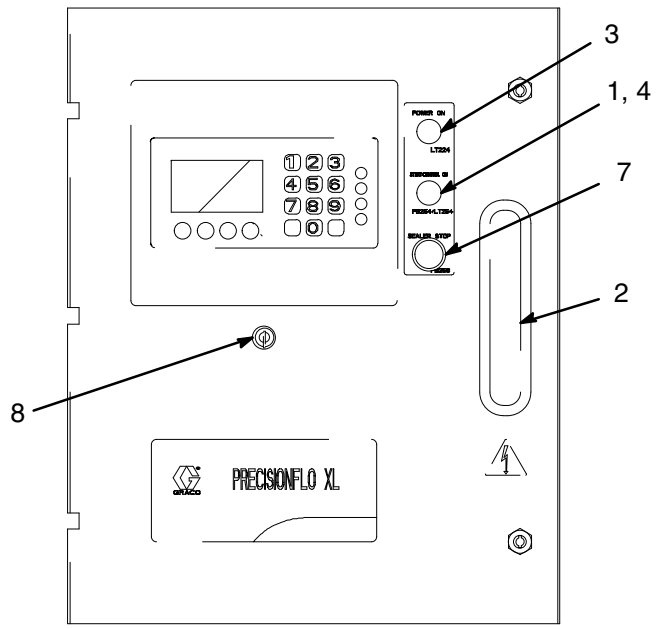


Fig. 15 TI1552

Restarting the Module

If the module is on, but the Control On indicator (4) on the control assembly is not lit, press the Master Start button (1) on the control unit.

Control Unit Buttons, Switches and Indicators

Table 1—PrecisionFlo XL Buttons/Switches

Ref	Button/Switch	What it Does
1	Master Start button	• Turns on power to PrecisionFlo's fluid modules after power is applied to the module. • Engages the Plate Control Relay (PCR) and signals the external controller that the power has been applied to the module. • Lights Control On light (4).
2	Main Electrical Power (Disconnect) Switch	• Turns on power to system. • Lights Power On light (3).
7	Sealer Stop button	• Disengages the Plate Control Relay (PCR). • Signals the external controller that a SEALER STOP condition is in effect. • Turns off Control On light (4). • Disables all air solenoids and I/P regulators.
8	Run/Setup Mode Key Switch	• Turn key switch counter-clockwise to set control unit to Run mode. When the key is in Run mode or removed, you can operate and monitor the system. • Turn key switch clockwise to set control unit to Setup mode (for software configuration). The key cannot be removed while turned to Setup mode.

Table 2—PrecisionFlo XL Indicators

Ref	Indicator	Indicator light is	Meaning
3	Power On/ Ground Connected light	On	Power is on to the PrecisionFlo XL assembly.
		Off	Power is off.
4	Control On light	On	PCR is engaged and the PrecisionFlo XL Control Assembly is ready for operation.
		Off	PrecisionFlo XL control assembly is not ready for operation.
5	User Display	On	Display is on when power is applied to the control assembly.
		Off	Display is off when power is removed from the control assembly.
6	Main Fault light	Off	Light is off when control assembly does not have a fault condition.
		On	Light turns on when an alarm condition is present.
		Flashing	Light flashes when a warning condition is present.
		Flashing	Light flashes when in Manual mode.

Loading Material

Before you can configure the software, you must load material into the supply system.

1. If this is a new installation, follow the **Initial Start-up** procedure. Otherwise, follow the **Standard Startup** procedure. See page 27.
2. Turn on fluid supply pressure to the fluid module.
3. Place the dispense device(s) over a waste container.
4. Set the control unit to Manual mode. See **Operation Modes**, below.
5. Manually dispense fluid until clean, air-free fluid flows from Dispense Gun 1. See **Manually Dispensing Fluid**, page 30. If two dispensing devices are installed, repeat the process for Gun 2.

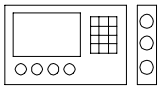
Operation Modes

The PrecisionFlo XL system has two operating modes:

- **Automatic Dispense mode —** enables the PrecisionFlo XL module to begin dispensing when it receives a command from the robot.
- **Manual Dispense mode —** enables the PrecisionFlo XL module to begin dispensing when you press Dispense Gun 1 or Gun 2 on the EasyKey or TouchScreen interface. Dispensing continues for as long as the Dispense Gun 1 or 2 button is pressed.

To select the Operation Mode and to operate in Manual Dispense mode, see the following specific instructions for your interface.

Refer to **Theory of Operation** section, page 105 for more information on Operation Modes.



EasyKey Interface

NOTE: Refer to **Keypad Overview** on page 44 for key locations.

Setting Operation Mode

On the keypad, perform the following steps:

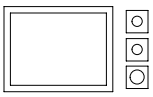
1. With the key switch set to Run mode, press the right arrow key ▶ until the **Overview** screen appears.
2. The Dispense mode is indicated on this screen, either Auto or Manual. The red beacon flashes in Manual mode.
3. To change the mode, press the Auto/Manual key  .

Manually Dispensing Fluid

Make sure the Control On indicator is lit. If it is not, push the Master Start button (1, Fig. 15) to turn on power to the PrecisionFlo XL fluid module(s).

On the keypad, perform the following steps:

1. Place the system in Manual Dispense mode. Refer to **Setting Operation Mode**, above.
2. Press the Dispense Gun 1 key  or Gun 2 key  , depending on which dispense device you want to actuate.
   a. Press the key and verify that the dispense device opens.
   b. Continue to press the key as long as needed to load material or dispense.
3. Repeat step 2 for Gun 2  , if applicable.



TouchScreen Interface

Setting Operation Mode

The Dispense mode indicator is at the top right-hand corner of every screen. To toggle between Manual and Automatic modes touch the Dispense mode button just below the indicator.

Manually Dispensing Fluid

Make sure the Control On indicator is lit. If it is not, push the Master Start button (1, Fig. 15) to turn on power to the PrecisionFlo XL fluid module(s).

On the TouchScreen, perform the following steps:

1. Place the system in Manual Dispense mode. Refer to **Setting Operation Mode**, above.

2. Before dispensing in Manual mode, set Manual Gun flow rate value.

   a. Touch the **Setup** and **Values** buttons.

   b. Touch the **Manual Gun** data cell. The numeric keypad appears.

   c. Enter the new value and touch **Accept**.

NOTE: The Manual Gun flow rate scale of 0 to 100% is equivalent to 0 to 10 volts. For example, 50% equals 5 volts. The Manual Gun flow rate, in conjunction with the PSI/Volt setting establishes the system target pressure or flow rate, depending on whether the Control Mode is set to Pressure or Flow.

3. To start dispensing from Gun 1, touch and hold **Dispense Gun 1** button. Dispensing continues as long as you continue to touch **Dispense Gun 1**.

4. To stop dispensing, release the **Dispense Gun 1** button.

   If two guns are being used, repeat steps 3 and 4 using the **Dispense Gun 2** button.

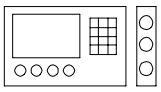
5. Touch **Dispense Mode** to toggle to Automatic Dispense mode.

Robot Modes

The PrecisionFlo XL system has two robot modes:

- **Digital mode —** enables the PrecisionFlo XL system to dispense at preset rates in the control unit. The rates are set on the screen and selected through the robot I/O interface.
- **Analog mode —** enables the PrecisionFlo XL system to dispense at a rate proportional to a 0–10 VDC analog input signal from the robot.

Refer to **Theory of Operation** section, page 105 for more information on Robot Modes.

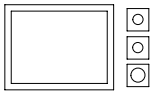


EasyKey Interface

Setting Robot Mode

On the keypad, perform the following steps:

1. With the system in Setup mode (key switch clockwise), press the right arrow key ▶ until the **Setup1–Modes** screen appears.
2. The robot mode is indicated on this screen, either Digital or Analog.
3. To change the mode, press the down arrow key ▼ until the cursor is over the mode cell.
4. Press Enter and use the up and down arrow keys, ▲ or ▼, to change values.
5. Press Enter again to store the change.



TouchScreen Interface

Setting Robot Mode

1. With the system in Setup mode (key switch clockwise), touch the **Setup** and **Modes** buttons.
2. Locate **Robot Mode** data cell. The robot mode is indicated as either Digital or Analog.
3. Toggle between analog and digital by touching **Robot Mode**.

   If the robot command signal is analog, use **Analog**.

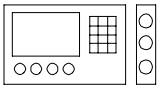
   If the robot does not have an analog output, use **Digital**.

Control Modes

The PrecisionFlo XL module has two fluid dispensing control modes:

- **Pressure control —** regulator outlet pressure is controlled to the requested value. Use Pressure mode when a constant pressure is required for a spray application. This mode must be used if the system does not include a flow meter.
- **Flow control —** the control unit measures the flow rate of material being dispensed and the regulator outlet pressure is varied to control the fluid flow rate to the requested value. Use Flow mode when a constant bead size is required.

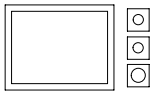
Refer to **Theory of Operation** section, page 105 for more information on Control Modes.



EasyKey Interface

Setting the Control Mode

1. With the system in Setup mode (key switch clockwise), press the right arrow key ▶ until the **Setup1–Modes** screen appears.
2. The control mode is indicated on this screen, either Pressure or Flow.
3. To change the mode, press the down arrow key ▼ until the cursor is over the mode cell.
4. Press Enter and use the up and down arrow keys, ▲ or ▼, to change values.
5. Press Enter again to store the change.



TouchScreen Interface

Setting the Control Mode

1. With the system in Setup mode (key switch clockwise), touch the **Setup** and **Modes** buttons.
2. Locate **Control Mode** data cell. The control mode is indicated as either Pressure or Flow.
3. Toggle between Pressure and Flow modes by touching **Control Mode**.

Shutting Down the System

1. Shut off the material supply to the fluid module.

2. Follow the **Pressure Relief Procedure** on page 24.

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 24.

3. Turn off the PrecisionFlo XL system's compressed air supply.

4. Press the Sealer Stop button (7). See Fig. 16.

5. Turn off the main electrical disconnect (2).

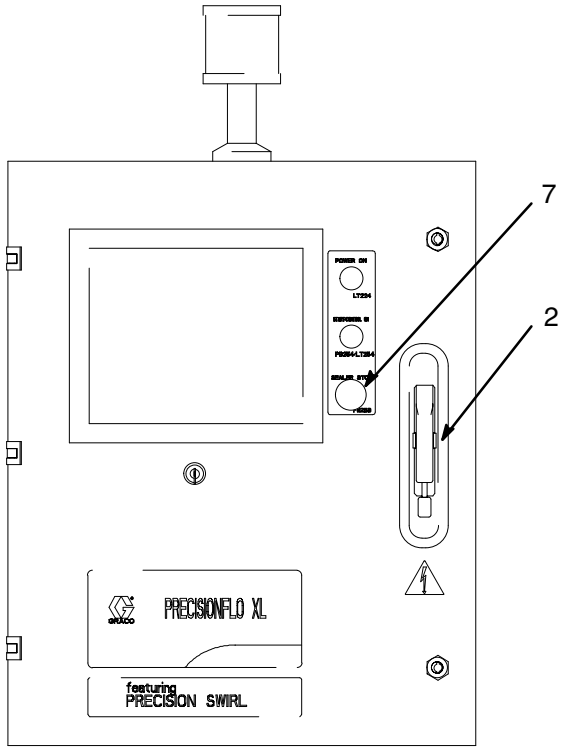


Fig. 16 TI1484A

Configuring Software

After you have loaded material into the dispensing system, configure the PrecisionFlo XL software. Figure 17 shows the major configuration steps.

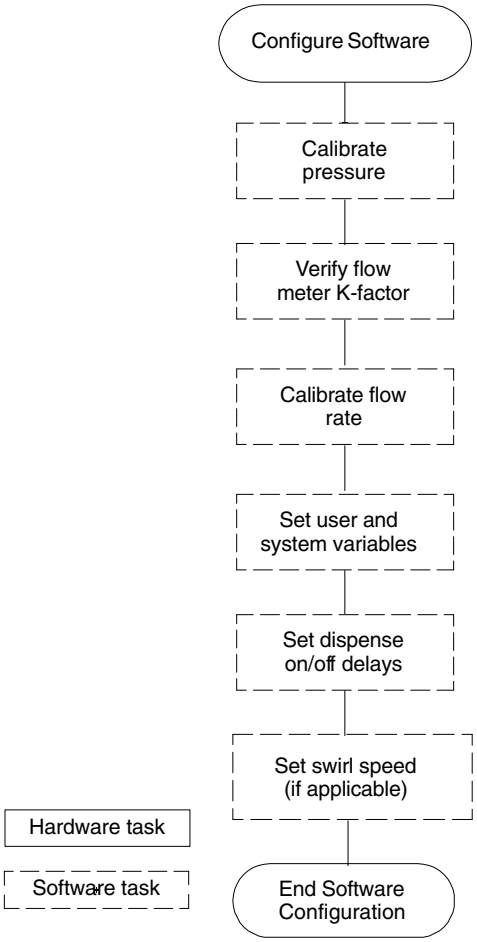


Fig. 17

NOTE: The PrecisionFlo XL system compensates for temperature, flow, or pressure fluctuations. However, if you change hardware on the dispensing system or change the type of material being dispensed, you must reconfigure the PrecisionFlo XL software.

To configure the PrecisionFlo XL software, perform the following procedure. When you have completed this procedure, the module is ready for operation.

1. Calibrate pressure for the system. See page 36.
2. Verify the flow meter K–Factor(s). See page 35.
3. Calibrate the flow rate for the application. See page 37.
4. Verify other controller preset values. See page 39 for more information.
5. The **PrecisionFlo XL User Interface** section on pages 44–59 gives detailed operating instructions for the display keypad and each screen.

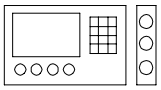
Setting Flow Meter K–Factors

The accuracy of the PrecisionFlo XL volume reporting depends on precise adjustment of the K-factor(s). The control unit uses the K-factor(s) to calculate the volume dispensed. If the set value is not correct, the system still delivers accurate and repeatable flow rates; however, the reported value may not be correct. See page 115 for additional K-factor information.

Table 3—Flow Meter K-Factors

Part No.	Description	K–Factor Pulses/Liter
239716	G3000 Gear Meters	8400
246190	Helical Meter	3500
15D877	83MP–15 Coriolis	2000

NOTE: Factory configured packages have the K–factor(s) preset.

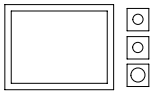


EasyKey Interface

Set Flow Meter K-Factor

On the keypad, perform the following steps:

1. With the system in Setup mode, press the right arrow key ▶ until the **Setup –Dispense** screen appears.
2. Key in the 4-digit K-factor value and press Enter. See Table 3 for values.
3. If there are two flow meters in the system, press the down arrow key ▼ until the cursor is over the second K–factor value.
4. Key in the correct value and press Enter.



TouchScreen Interface

Set Flow Meter K-Factor

On the TouchScreen, perform the following steps:

1. With the system in Setup mode, touch the **Setup** and **Dispense** buttons.
2. Touch the Flow Meter K-factor data cell. Enter the 4-digit K-factor value. See Table 3 for values.
3. Touch **Accept**.
4. If there are two flow meters in the system, touch the second Flow Meter K-factor data cell and enter the correct value.
5. Touch **Accept**.

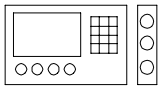
Calibrating Pressure

The PrecisionFlo XL system uses variables (Kp and Ki) in the software calculations to accurately and precisely control the fluid pressure and flow rate. The control unit calculates Kp and Ki automatically during pressure calibration. These values are different with every material.

NOTE: The system must be loaded with material before calibrating pressure. The nozzle or tip should be installed on the dispense device. During the calibration process, fluid will dispense and the regulator oscillates rapidly.

Before Calibrating

1. Verify that the system is in Setup mode.
2. Verify that dispense device(s) are placed over a material waste container.
3. Verify that the fluid module(s) air supplies are on.
4. Verify that the system is in Manual Dispense mode.
5. If the Regulator Pre–charge Kit 245896 is installed, verify the switch is in the OFF position.

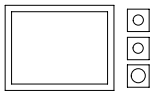


EasyKey Interface

Calibrate Pressure

On the keypad, perform the following steps:

1. Press the right arrow key ▶ until the **Calibration–Pressure** screen appears.
2. Press the Dispense Gun 1 key  . The system dispenses material for 15-30 seconds and gathers the required information.
3. If two fluid modules are installed, repeat the pressure calibration for the second module by pressing the Dispense Gun 2 key  .



TouchScreen Interface

Calibrate Pressure

On the TouchScreen, perform the following steps:

1. Touch the **Calibration** and **Pressure** buttons.
2. Touch **Pressure Tune Regulator 1** button. The system dispenses material for 15-30 seconds and gathers the required information.
3. If two fluid modules are installed, repeat the pressure calibration for the second module by touching the **Pressure Tune Regulator 2** button.

Manually Adjusting Kp

If automatic pressure calibration does not result in proper system pressure control, you can change the Kp value manually:

- Increase Kp if the regulator outlet pressure does not closely follow the desired pressure. Continue to increase the Kp value by 10% increments until the proper pressure control is achieved.
- Decrease Kp if the regulator outlet pressure ascillates rapidly above and below the commanded pressure. Continue to decrease the Kp value by 10% increments until the outlet pressure is stable.

Flow Rate Calibration

You only calibrate flow rate if you are operating in Flow mode. If your system does not have a flow meter or you are operating in Pressure mode, you do not calibrate the flow rate.

How Flow Rate Calibration Works

Each application may have different flow rate requirements. Flow rate calibration verifies and calibrates the maximum flow rate of the system.

At the start of the flow rate calibration procedure, you need to enter the maximum flow rate required by the application. When you actuate the dispensing device during calibration, the control unit:

1. Determines current flow rate.
2. Calculates the outlet pressure required to obtain the flow rate value you entered.
3. Calculates a linear ratio of the robot analog input voltage to the desired flow rate. Refer to Fig. 18.
4. Adjusts outlet pressure to maintain the desired flow rate.

Flow mode: Analog voltage to flow rate ratio

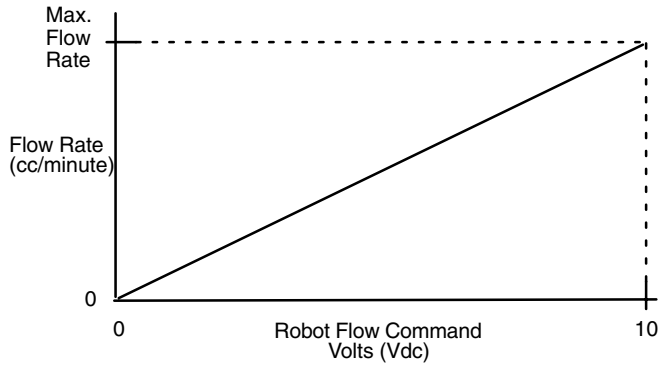


Fig. 18

Flow Rate Guide

Use the values in Table 4 as a guide to determine the maximum flow rate to enter during flow rate calibration, or enter the desired bead size and maximum robot speed on the Flow Rate Calibration screen, and PrecisionFlo XL will calculate the maximum flow rate for you.

Table 4—Maximum Flow Rate Values (cc/min)

Round Equivalent Bead Diameter (mm)					
Max. Robot Speed (mm/sec)	**2**	**3**	**5**	**7**	**9**
50	10	21	59	115	191
100	19	42	118	231	382
200	38	85	236	462	763
300	57	127	353	693	1145
400	75	170	471	924	1527
500	94	212	589	1155	1909
600	113	254	707	1385	2290
700	132	297	825	1616	2672
800	151	340	943	1847	3054
900	170	382	160	2078	3435
1000	189	424	1178	2309	3817

Setting Inlet Pressure

The inlet pressure reading should be in the range of 300 psi (2.1 MPa, 21 bar) to 500 psi (3.4 MPa, 34 bar) above the outlet pressure reading under your highest flow condition.

Excessive inlet pressure causes accelerated wear on the regulating valve and the pump feed system.

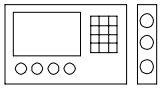
Feed System Pressure Drop

During material flow, your inlet pressure reading drops. The amount the pressure drops is the amount of pressure lost between the feed pump and the regulator inlet. With high viscosity fluids or long line lengths, this pressure drop can be thousands of psi (hundreds of bar). This means that the static pump pressure is set much higher than the regulator needs at its inlet. To prevent excessive control regulator wear or surging, a mastic fluid pressure regulator is recommended on the feed line close to the control regulator. The mastic regulator suppresses the static feed pressure at the control regulator inlet.

Calibrating Flow Rate

Before Calibrating

1. Verify that the system is in Setup mode.
2. Verify that dispense device(s) are placed over a material waste container.
3. Verify that the fluid module(s) air supplies are on.
4. Verify that the system is in Manual Dispense mode.

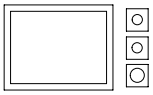


EasyKey Interface

Calibrate Flow Rate

On the keypad, perform the following steps:

1. Press the right arrow key ▶ until the **Calibration–Flow** screen appears.
2. Key in the maximum flow rate desired in cc/min. If this value is not known, you can enter the maximum robot speed in mm/s and the desired bead diameter. The system will calculate the maximum flow rate required.
3. Press the Dispense Gun 1 key  . The system begins dispensing material and calibrating fluid flow. This takes from 10 to 30 seconds.
4. If two fluid modules are installed, repeat the flow rate calibration for the second module by pressing the Dispense Gun 2 key  .



TouchScreen Interface

Calibrate Flow

On the TouchScreen, perform the following steps:

1. Touch **Calibration** and **Flow** buttons.
2. Touch **Calibrate Regulator 1** button. The system begins dispensing material and calibrating fluid flow. This takes from 10 to 30 seconds.
3. If two fluid modules are installed, repeat the flow rate calibration for the second module by touching the **Calibrate Regulator 2** button.

Other Software Settings

There are various software settings that are preset at the factory, based on the system configuration that was ordered. A quick check of these variables is recommended. See Tables 5 and 6.

The user interface screens are listed beginning on page 45 to guide you through this process.

For screen-captures of the screens and your selection options, see page 44 for the EasyKey interface and page 60 for the TouchScreen interface.

Setting User Variables

The following variables and presets should be verified prior to calibration and path programming and/or operation in Automatic mode. All of the screens as well as additional screen information can be viewed in the **User Interface** section.

There are additional variables that should be set after the path programming is completed, they include; High/Low pressure settings and Style (volume) information.

Table 5—PrecisionFlo XL User Variables and Presets

Values in italics are factory defaults.

Screen	Variable / Preset	Values	Comments
Setup1 – Modes	Robot Mode	*Digital* or Analog	Speed command, digital presets or robot analog
	Control Mode	*Pressure* or Flow	Pressure control to control on pressure, Flow to control on volume. Must have flow meter to control on volume.
	Swirl Mode	*Manual* or Auto	In Manual mode, the XL controller controls speed, 0–100% (0–10 VDC). In Auto mode, a second analog input (0–10 VDC) controls the swirl speed. Only applicable to systems using PrecisionSwirl orbiter.
	Robot Interface	*Discrete* or Serial	Discrete for systems using hard–wired 120 VAC or 24 VDC I/O. Serial for systems using network I/O.
	Flow Scale 1	50 – 150%, *100%*	Scales the flow output signal to increase or decrease the bead size/volume on gun 1.
	Flow Scale 2	50 – 150%, *100%*	Scales the flow output signal to increase or decrease the bead size/volume on gun 2.
	Swirl Manual	0 – 100%, *50%*	Sets the PrecisionSwirl orbiter speed when the Swirl mode is set to Manual.
	Swirl Auto	50 – 150%, *100%*	Scales the PrecisionSwirl speed signal to increase or decrease the Swirl speed when the Swirl mode is set to Auto.
Setup1 – Config	Job End Mode	Timer or *Robot I/O*	Determines if the end of the cycle is determined by an input from the robot interface or from an internally derived timer.
	Language	Many	Set the desired language.
	Pressure Units	*psi* or bar	Set the desired pressure units.
Setup2 – Values	Low Flow Rate	0 – 100%, *25%*	Speed setting number 1 if using discrete speed signals rather than analog.
	Med Flow Rate	0 – 100%, *50%*	Speed setting number 2 if using discrete speed signals rather than analog.
	High Flow Rate	0 – 100%, *75%*	Speed setting number 3 if using discrete speed signals rather than analog.
	Manual Gun Flow Rate	0 – 100%, *50%*	Speed setting for Manual Dispense.
	Job End Delay	0 – 999 sec, *4 sec*	Delay time for job complete if Job End mode is set to Timer.
Setup2 – Set Clock	Year, Month, Day, Hour, Minute		Set the Time and Date.
Setup2 – Temp Cont	Set the proper temperature set point and High/Low limits for the temperature zones being used. Set any unused temperature zones to Off.		

Other System Variables

After the calibration and robot path programming is complete and the desired bead profiles have been achieved, verify that the following variables are set.

Table 6—PrecisionFlo XL System Variables

Screen	Variable / Preset	Values	Comments
Setup2 – Styles	Volume	0 – 9999 cc, *100 cc*	Set the volume set point for each of the 32 styles being used.
Setup1 – Modes	Tolerance	0 – 99.9%, *10%*	Set the volume tolerance for each of the 32 styles being used.
Faults – Level	Set the User configurable faults to Alarms or Warnings. More information on the faults can be found in the **User Interface** section.		
	An Alarm will cause the fault signal to activate and the system ready signal to drop out. This is something considered by the user to be a major fault, one which causes the system to stop dispensing.		
	A Warning will cause the fault signal to activate and the system ready to stay on. This is something considered by the user to be a minor fault, one which will warn the user but will continue dispensing even if the bead profile is degraded.		

Communicating with PrecisionFlo XL

Communication with the PrecisionFlo XL is carried out through the Graco Shell program (included). This is a text based menu program that you can use to perform the following tasks:

- Upgrade software
- Display software versions
- Download job and alarm logs
- Backup and restore setup parameters
- Restore the factory defaults

You can access the Graco Shell program via the programming port on the side of the control box. Plug one end of the programming cable (233657) into the RJ12 (phone jack style) on the control box and the other end of the cable into the serial (COM port) of a laptop computer.

If using the Ethernet Adapter 117420, see page 42.

The laptop computer used to interface to the Graco Shell must be running some type of terminal emulation software. Some examples are HyperTerminal or Tera Term. Graco recommends using Tera Term which can be downloaded from **http://hp.vector.co.jp/authors/VA002416/teraterm.html**. The following communications parameters must be used (these are the default parameters in Tera Term).

Setting	Value
Port	COM 1 or COM 2
Baud Rate	9600
Data	8 Bit
Parity	None
Stop	1 bit
Flow Control	None

Once the programming cable is connected and the communications software is running, the user can activate the Graco Shell by pressing the Enter key on the keyboard. The main menu will display.

```
Welcome to the Graco Control Application Menu
Build date: Jul 06 2001 15:45:38 (debug build)
a. Software Update and Version Information
b. Data Transfer
c. Restore settings to factory defaults
Enter Selection [a-c]:
```

Select “a” for the following options.

```
a. Install Control Application Software
b. Display Software Versions
c. Return to Main Menu
Enter Selection [a-c]:
```

Upgrade Software

NOTE: To upgrade the controller software, you must first obtain the latest version of **pfloxl.rec**. Contact your Graco distributor for details.

Select option “a”. Make sure the key switch is turned to Setup mode. The following text displays.

```
Are you sure?  Enter yes to continue:
```

Type “yes”. The following text displays.

```
HyperTerminal:      Go to (Menu Transfer ->
Send File) and select OS file.
Tera Term:          Go to (File -> Send File)
and select OS file.
Once file is transferred, menu 1 will be
shown.
```

Select Send File from the File menu in Tera Term. Then select the **pfloxl.rec** from the selection box window (you need to browse to the appropriate directory).

The file will begin to download to the controller, which will take approximately five to ten minutes. When the download is complete, a new menu appears on the screen. The software upgrade is now complete.

Display Versions

Select option “b”. Text similar to this displays.

```
Boot Code version: 1.5, checksum=192345d,
built:n 25 2001 17:05:01
Control Application version: 1.1, check-
sum=3d38fe9, built:Jul 09 2001 11:21:58
```

Return to Main Menu

Select option “c”. The main menu displays.

```
Welcome to the Graco Control Application Menu
Build date: Jul 06 2001 15:45:38 (debug build)
a. Software Update and Version Information
b. Data Transfer
c. Restore settings to factory defaults
Enter Selection [a-c]:
```

If option “b” is selected, the following menu displays.

```
a. Transfer job log file
b. Dump job log file to screen
c. Transfer alarm log file
d. Dump alarm log file to screen
e. Transfer setup values to laptop
f. Dump setup values to screen
g. Restore setup values from laptop
h. Return to Main Menu
Enter Selection [a-h]:
```

Ethernet Adapter 117420

Install Hardware

1. Mount the Ethernet adapter to the DIN rail, just below the 24 VDC power supply.

2. Remove the existing connector from J4 of the control board. Insert the adapter assembly J4 connector into the control board J4 connection.

3. Connect the 24 VDC (wire #2210) and common (wire #2211) to open positions on the terminal blocks near the 234 VDC power supply.

NOTE: As an alternative, the connections can be made directly to the power supply output.

4. Connect a CAT5 cable to the adapter RJ45 Ethernet port. You can connect the Ethernet cable directly to a PC (crossover cable) or to an Ethernet hub/switch (patch cable).

Setup Software

1. The Ethernet adapter is shipped without an IP address setting. Ask your system administrator for an IP address (an example IP address is 192.168.0.100).

2. Follow the instructions in the Lantronix CoBox DR1 Installation Guide, section 4.2 – Assigning a New IP Address. After following the procedure, you should see a new configuration menu on the PC.

3. Select **O Server configuration** from the Change Setup menu.

4. When prompted to enter the new IP address, enter the IP address you were assigned in step 1.

5. Press the Enter key at the remaining prompts to keep the default values for the other parameters.

6. Select **9 Save and Exit** to save the new settings.

Download Log files from PrecisionFlo XL

NOTE: To communicate with the PrecisionFlo XL, use a program, such as Tera Term, that supports opening a terminal session via TCP/IP.

1. Select TCP/IP in your terminal program's New Connection dialogue box (appears automatically at Tera Term startup).

2. In the host field, type the Ethernet adapter IP address.

3. In the TCP port # field, type 10001. Click OK.

4. A blank session window should appear in your terminal program. Press the Enter key to display the Graco Application Menu of the PrecisionFlo XL.

5. Use your terminal program text logging feature to begin logging all the data displayed on the screen to a file before selecting one of the Data Transfer options. In Tera Term, logging is done from the File-Log menu.

6. Select one of the Data Transfer options: "Dump job log file to screen" or "Dump alarm log to screen".

   NOTE: Only use "Dump job log file to screen" or "Dump alarm log to screen" options to transfer data. "Transfer job log file" and "Transfer alarm log file" options do not work reliably via an Ethernet connection.

PrecisionFlo XL Module Operation

Transfer Job Log, Alarm Log, or Setup Values

Select option “a”, “c”, or “e”. The following text displays.

```
Tera Term Instructions:
   1. Go to the  File -> Transfer -> XMODEM ->
Receive... Menu
.  2. Select the 1K and Binary Option
.  3. Specify the file name and directory to
store the setup values
.  4. Click the Open button.

HyperTerminal Instructions:
   1. Go to the Transfer ->  Receive... menu
.  2. Select the Y-Modem protocol
.  3. Specify the directory to store the setup
file
.  4. Click the Receive button. The setup val-
ues will be stored in a file named PFloXLSe-
tUpData.dat in the directory specified in #3
above.
```

(Type Ctrl–X several times to cancel the transfer)

Select Transfer and XMODEM and Receive from the File Menu in Tera Term. Click on the 1K and Binary options at the bottom of the selection window. Then select a filename, directory, and click on the open button. The download takes from 1 to 5 minutes. When the download is complete, confirmation appears and a new menu appears on the screen.

Dump Job Log, Alarm Log, or Setup Values

Select option “b”, “d”, or “f”.

Use these options when Ethernet Adapter 117420 is being used (see page 42) or to cut and paste from the Windows clipboard to a spreadsheet application.

Restore Setup Values

Select option “g”. The following text displays.

```
Tera Term Instructions:
   1. Go to the File -> Transfer -> XMODEM ->
      Send... Menu
.  2. Select the 1K Option
.  3. Select the file which contains the setup
     values to restore
.  4. Click the Open button.

HyperTerminal Instructions:
   1. Go to the Transfer ->  Send... menu
.  2. Select the Y-Modem protocol
.  3. Select the file (PFloXLSetUpData.dat)
      which contains the setup values
      to restore
.  4. Click the Send button.
```

(Type Ctrl–X several times to cancel the transfer)

Select Transfer and XMODEM and Send from the File Menu in Tera Term. Click on the 1K option at the bottom of the selection window. Then select a filename, directory, and click on the open button. This operation only works if the key switch is turned to Setup mode. The download takes from 1 to 5 minutes. When the download is complete, confirmation appears and a new menu appears on the screen.

Return to Main Menu

Select option “h”. The main menu displays.

```
Welcome to the Graco Control Application Menu
Build date: Jul 06 2001 15:45:38 (debug build)
a. Software Update and Version Information
b. Data Transfer
c. Restore settings to factory defaults
Enter Selection [a-c]:
```

Restore Defaults

Select option “c” and the following message appears.

```
Are you sure?  Enter yes to continue:
```

Type “yes”. Make sure that the key switch is turned to the Setup mode.

When the operation is complete, the main menu appears again.

PrecisionFlo XL EasyKey Interface

EasyKey Keypad Overview

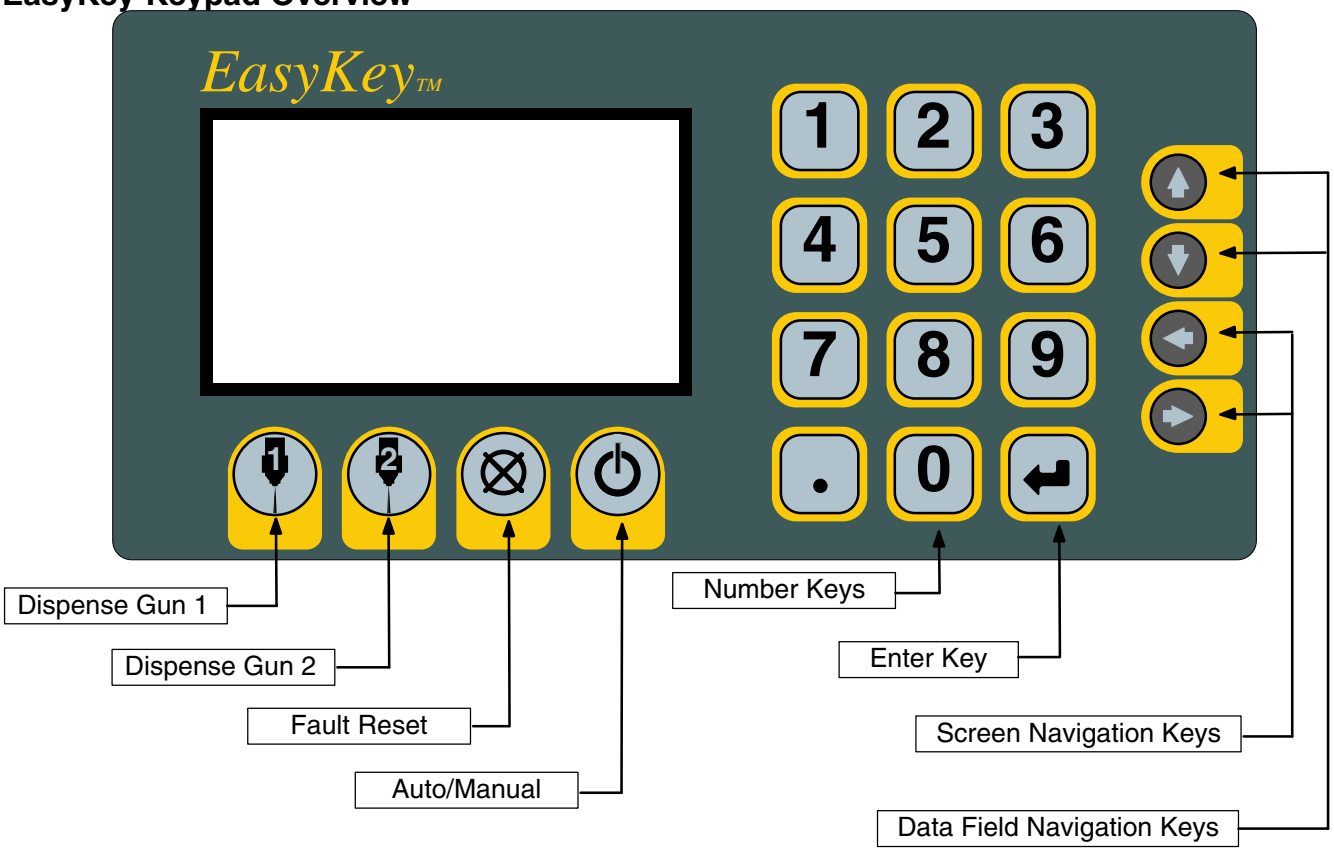


Fig. 19

Button Groups

There are three groups of buttons on the PrecisionFlo XL user interface.

- **Action Keys—**These keys perform an action when they are pressed. Dispense Gun 1, Dispense Gun 2, Fault Reset, and Auto/Manual.
- **Numeric Entry Keys—**These keys are used to enter variable data into the controller.
- **Navigation Keys—**These keys are used to navigate between and within the different user screens.

Action Keys

- **Dispense Gun 1—**Used for functions related to the primary regulator and dispense gun, including Manual Dispense, Autotune, and Flow Calibration.
- **Dispense Gun 2—**Used for functions related to the secondary regulator and dispense gun, including Manual Dispense, Autotune, and Flow Calibration.
- **Fault Reset—**Used to reset a fault generated on the controller once the fault has been corrected.
- **Auto/Manual—**Used to change the mode of operation between Automatic and Manual.

NOTE: The key switch under the display is used to enable the setup mode. When the key is in the vertical position or removed, you can operate and monitor the system. The key cannot be removed while turned to the 2-o'clock position for setup.

Contrast Adjustment

Adjust Display Board potentiometer R53 (lower right).

Clockwise = brighter
Counterclockwise = darker

Screen Overview

Overview Screen

The purpose of this screen is to display an overview of the process parameters. The Reg 2 column will only be shown for dual regulator systems.

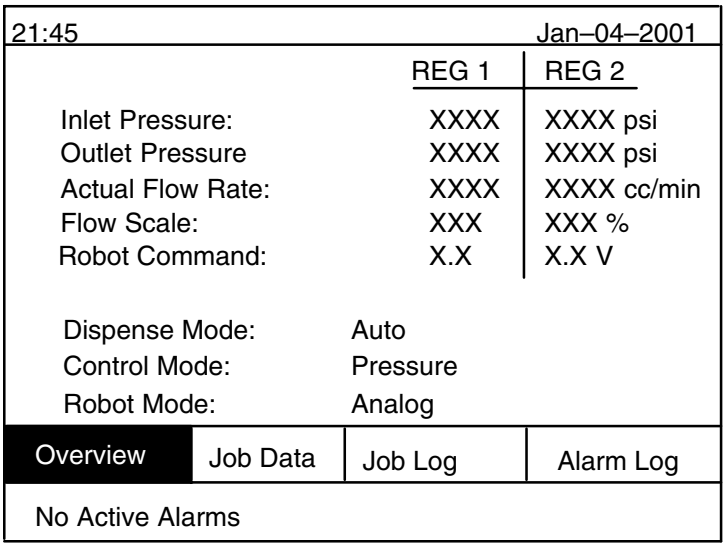


Table 7—Overview Screen Values

Description	Possible Values	Default Value
Inlet Pressure Reg 1 and 2	0–5000 psi or 340 bar	N/A
Outlet Pressure Reg 1 and 2	0–5000 psi or 340 bar	N/A
Actual Flow Rate Reg 1 and 2	0–5000 cc/min	N/A
Flow Scale	50–150%	N/A
Robot Command	0–9.9 V	N/A
Dispense Mode	Auto or Manual	N/A
Control Mode	Pressure or Flow Rate	N/A
Robot Mode	Analog or Digital	N/A

Job Data Screen
The purpose of this screen is to display job information for the last job completed.

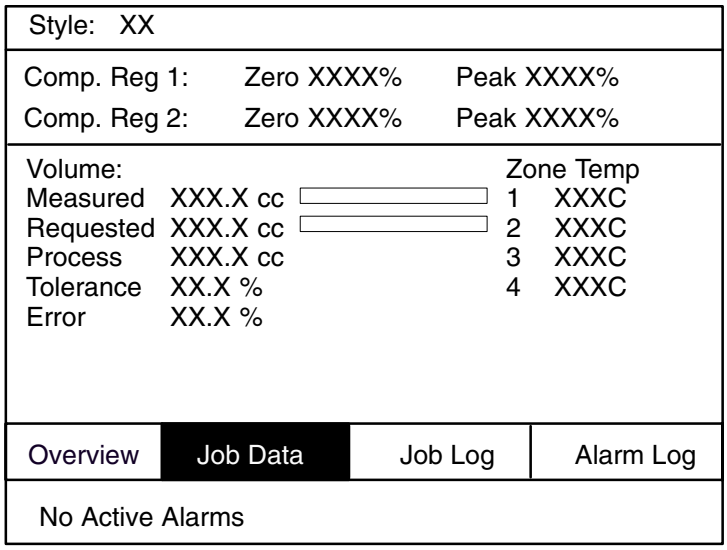


Fig. 20

Table 8—Job Data Screen Values

Description	Possible Values	Default Value
Style	Purge, 1–31	N/A
Zero Compensation Reg 1	–20 to 199%	N/A
Zero Compensation Reg 2	–20 to 199%	N/A
Peak Compensation Reg 1	25 to 400%	N/A
Peak Compensation Reg 2	25 to 400%	N/A
Measured Volume	0 to 9999 cc	N/A
Requested Volume	0 to 9999 cc	N/A
Process Volume	0 to 9999 cc	N/A
Tolerance	–99.9 to 99.9%	N/A
Error	–99.9 to 99.9%	N/A
Temperature Zone 1	0 to 999°F (0 to 537°C)	N/A
Temperature Zone 2	0 to 999°F (0 to 537°C)	N/A
Temperature Zone 3	0 to 999°F (0 to 537°C)	N/A
Temperature Zone 4	0 to 999°F (0 to 537°C)	N/A

NOTE: When a single zone temperature conditioning system is used, only one zone appears on this screen. If no temperature system is used, no zones appear; if four-zone electric heat, all four zones appear.

Job Log Screen

The purpose of this screen is to display a summary of the most recent jobs. The most recent eight jobs are initially displayed on the screen. Pressing the down arrow, ▼, on the keypad brings up the previous eight jobs. The up arrow on the keypad, ▲, scrolls back first eight. The user can scroll through the last 120 jobs using this screen. The last 1000 jobs are available by downloading the data through the serial port.

	Time	Meas.	Req.	Proc.	%Error
01	15:15	132.7	140.6	132.7	–5.6
02	13:11	150.0	150.0	150.0	4.
03	10:05	158.2	160.5	139.2	–1.4
04	07:17	158.2	160.5	139.2	–1.4
05	02:27	158.2	160.5	139.2	–1.4
06	23:59	158.2	160.5	139.2	–1.4
07	22:10	158.2	160.5	139.2	–1.4
08	20:15	158.2	160.5	139.2	–1.4

Overview	Job Data	Job Log	Alarm Log

No Active Alarms

Fig. 21

NOTES:

- The first column displays an index number, not a job number. Item 1 is always the most recent job.
- The date is also stored with the log data. The date is not shown because of space limitations, but is accessible by downloading the data through the serial port.
- Measured volume is the volume measured by the flow meter during the job.
- Requested volume is the volume (based on the flow command) requested by the robot during the job.
- Process volume is the user-entered volume the robot should request for the job style.

Alarm Log Screen

The purpose of this screen is to display a summary of the most recent alarms. The most recent eight alarms are initially displayed on the screen. Pressing the down arrow, ▼, on the keypad brings up the previous eight alarms. The up arrow on the keypad, ▲, scrolls back to the first eight. The user can scroll through the last 120 alarms using this screen. The last 1000 alarms are available by downloading the data through the serial port.

	Date	Time	Description
1	02-03-01	15:15	Inlet Pressure Low
2	02-03-01	13:11	Swirl Speed Error
3	02-03-01	10:05	High Volume on Last Job
4	02-03-01	07:17	No Flow on Last Job
5	02-03-01	02:27	Outlet Pressure Low
6	02-03-01	23:59	Temperature Conditioner
7	02-03-01	22:10	Calibration Failure
8	02-03-01	20:15	High Volume on Last Job

Overview | Job Data | Job Log | Alarm Log

No Active Alarms

Fig. 22

NOTE: The date format is MM–DD–YY.

Setup 1—Modes Screen

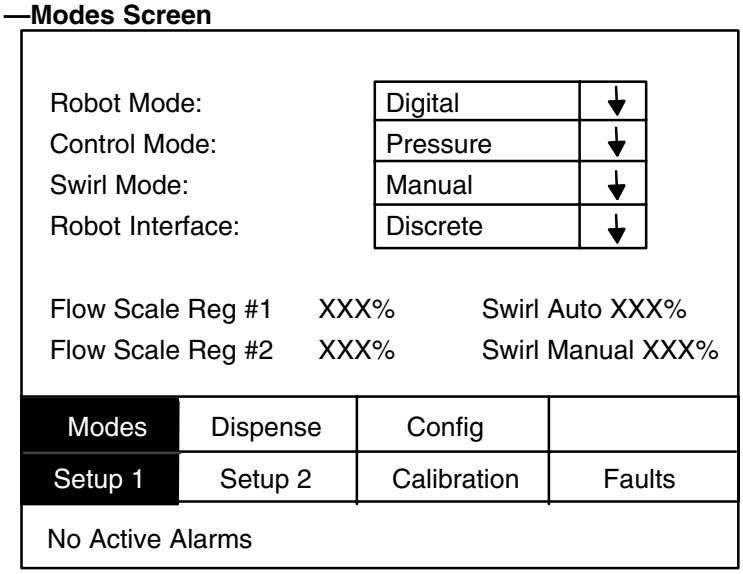


Fig. 23

Table 9—Modes Screen Values

Description	Possible Values	Default Value
Robot Mode	Analog or Digital	Digital
Control Mode	Pressure or Flow	Pressure
Swirl Mode	Manual or Auto	Manual
Robot Interface	Discrete or Serial	Discrete
Flow Scale	50 to 150%	100%
Swirl Manual Scaling	0 to 100%	50%
Swirl Auto Scaling	50 to 150%	100%

Setup 1—Dispense Screen
The purpose of this screen is to set parameters related to the dispense cycle.

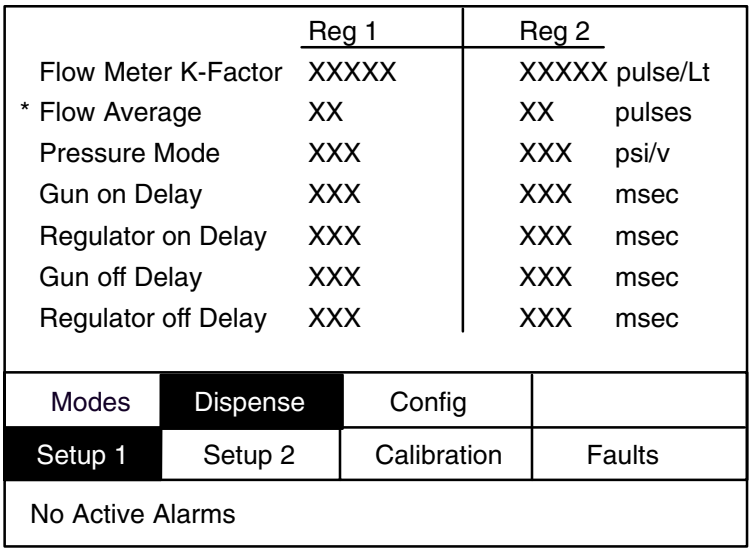


Fig. 24

Table 10—Dispense Screen Values

Description	Possible Values	Default Value
Flow Meter K–Factor	1 to 99,999 pulses/liter	Set at factory for specific system
Flow Average	1 to 99 pulses	Sets automatically at flow calibration
Pressure Mode	0 to 999 psi/v	Sets automatically at flow calibration
Gun On Delay	0 to 999 msec	0
Reg On Delay	0 to 999 msec	0
Gun Off Delay	0 to 999 msec	0
Reg Off Delay	0 to 999 msec	0

NOTES:

- This screen always shows two regulator values. If a single regulator system has been selected on the setup > configuration screen, only the regulator 1 values can be edited, regulator 2 values will remain at the system defaults.
- Parameters that are set as part of the Autotune process are identified with an asterisk (*).

Setup 1—Configuration Screen
The purpose of this screen is to allow users to configure a number of general parameters.

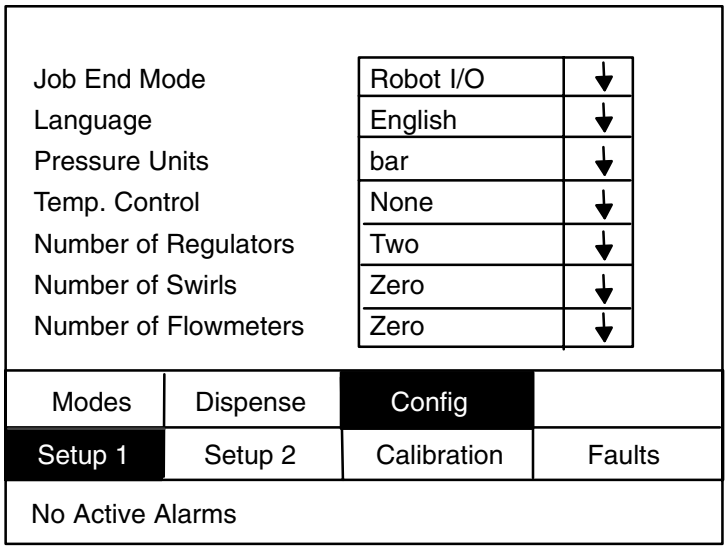


Fig. 25

Table 11—Configuration Screen Values

Description	Possible Values	Default Value
Job End Mode	Timer or Robot I/O	Robot I/O
Language	English, Spanish, French, German, Italian, Portuguese, Japanese, or Korean	English
Pressure Units	psi or bar	psi
Temperature Control	None, Temp Cond., or Elec. Heat	None
Number of Regulators (guns)	1 or 2	1
Number of Swirls	0, 1, or 2	0
Number of Flow Meters	0, 1, or 2	1

NOTE: Selecting the number of regulators limits which fields can be edited in setup and which fields are visible in run. All fields are always viewable in setup.

Setup 2—Setup Screen

The purpose of this screen is to allow users to set up style parameters. When this screen is selected, the first volume field will be highlighted. When the user tabs past the last tolerance field, the next eight styles will be displayed and the first volume field will be highlighted. Style 0 is dedicated to the purge style. There is a maximum of 32 styles.

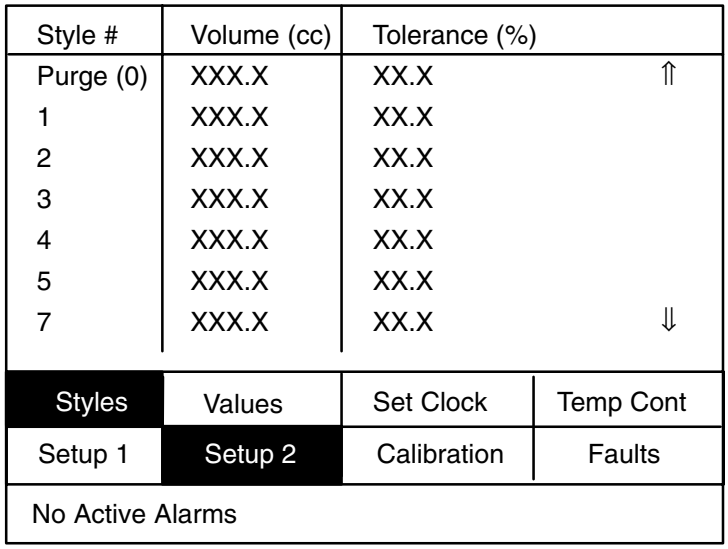


Fig. 26

Table 12—Setup Screen Values

Description	Possible Values	Default Value
Volume	0 to 9999.9 cc	100
Tolerance	0 to 99.9%	10%

NOTE: Setting the tolerance to 0% disables volume faults for that style.

Setup 2—Values Screen

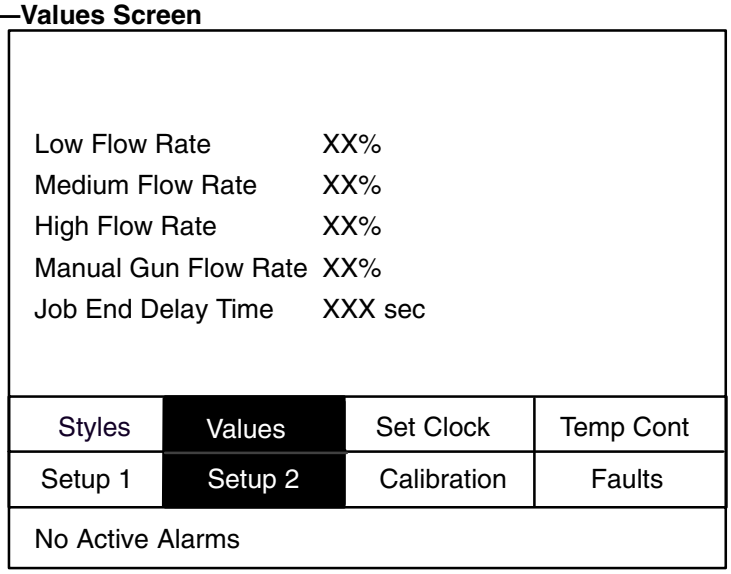


Fig. 27

Table 13—Values Screen Values

Description	Possible Values	Default Value
Low Flow Rate	0 to 99%	25%
Medium Flow Rate	0 to 99%	50%
High Flow Rate	0 to 99%	75%
Manual Flow Rate	0 to 99%	50%
Job End Delay Time	1 to 999 sec	4

NOTE: Analog mode flow command signals of less that 1 volt default to the Low Flow Rate value.

Setup 2—Set Clock Screen

The purpose of this screen is to set parameters for time and date. The date is entered in MM–DD–YYYY format. Time is entered in HH:MM format.

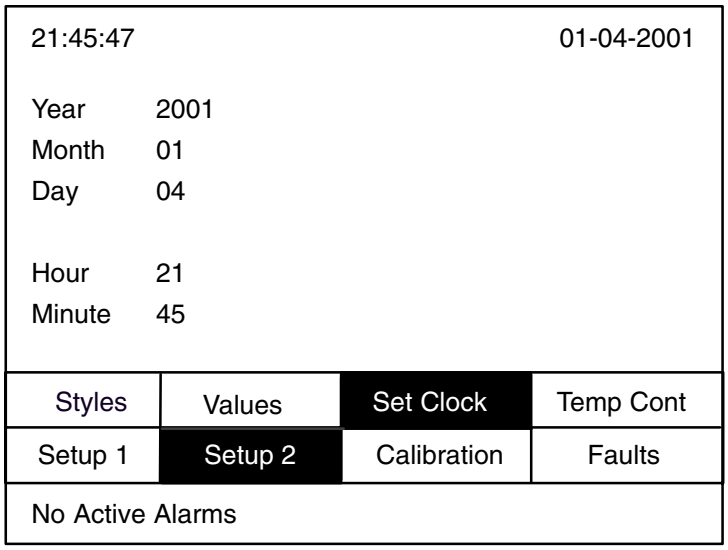


Fig. 28

Setup 2—Temperature Control Screen

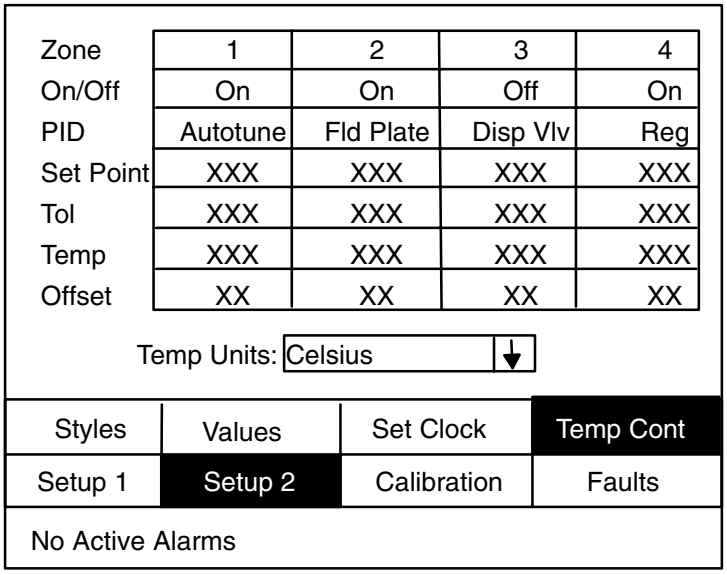


Fig. 29

Table 14—Temperature Control Screen Values

Description	Possible Values	Default Value
On/Off—Enable/Disable Temperature Zones	On/Off	Off
PID—Close Window *The PID field will display “Autotune” if there is an Autotune in progress. After completion of the Autotune process, the field will change to “Done.”	Hose, Fluid Plate, Dispense Valve, Regulator, Autotune, Done Setting a device sets the proper PID values for that device.	Fluid Plate
Set Point	60–176°F (16–80°C)	100°F
Tol—Tolerance Above/Below Setpoint for Temp limits	2–50°F (1–28°C)	5°F
Temp—Actual Zone Temp	0–990°F or C	N/A
Offset—This value is subtracted from the value calculated from RTD resistance. Used to adjust for wiring resistance.	0–40°F (0–22°C)	0°F

* If you select AutoTune for any zone and press Enter, the AutoTune process for that zone begins. The control will heat and monitor that device to automatically determine the correct PID values. This process takes from 5 to 40 minutes and should be started from ambient temperature. When complete, the field displays “Done”

NOTES:

- If set points are entered in Celsius and the readout is later changed to Fahrenheit, the set points are automatically converted.
- If “Temperature Conditioning” was selected on int Setup 1, Config screen, default PID values are automatically set for zone 1. If these values are changed, they will revert back to the default values at the next power up.

Calibration—Pressure Screen

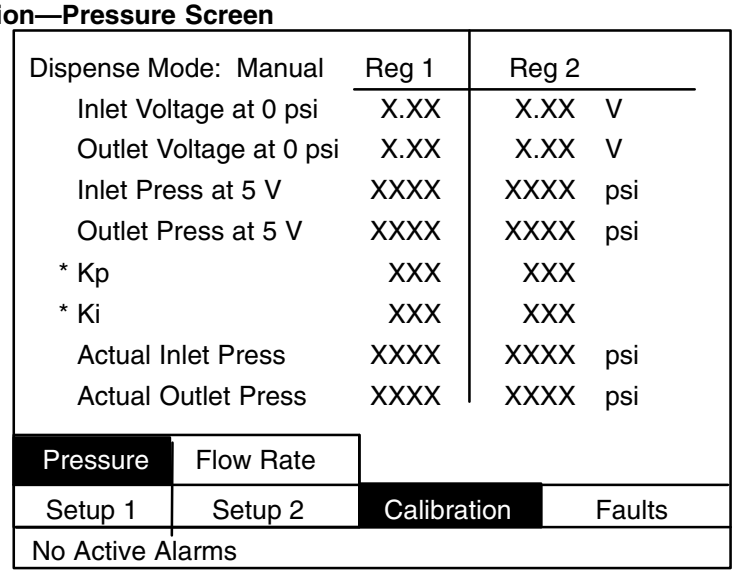


Fig. 30

Table 15—Pressure Screen Values

Description	Possible Values	Default Value
Inlet Voltage at 0 psi (0 bar)	0–2.00 V †	1.00
Outlet Voltage at 0 psi (0 bar)	0–2.00 V †	1.00
Inlet Pressure at 5 V	0–5000 psi ††	3500 psi
Outlet Pressure at 5 V	0–5000 psi ††	3500 psi
*Kp	0–999	160
*Ki	0–999	8
Actual Inlet Pressure	0–5000 psi or 0–340 bar	N/A
Actual Outlet Pressure	0–5000 psi or 0–340 bar	N/A

* Set by the AutoTune process

† These values can be adjusted to calibrate the pressure transducers on the inlet and outlet of the fluid control regulator

†† These pressures should match the pressure range switch positions on the transducer amplifier card in the fluid plate junction box (see fig. 77).

NOTE: To calibrate pressure, push the Gun 1 or Gun 2 button on the keypad while on this screen.

Calibration—Flow Rate Screen

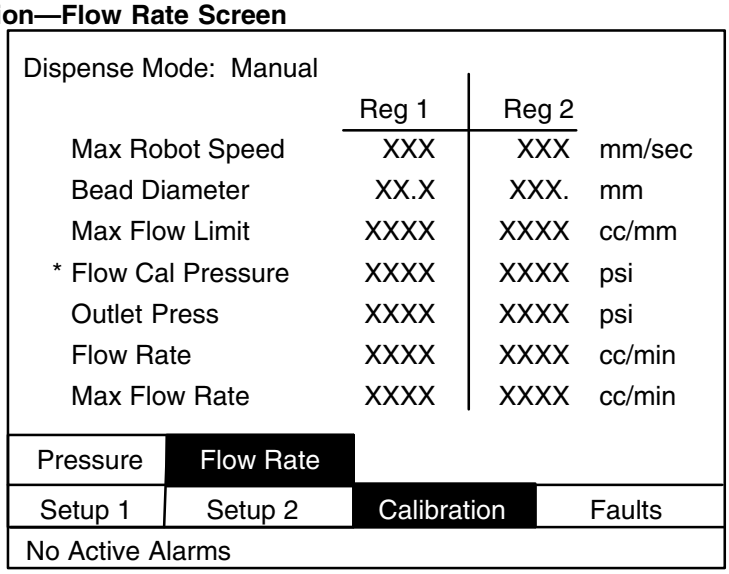


Fig. 31

Table 16—Flow Rate Screen Values

Description	Possible Values	Default Value
Max Robot Speed	0–999 mm/sec	500
Bead Diameter	0–99.9 mm	5
Max Flow Limit	0–9999 cc/min	1000
*Flow Cal Pressure	0–5000 psi or 0–340 bar	N/A
Outlet Pressure	0–5000 psi or 0–340 bar	N/A
Flow Rate	0–9999 cc/min	N/A
Max Flow Rate	0–9999 cc/min	N/A

*Set by the Autotune process.

NOTE: To do a flow rate calibration, push the Gun 1 or Gun 2 button on the keypad while on this screen.

Faults—Action Screen

The purpose of this screen is to set the alarms to be either warnings or alarms. An alarm will stop the system, but a warning will not. When this screen is selected, the top fault field is highlighted. The fault warning/alarm status can then be toggled by pressing the Enter key.

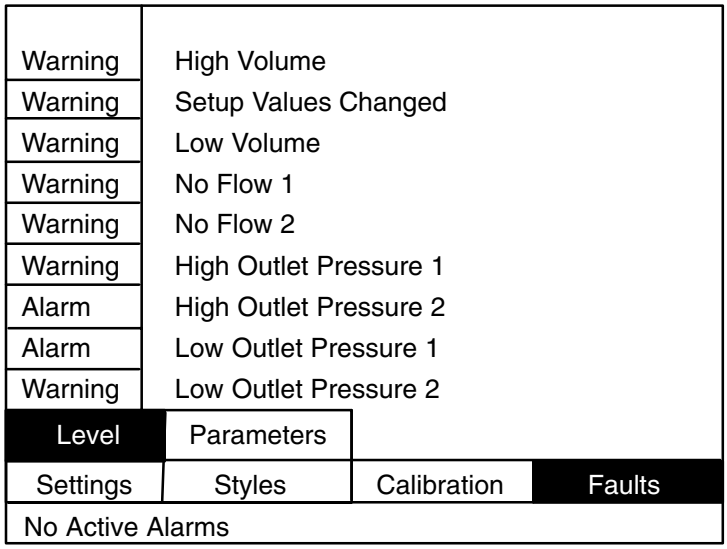


Fig. 32

Faults—Parameters Screen

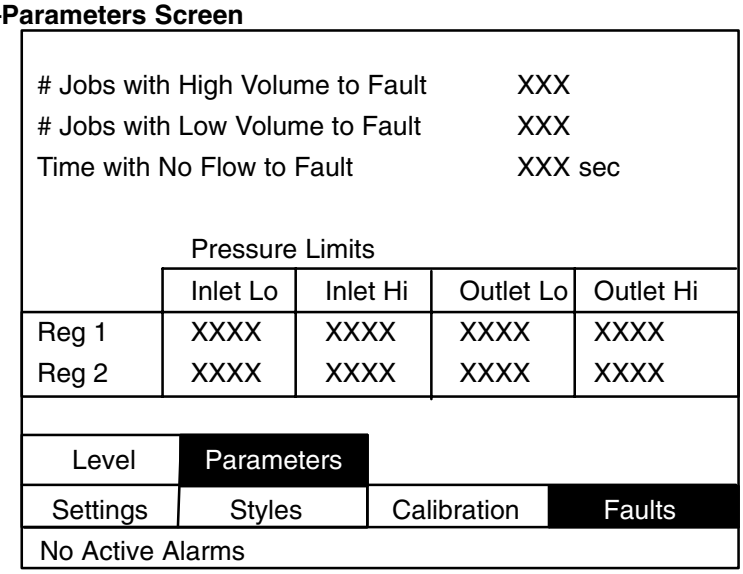


Fig. 33

Table 17—Parameters Screen Values

Description	Possible Values	Default Value
# Jobs to hi vol fault	0–999	1
# Jobs to lo vol fault	0–999	1
Time w/o flow to fault	0–999 sec	1
Inlet Pressure low limit	0–5000 psi or 0–340 bar	0
Inlet Pressure high limit	0–5000 psi or 0–340 bar	3500
Outlet Pressure low limit	0–5000 psi or 0–340 bar	0
Outlet Pressure high limit	0–5000 psi or 0–340 bar	3500

PrecisionFlo XL TouchScreen Interface

Setup Mode– Navigation Bar and Fault Status Bar

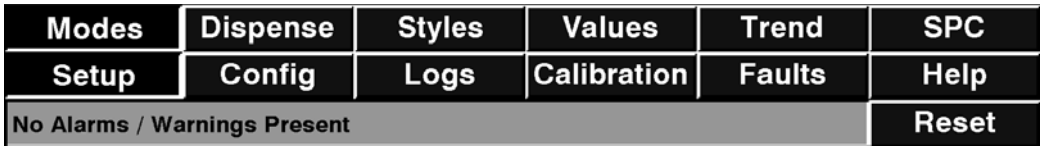


Fig. 34

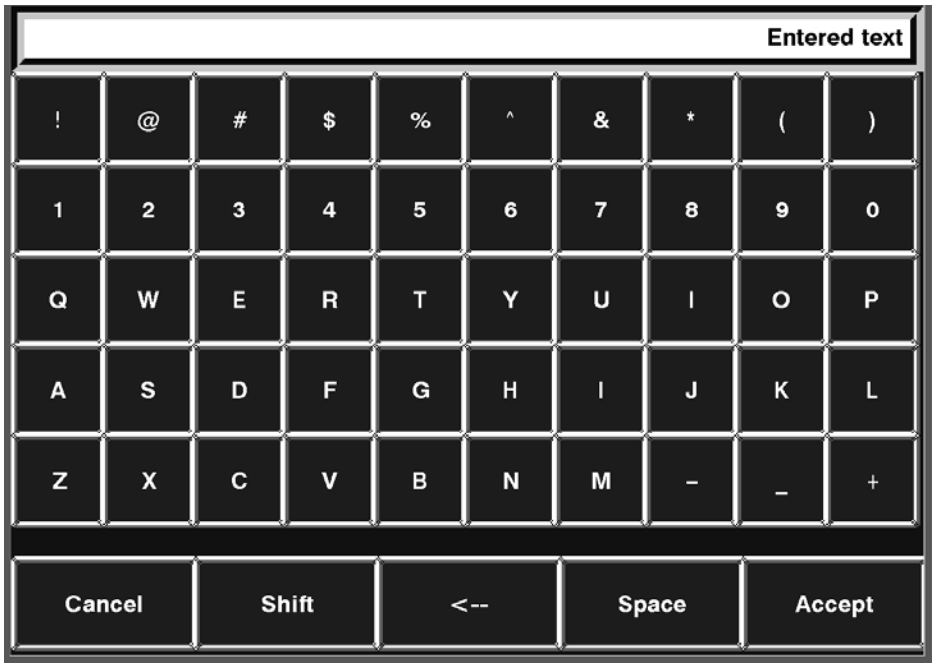
Run Mode– Navigation Bar and Fault Status Bar

Fig. 35

Numeric Pop-Up Keypad

Fig. 36

Alpha-Numeric Pop-Up Keypad



16-character limit

Fig. 37

Setup Screens

Setup – Modes Screen

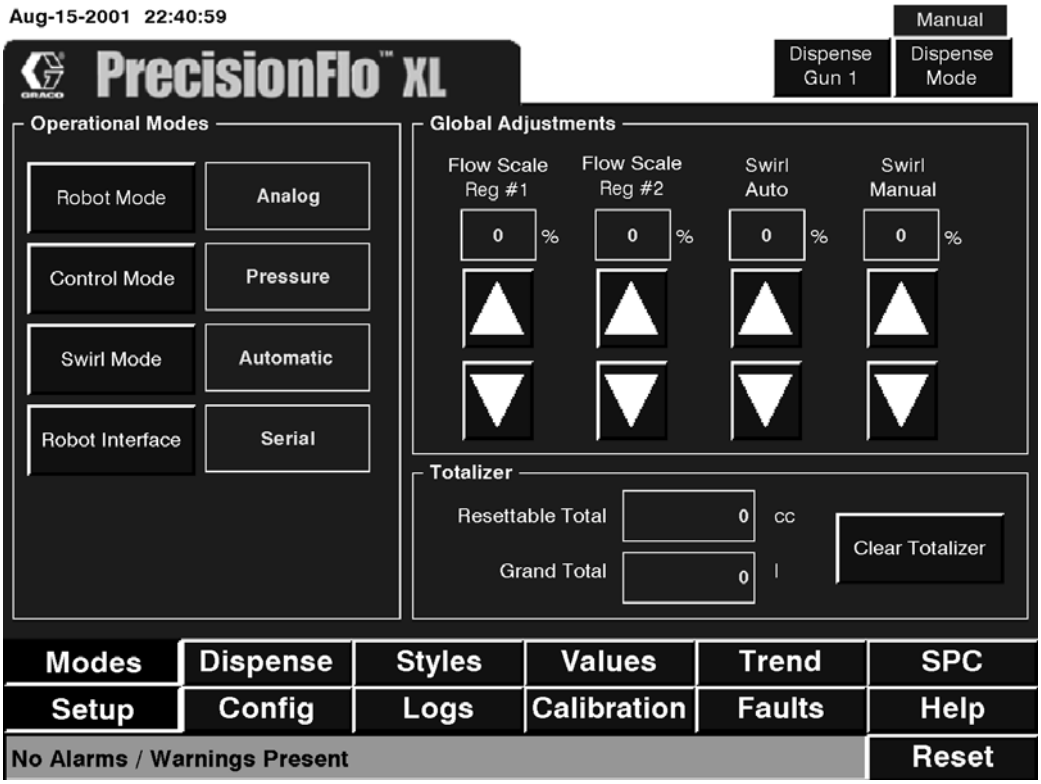


Fig. 38

Table 18—Setup Modes Screen Values

Description	Possible Values	Default Value
Operational Modes		
Robot Mode	Analog/Digital	Digital
Control Mode	Pressure/Flow	Pressure
Swirl Mode	Automatic/Manual	Manual
Robot Interface	Serial/Discrete	Discrete
Global Adjustments		
Flow Scale Reg #1	50–150%	100%
Flow Scale Reg #2	50-150%	100%
Swirl Auto	50-150%	100%
Swirl Manual	0-100%	50%
Totalizer		
Resettable Total	0 to 214, 748,364.8 L	
Grand Total	0 to 214, 748,364.8 cc	
Clear Totalizer	Reset to zero	

Setup – Dispense Screen

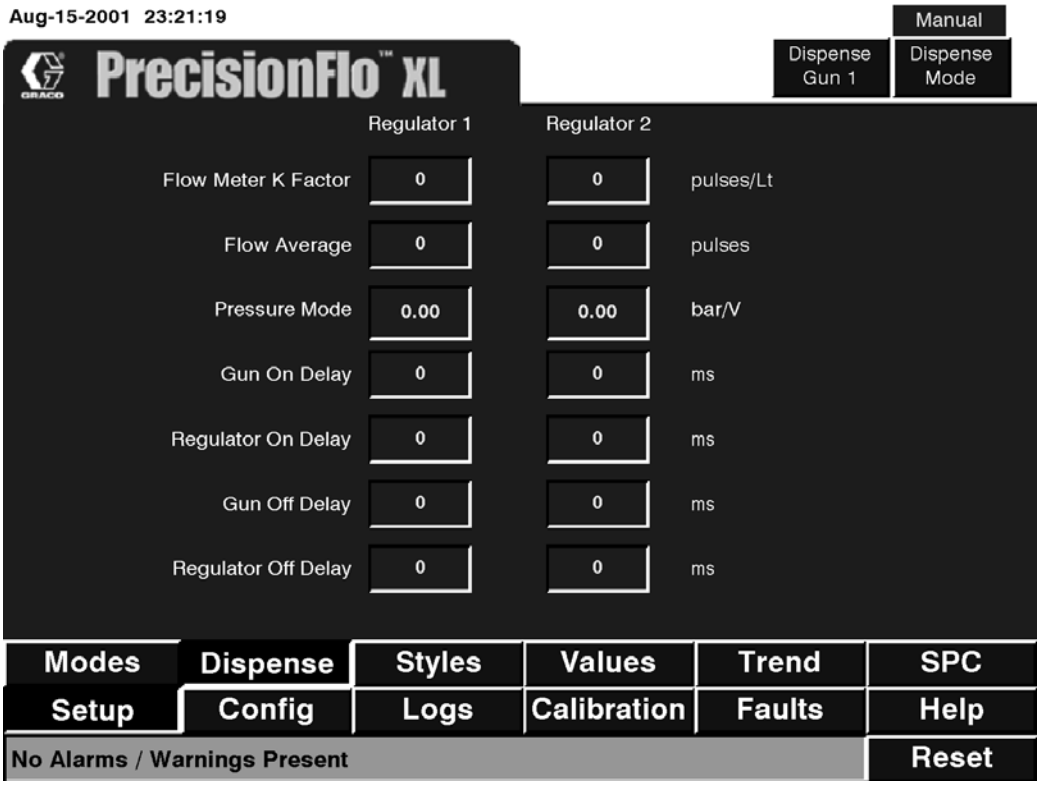


Fig. 39

Table 19—Setup Dispense Screen Values

Description	Possible Values	Default Value
Flow Meter K Factor (pulses/Lt)	99,999	Set at factory for specific system
Flow Average (pulses)	0-99	Sets automatically at flow calibration
Pressure Mode (PSI/V)	0-999	Sets automatically at flow calibration
Gun On Delay (ms)	0-999	0
Regulator On Delay (ms)	0-999	0
Gun Off Delay (ms)	0-999	0
Regulator Off Delay (ms)	0-999	0

Setup – Styles Screen

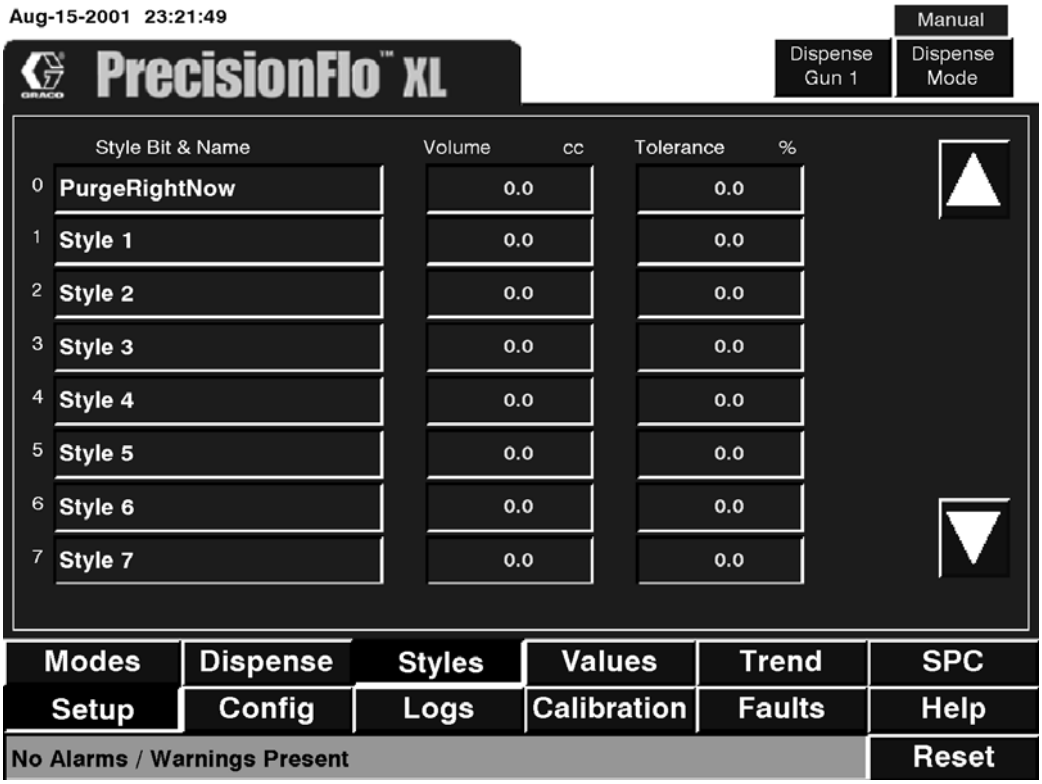


Fig. 40

Table 20—Setup Styles Screen Values

Description	Possible Values
Style Bit & Name	Enter style names using pop-up alphanumeric keypad
Volume (cc)	0-9,999.9
Tolerance (%)	0-99.9

NOTE: Setting the tolerance to 0% disables volume faults for that style.

Setup – Values Screen

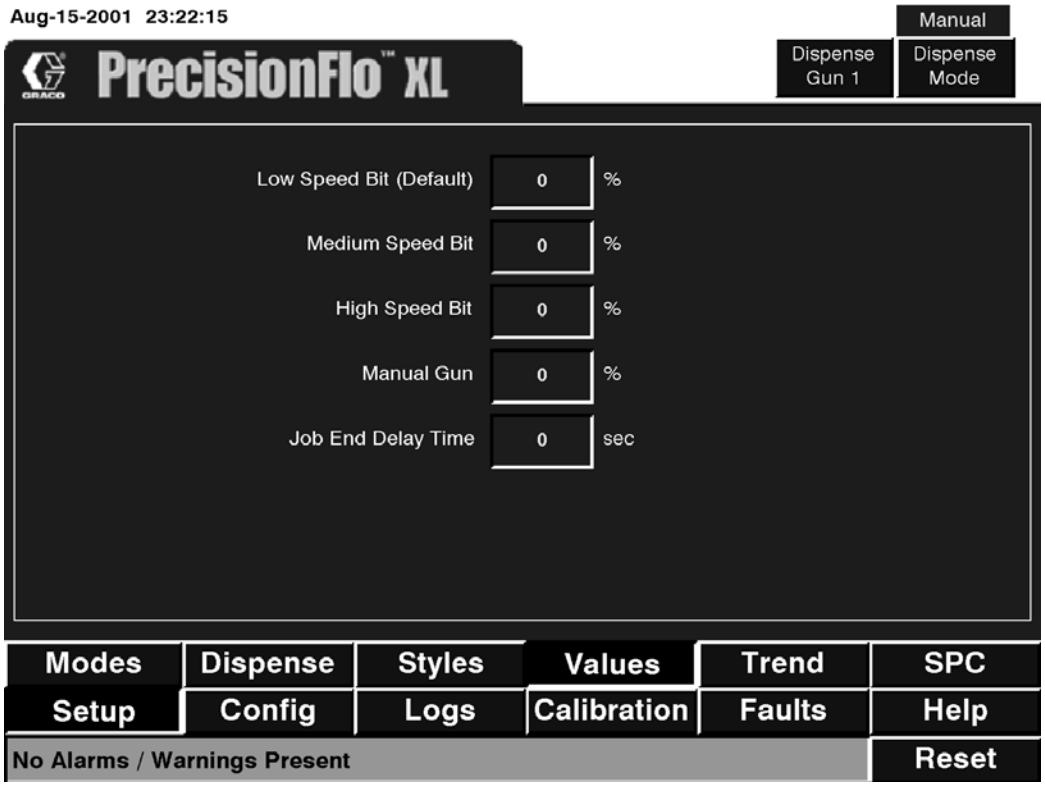


Fig. 41

Table 21—Setup Values Screen Values

Description	Possible Values	Default Value
*Low Speed Bit (Default) (%)	0-99%	25%
Medium Speed Bit (%)	0-99%	50%
High Speed Bit (%)	0-99%	75%
Manual Gun (%)	0-99%	50%
Job End Delay Time (sec)	1-999	4 sec

*Analog mode flow command signals less than 1 volt will default to this value.

Setup – Trend Screen

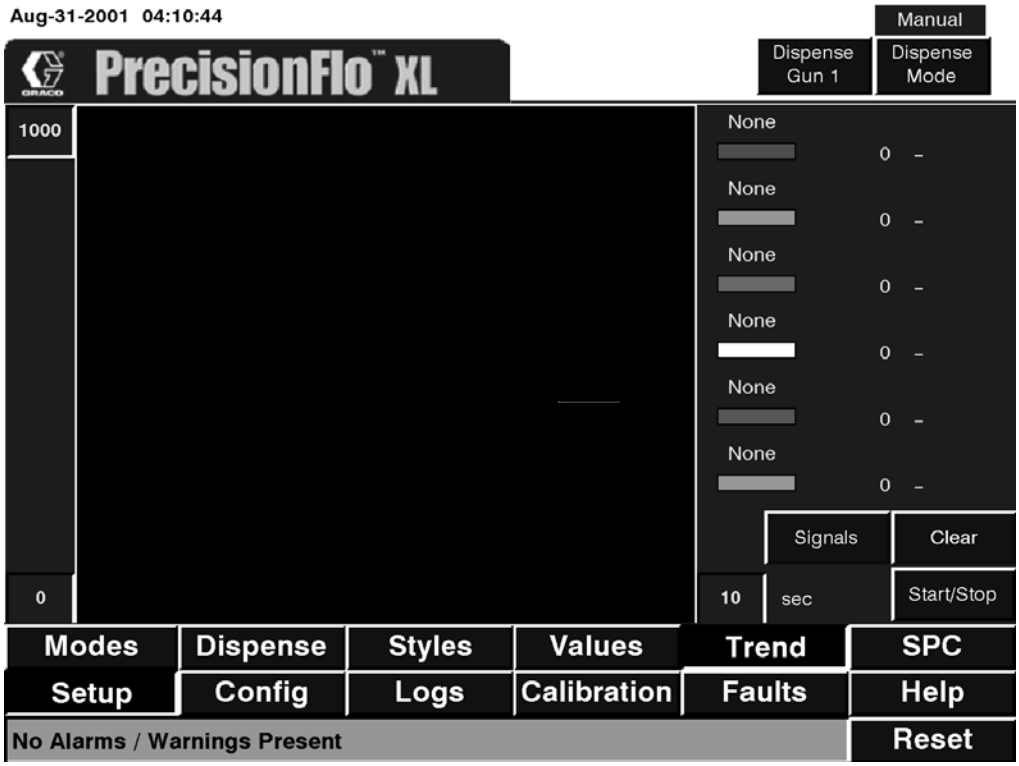


Fig. 42

Table 22—Setup Trend Screen Values

Description	Possible Values
Signals (Select signals to display)	Inlet Pressure Regulator 1/Regulator 2 Outlet Pressure Regulator 1/Regulator 2 Desired Pressure Regulator 1/Regulator 2 Requested Flow Regulator 1/Regulator 2 Flow Rate Regulator 1/Regulator 2 Robot Command Flow Reg 1Reg 2 Swirl Speed Regulator 1/Regulator 2 Robot Command Swirl Reg 1/Reg 2 Zero Compensation Reg 1/Reg 2 Peak Compensation Reg 1/Reg 2 Actual Temperature Zone 1/Zone 2/Zone 3/Zone 4

This screen is used to analyze system performance much as you would with an oscilloscope. Select the signal(s) to monitor and enter the number of seconds to display across the window. Smaller numbers will make the display scroll faster (valid range is 3 to 120 seconds). The two values at the left edge of the window can be used to change the range of values displayed. Touch the Start/Stop button to begin trending.

Setup – SPC Screen

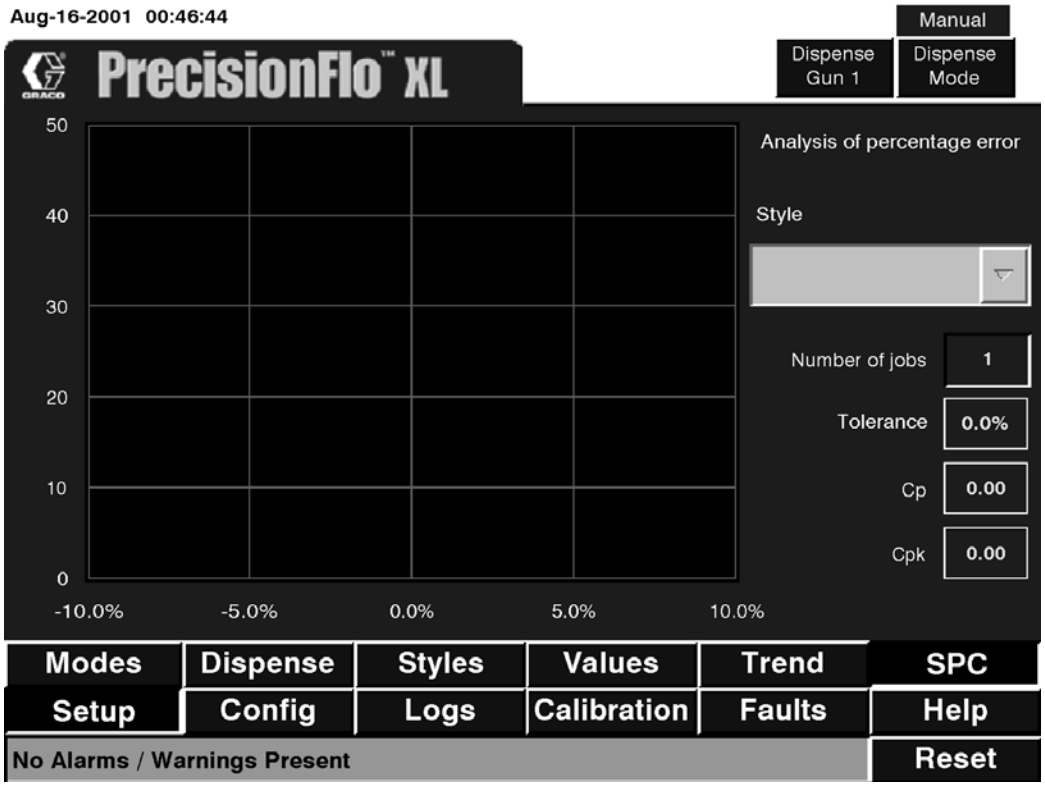


Fig. 43

Table 23—Setup SPC Screen Values

Description	Possible Values
Style	As entered on Setup Styles screen (Fig. 40)
Number of jobs	1-65,000
Tolerance	Displays the tolerance value set for the corresponding style name on the Setup Styles screen.

The Statistical Process Control (SPC) screen is used to monitor quality in a manufacturing process. Select the style name and the number of jobs to check and the screen will show a bar graph of performance accuracy and repeatability. This is the same information shown on the Job Log screen displayed in graph format.

Notes

Notes

Config – General Screen (1 regulator)

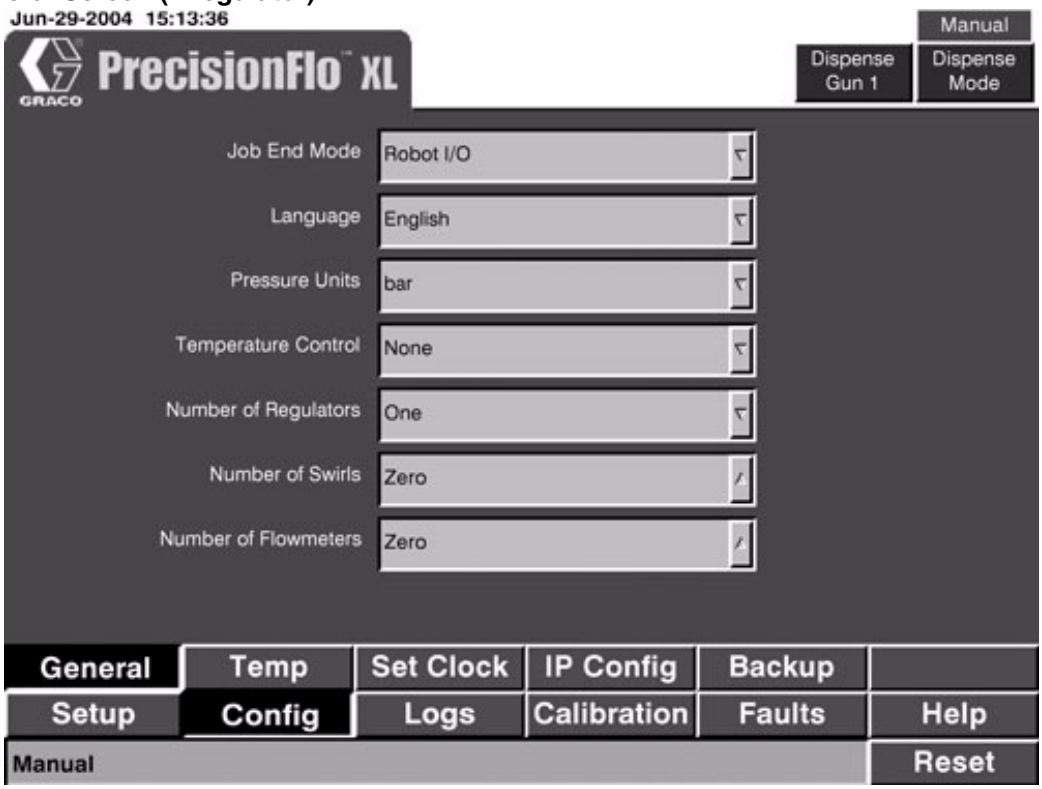


Fig. 44

Config – General Screen (2 regulators)

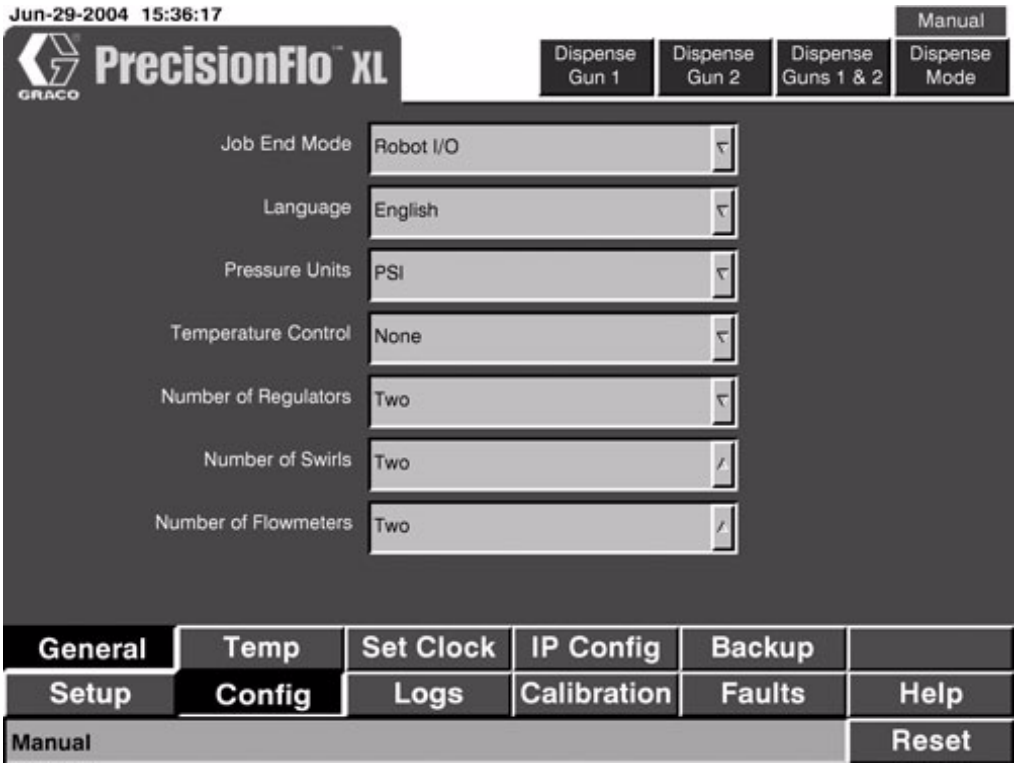


Fig. 45

Table 24—Config General Screen Values (1 regulator)

Description	Possible Values	Default
Job End Mode	Robot I/O/Timer	Timer
Language	English/French/German/Italian/ Japanese/Korean/Portuguese/ Spanish	English
Pressure Units	bar/PSI	PSI
Temperature Control	None/Electric Heat/Temperature Conditioning	None
Number of Regulators	One/Two	One
Number of Swirls	None/One/Two	None
Number of Flow Meters	None/One/Two	One

Notes

Config – Temperature Screen

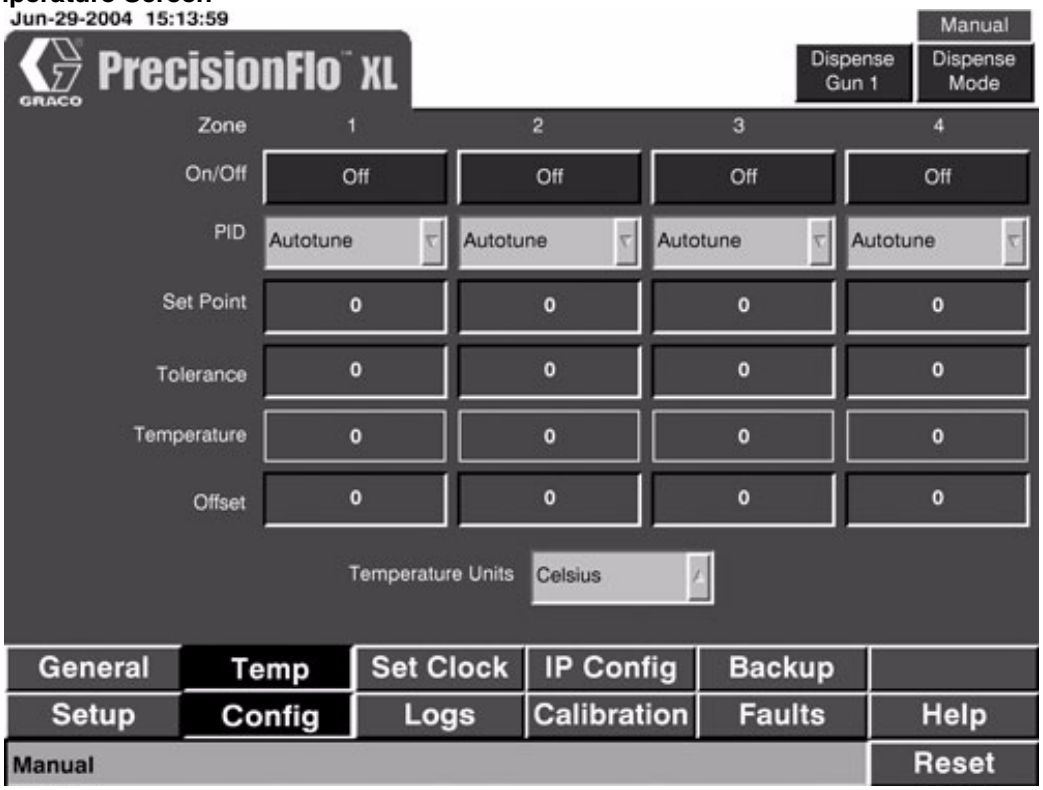


Fig. 46

Table 25—Config Temperature Screen Values

Description	Possible Values
Zones 1 – 4	On/Off
PID—Close Window *The PID field will display “Autotune” if there is an Autotune in progress. After completion of the Autotune process, the field will change to “Done.”	Autotune/Dispense Valve/Fluid Plate/Hose/Regulator/ Done Setting a device sets the proper PID values for that device.
Set Point	60.0–176.0°F/16–80 °C
Tolerance	2.0–50.0°F/1–28°C
Temperature	Displays actual temperature reading
Temperature Units	Fahrenheit/Celsius
Offset—This value is subtracted from the value calculated from the RTD resistance and used to adjust for wiring resistance.	0–40°F/0–72°C

*If you select AutoTune for any zone and press Enter, the AutoTune process for that zone begins. The control will heat and monitor that device to automatically determine the correct PID values. This process takes from 5 to 40 minutes and should be started from ambient temperature. When complete, the field displays “Done”

NOTES:

- If set points are entered in Celsius and the readout is later changed to Fahrenheit, the set points are automatically converted.
- If “Temperature Conditioning” was selected on int Setup 1, Config screen, default PID values are automatically set for zone 1. If these values are changed, they will revert back to the default values at the next power up.

Config – Set Clock Screen

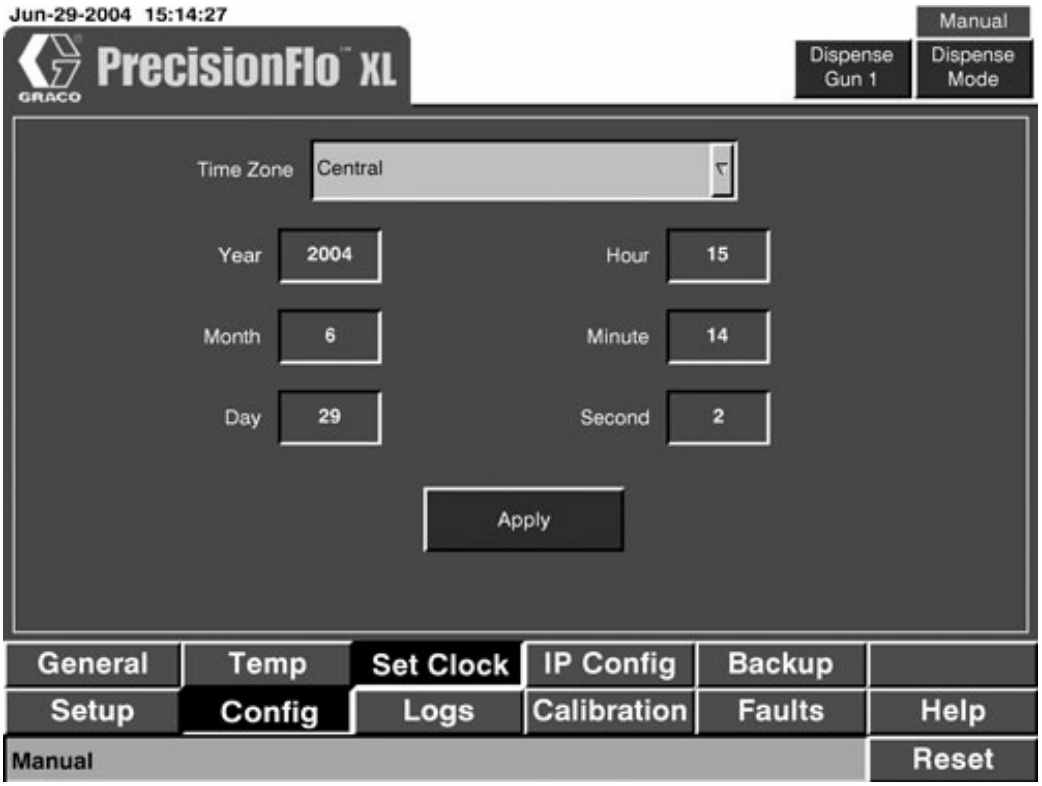


Fig. 47

Table 26—Config Set Clock Screen Values

Description	Possible Values
Time Zone	Eastern/Central/Mountain/Pacific/Alaska/Hawaii/Samoa
Year	2000–2038
Month	1–12
Day	1–31
Hour	1–24
Minute	0–23
Second	0–59

Notes

Config – IP Configuration Screen

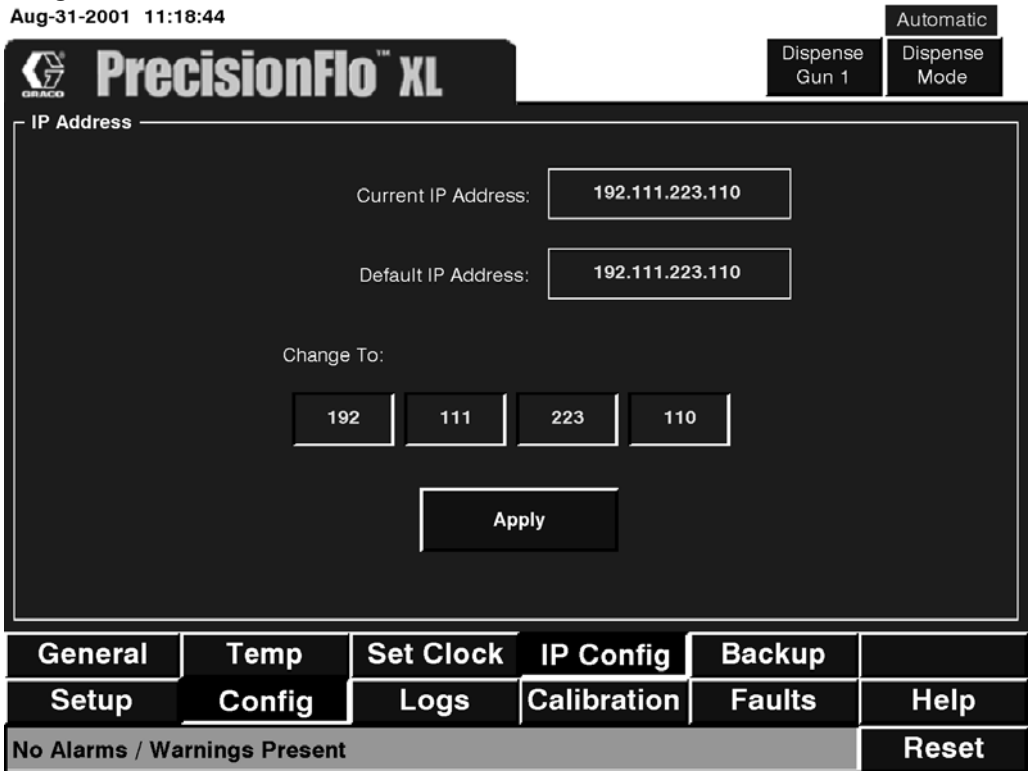


Fig. 48

See Appendix A: Ethernet and FTP for an explanation of how to use this screen.

Config – Backup Screen

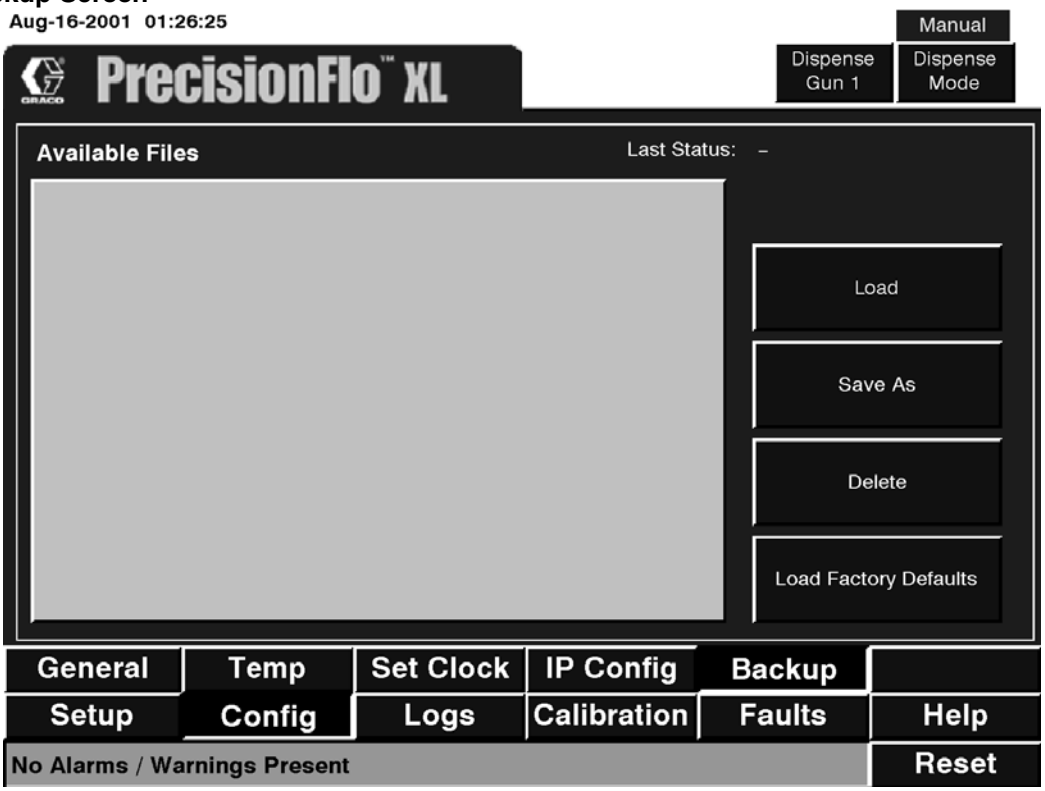


Fig. 49

Table 27—Config Backup Screen Values

Description	Possible Values
Load	Any previously saved setup file
Save As	Enter file name using pop-up alpha-numeric keypad
Load Factory Defaults	Reloads the factory set parameters

Use this screen to save your current setup parameters to a retrievable file on the hard drive of your PC or to retrieve a previously saved setup file. You can also reload the factory default setup.

Notes

Logs – Job Log Screen

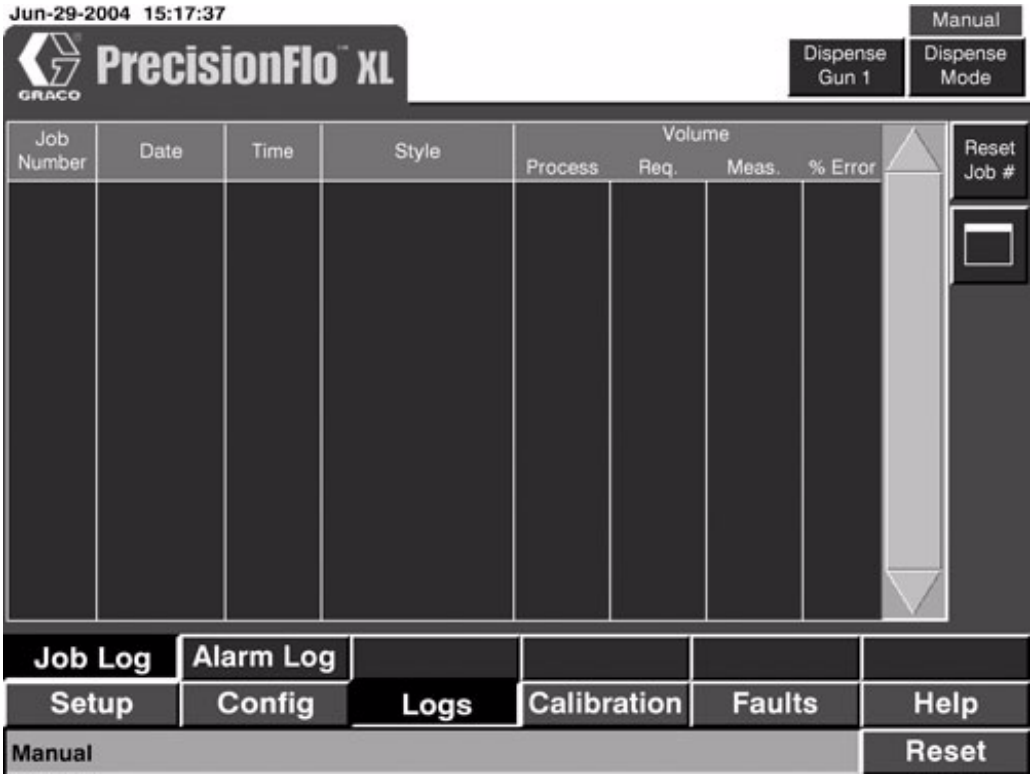


Fig. 50

Table 28—Logs Job Log Screen Values

Description
Job Number
Date
Time
Style
Volume
Meas.
Req.
Process
% Error

NOTE: The Reset Job # button causes the next job to be number one.

Logs – Alarm Log Screen

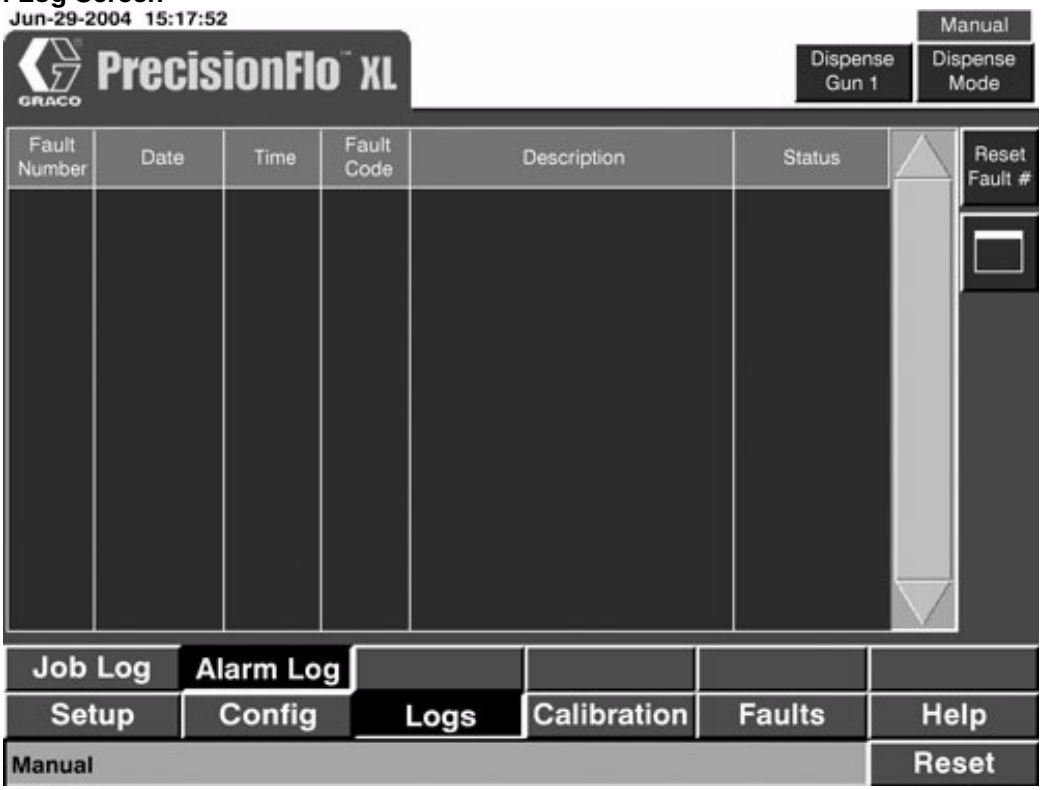


Fig. 51

Table 29—Logs Alarm Log Screen Values

Description
Fault Number
Date
Time
Fault Code
Description
Status
Reset Fault #

NOTE: The Reset Fault # button causes the next fault to be number one.

Notes

Calibration – Pressure Screen

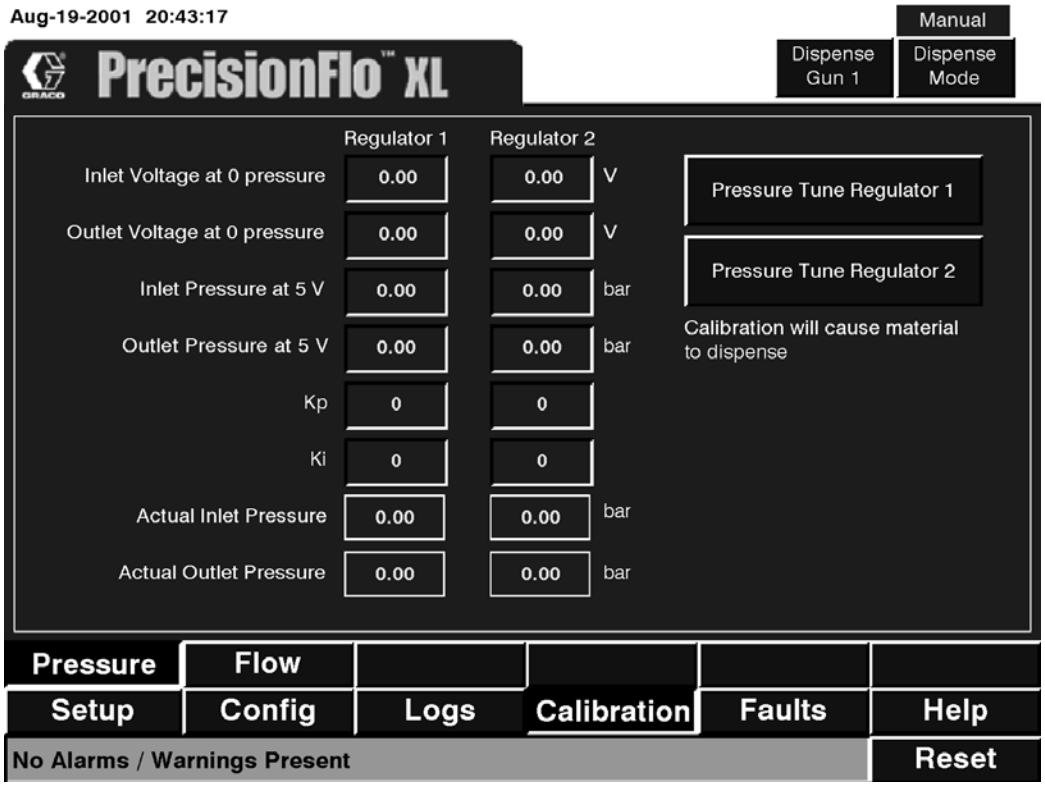


Fig. 52

Table 30—Calibration Pressure Screen Values

Description	Possible Values
*Inlet Voltage at 0 Pressure	0.0–2.0 V
*Outlet Voltage at 0 Pressure	0.0–2.0 V
†Inlet Pressure at 5 V	0.0–344.83 bar/0.0–5000 PSI
†Outlet Pressure at 5 V	0.0–344.83 bar/0.0–5000 PSI
Kp	0–999
Ki	0–999
Actual Inlet Pressure	
Actual Outlet Pressure	

* These values can be adjusted to calibrate the inlet and outlet regulator pressure transducers.

† These pressures should match the pressure range switch positions on the transducer amplifier card in the fluid plate junction box (see fig. 77).

Calibration – Flow Screen

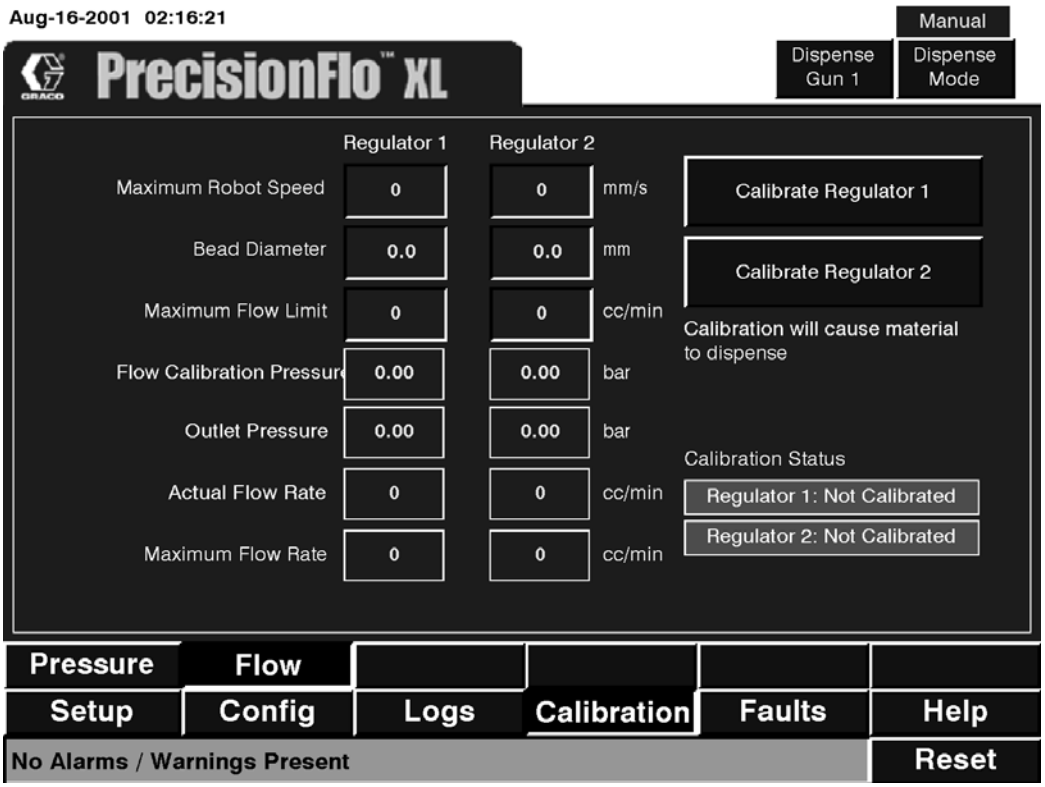


Fig. 53

Table 31—Calibration Flow Screen Values

Description	Possible Values
Maximum Robot Speed	0.0–999.0 mm/s
Bead Diameter	0.0–99.9 mm
Maximum Flow Limit	0.0–5000.0 cc/min
Flow Calibration Pressure	Actual
Outlet Pressure	Actual
Actual Flow Rate	Actual
Maximum Flow Rate	Actual

Notes

Faults – Level 1 Screen

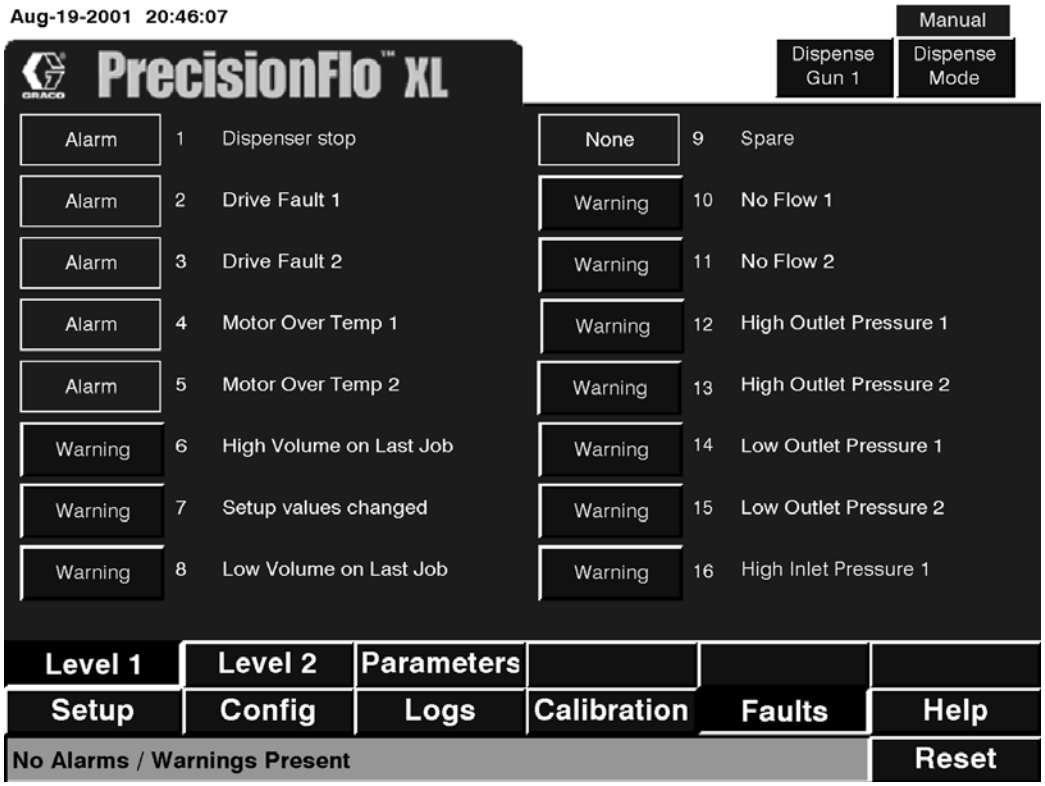


Fig. 54

Table 32—Faults Level 1 Screen Values

Description	Possible Values	Default Value
1. Dispenser stop	Always Alarm	Alarm
2. Drive Fault 1	Always Alarm	Alarm
3. Spare	None	
4. Motor Over Temp 1	Always Alarm	Alarm
5. Spare	None	
6. High Volume on Last Job	Alarm/Warning	Warning
7. Setup values changed	Alarm/Warning	Warning
8. Low Volume on Last Job	Alarm/Warning	Warning
9. Spare	None	
10. No Flow 1	Alarm/Warning	Warning
11. No Flow 2	Alarm/Warning	Warning
12. High Outlet Pressure 1	Alarm/Warning	Warning
13. High Outlet Pressure 2	Alarm/Warning	Warning
14. Low Outlet Pressure 1	Alarm/Warning	Warning
15. Low Outlet Pressure 2	Alarm/Warning	Warning
16. High Inlet Pressure 1	Alarm/Warning	Warning

Faults – Level 2 Screen

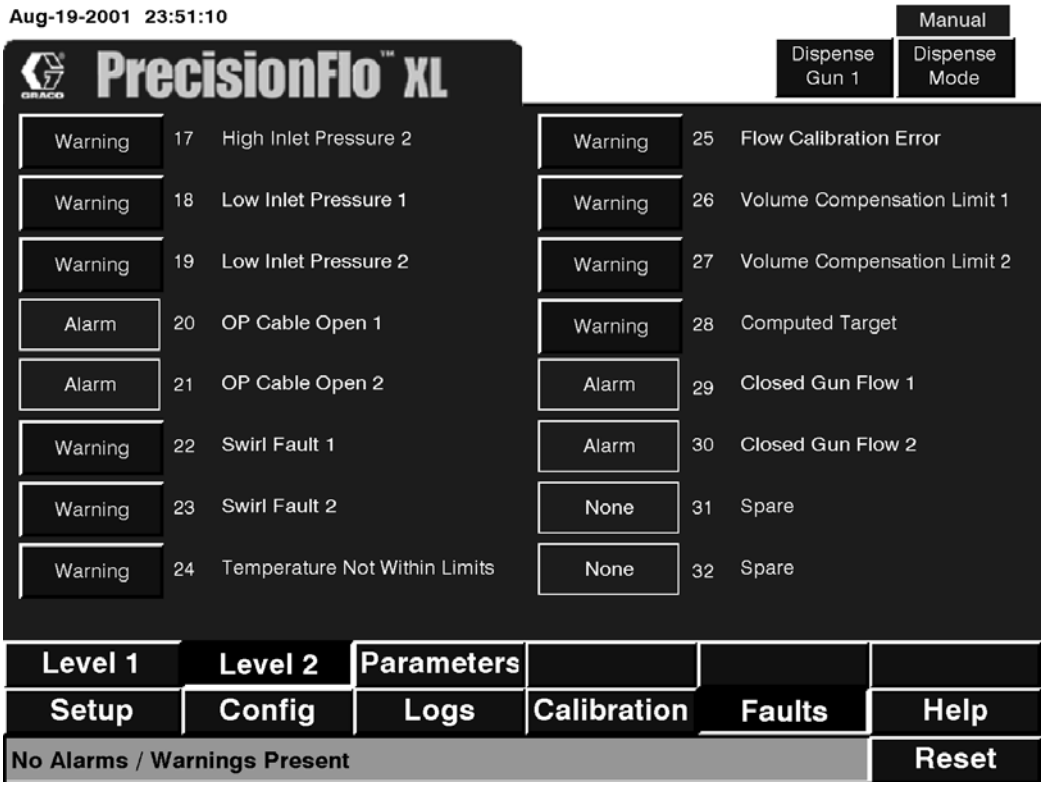


Fig. 55

Table 33—Faults Level 2 Screen Values

Description	Possible Values	Default Value
17. High Inlet Pressure 2	Alarm/Warning	Warning
18. Low Inlet Pressure 1	Alarm/Warning	Warning
19. Low Inlet Pressure 2	Alarm/Warning	Warning
20. OP Cable Open 1	Always Alarm	Alarm
21. OP Cable Open 2	Always Alarm	Alarm
22. Swirl Fault 1	Alarm/Warning	Warning
23. Swirl Fault 2	Alarm/Warning	Warning
24. Temperature Not Within Limits	Alarm/Warning	Warning
25. Flow Calibration Error	Alarm/Warning	Warning
26. Volume Compensation Limit 1	Alarm/Warning	Warning
27. Volume Compensation Limit 2	Alarm/Warning	Warning
28. Computed Target	Alarm/Warning	Warning
29. Closed Gun Flow 1	Alarm	Alarm
30. Closed Gun Flow 2	Alarm	Alarm
31. Spare	None	
32. Spare	None	

Notes

Faults – Parameters Screen

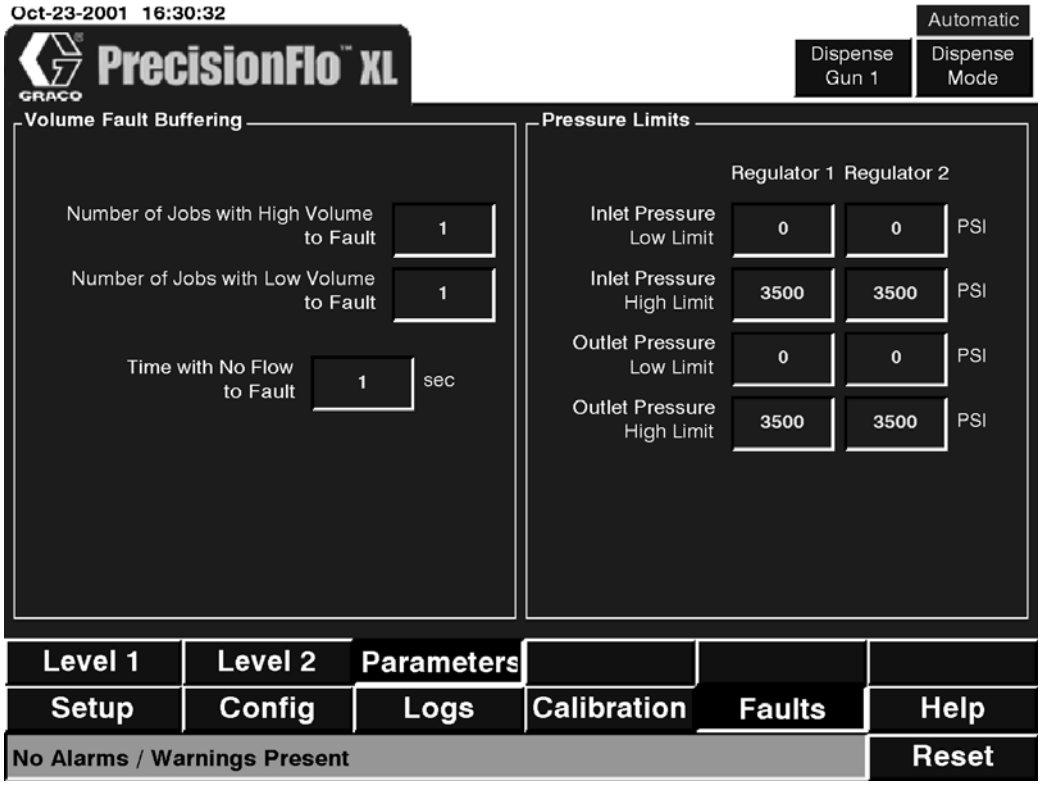


Fig. 56

Table 34—Faults Parameters Screen Values

Description	Possible Values
Volume Fault Buffering	
Number of Jobs with High Volume to Fault	0–999
Number of Jobs with Low Volume to Fault	0–999
Time with No Flow to Fault	1–999
Pressure Limits	
Inlet Pressure Low Limit	0.0–344.83 bar/0.0–5000 psi
Inlet Pressure High Limit	0.0–344.83 bar/0.0–5000 psi
Outlet Pressure Low Limit	0.0–344.83 bar/0.0–5000 psi
Outlet Pressure High Limit	0.0–344.83 bar/0.0–5000 psi

Notes

Notes

Run Screens

Status Screen (1 regulator)

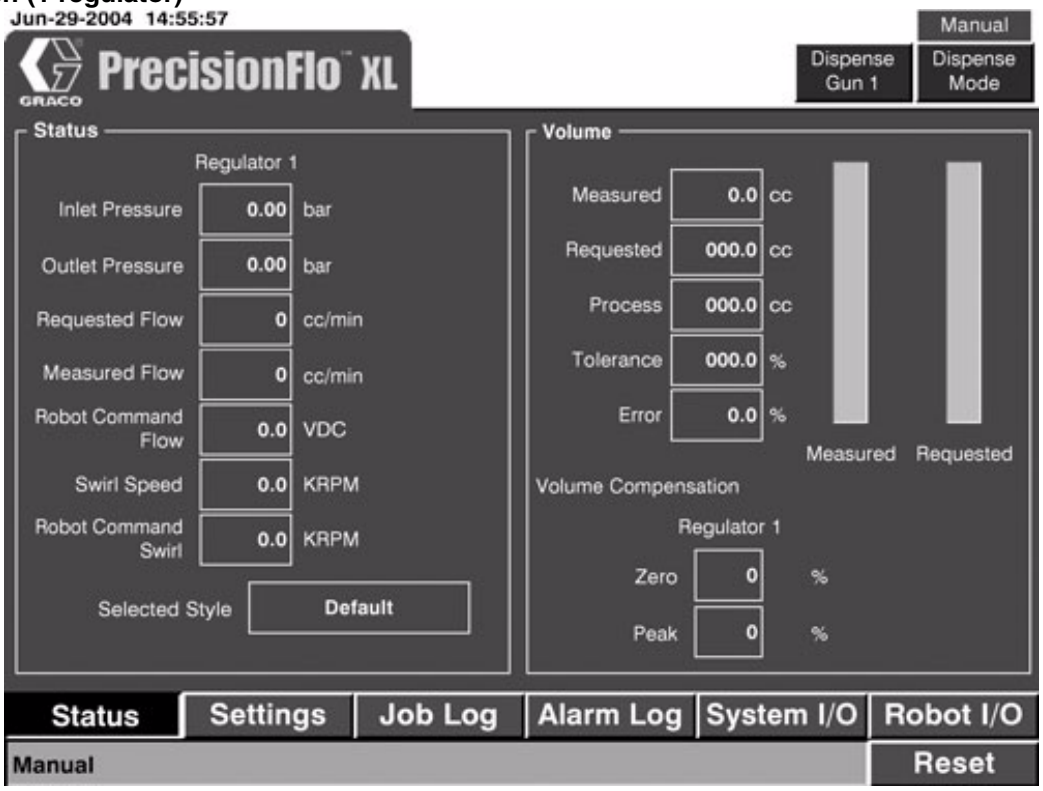


Fig. 57

Status Screen (2 regulators)

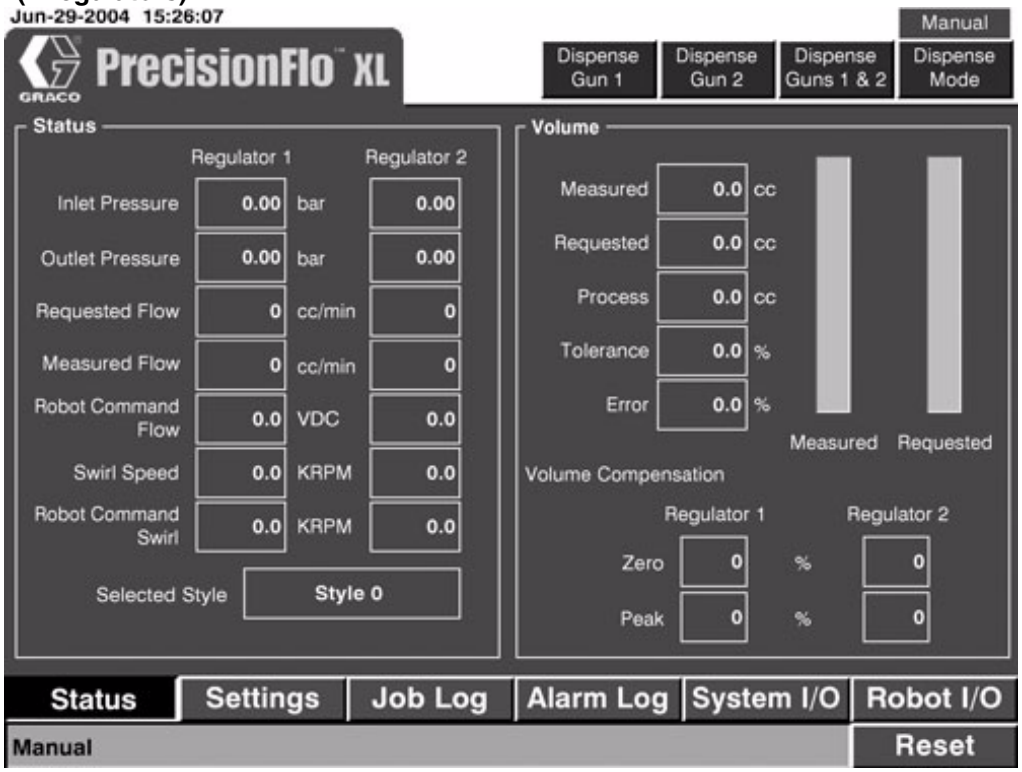


Fig. 58

Table 35—Status Screen Values

Description	Possible Values
Status	
Inlet Pressure Reg 1 and 2	0–5000 psi or 0–344 bar
Outlet Pressure Reg 1 and 2	0–5000 psi or 0–344 bar
Requested Flow Reg 1 and 2	0–9999 cc/min
Measured Flow Reg 1 and 2	0–9999 cc/min
Robot Command Flow	0–9.9 V
Swirl Speed	0.0 to 25.0 KRPM
Robot Command Swirl	0.0 to 25.0 KRPM
Selected Style	
Volume	
Measured	
Requested	
Process	
Tolerance	
Error	
Volume Compensation	
Zero	
Peak	

Notes

Settings Screen

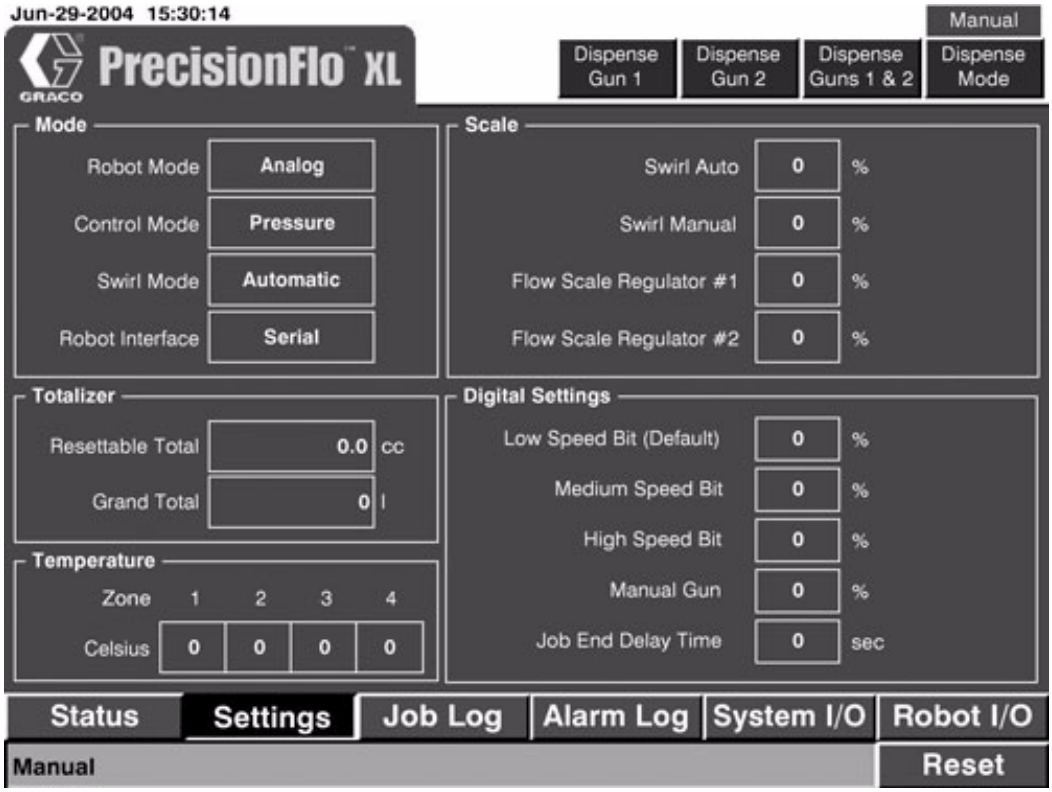


Fig. 59

Table 36—Settings Screen Values

Description	Possible Values	Default Value
Mode		
Robot Mode	Analog/Digital	Digital
Control Mode	Pressure/Flow	Pressure
Swirl Mode	Manual/Automatic	Manual
Robot Interface	Discrete/Serial	Serial
Totalizer		
Resettable Total		
Grand Total		
Scale		
Swirl Auto %	50 to 150%	100%
Swirl Manual %	0 to 100%	50%
Flow Scale Regulator #1 (%)	50 to 150%	100%
* Flow Scale Regulator #2 (%)	50 to 150%	100%
Digital Settings		
Low Speed Bit (%) (default)	0 to 99%	25
Medium Speed Bit (%)	0 to 99%	50
High Speed Bit (%)	0 to 99%	75
Manual Gun Flow Rate (%)	0 to 99%	50
Job End Delay Time (sec)	1 to 999 sec	4

*When there are 2 regulators

Job Log Screen

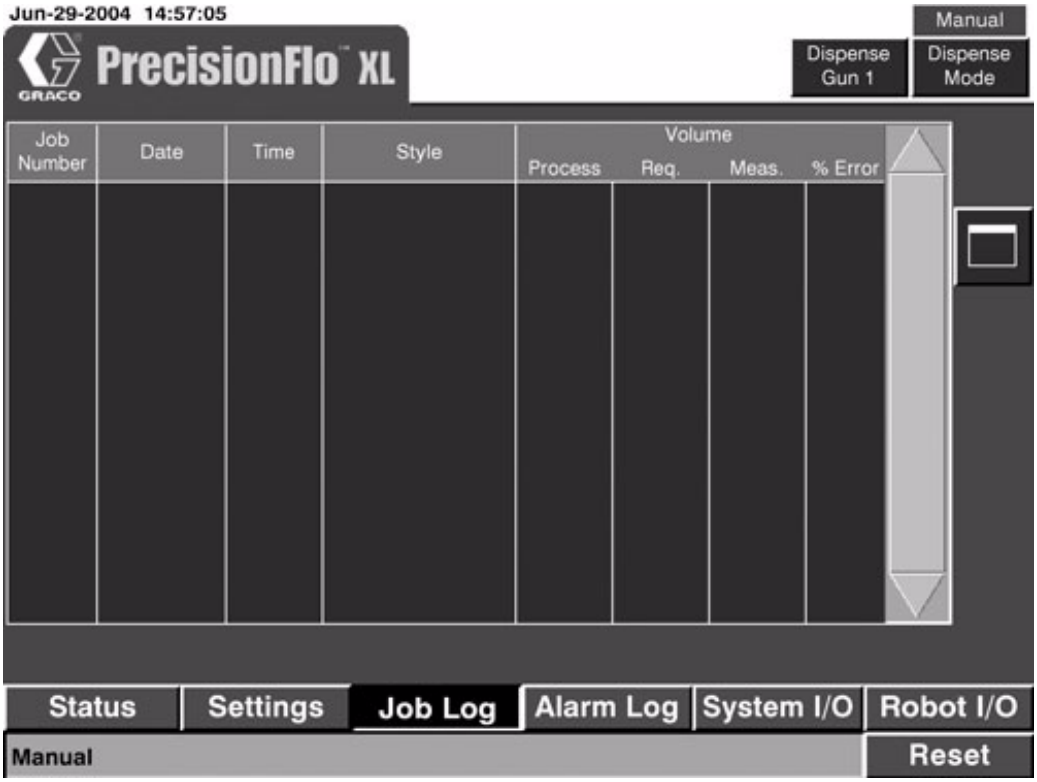


Fig. 60

The PrecisionFlo XL writes a record to a log each time a dispense job is completed.

Job Number: Sequential order of dispense jobs.

Style: The name of the style of the dispense job completed.

Volumes

- **Process:** The Target Volume set for the style. This is the volume that the robot should request for this style based on the flow command value and job length.
- **Requested:** The volume requested by the robot flow command during the job.
- **Measured:** The volume measured by the flow meter during the job.
- **% Error:** The difference between the measured volume and the requested volume in Flow Mode or the process volume in Pressure Mode.

The last 1000 jobs can be scrolled through on the screen. To view more jobs, press the Maximize button , which makes the last 10,000 jobs viewable.

Notes

Alarm Log Screen

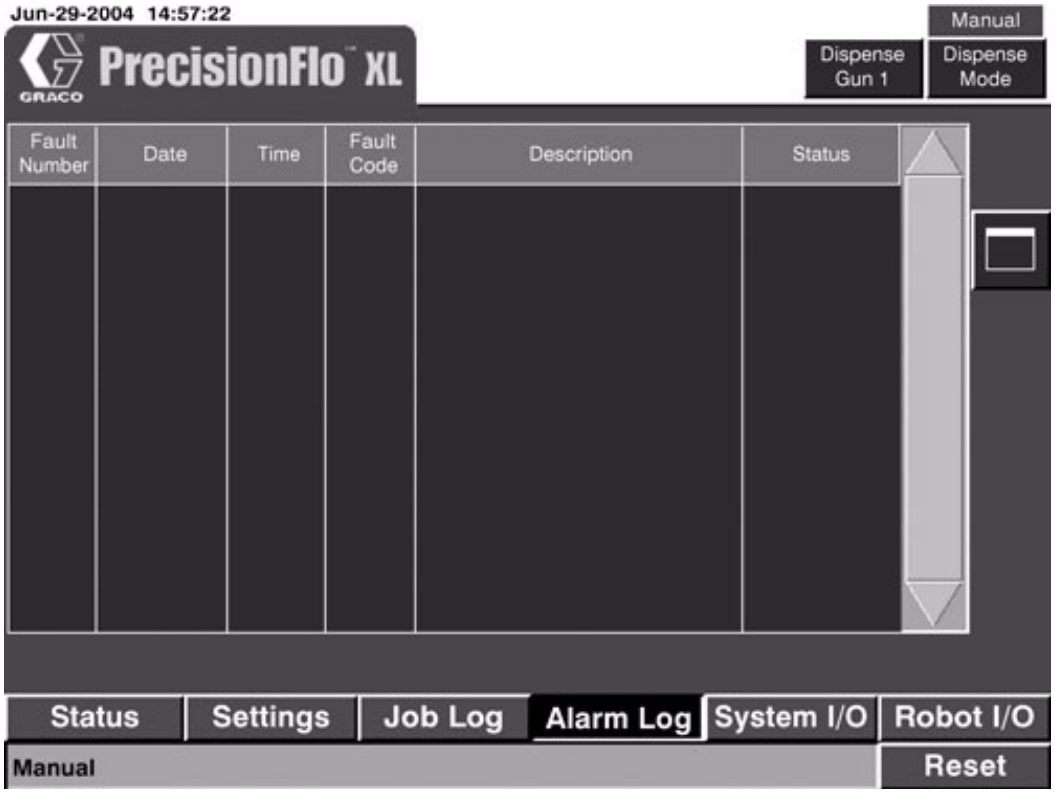


Fig. 61

The PrecisionFlo XL writes a record to a data log each time a fault occurs or is cleared. The last 1000 fault log entries are displayed. To view the last 2500 entries, press the Maximize Button .

System I/O – Input Screen

Fig. 62

System I/O – Output Screen

Fig. 63

Notes

Robot I/O – Input Screen

Fig. 64

Robot I/O – Output Screen

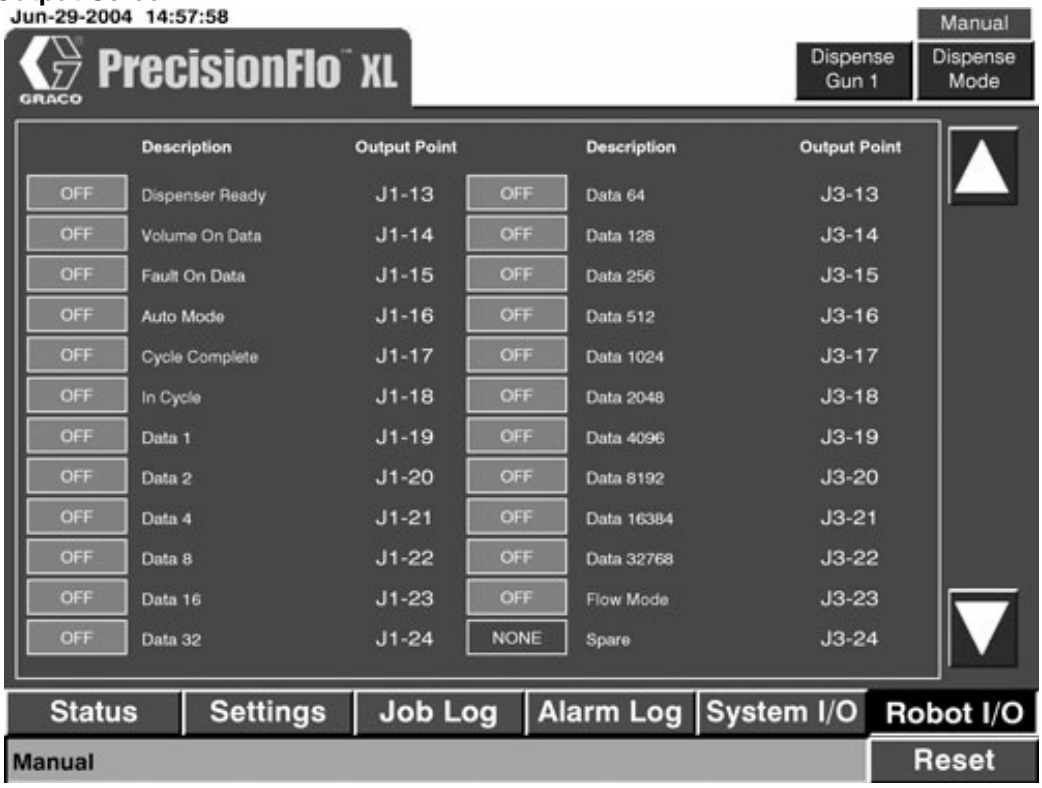


Fig. 65

Robot I/O Interface

Table 37—Robot Interface Analog Inputs to the PrecisionFlo XL

Refer to page 104 for more information on analog signals.

Signal Name	Wire	Board ID	Cable	Signal Description
Analog Flow Command 1	3280	J1–21	RAR–1	Robot speed command for Fluid Control plate 1.
Analog Common		J1–10	RAR–2	Robot speed command 1 common.
Analog Flow Command 2	3290	J1–22	RAR–3	Robot speed command for Fluid Control plate 2.
Analog Common		J1–12	RAR–4	Robot speed command 2 common.
Swirl Speed Command 1	3220	J1–17	RAR–5	Swirl speed command for orbiter 1.
Analog Common	3110	J1–7	RAR–6	Swirl speed 1 common.
Swirl Speed Command 2	3230	J1–18	RAR–7	Swirl speed command for orbiter 2.
Analog Common		J1–8	RAR–8	Swirl speed 2 common.

Table 38—Robot Interface Digital Inputs to the PrecisionFlo XL

Your controller must have either a 24 VDC or 120 VAC I/O card to receive this input. See page 104 for more information on digital inputs.

Signal Name	Wire	Board ID	Cable	Signal Description
Dispense Gun 1	8170	J4–13	RDR–A1	When this signal is applied, Dispense Gun 1 opens.
Dispense Gun 2	8180	J4–14	RDR–A2	When this signal is applied, Dispense Gun 2 opens.
Request Volume	8190	J4–15	RDR–A3	This signal requests that the volume move to the data bits. The signal must remain on HIGH until the bits are read.
Fault Reset	8200	J4–16	RDR–A4	This signal acknowledges/resets a fault in the controller.
Initiate Style	8210	J4–17	RDR–A5	This signal takes information on the style bits and uses the number for the next job. The signal must remain on HIGH for 50 msec prior to start of job.
Job Complete / Measure Volume	8220	J4–18	RDR–A6	When this signal is HIGH and robot I/O is selected for the job end, the dispense job is ended and volume is calculated.
Swirl Enable 1	8230	J4–19	RDR–A7	When this signal is applied, the PrecisionSwirl 1 orbits.
Swirl Enable 2 ‡	8240	J4–20	RDR–A8	When this signal is applied, the PrecisionSwirl 2 orbits.
Style 1	8250	J4–21	RDR–A9	Style bit #1
Style 2	8260	J4–22	RDR–A10	Style bit #2
Style 4	8270	J4–23	RDR–A11	Style bit #4
Style 8	8280	J4–24	RDR–A12	Style bit #8
Style 16	8670	J5–13	RDR–A13	Style bit #16
Low Speed	8680	J5–14	RDR–A14	When this signal is HIGH and digital robot mode is selected, the PrecisionFlo XL will default to a preset Low Speed setting in the controller.
Med Speed	8690	J5–15	RDR–A15	When this signal is HIGH and digital robot mode is selected, the PrecisionFlo XL will default to a preset Medium Speed setting in the controller.
High Speed	8700	J5–16	RDR–A16	When this signal is HIGH and digital robot mode is selected, the PrecisionFlo XL will default to a preset High Speed setting in the controller.
Remote Start	8710	J5–17	RDR–B1	When HIGH, this signal starts the controller. The signal is normally LOW.
Remote Stop	8720	J5–18	RDR–B2	When LOW, the controller will stop. The signal is normally HIGH.
Remote Temp Enable	8730	J5–19	RDR–B3	HIGH signal enables the temperature control.
Spare 1	8740	J5–20	RDR–B4	Spare
Spare 2	8750	J5–21	RDR–B5	Spare
Spare 3	8760	J5–22	RDR–B6	Spare
Spare 4	8770	J5–23	RDR–B7	Spare
Spare 5	8780	J5–24	RDR–B8	Spare

‡ For a system with two fluid plates and only one PrecisionSwirl, Swirl Enable 1 is used even if the single PrecisionSwirl is for Fluid Plate 2.

Table 39—Robot Interface Digital Outputs from the PrecisionFlo XL

See page 104 for more information on digital outputs.

Signal Name	Wire	Board ID	Cable	Signal Description
L1	2190	J1–1	RDR–B9	Interface power (24 VDC or 120 VAC, depending on board).
L2	2131	J4–1	RDR–B10	Interface neutral (24 VDC common or 120 VAC neutral).
Dispenser Ready	7170	J1–13	RDR–C1	This signal is HIGH when system is Ready.
Volume on Data	7180	J1–14	RDR–C2	This signal is HIGH when data bits contain volume data.
Fault on Data	7190	J1–15	RDR–C3	This signal is HIGH when a fault exists in the controller and data bits contain fault code data.
Auto Mode	7200	J1–16	RDR–C4	This signal is HIGH when the controller is in automatic mode.
Cycle Complete	7210	J1–17	RDR–C5	This output signal is HIGH when system is not dispensing.
In Cycle	7220	J1–18	RDR–C6	This output signal is HIGH when system is dispensing.
Data 1*	7230	J1–19	RDR–C7	These signals pass volume and fault information.
Data 2*	7240	J1–20	RDR–C8	These signals pass volume and fault information.
Data 4*	7250	J1–21	RDR–C9	These signals pass volume and fault information.
Data 8*	7260	J1–22	RDR–C10	These signals pass volume and fault information.
Data 16*	7270	J1–23	RDR–C11	These signals pass volume and fault information.
Data 32*	7280	J1–24	RDR–C12	These signals pass volume and fault information.
Data 64*	7680	J3–13	RDR–C13	These signals pass volume and fault information.
Data 128*	7690	J3–14	RDR–C14	These signals pass volume and fault information.
Data 256*	7700	J3–15	RDR–C15	These signals pass volume and fault information.
Data 512*	7710	J3–16	RDR–C16	These signals pass volume and fault information.
Data 1024*	7720	J3–17	RDR–D1	These signals pass volume and fault information.
Data 2048*	7730	J3–18	RDR–D2	These signals pass volume and fault information.
Data 4096*	7740	J3–19	RDR–D3	These signals pass volume and fault information.
Data 8192*	7750	J3–20	RDR–D4	These signals pass volume and fault information.
Data 16384*	7760	J3–21	RDR–D5	These signals pass volume and fault information.
Data 32768*	7770	J3–22	RDR–D6	These signals pass volume and fault information.
Flow Mode	7780	J3–23	RDR–D7	This signal is high when flow control mode is selected.
Sealer Stop to Robot	2680	N/A	RDR–D15	Contact used to detect PrecisionFlo E–Stop.
Sealer Stop to Robot	2681	N/A	RDR–D16	Contact used to detect PrecisionFlo E–Stop.

*See the following page for fault codes.

Table 40—Fault Codes

Bit Description	Fault Code	Fault Description	Level
Dispenser Stop	1	MCR/PCR is not energized	Alarm
Drive Fault 1	2	Linear motor amplifier board fault	Alarm
Spare	3	Spare	–
Motor Over Temp 1	4	Linear motor above 90 degrees C or sensor open	Alarm
Spare	5	Spare	–
High Volume	6	Actual Volume > Requested Volume + (Requested Volume x % Tolerance)	Alarm or Warning
Setup Values Changed	7	Setup values were changed	Alarm or Warning
Low Volume	8	Actual Volume < Requested Volume – (Requested Volume x % Tolerance)	Alarm or Warning
Spare	9	Spare	–
No Flow 1	10	No flow meter pulses detected with regulator 1 dispensing	Alarm or Warning
No Flow 2	11	No flow meter pulses detected with regulator 2 dispensing	Alarm or Warning
High Outlet Pressure 1	12	Outlet Pressure 1 > Maximum Outlet Pressure 1 for one second	Alarm or Warning
High Outlet Pressure 2	13	Outlet Pressure 2 > Maximum Outlet Pressure 2 for one second	Alarm or Warning
Low Outlet Pressure 1	14	Outlet Pressure 1 < Minimum Outlet Pressure 1 for one second	Alarm or Warning
Low Outlet Pressure 2	15	Outlet Pressure 2 < Minimum Outlet Pressure 2 for one second	Alarm or Warning
High Inlet Pressure 1	16	Inlet Pressure 1 > Maximum Inlet Pressure 1 for one second	Alarm or Warning
High Inlet Pressure 2	17	Inlet Pressure 2 > Maximum Inlet Pressure 2 for one second	Alarm or Warning
Low Inlet Pressure 1	18	Inlet Pressure 1 < Minimum Inlet Pressure 1 for one second	Alarm or Warning
Low Inlet Pressure 2	19	Inlet Pressure 2 < Minimum Inlet Pressure 2 for one second	Alarm or Warning
OP Cable Open 1	20	Operations cable to regulator 1 fluid plate disconnected	Alarm
OP Cable Open 2	21	Operations cable to regulator 2 fluid plate disconnected	Alarm
Swirl Fault 1	22	Swirl 1 orbiter not rotating within speed range	Alarm or Warning
Swirl Fault 2	23	Swirl 2 orbiter not rotating within speed range	Alarm or Warning
Temp Not Within Limits	24	Temp conditioner zone out of set range	Alarm or Warning
Flow Calibration Error	25	Flow calibration could not be completed with current settings	Warning

Table 40—Fault Codes

Bit Description	Fault Code	Fault Description	Level
Volume Comp Limit 1	26	Regulator 1 peak volume compensation reached 25% or 400% limit	Alarm or Warning
Volume Comp Limit 2	27	Regulator 2 peak volume compensation reached 25% or 400% limit	Alarm or Warning
Computed Target	28	Requested volume outside of range from process volume	Alarm or Warning
Closed Gun Flow 1	29	Flow 1 > 1000 cc/min for 10 samples with gun 1 closed	Alarm
Closed Gun Flow 2	30	Flow 2 > 1000 cc/min for 10 samples with gun 2 closed	Alarm

Discrete Signals

Robot I/O Board shown

(inside PrecisionFlo XL control unit)

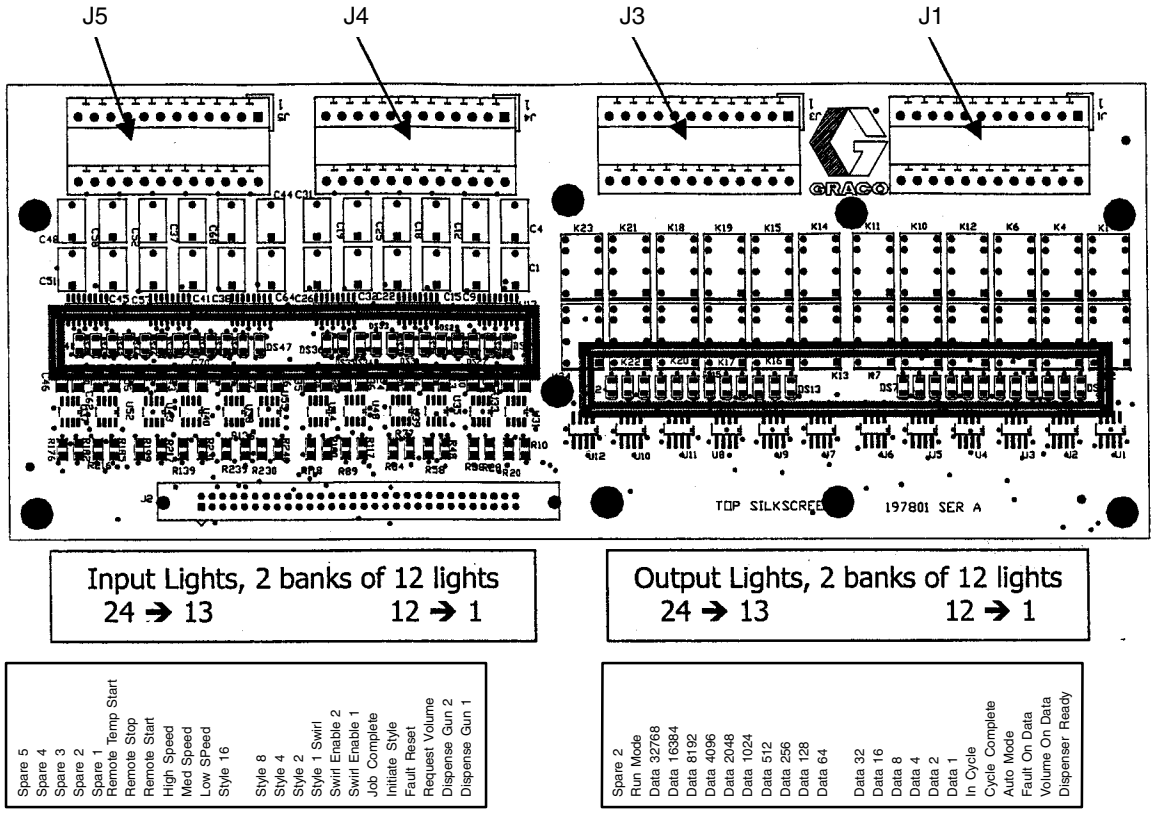


Fig. 66

Note: The transparent circuit board cover over the discrete I/O board in the control box, identifies the location of the LEDs.

Serial Robot I/O

When DeviceNet, InterBus, Profibus or ControlNet is selected for the robot I/O interface, the unit is shipped with the appropriate I/O card. Detailed information regarding the I/O cards (AnyBus) is available at the web site www.222.anybus.com.

The PrecisionFlo XL ECB communicates to the Any-Bus I/O card with a parallel bus. The configuration of the PrecisionFlo XL I/O data can be modified by adding jumpers to the SIO connector J8.

The default data format for values larger than 8 bits is Big Endian. By adding a jumper from +5 VDC to SIO J8 pin 20, the data format is changed to Little Endian.

The input data size is 16 bytes (128 bits). The default output data size is also 16 bytes. The output data size can be increased to 48 bytes (384 bits) by adding a jumper from +5 VDC to SIO J8 pin 19. See the detailed data map (Table 41) for more information regarding the PrecisionFlo XL data structure.

All AnyBus cards are slave devices and contain the required connectors for integrating the card into the device network. Details regarding the DeviceNet AnyBus card are provided here as an example.

DeviceNet Connector

- Fieldbus interface connection
- Five pin connector, 5.08 mm spacing

Pin	Signal	Description
1	V –	Negative of supply voltage (common)
2	CAN_L	CAN_L bus line
3	SHIELD	Cable shield connection point
4	CAN_H	CAN_H bus line
5	V +	Positive of supply voltage (24 VDC)

DeviceNet Connector

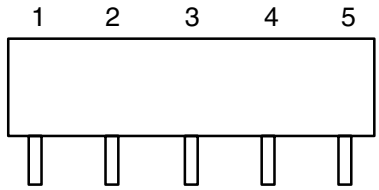


Fig. 67

Configuration Switches

- Used to set baud rate and Mac ID (node number)
- Switches 1 and 2 are used to configure the baud rate
- Switches 3 through 8 are used to configure the Mac ID

Baud Rate	Switch 1	Switch 2
125k	OFF	OFF
250k	OFF	ON
500k	ON	OFF
(reserved)	ON	ON

Configuration Switches

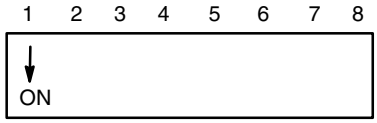


Fig. 68

Mac ID	Switch 3 (MSB)	Switch 4	Switch 5	Switch 6	Switch 7	Switch 8 (LSB)
0	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	ONM	OFF
3	OFF	OFF	OFF	OFF	ON	ON
—	—	—	—	—	—	—
62	ON	ON	ON	ON	ON	OFF
63	ON	ON	ON	ON	ON	ON

Status Indicators

- LEDs 2 and 3 indicate run time status and errors
- LEDs 1 and 4 are reserved for future use

LED 2 – Network Status

State	Description
Off	Not powered, not online
Green, steady	Link OK, online, connected
Green, flashing	Online, not connected
Red, steady	Critical link failure
Red, flashing	Connection timeout

LED 3 – Module Status

State	Description
Off	No power to device
Green, steady	Device operational
Green, flashing	Data size larger than configure
Red, steady	Unrecoverable fault
Red, flashing	Minor fault

Status Indicators

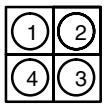


Fig. 69

Table 41—Data Map Precision Flo XL to Robot, Little Endian Format

16 or 48 bytes of data from the PrecisionFlo XL to the robot Little Endian format +5 VDC jumper to SIO J8, pin 20							
Byte	**Node Address**	**PrecisionFlo XL Variable**	**Units**	**Byte**	**Node Address**	**PrecisionFlo XL Variable**	**Units**
0	N10I01	dispense ready		9	N10I71	actual swirl speed 2–64	
	N10I02	in cycle			N10I72	actual swirl speed 2–128	
	N10I03	volume on data		10	N10I73	actual swirl speed 2–256	RPM
	N10104	major_fault	System Alarm		N10174	actual swirl speed 2–512	
	N10I05	minor_fault	System Warning		N10I75	actual swirl speed 2–1024	
					N10I76	actual swirl speed 2–2048	
	N10I06				N10I77	actual swirl speed 2–4096	
	N10I07	automatic_mode			N10I78	actual swirl speed 2–8192	
	N10I08	manual_mode			N10I79	actual swirl speed 2–16384	
1	N10I09				N10I80	actual swirl speed 2–32768	
	N10I10			11–12	N10I81–96		
	N10I11	cycle complete		13–14	N10I97–112		
	N10I12	fault on data		15	N10I113	pressure units	0=bar, 1=PSI
	N10I13				N10I114	temp units	0=deg C, 1=deg F
	N10I14						
	N10I15				N10I115	flow mode	0=pressure, 1=flow
	N10I16						
2	N10I17–24				N10I116		
3	N10I25–32				N10I117		
4	N10I33	Data Bus – 1			N10I118		
	N10I34	Data Bus – 2			N10I119		
	N10I35	Data Bus – 4			N10I120		
	N10I36	Data Bus – 8		16	N10I121–128		
	N10I37	Data Bus – 16		If no jumper installed at SIO J8, pin 19, the output data size is 16 bytes			
	N10I38	Data Bus – 32		If +5VDC is jumpered to SIO J8, pin 19, the output data size is 48 bytes			
	N10I39	Data Bus – 64		17	N10I129–136	inlet pressure 1 – low byte	*
	N10I40	Data Bus – 128		18	N10I137–144	inlet pressure 1 – high byte	
5	N10I41	Data Bus – 256		19	N10I145–152	inlet pressure 2 – low byte	*
	N10I42	Data Bus – 512		20	N10I153–160	inlet pressure 2 – high byte	
	N10I43	Data Bus – 1024		21	N10I161–168	outlet pressure 1 – low byte	*
	N10I44	Data Bus – 2048		22	N10I169–176	outlet pressure 1 – high byte	
	N10I45	Data Bus – 4096		23	N10I177–184	outlet pressure 2 – low byte	*
	N10I46	Data Bus – 8192		24	N10I185–192	outlet pressure 2 – high byte	
	N10I47	Data Bus – 16384		25	N10I193–200	desired pressure 1 – low byte	*
	N10I48	Data Bus – 32768		26	N10I201–208	desired pressure 1 – high byte	
6	N10I49	actual swirl speed 1–1	RPM	27	N10I209–216	desired pressure 2 – low byte	*
	N10I50	actual swirl spped 1–2		28	N10I217–224	desired pressure 2 – high byte	
	N10I52	actual swirl speed 1–4		29	N10I225–232	flow rate command 1 – low byte	cc/min
	N10I52	actual swirl speed 1–8		30	N10I233–240	flow rate command 1 – high byte	
	N10I53	actual swirl spped 1–16		31	N10I241–248	flow rate command 2 – low byte	cc/min
	N10I54	actual swirl speed 1–32		32	N10I249–256	flow rate command 2 – high byte	
	N10I55	actual swirl speed 1–64		33	N10I257–264	flow rate 1 – low byte	cc/min
	N10I56	actual swirl speed 1–128		34	N10I265–272	flow rate 1 – high byte	
7	N10I57	actual swirl speed 1–256	RPM	35	N10I273–280	flow rate 2 – low byte	cc/min
	N10I58	actual swirl speed 1–512		36	N10I281–288	flow rate 2 – high byte	
	N10I59	actual swirl speed 1–1024		37	N10I289–296	swirl speed cmd 1 – low byte	RPM
	N10I60	actual swirl speed 1–2048		38	N10I297–304	swirl speed cmd 1 – high byte	
	N10I61	actual swirl speed 1–4096		39	N10I305–312	swirl speed cmd 2 – low byte	RPM
	N10I62	actual swirl speed 1–8192		40	N10I313–320	swirl speed cmd 2 – high byte	
	N10I63	actual swirl speed 1–16384		41	N10I321–328	zone 1 temp – low byte	**
	N10I64	actual swirl speed 2–32768		42	N10I329–336	zone 1 temp – high byte	
8	N10I65	actual swirl speed 2–1	RPM	43	N10I337–344	zone 2 temp – low byte	**
	N10I66	actual swirl speed 2–2		44	N10I345–352	zone 2 temp – high byte	
	N10I67	actual swirl speed 2–4		45	N10I353–360	zone 3 temp – low byte	**
	N10I68	actual swirl speed 2–8		46	N10I361–368	zone 3 temp – high byte	
	N10I69	actual swirl speed 2–16		47	N10I369–376	zone 4 temp – low byte	**
	N10I70	actual swirl speed 2–32		48	N10I377–384	zone 4 temp – high byte	

* *See N10I113 for units*

** *See N10I114 for units*

Note: For Interbus, the cyclic data is always 16 bytes. For bytes 17–48, PCP messaging must be used. Not all master/scanner cards support 48 bytes. For these cases use the 16 byte output data size.

Table 42—Robot I/O to PrecisionFlo, Little Endian Format

16 bytes of data from the robot to the PrecisionFlo XL Little Endian format; +5VDC jumpered to SIO J8, pin 20			
Byte	**Node Address**	**Use in our system**	**Notes**
	(i.e. Node 10)		
0	N10:O01	style 1	
	N10:O02	style 2	
	N10:O03	style 4	
	N10:O04	style 8	
	N10:O05	style 16	
	N10:O06		
	N10:O07		
	N10:O08	Initiate Style	
1	N10:O09	gun_1_on	
	N10:O10	gun_2_on	
	N10:O11	swirl_1_on	
	N10:O12	swirl_2_on	
	N10:O13		
	N10:O14		
	N10:O15	job complete	
	N10:O16	remote_start	
2	N10:O17	request_volume	
	N10:O18	fault_reset	
	N10:O19	remote_stop	must be set to 1 if not used
	N10:O20		
	N10:O21		
	N10:O22		
	N10:O23		
	N10:O24		
3	N10:O25		
	N10:O26		
	N10:O27		
	N10:O28		
	N10:O29		
	N10:O30		
	N10:O31		
	N10:O32		
4	N10:O33	flow_command_1_1	_1 indicates a value of one. The range of the flow command is 0–1023 for 0–100% (0–10.0 VDC equvalent)
	N10:O34	flow_command_1_2	
	N10:O35	flow_command_1_4	
	N10:O36	flow_command_1_8	
	N10:O37	flow_command_1_16	
	N10:O38	flow_command_1_32	
	N10:O39	flow_command_1_64	
	N10:O40	flow_command_1_128	
5	N10:O41	flow_command_1_256	
	N10:O42	flow_command_1_512	
	N10:O43		Reserved, do not use, must be set to zero
	N10:O44		
	N10:O45		
	N10:O46		
	N10:O47		
	N10:O48		
6	N10:O49	flow_command_2_1	_2 indicates a value of two. The range of the flow command is 0–1023 for 0–100% (0–10.0 VDC equvalent)
	N10:O50	flow_command_2_2	
	N10:O51	flow_command_2_4	
	N10:O52	flow_command_2_8	
	N10:O53	flow_command_2_16	
	N10:O54	flow_command_2_32	
	N10:O55	flow_command_2_64	
	N10:O56	flow_command_2_128	
7	N10:O57	flow_command_2_256	
	N10:O58	flow_command_2_512	

Byte	Node Address	Use in our system	Notes
	N10:O59		Reserved, do not use, must be set to zero
	N10:O60		
	N10:O61		
	N10:O62		
	N10:O63		
	N10:O64		
8	N10:O65	swirl_command_1_1	_1 indicates a value of one. The range of the flow command is 0–1023 for 0–100% (0–10.0 VDC equvalent)
	N10:O66	swirl_command_1_2	
	N10:O67	swirl_command_1_4	
	N10:O68	swirl_command_1_8	
	N10:O69	swirl_command_1_16	
	N10:O70	swirl_command_1_32	
	N10:O71	swirl_command_1_64	
	N10:O72	swirl_command_1_128	
9	N10:O73	swirl_command_1_256	
	N10:O74	swirl_command_1_512	
	N10:O75		Reserved, do not use, must be set to zero
	N10:O76		
	N10:O77		
	N10:O78		
	N10:O79		
	N10:O80		
10	N10:O81	swirl_command_2_1	_2 indicates a value of two. The range of the flow command is 0–1023 for 0–100% (0–10.0 VDC equvalent)
	N10:O82	swirl_command_2_2	
	N10:O83	swirl_command_2_4	
	N10:O84	swirl_command_2_8	
	N10:O85	swirl_command_2_16	
	N10:O86	swirl_command_2_32	
	N10:O87	swirl_command_2_64	
	N10:O88	swirl_command_2_128	
11	N10:O89	swirl_command_2_256	
	N10:O90	swirl_command_2_512	
	N10:O91		Reserved, do not use, must be set to zero
	N10:O92		
	N10:O93		
	N10:O94		
	N10:O95		
	N10:O96		
12	N10:O97		spare_4
	N10:O98		spare_3
	N10:O99		spare_2
	N10:O100		spare_1
	N10:O101	remote_temp_enable	must be set to 1 if not used
	N10:O102	high_speed	
	N10:O103	medium_speed	
	N10:O104	low_speed	
13	N10:O105–O112		spare_byte_1
14–15	N10:O113–O128		spare_word_1
	= Not Used		

Table 43—Data Map Precision Flo XL to Robot, Big Endian Format

16 or 48 bytes of data from the PrecisionFlo XL to the robot Big Endian format no jumper to SIO J8, pin 20							
Byte	**Node Address**	**PrecisionFlo XL Variable**	**Units**	**Byte**	**Node Address**	**PrecisionFlo XL Variable**	**Units**
0	N10I01	dispense ready		9	N10I71	actual swirl speed 2–16384	
	N10I02	in cycle			N10I72	actual swirl speed 2–32768	
	N10I03	volume on data		10	N10I73	actual swirl speed 2–1	RPM
	N10104	major_fault	System Alarm		N10174	actual swirl speed 2–2	
	N10I05	minor_fault	System Warning		N10I75	actual swirl speed 2–4	
					N10I76	actual swirl speed 2–8	
	N10I06				N10I77	actual swirl speed 2–16	
	N10I07	automatic_mode			N10I78	actual swirl speed 2–32	
	N10I08	manual_mode			N10I79	actual swirl speed 2–64	
1	N10I09				N10I80	actual swirl speed 2–128	
	N10I10			11–12	N10I81–96		
	N10I11	cycle complete		13–14	N10I97–112		
	N10I12	fault on data		15	N10I113	pressure units	0=bar, 1=PSI
	N10I13				N10I114	temp units	0=deg C, 1=deg F
	N10I14						
	N10I15				N10I115	flow mode	0=pressure, 1=flow
	N10I16						
2	N10I17–24				N10I116		
3	N10I25–32				N10I117		
4	N10I33	Data Bus – 256			N10I118		
	N10I34	Data Bus – 512			N10I119		
	N10I35	Data Bus – 1024			N10I120		
	N10I36	Data Bus – 2048		16	N10I121–128		
	N10I37	Data Bus – 4096		If no jumper installed at SIO J8, pin 19, the output data size is 16 bytes			
	N10I38	Data Bus – 8192		If +5VDC is jumpered to SIO J8, pin 19, the output data size is 48 bytes			
	N10I39	Data Bus – 16384		17	N10I129–136	inlet pressure 1 – high byte	*
	N10I40	Data Bus – 32768		18	N10I137–144	inlet pressure 1 – low byte	
5	N10I41	Data Bus – 1		19	N10I145–152	inlet pressure 2 – high byte	*
	N10I42	Data Bus – 2		20	N10I153–160	inlet pressure 2 – low byte	
	N10I43	Data Bus – 4		21	N10I161–168	outlet pressure 1 – high byte	*
	N10I44	Data Bus – 8		22	N10I169–176	outlet pressure 1 – low byte	
	N10I45	Data Bus – 16		23	N10I177–184	outlet pressure 2 – high byte	*
	N10I46	Data Bus – 32		24	N10I185–192	outlet pressure 2 – low byte	
	N10I47	Data Bus – 64		25	N10I193–200	desired pressure 1 – high byte	*
	N10I48	Data Bus – 128		26	N10I201–208	desired pressure 1 – low byte	
6	N10I49	actual swirl speed 1–256	RPM	27	N10I209–216	desired pressure 2 – high byte	*
	N10I50	actual swirl spped 1–512		28	N10I217–224	desired pressure 2 – low byte	
	N10I52	actual swirl speed 1–1024		29	N10I225–232	flow rate command 1 – high byte	cc/min
	N10I52	actual swirl speed 1–2048		30	N10I233–240	flow rate command 1 – low byte	
	N10I53	actual swirl spped 1–4096		31	N10I241–248	flow rate command 2 – high byte	cc/min
	N10I54	actual swirl speed 1–8192		32	N10I249–256	flow rate command 2 – low byte	
	N10I55	actual swirl speed 1–16384		33	N10I257–264	flow rate 1 – high byte	cc/min
	N10I56	actual swirl speed 1–32768		34	N10I265–272	flow rate 1 – low byte	
7	N10I57	actual swirl speed 1–1	RPM	35	N10I273–280	flow rate 2 – high byte	cc/min
	N10I58	actual swirl speed 1–2		36	N10I281–288	flow rate 2 – low byte	
	N10I59	actual swirl speed 1–4		37	N10I289–296	swirl speed cmd 1 – high byte	RPM
	N10I60	actual swirl speed 1–8		38	N10I297–304	swirl speed cmd 1 – low byte	
	N10I61	actual swirl speed 1–16		39	N10I305–312	swirl speed cmd 2 – high byte	RPM
	N10I62	actual swirl speed 1–32		40	N10I313–320	swirl speed cmd 2 – low byte	
	N10I63	actual swirl speed 1–64		41	N10I321–328	zone 1 temp – high byte	**
	N10I64	actual swirl speed 2–128		42	N10I329–336	zone 1 temp – low byte	
8	N10I65	actual swirl speed 2–256	RPM	43	N10I337–344	zone 2 temp – high byte	**
	N10I66	actual swirl speed 2–512		44	N10I345–352	zone 2 temp – low byte	
	N10I67	actual swirl speed 2–1024		45	N10I353–360	zone 3 temp – high byte	**
	N10I68	actual swirl speed 2–2048		46	N10I361–368	zone 3 temp – low byte	
	N10I69	actual swirl speed 2–4096		47	N10I369–376	zone 4 temp – high byte	**
	N10I70	actual swirl speed 2–8192		48	N10I377–384	zone 4 temp – low byte	

* *See N10I113 for units*

** *See N10I114 for units*

Note: For Interbus, the cyclic data is always 16 bytes. For bytes 17–48, PCP messaging must be used. Not all master/scanner cards support 48 bytes. For these cases use the 16 byte output data size.

Table 44—Robot I/O to PrecisionFlo, Big Endian Format

16 bytes of data from the robot to the PrecisionFlo XL Big Endian format; no jumper to SIO J8, pin 20			
Byte	**Node Address**	**Use in our system**	**Notes**
	(i.e. Node 10)		
0	N10:O01	style 1	
	N10:O02	style 2	
	N10:O03	style 4	
	N10:O04	style 8	
	N10:O05	style 16	
	N10:O06		
	N10:O07		
	N10:O08	Initiate Style	
1	N10:O09	gun_1_on	
	N10:O10	gun_2_on	
	N10:O11	swirl_1_on	
	N10:O12	swirl_2_on	
	N10:O13		
	N10:O14		
	N10:O15	job complete	
	N10:O16	remote_start	must be set to 1 if not used
2	N10:O17	request_volume	
	N10:O18	fault_reset	
	N10:O19	remote_stop	
	N10:O20		
	N10:O21		
	N10:O22		
	N10:O23		
	N10:O24		
3	N10:O25		
	N10:O26		
	N10:O27		
	N10:O28		
	N10:O29		
	N10:O30		
	N10:O31		
	N10:O32		
4	N10:O33	flow_command_1_256	
	N10:O34	flow_command_1_512	
	N10:O35		Reserved, do not use, must be set to zero
	N10:O36		
	N10:O37		
	N10:O38		
	N10:O39		
	N10:O40		
5	N10:O41	flow_command_1_1	_1 indicates a value of one. The range of the flow command is 0–1023 for 0–100% (0–10.0 VDC equvalent)
	N10:O42	flow_command_1_2	
	N10:O43	flow_command_1_4	
	N10:O44	flow_command_1_8	
	N10:O45	flow_command_1_16	
	N10:O46	flow_command_1_32	
	N10:O47	flow_command_1_64	
	N10:O48	flow_command_1_128	
6	N10:O49	flow_command_2_256	
	N10:O50	flow_command_2_512	
	N10:O51		Reserved, do not use, must be set to zero
	N10:O52		
	N10:O53		
	N10:O54		
	N10:O55		
	N10:O56		

Byte	Node Address	Use in our system	Notes
7	N10:O57	flow_command_2_1	_1 indicates a value of one. The range of the flow command is 0–1023 for 0–100% (0–10.0 VDC equvalent)
	N10:O58	flow_command_2_2	
	N10:O59	flow_command_2_4	
	N10:O60	flow_command_2_8	
	N10:O61	flow_command_2_16	
	N10:O62	flow_command_2_32	
	N10:O63	flow_command_2_64	
	N10:O64	flow_command_2_128	
8	N10:O65	swirl_command_1_256	
	N10:O66	swirl_command_1_512	
	N10:O67		Reserved, do not use, must be set to zero
	N10:O68		
	N10:O69		
	N10:O70		
	N10:O71		
	N10:O72		
9	N10:O73	swirl_command_1_1	_1 indicates a value of one. The range of the flow command is 0–1023 for 0–100% (0–10.0 VDC equvalent)
	N10:O74	swirl_command_1_2	
	N10:O75	swirl_command_1_4	
	N10:O76	swirl_command_1_8	
	N10:O77	swirl_command_1_16	
	N10:O78	swirl_command_1_32	
	N10:O79	swirl_command_1_64	
	N10:O80	swirl_command_1_128	
10	N10:O81	swirl_command_2_256	
	N10:O82	swirl_command_2_512	
	N10:O83		Reserved, do not use, must be set to zero
	N10:O84		
	N10:O85		
	N10:O86		
	N10:O87		
	N10:O88		
11	N10:O89	swirl_command_2_1	_1 indicates a value of one. The range of the flow command is 0–1023 for 0–100% (0–10.0 VDC equvalent)
	N10:O90	swirl_command_2_2	
	N10:O91	swirl_command_2_4	
	N10:O92	swirl_command_2_8	
	N10:O93	swirl_command_2_16	
	N10:O94	swirl_command_2_32	
	N10:O95	swirl_command_2_64	
	N10:O96	swirl_command_2_128	
12	N10:O97		spare_4
	N10:O98		spare_3
	N10:O99		spare_2
	N10:O100		spare_1
	N10:O101	remote_temp_enable	must be set to 1 if not used
	N10:O102	high_speed	
	N10:O103	medium_speed	
	N10:O104	low_speed	
13	N10:O105–O112		spare_byte_1
14–15	N10:O113–O128		spare_word_1
	= Not Used		

Table 45—PrecisionFlo XL I/O to Cell Controller

	Node Address	PrecisionFlo XL Variable	GM–RS4 Spec	Comments
Byte 0	N10I01	Dispenser Ready	dispense_ready	
	N10I02	In Cycle	dispense_in_process	
	N10I03	Volume on Data	volume_ok	
	N10I04	Major Fault	major_fault	
	N10I05	Minor Fault	minor_fault	
	N10I06	–	remote_start_in_process	
	N10I07	Automatic Mode	automatic_mode	
	N10I08	Manual Mode	manual_mode	
Byte 1	N10I09	–	de_pressurized	
	N10I10	–	drum_empty	
	N10I11	Cycle Complete	reserved	
	N10I12	Fault on Data	reserved	
	N10I13	–	shotmeter_full	
	N10I14	–	shotmeter_empty	
	N10I15	–	shotmeter_pressurized	
	N10I16	–	reserved	
Byte 2	N10I17	–	reserved	
	N10I18	–	felt_index_complete	
	N10I19	–	drip_check_complete	
	N10I20	–	clear_check_passed	
	N10I21	–	black_check_passed	
	N10I22	–	reserved	
	N10I23	–	reserved	
	N10I24	–	purge_request	
Byte 3	N10I25	–	reserved	
	N10I26	–	reserved	
	N10I27	–	reserved	
	N10I28	–	reserved	
	N10I29	–	reserved	
	N10I30	–	reserved	
	N10I31	–	reserved	
	N10I32	–	reserved	
Byte 4–5	N10I33–48	16 Bit Pflo XL Data Bus	–	Used for fault code and volume reporting
Byte 6–7	N10I49–64	Actual Swirl speed 1	–	Unsigned 16 bit integer; 0 to 24,000 RPM
Byte 8–9	N10I65–80	Actual Swirl speed 2	–	Unsigned 16 bit integer; 0 to 24,000 RPM
Byte 10–11	N10I81–96	spare_word_1	–	
Byte 12–13	N10I97–112	spare_word_2	–	
Byte 14–15	N10I113–128	spare_word_3	–	

Theory of Operation

Input and Output Signals

Terminology

For the purpose of this document a **digital signal** is said to be SET when voltage is present (or above the minimum threshold). A signal is said to be RESET when the signal voltage is not present (below minimum threshold). **Devices** are referred to as SET when they are in their energized or active state.

Digital Inputs

Dispense Gun 1

This is the Dispense Signal. The PrecisionFlo XL unit will attempt to dispense at either the commanded flow rate or commanded pressure while this signal is SET, dependent on mode.

Dispense Gun 2

This signal is used either independently or in conjunction with **Dispense Gun 1** when a second dispense valve is added to the system. For purposes of Dispense Cycle timing, operating both or either are considered a single dispense signal. For dispensing operations, an additional calibration point is added for **Dispense Gun 2**.

Request Volume

This signal is used to request the PrecisionFlo XL system to put the last logged volume on the data bus. The PrecisionFlo XL will SET the **Volume on data** signal when the data bus is ready to be read.

Fault Reset

This signal is used to clear a fault using the robot I/O.

Initiate Style

This input can be used to start a new dispense job.

Job Complete/Measure Volume

This input can be used to signal a job end.

Style Bits 1, 2, 4, 8, 16

These inputs are read at the start of a job to determine the selected style.

Low, Medium, High Speed

These are the digital robot flow commands.

Swirl Enable 1

This is the input signal to enable the optional swirl orbiter 1.

Swirl 2

This is the input signal to enable the optional swirl orbiter 2.

Remote Start

When HIGH, this signal starts the controller. The signal is normally LOW.

Remote Stop

When LOW, the controller will stop. The signal is normally HIGH.

Remote Temp Enable

HIGH signal enables the temperature control.

Digital Outputs

L1

Interface power (24 VDC or 120 VAC, depending on board).

L2

Interface neutral (24 VDC or 120 VAC neutral).

Dispenser Ready

This signal will be SET under the following conditions:

1. System is in automatic mode.
2. System does not have an active ALARM (Warnings have no effect).

Volume On Data

This signal is used in conjunction with Request Volume to indicate the data bus is ready to be read.

NOTE: This signal *does not* indicate a valid job or part.

Fault on Data

This bit is RESET under the following conditions:

1. System is in automatic mode.
2. No Faults (alarms or warnings) are active.

Auto Mode

This signal indicates if the PrecisionFlo XL system is in automatic mode.

In Cycle

In Cycle signal is set at the beginning of a dispense cycle. It is reset at the end of the dispense cycle. The dispense cycle can end in two ways, depending on how the Job End mode is set:

- If the Job End mode is set to Robot I/O, dispense cycle ends when the job complete signal is received from the Robot I/O.
- If the Job End mode is set to Timer, dispense cycle ends when the Job End delay timer expires.

Cycle Complete

Cycle Complete signal is reset at the beginning of a dispense cycle. It is set after the dispense cycle ends and no faults are present. If a fault is present at the end of a dispense cycle, the cycle complete signal is not set until the fault is cleared.

Data Bits 1, 2, 4, 8, 16, 32, 64, 128, 256, 512,1024, 2048, 4096, 8192, 16384, 32768

These bits should be read as a binary number. Data bits represent binary bits 0-9 respectively. All bits remain RESET until either a fault occurs (value represents the fault code) or a Volume Request sequence is initiated (value represents the volume in cubic centimeters).

Sealer Stop to Robot

Contact used to detect PrecisionFlo E–Stop.

Analog Signals

Robot Analog

The robot analog signal inputs represent flow or pressure requests. The voltage must be between 0 and 10 volts DC. The 0-10 volt signal is interpreted as a relative 0-100% flow or pressure command signal. The system must be in Analog Mode for this input to be active.

Swirl Analog

This analog signal is used by the optional swirl controls when the Swirl Mode is set to Automatic. 0-10V represents a 0 to 100% (6,600 to 24,000 RPM) Swirl Speed command.

NOTE: The minimum actual speed of the swirl motor is 6,600 RPM.

Interlocks

Temperature Fault

This interlock should be wired to a set of normally open “Dry Contacts” in the temperature controller. The contacts should be SET when the temperature control system is operational and at temperature. If this signal is not used, it must be jumpered.

NOTE: This signal is always a 24 VDC signal and should be wired as shown in the electrical schematic, manual 309364.

Remote Stop

This signal needs to be set by a robot controller to access the PrecisionFlo XL to function. When not set, this signal is the same as pressing the Stop button on the front of the controller. If this signal is not used it must be jumpered as shown in the electrical schematic, form no. 309364.

Operation Modes

Dispense Modes:

Manual Mode

When in Manual mode, the PrecisionFlo XL control remains in a ready state and reacts only to input from the user interface. The PrecisionFlo XL control ignores robotic controller signals when in Manual mode.

Automatic Mode

When in Automatic mode, the PrecisionFlo XL control remains in a ready state, indicated by the DISPENSER READY signal, and reacts to inputs such as DISPENSE and VOLUME REQUEST signals from the robot.

When a fault is detected, the PrecisionFlo XL control sets the FAULT ON DATA signal HIGH, and may set the DISPENSER READY signal LOW. Fault detection can also occur during manual dispensing. (See **Fault Handling** on page 111.)

During dispensing, the PrecisionFlo XL control performs a variety of functions in the background. These functions include fault monitoring, real-time volume compensation, measuring volume (per job), and continuous calculations to maintain the pressure and flow control loops.

Control Modes:

Pressure

The robot I/O or Manual dispense command and the psi/volt setting are used to set a pressure target. The regulator adjusts to maintain this pressure.

Flow

The robot I/O command for manual dispense establishes a Flow Rate target. A pressure setpoint is determined from the calibration results and the volume compensation values. The regulator adjusts to maintain the pressure setpoint, volume compensation will adjust the pressure setpoint to achieve the desired flow rate.

Robot I/O Modes:

Analog

0-10 VDC signal from the robot is used to determine the pressure or flow command. A 10 volt command in Flow Control Mode will establish a flow rate command equal to the value entered during the flow calibration procedure.

Digital

Three digital I/O signals (High, Medium, Low speed) are used to set three discrete commands. 0–100% is equivalent to 0–10 volt analog command. If no digital I/O signal is given, the system defaults to the Low speed value.

Swirl Modes:

Automatic

- Analog input is used to set swirl speed
- Robot I/O for activating swirl orbiter
- Robot Analog Swirl signal scaled by “Swirl Auto” setting. A swirl auto value of 50% would give a 5 V command to the swirl controller with a 10 V robot analog swirl signal

Manual

- Manual setting of swirl speed by the “Swirl Manual” variable on the settings screen. 0–100% sets 0–100% of swirl speed
- Swirl enable from robot I/O or PrecisionFlo XL Manual dispense
- PrecisionFlo manual dispense will activate swirl enable.

The PCR must be set (green light on) to enable the swirl controller

The swirl circuit board(s) and wiring are optional and only installed in models ordered with swirl capability.

The swirl fault is selectable as an Alarm or a Warning.

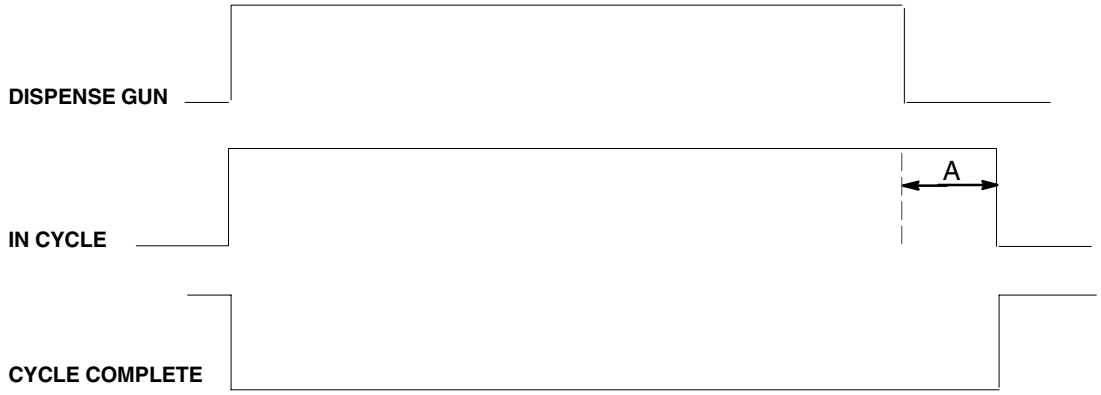
A swirl fault is generated if a swirl enable command is given to the swirl controller and the swirl orbiter does not orbit at the desired speed.

Typical Dispense Cycle

The **In Cycle** signal is set at the beginning of a dispense cycle, which starts with a **Dispense Gun** signal or **Initiate Style** signal from the robot. The style bits from the robot are read only at the beginning of the job.

Using Timer for Job End

If the Job End mode is set to Timer, the dispense cycle ends when the Job End delay timer expires and there are no faults present. The **Cycle Complete** signal is reset at the end of the dispense cycle.

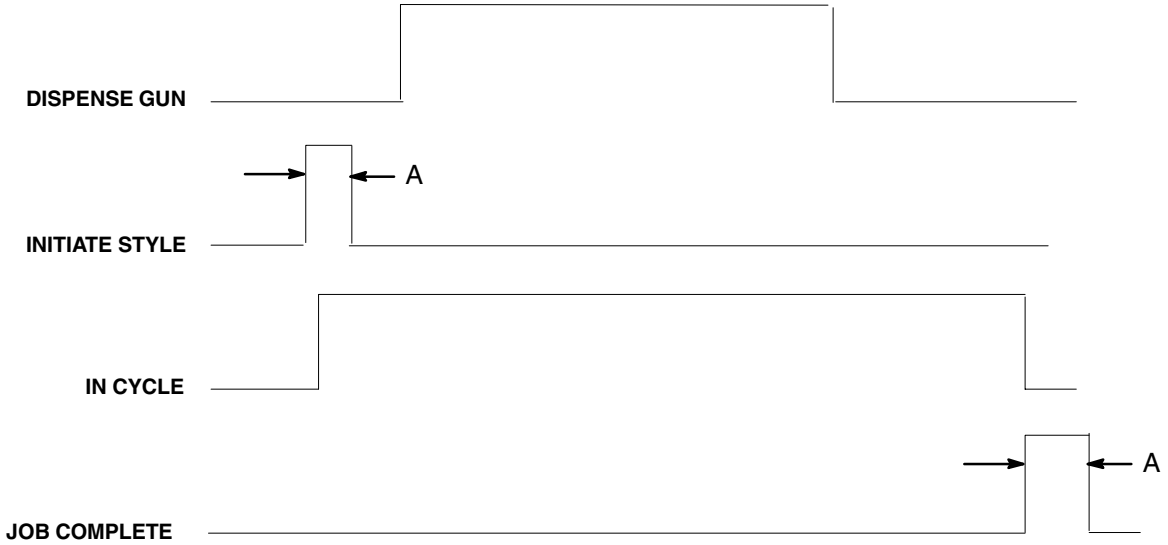


A = Dispense Done delay time, default is 4 seconds

Fig. 70

Using Robot I/O for Job End

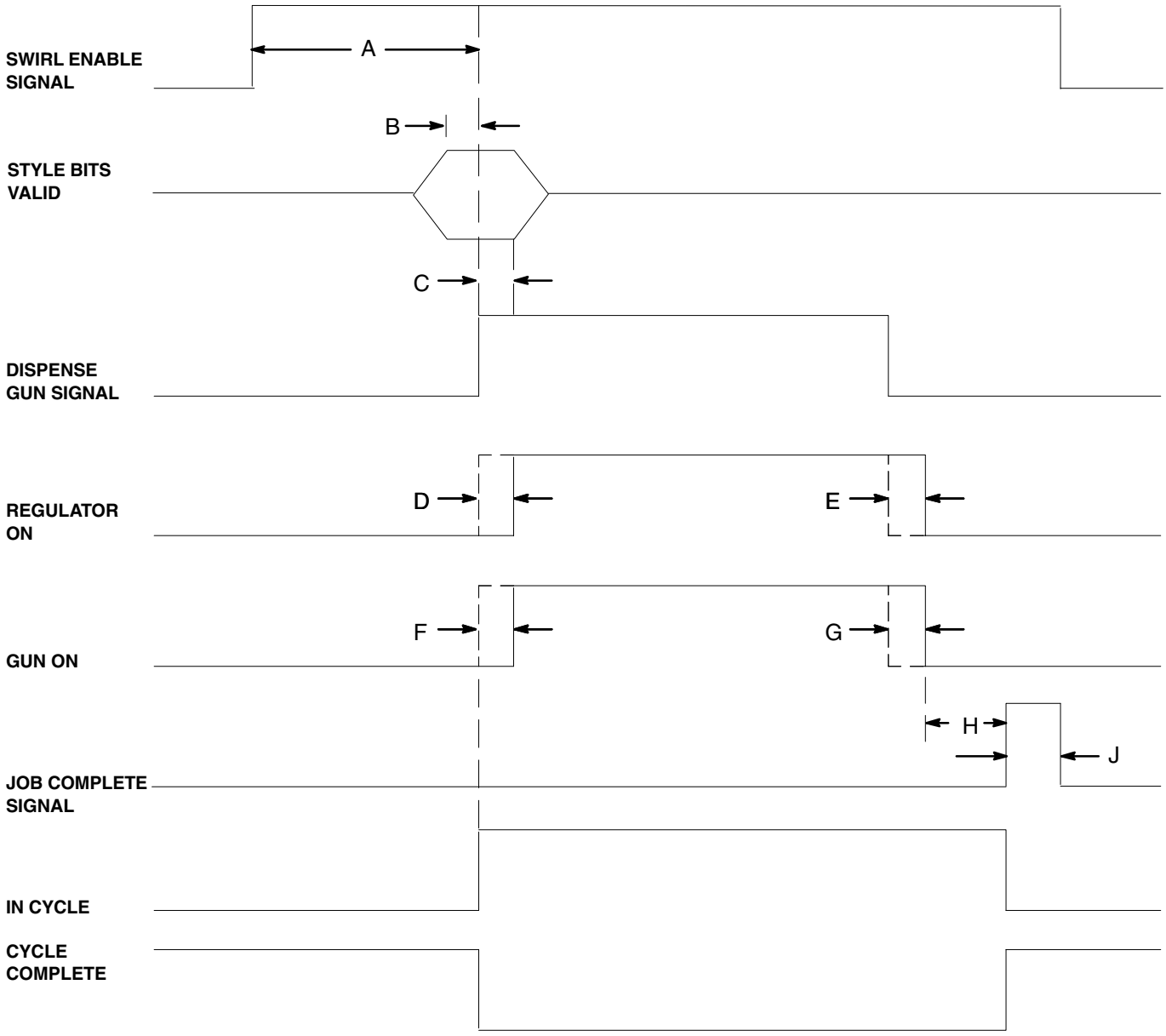
If the Job End mode is set to Robot I/O, the dispense cycle ends when the **Job Complete** signal is received from the Robot I/O. This is the recommended method to end a job, as an unexpected production stoppage in the middle of the dispense will not give a false Job End signal.



A = Minimum pulse width is 20 milliseconds

Fig. 71

Using Dispense Gun Signal for Job Start and Robot I/O for Job End



A = Swirl applicator acceleration time. A minimum of 4 seconds is recommended.

B = Style bits must be valid for a minimum of 10 msec before the job is started.

C = Style bits must remain valid for a minimum of 20 msec after the job is started.

D = Regulator On Delay.

E = Regulator Off Delay.

F = Gun On Delay.

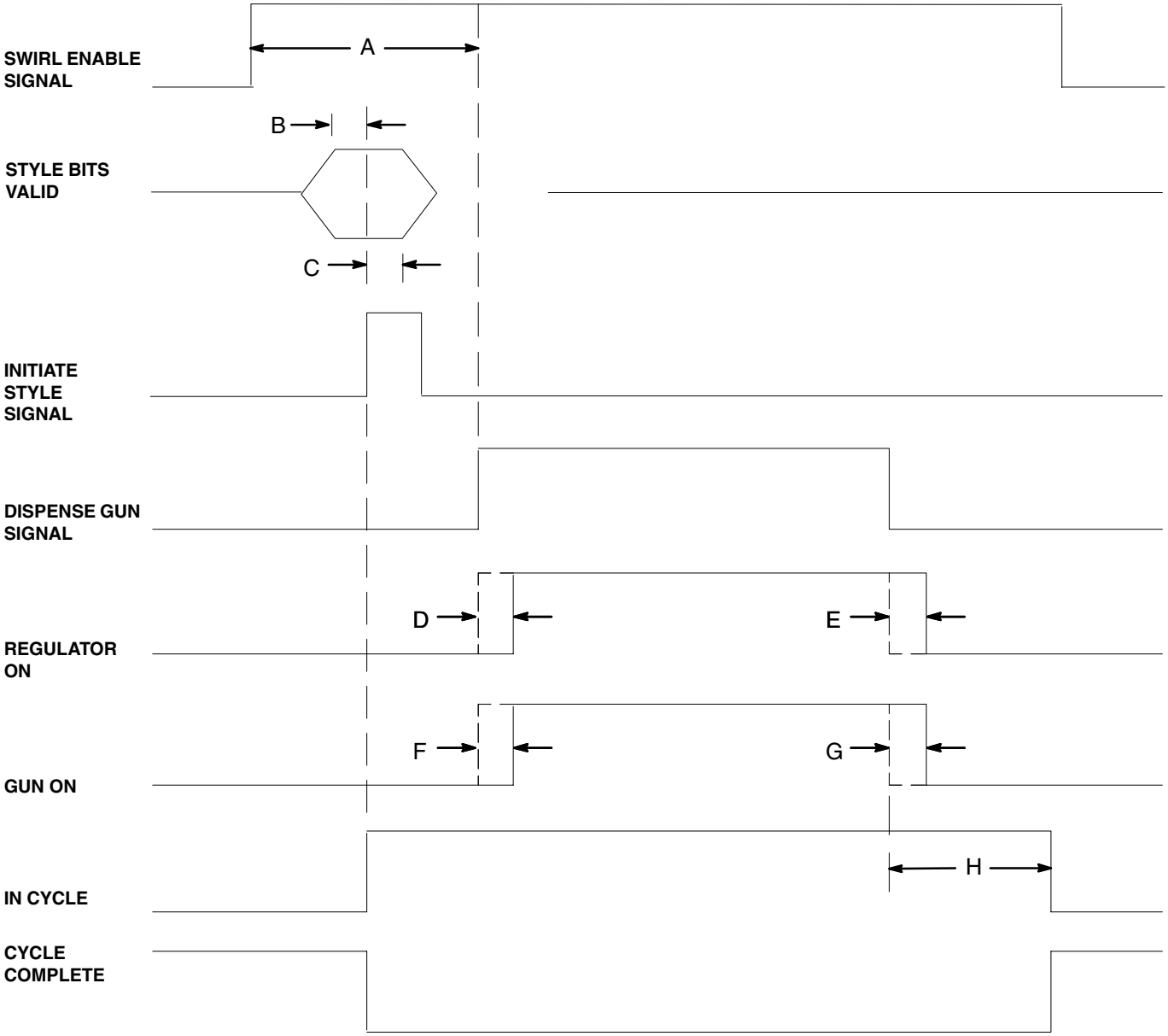
G = Gun Off Delay.

H = A minimum delay of 100 msec is required after all guns and regulators are off before the Job Complete signal is activated.

J = The minimum pulse width for the Job complete signal is 20 msec.

Fig. 72

Using Robot I/O for Job Start and Delay Timer for Job End



A = Swirl applicator acceleration time. A minimum of 4 seconds is recommended.

B = Style bits must be valid for a minimum of 10 msec before the job is started.

C = Style bits must remain valid for a minimum of 20 msec after the job is started. The minimum pulse width for the Initiate Style signal is also 20 msec.

D = Regulator On Delay.

E = Regulator Off Delay.

F = Gun On Delay.

G = Gun Off Delay.

H = Job End Delay time, default is 4 seconds.

Fig. 73

Typical Job Cycle

1. Robotic system controller verifies that the DISPENSER READY signal is HIGH.

2. Robotic system goes into cycle.

3. The robotic system raises the swirl enable signal to start the swirl applicator.

4. Robotic system controller places the style information on the style data bus.

5. PrecisionFlo XL control reads the style bits from the data bus. (Style Bits 1–16*)*

   Style bit data must be valid a minimum of 15 msec before DISPENSE or INITIATE STYLE is raised, and must remain valid for a minimum of 130 msec afterward.

6. PrecisionFlo XL control waits for DISPENSE signal from the robotic system to start dispensing.

7. Robotic system controller requests material to be dispensed by setting the DISPENSE signal HIGH.

8. PrecisionFlo XL control activates the closer solenoid, retracting the closer pneumatic cylinder. (This only occurs on models with the electric fluid regulator.)

9. Dispense gun opens after the GUN ON DELAY, immediately if the delay is set to zero.

10. PrecisionFlo XL control checks if a REGULATION ON DELAY has been set by the user.

    If the delay has been set, the PrecisionFlo XL control waits until the delay has expired, then begins regulating material to the gun.

    If the delay has not been set, the PrecisionFlo XL control immediately begins regulating material to the gun.

11. PrecisionFlo XL control regulates output based on the FLOW COMMAND input signal from the robot.

12. PrecisionFlo XL control measures the volume dispensed continuously.

13. PrecisionFlo XL control continuously monitors fluid pressures, and the flow rate as measured by the flow meter, and makes adjustments for changes in operating conditions.

14. PrecisionFlo XL control monitors operating parameters to detect and report any faults that may occur. (see Fault Handling on page 111.)

15. Robot sets the DISPENSE line LOW, indicating that no material is required during this portion of the program. (Robot can cycle the DISPENSE signal HIGH and LOW throughout a cycle if required. Volume measurement will still occur.)

16. The regulator closes after the REGULATOR OFF DELAY expires.

17. The PrecisionFlo XL control checks if a GUN OFF DELAY has been set by the user.

    If the delay has been set, the PrecisionFlo XL control waits until the delay has expired, then closes the dispense gun solenoid, which closes the gun.

    If the delay has not been set, the PrecisionFlo XL control immediately closes the dispense gun solenoid, which closes the gun.

18. PrecisionFlo XL control deactivates closer, which closes the needle 2 seconds after the gun solenoid is deactivated. (This only occurs on models with the electric fluid regulator.)

19. PrecisionFlo XL control stops measuring volume after the DISPENSE DONE DELAY timer expires or the JOB COMPLETE robot I/O signal is received.

20. PrecisionFlo XL control updates the Status screen and the Data table.

21. The robotic system lowers the swirl enable signal.

22. PrecisionFlo XL control waits to be polled for volume dispensed. (See Volume Reporting on page 113.)

On/Off Delays

The PrecisionFlo XL regulator (or metering valve) can physically respond faster than the dispense device and its solenoid. As a result, the regulator can supply material to the dispense device before the device has time to open. Supplying material to a closed device can create trapped-pressure.

At the end of a cycle, the dispense device can shut off before the pressure has dissipated. This can cause a dispense of an excess of material at the beginning of a cycle.

To eliminate these two problems, you can change the delay time associated with the opening of the regulator/metering valve and/or the closing of the dispense device (Table 46).

In general, your outlet pressure on the screen during “no flow” should be close to the outlet pressure during dispense. If your dispense hose to the gun is creating too much pressure drop during flow, you may want the no flow reading to be lower. High trapped pressures shorten the dispense device life.

Table 46 — Delay On/Off Timing

Key	Delay Variable	Time Setting
A	Regulator ON	Sets time from Dispense Gun High to Regulator ON. Set by user.
B	Gun ON	Sets time from Dispense Gun High to Gun Open command. Usually set to zero. Can be used to change the starting point of a bead.
C	Gun OFF	Sets time from Dispense Gun Low to Gun Close command. Usually set to zero. Higher values will lower the trapped pressure.
D	Regulator OFF	Sets time from Dispense Gun Low to Regulator OFF. User sets. Zero or small values will lower the trapped pressure.

Fig. 72 and 73 and Table 46 show delay ON and OFF timing.

Fault Reporting

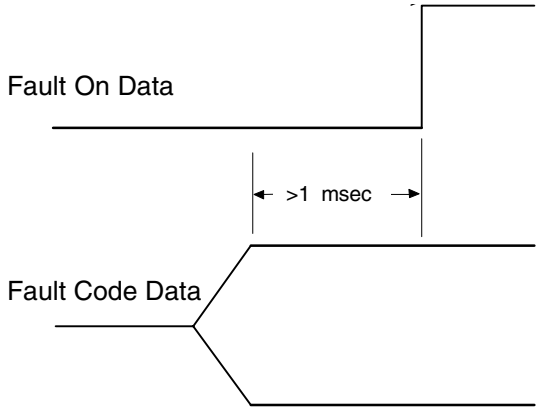


Fig. 74

Fault code data is valid for a minimum of 1 msec before FAULT ON DATA goes HIGH. Fault code data remains valid, and the FAULT ON DATA remains HIGH, until a FAULT RESET is received from the robotic controller, or the fault is cleared using the display.

Fault codes are reported using the FAULT ON DATA signal and the data bus. Fault codes can be either:

- **Alarms**, which cause the PrecisionFlo XL DISPENSER READY signal to go LOW or,
- **Warnings**, which keep the PrecisionFlo XL DISPENSER READY signal HIGH.

NOTE: Both volume and fault data are available on the I/O interface. Volume and fault data share I/O points, Data 1 – Data 32768. See Table 39, page 91. If the VOLUME ON DATA output is on, the outputs contain volume data. If the FAULT ON DATA output is on, the outputs contain fault data.

The robot can read a fault code any time during the cycle. If several faults are present at the same time, the highest priority fault code is sent to the data bus. At the end of the dispense cycle the data bus is used for volume reporting, if requested by the robotic controller. Once volume reporting has been completed, the fault code is placed back on the data bus.

Each Fault is recorded on the user interface. The fault data is also available on the I/O interface until the fault is cleared.

Refer to the **Troubleshooting and Fault Recovery** section page 125 for fault code causes, descriptions, and solutions for the various faults.

Fault On Data Output

The data outputs represent binary values. To determine the fault, add the data together and compare it against Table 40—Fault Codes, page 92.

Example 1:

Output ON: ● Output OFF: ○

State	●	○	●	○	●	○	○	○	○	○	○	○	○	○	○	○
Data Value	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192	16384	32768

Total Volume = 1 + 4 +16 = 21, which represents a “Op Cable 2 Open” fault.

Typical Fault Reporting Procedure

1. A problem occurs in the PrecisionFlo XL control.
2. The PrecisionFlo XL control analyzes the problem indication and determines if the fault is an alarm or a warning.
3. If the fault is an alarm:
   a. PrecisionFlo XL control sets the DISPENSER READY signal LOW.
   b. PrecisionFlo XL control places the fault code on the data bus and sets the FAULT ON DATA signal HIGH.

   The robot can detect the fault strobe signal and read the fault data immediately or at the end of the cycle (see steps 4 and 5).

   If the fault is a Warning, normal operation continues to the end of the cycle. A Warning should be cleared using the TouchScreen or FAULT RESET.
4. On completion of the cycle, if volume information is requested, the PrecisionFlo XL control uses the data bus to transfer the volume data. (See Figure 75, Volume Reporting on page 113.) During volume transfer, the FAULT ON DATA signal is LOW.
5. When the cycle is completed and any volume information has been transferred, the PrecisionFlo XL control places the fault code on the data bus and FAULT ON DATA changes to HIGH.

Volume Reporting

Both volume and fault data are available on the I/O interface. Volume and fault data share I/O points, Data 1 – Data 32768. See Table 39, page 91. If the VOLUME ON DATA output is on, the outputs contain volume data. If the FAULT ON DATA output is on, the outputs contain fault data.

The volume data recorded for each job is stored on the user interface. The volume data for the last job completed only is available on the I/O interface. When a new job begins, the volume data is overwritten on the I/O interface. It is recommended you only gather data after a job is complete. If you request data during a job, the volume reported is only the amount dispensed up to the point of the request.

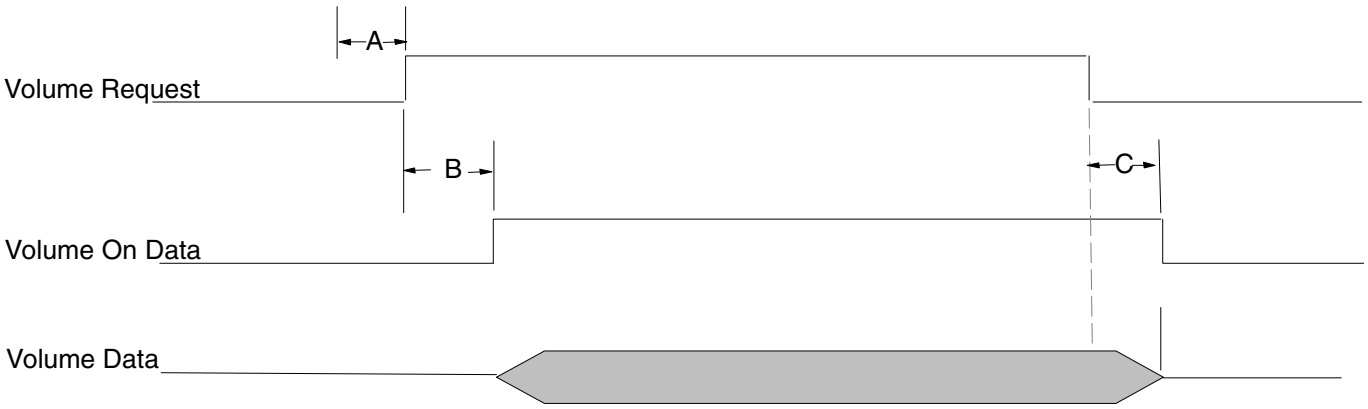


Fig. 75

Table 47 — Volume Data Timing Limits

		Minimum Time (msec)	Maximum Time (msec)
A	VOLUME REQUEST rises	–	–
B	VOLUME REQUEST rises to Volume On Data rises	0	100
C	VOLUME REQUEST drops to VOLUME On Data drops	0	100

Volume On Data Output

The data outputs represent binary values. To calculate volume, add the volumes together.

Example 1:

Output ON: ● Output OFF: ○

State	●	●	○	●	○	○	●	○	○	○	○	●	○	○	○	○
Data Value	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192	16384	32768

Total Volume = 1 + 2 + 8 + 64 + 2048 = 2123 cc

Example 2:

Output ON: ● Output OFF: ○

State	●	○	○	○	●	●	○	○	○	○	○	○	○	○	○	○
Data Value	1	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192	16384	32768

Total Volume = 1 + 16 + 32 = 49 cc

Typical Volume Reporting Procedure

1. Robotic controller sets DISPENSE to LOW and DISPENSE DONE DELAY expires or a JOB COMPLETE signal from the robot ends a dispense job.
2. The PrecisionFlo XL control stops measuring volume dispensed. An entry is made to the data log which records the volume dispensed. On installations with two flow meters, this is the combined volume of both flow meters.
3. Robot controller sets the VOLUME REQUEST signal HIGH.
4. PrecisionFlo XL control places the 16 bits of volume information on the data bus.
5. PrecisionFlo XL control sets the VOLUME ON DATA signal HIGH.
6. Robotic controller reads the data.
7. Robotic controller sets the VOLUME REQUEST signal LOW to indicate volume data has been read.
8. PrecisionFlo XL control sets the VOLUME ON DATA signal to LOW.
9. After volume is reported, if a fault was detected during the cycle, the PrecisionFlo XL control places the fault code on the data bus. (See Fault Reporting on page 111.)
10. When the robot sets the DISPENSE line high to begin the next cycle, the PrecisionFlo XL control discards previously stored volume data.

Verifying Flow Meter Calibration

Verification and Calibration

Most sealant and adhesive materials are compressible. Since the flow meter is measuring the material under high pressure, the actual volume of material dispensed may vary slightly from the measured volume, due to this compressibility. If the K-factor is not correct, the displayed volume will not be accurate.

Follow this procedure to calibrate the flow meter(s) during initial setup and on a routine basis to check for flow meter wear.

Method 1. Using a gram scale

1. Obtain a beaker, 500 cc or larger, and measure the mass of the empty beaker.
2. Manually dispense material into the beaker. Hold the beaker so that the stream of material is submerged in the captured material. This is to minimize air entrapment in the container.
3. Record the volume dispensed on the Run screen and the flow meter K-factor from the Setup screen.
4. Calculate the actual volume dispensed:

$$\frac{\text{fluid mass (g)}}{\text{density (g/cc)}} = \text{volume}$$

5. Calculate the new flow meter K-factor:

$$\text{K–Factor (new)} = \frac{\text{displayed volume (cc) x K–Factor (old)}}{\text{measured volume (cc)}}$$

6. Enter new K-factor.
7. Go to step 1 and verify the new K-factor.

Method 2. Without using a gram scale, visual measurement

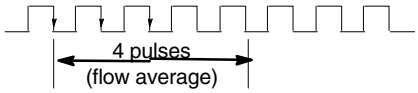
1. Obtain a beaker, 500 cc or larger with measurement increments.
2. Manually dispense material into the beaker. Hold the beaker so that the stream of material is submerged in the captured material. This is to minimize air entrapment in the container.
3. Record the volume dispensed on the Run screen and the flow meter K-factor from the Setup screen.
4. Settle the material into the beaker and view the actual volume dispensed.
5. Calculate the new flow meter K-factor:

$$\text{K–Factor (new)} = \frac{\text{displayed volume (cc) x K–Factor (old)}}{\text{dispensed volume (cc)}}$$

6. Enter new K-factor.
7. Go to step 1 and verify new K-factor.

Flow Rate Calculation

The flow average value is calculated by the system based on the K-factor and the flow rate entered during flow calibration.



The time is measured for the number of flow meter pulses in the flow average variable to occur and the flow rate is calculated.

Example: Flow Average = 4 pulses
Flow Rate = 400 cc/min
K-factor = 3500 pulses/liter = 3.5 pulses/cc

This gives a pulse rate of 23.3 pulses/second or 43 milliseconds/pulse. A new flow rate is measured approximately every 171 milli-seconds.

If the time measured with the same parameters (3500 pulses/liter, 4 pulses flow average) is 180 milliseconds, the flow rate calculation would be 380 cc/minute.

Flow Calibration

In order to control the flow rate of a material, the system must determine the pressure required at the regulator outlet to achieve a desired flow rate (Fig. 76).The calibration procedure provides the pressure required to obtain the maximum desired flow rate (10 VDC flow command.)

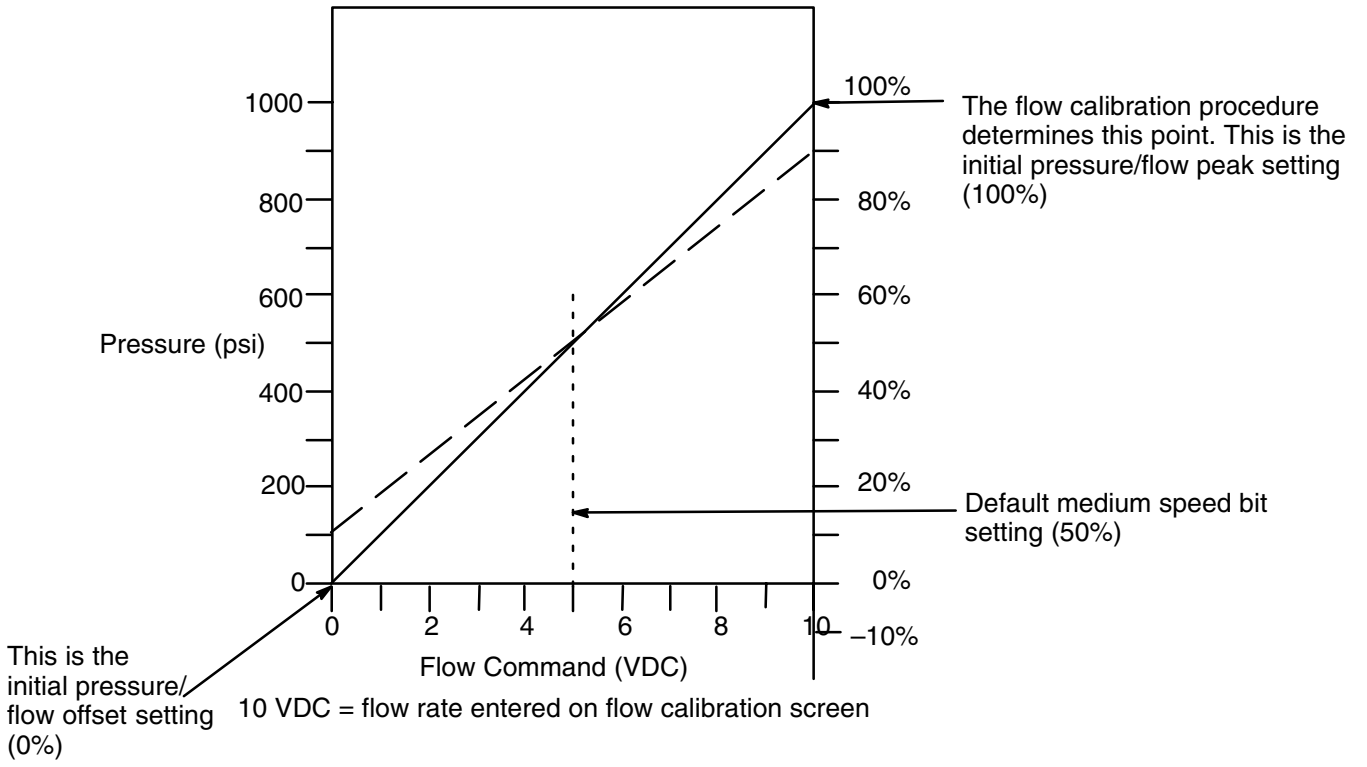


Fig. 76

Volume Compensation

Volume compensation is used when the PrecisionFlo XL system is operated in flow control mode. The system measures the actual flow rate and adjusts the pressure/flow relationship (as determined during flow calibration) to achieve the desired flow.

When flow calibration is completed, the resulting pressure value is divided by 100 to obtain a 1% value. The initial offset is set to 0%, the initial peak is set to 100% (see Flow Calibration on page 116).

Each time a new flow rate measurement has been completed, the actual flow rate is compared to the requested flow rate. The flow rate command from the robot (analog or digital) is also compared to the flow rate defined by the digital medium speed bit. The medium speed bit should be set to the average value of the minimum and maximum robot commands when using Analog for Robot mode.

Endpoint Adjustment	Flow Command ≤ Medium Speed Point	Flow Command > Medium Speed Point
Flow rate < desired flow rate	Increase offset	Increase peak
Flow rate ≥ desired flow rate	Decrease offset	Decrease peak

The volume compensation routine moves the end points of a straight line which defines the pressure/flow relationship of the system.

The end point of the pressure/flow line (offset or peak) is moved the 1% value determined at the end of the flow calibration routine. The magnitude of the flow rate error does not affect the size of the adjustment.

The maximum adjustment range of the peak point is 25 to 400% of the original value from calibration. If the 25% or 400% limits are reached, a Volume Comp Limit fault is generated.

Maintenance

The following is a list of recommended maintenance procedures and frequencies to operate your equipment safely. The maintenance is divided between mechanical and electrical tasks. Maintenance must be performed by trained personnel per this schedule to assure safety and reliability of the equipment.

Mechanical

	Operator	Maintenance Person					
Task	**Daily**	**Weekly**	**Monthly**	**3–6 months or 125,000 cycles**	**6–12 months or 250,000 cycles**	**18–24 months or 500,000 cycles**	**36–48 months or 1,000,000 cycles**
Inspect system for leaks	✓						
Depressurize fluid, after operation	✓						
Remove heat from system, after operation	✓						
Inspect filter (234967) bowls and drain as required		✓					
Check hoses for wear		✓					
Check/tighten fluid connections		✓					
Check/tighten air connections		✓					
Replace PrecisionSwirl Bellows		✓					
Lubricate dispense valves*			✓				
Rebuild regulator				✓			
Rebuild dispense valve				✓			
Check/replace PrecisionFlo Bellows					✓		
Replace air filter 234967 assembly						✓	
Replace Solenoid							✓
Replace V/P valve							✓
* Applies to EnDure™ and UltraLite 1K model valves							

Electrical

Task	**Daily**	**Weekly**	**Monthly**	**6 months**	**12 months**
Calibrate flow meter*			✓		
Check cables for wear		✓			
Verify cable connections		✓			
Verify resistance of electric heaters					✓
Verify operation of “System Stop” button		✓			
* Weekly calibration is recommended for applications using abrasive materials.					

Troubleshooting

Fluid Modules

Problem	Cause(s)	Possible Solution(s)
No outlet pressure	Air pressure low	Verify air pressure is above 60 psi (0.4 MPa, 4 bar)
	No “Gun On” signal from robot	Check input from robot
	No output signal from system I/O board	Check signal from system I/O board, verify that a signal is being sent (1–5 VDC)
	No air signal to air diaphragm	Check for loose/disconnected/worn operations cable; tighten/replace as required
		Check for loose/disconnected DIN connector to V/P valve; tighten
	False signal being sent to control	Check outlet pressure sensor output; verify that it corresponds to zero pressure; replace sensor and/or amplifier
	Motor power cable open (linear motor only)	Check for loose/disconnected/worn motor power cable; tighten/replace as required
		Check air filter on V/P valve inlet
High outlet pressure	Needle/seat is worn	Rebuild regulator; replace needle/seat
Air leaks from fluid module	Loose air connections	Check air connections; tighten if necessary
	Worn gaskets	Check/replace gaskets on V/P and solenoid valve
Fluid module heater does not heat	Temperature controller turned off	Verify Zone #2 is on through the user interface
	Loose electrical connections	Verify connection between inlet hose and fluid module connector
		Verify connections between inlet hose and main enclosure
	Blown fuse	Check/verify fuse in Electric heat box
	Broken heater element	Check/verify heater resistance
	Broken sensor	Check/verify sensor resistance
	Failed solid state relay	Check power through relay #SSR405
Material leaks from shaft seal (linear motor only)	Worn shaft seal(s)	Rebuild regulator; replace shaft seals
Sluggish open (linear motor only)	Air pressure low to closer	Verify air pressure is above 60 psi (0.4 MPa, 4 bar)

Flow Meter

Problem	Cause(s)	Possible Solution(s)
No flow measurement	Flow meter pick-up sensor loose (except non-intrusive)	Tighten flow meter pick-up sensor
	Flow too low	Verify flow rate is above minimum for the flow meter selected
	Loose wiring	Verify wiring connections from flow meter to junction box
	Worn/damaged flow meter pick-up sensor	Replace pick-up sensor
False measurement	Flow meter not calibrated	Calibrate flow meter
	Flow meter cable shield wire not connected	Verify shielding to ground
	System not grounded properly	Verify system ground
	Noisy power source	Verify clean power supply power to main enclosure
	Inaccurate setup information (non-intrusive only)	Verify setup information and parameters
Flow reported is not correct or inconsistent	Flow meter not calibrated	Calibrate flow meter
	Flow meter is worn	Replace flow meter
	Inaccurate setup information (non-intrusive only)	Verify setup information and parameters
	Vibrations to flow meter (non-intrusive only)	Verify flow meter mounting is stable and vibration-free

Dispense Valves

Problem	Cause(s)	Possible Solution(s)
Valve not opening	Air not getting to open port	Verify air pressure solenoid
	No “Gun On” signal from robot	Check input from robot
	No output from system I/O board	Check output from system I/O board; verify that it is on
Valve not shutting off	Air not getting to close port (except AutoPlus valve)	Verify air pressure to solenoid
		Verify solenoid operation
		Verify air line routing and connections
	“Gun On” signal from robot is on	Check input from robot
		Check output from system I/O board; verify that it is on
	Spring is not functional (AutoPlus only)	Check spring in the air cylinder; verify integrity
Sluggish open/close	Air pressure low	Verify air pressure is above 60 psi (0.4 MPa, 4 bar)
	Needle/seat worn	Rebuild valve; replace needle/seat
	Pressurized material past the valve shut-off is escaping	Reduce running pressure
		Reduce nozzle length
		Increase nozzle orifice size
Material leaks from back of valve	Shaft seal is worn	Rebuild valve; replace seals
Air leaks from dispense valve	Loose air connections	Check air connections; tighten if necessary
	Worn piston o-ring	Rebuild valve; replace piston o-ring
Water leaks from dispense valve or manifold assembly	Worn o-ring(s)	Rebuild valve/manifold; replace o-rings
	Loose water connections	Verify connections; tighten and/or replace fittings as necessary
Dispense valve does not heat	Temperature controller turned off	Verify zone #4 is on through the user interface
	Loose electrical connections	Verify connection between outlet hose and valve connector
		Verify connection between outlet hose and main enclosure through extension cord
	Blown fuse	Check/verify fuse in Electric Heat box
	Broken heat cartridge	Check/verify heater resistance
	Broken sensor	Check/verify sensor resistance
	Failed solid state relay	Check power through relay #SSR422

Electrical Component Paths

(Refer to 309364 Schematic Manual)

Fluid Module #1

Use the following table to troubleshoot wiring to Fluid Module #1:

Component	Description	Component ID	J–Box Wire	Cable / Pin	Enclosure Wire	Board / Connector
Gun Solenoid Module #1	+24 VDC	DIN / Pin 1	4180/Red	OP1–C	4180	J3–13
	COM	DIN / Pin 2	4031/Wht	OP1–B	4031	J3–1
	GND	DIN / Pin 3	GND/Blk	OP1–D	GND	GND
Closer Solenoid	+24 VDC	DIN / Pin 1	4210/Red	OP1–E	4210	J3–15
	COM	DIN / Pin 2	4031/Wht	OP1–B	4031	J3–1
	GND	DIN / Pin 3	GND/Blk	OP1–D	GND	GND
Pressure Sensor In Module #1	SIG +	Green	AMP/J1–F	OP1–L	3190	J1–14
	SIG –	White	AMP/J1–E	OP1–K	3040	J1–2
	EXCIT +	Red	AMP/J1–G	Not connected to main enclosure		
	EXCIT –	Black	AMP/J1–H	Not connected to main enclosure		
Pressure Sensor Out Module #1	SIG +	Green	AMP/J1–B	OP1–J	3180	J1–13
	SIG –	White	AMP/J1–A	OP1–K	3040	J1–2
	EXCIT +	Red	AMP/J1–C	Not connected to main enclosure		
	EXCIT –	Black	AMP/J1–D	Not connected to main enclosure		
V/P Valve Module #1	+24 VDC	DIN / Pin 1	2210	OP1–A	2210	2210
	1–5 VDC SIG	DIN / Pin 2	4630	OP1–E	4630	J4–9
	COM	DIN / Pin 3	4031	OP1–F	4031	J4–1
Flow Meter Module #1	+ 24 VDC		2210	OP1–A	2210	2210
	SIG –		5530	OP1–P	5530	J7–1
	SIG +		5640	OP1–N	5640	J7–12

KEY

Component — External component wired into module's junction box.

Description — Type of signal

Component ID — Where it originates from on the component.

J–Box Wire — Wire number or terminal location in the module's junction box.

Cable/Pin — Pin number on the operations cable. The operations cable connects the module's junction box to the main electrical enclosure.

Enclosure Wire — The wire number inside of the main electrical enclosure.

Board/Connector — Where the wire terminates inside of the main electrical enclosure.

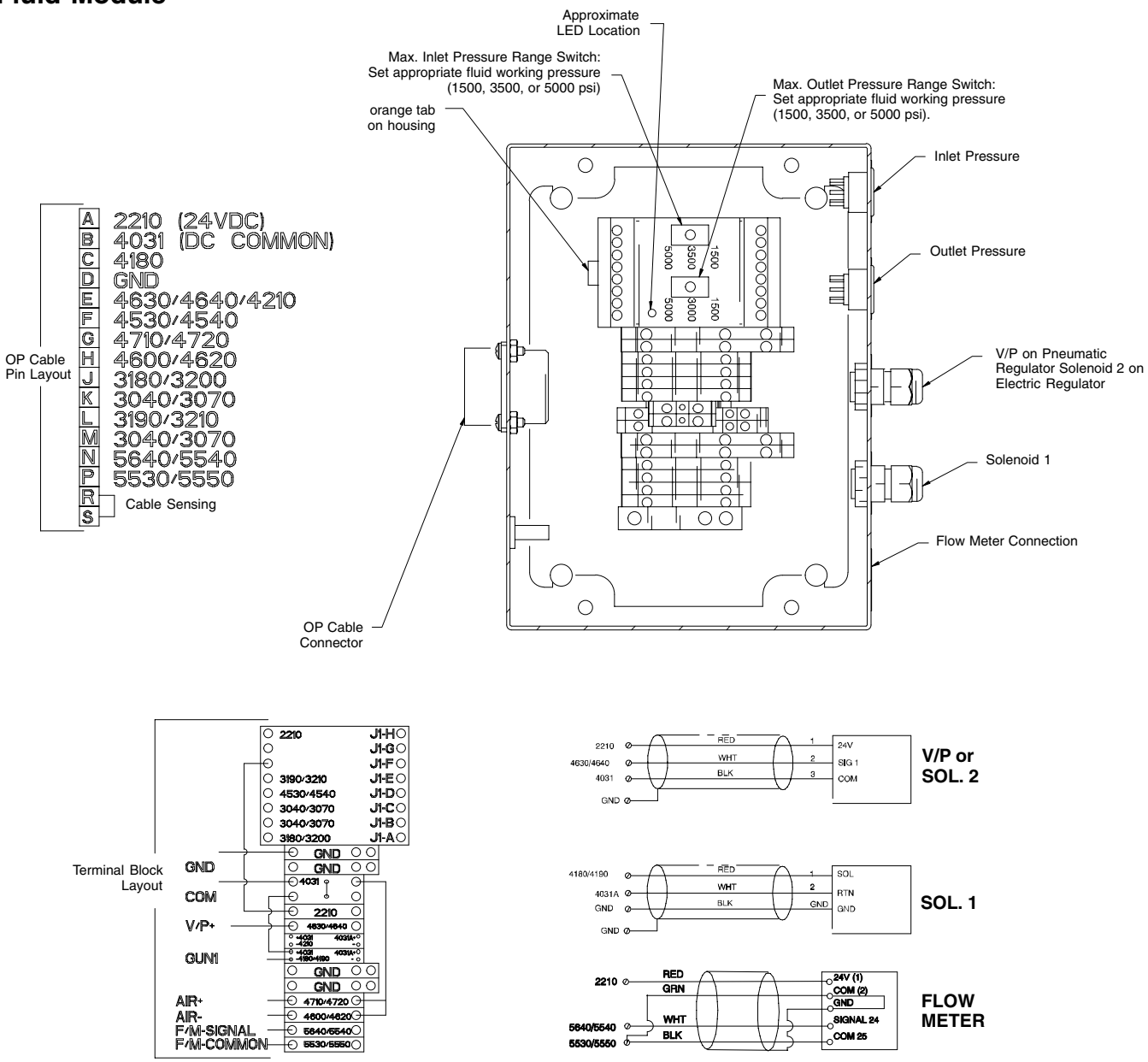
Fluid Module #2

Use the following table to troubleshoot wiring to Fluid Module #2:

NOTE: There is no closer solenoid on Fluid Module #2; the PrecisionFlo XL controls will only control a single Linear Motor Module.

Component	Description	Component ID	J–Box Wire	Cable / Pin	Enclosure Wire	Board / Connector
Gun Solenoid Module #2	+24 VDC	DIN / Pin 1	4190/Red	OP2–C	4190	J3–14
	COM	DIN / Pin 2	4031/Wht	OP2–B	4031	J3–1
	GND	DIN / Pin 3	GND/Blk	OP2–D	GND	GND
Input Transducer Module #2	SIG +	Green	AMP/J1–F	OP2–L	3210	J1–16
	SIG –	White	AMP/J1–E	OP2–K	3070	J1–4
	EXCIT +	Red	AMP/J1–G	Not connected to main enclosure		
	EXCIT –	Black	AMP/J1–H	Not connected to main enclosure		
Output Transducer Module #2	SIG +	Green	AMP/J1–B	OP2–J	3200	J1–15
	SIG –	White	AMP/J1–A	OP2–K	3070	J1–4
	EXCIT +	Red	AMP/J1–C	Not connected to main enclosure		
	EXCIT –	Black	AMP/J1–D	Not connected to main enclosure		
V/P Valve Module #1	+ 24 VDC	DIN / Pin 1	2210	OP2–A	2210	2210
	1–5 VDC SIG	DIN / Pin 2	4640	OP2–E	4640	J4–10
	COM	DIN / Pin 3	4031	OP2–F	4031	J4–2
Flow Meter Module #1	+ 24 VDC		2210	OP1–A	2210	2210
	SIG –		5550	OP1–P	5550	J7–3
	SIG +		5540	OP1–N	5540	J7–2

Fluid Module



TI1556A

Fig. 77

NOTE: The value of the Pressure Range Switch location should match the value entered in the Calibration – Pressure screen. Refer to page 36.

Troubleshooting and Fault Recovery

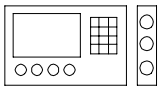
The following table describes the valid fault codes used by the PrecisionFlo XL module, possible causes, and solutions. PrecisionFlo XL module displays warnings and alarms on the user interface and alarms via the control unit fault light. See **Theory of Operation – Fault Reporting** on page 111 for detailed information on how fault codes are communicated.

NOTE:

- Alarms set the dispenser ready signal LOW.
- Warnings do not set the dispenser ready signal LOW.

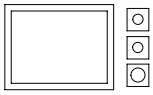
Resetting Control Unit After a Fault

If a fault has occurred, you should clear (reset) the fault before restarting the PrecisionFlo XL control unit. To reset the fault:



EasyKey Interface

Press the **Fault Reset** key  on the keypad.



TouchScreen Interface

Touch **Reset** on the TouchScreen to clear the fault or use remote Fault Reset of the robot I/O.

Table 48 — Fault Code Table

Fault Code	Fault Name	Fault Description	Causes	Solutions
The following faults are *always* Alarms				
1	Dispenser Stop	There is no electrical power to the PCR or servo drive.	Control assembly not activated at start up.	Press MASTER START .
			SEALER STOP push button pressed.	
			CONTROL ON light not lit, control assembly is off.	Apply power to PrecisionFlo XL module, then press MASTER START.
			Remote stop signal not connected in robot controller.	Connect signal in robot controller or jumper signal as shown on page 90.
2	Drive Fault 1	Servo circuit condition at servo drive's output, or hardware failure occurred on the drive.	Servo drive failure.	Replace servo drive
			Motor short.	Check that motor coil resistance is 10–13 ohms.
4	Motor Over Temp	PrecisionFlo metering valve linear motor temperature sensor has exceeded 90°C (194°F).	Servo drive short.	Check for continuity between + and – outputs of servo drive
			Servo motor short.	Insure that motor coil resistance is between 10 and 13 ohms.
			Excessive current to motor over period of time.	Monitor command signal outlet pressure to determine operating range.
			Dirty motor heat sink.	Clean motor surface.
			Poor motor ventilation.	Increase air flow around motor.
			Failed transducer.	Check transducer operation and grounding; replace if required.
			Motor power (MP) cable disconnected or damaged.	Check for proper connection of MP cable. Replace if damaged.

Table 48 — Fault Code Table *(continued)*

Fault Code	Fault Name	Fault Description	Causes	Solutions
20	OP Cable 1 Open	Control senses an open circuit in the Operation 1 cable.	Operation 1 cable disconnected.	Verify cables are properly connected.
			Operation 1 cable failed.	Replace Operation 1 cable.
21	OP Cable 2 Open	Control senses an open circuit in the Operation 2 cable.	Operation 2 cable disconnected.	Verify cables are properly connected.
			Operation 2 cable failed.	Replace Operation 2 cable.
			Improper system configuration.	If system only has one regulator, verify configuration in Set–Config screen is set to one regulator.
29	Closed Gun Flow 1	System reading flow meter pulses from Flow Meter 1 with Gun 1 closed.	Burst hose downstream of flow meter.	Check hose; replace if needed
			Flow meter providing false pulses.	Replace flow meter sensor (G3000 and SRZ–40) or calibrate meter (coriolis).
30	Closed Gun Flow 2	System reading flow meter pulses from Flow Meter 2 with Gun 2 closed.	Burst hose downstream of flow meter.	Check hose; replace if needed.
			Flow meter providing false pulses.	Replace flow meter sensor (G3000 and SRZ–40) or calibrate meter (coriolis).
Remaining faults are selectable by the user as Alarms or Warnings (Setup → Alarms/Warnings screen)				
6	High Volume	Material dispensed during the last dispense cycle was above the amount established by request and above the allowable (entered) tolerance.	Material viscosity is outside flow compensation window.	Verify material characteristics, recalibrate if necessary.
			PrecisionFlo XL regulator is not regulating properly.	Check regulator, repair if necessary.
			Incorrect style volume or tolerance when using Pressure mode.	Enter correct values or set the tolerance to 0% to disable this fault.
7	Setup Values Changed	Setup change notification	When the Key Switch was turned from Setup to Run mode, the control detected a change from previous setup data value(s).	No action necessary if changes were desired.
8	Low Volume	Material dispensed during the last dispense cycle was below the amount established by request and below the allowable (entered) tolerance.	Partially plugged tip or supply system. Error is outside flow compensation window.	Clean tip and/or supply system.
			Insufficient flow to PrecisionFlo XL metering valve inlet. Error is outside flow compensation window.	Increase flow rate to PrecisionFlo XL metering valve inlet.
			Material viscosity is outside flow compensation window.	Verify material characteristics, recalibrate if necessary.
			PrecisionFlo XL regulator is not regulating properly.	Check regulator, repair if necessary.
			Incorrect style volume or tolerance when using Pressure mode.	Enter correct values or set the tolerance to 0% to disable this fault.
10	No Flow 1	No material was dispensed when a Dispense Gun 1 signal was activated.	No material supply.	Replace drum or turn on pumps.
			Tip plugged.	Clean/replace tip.
			No air pressure to solenoid valves.	Turn on air to solenoid valves.
		Material was dispensed when a Dispense Gun 1 signal was activated, but no flow was read.	No flow meter signal.	Check cable and sensor.

Table 48 — Fault Code Table *(continued)*

Fault Code	Fault Name	Fault Description	Causes	Solutions
11	No Flow 2	No material was dispensed when a Dispense Gun 2 signal was activated.	No material supply.	Replace drum or turn on pumps.
			Tip plugged.	Clean/replace tip.
			No air pressure to solenoid valves.	Turn on air to solenoid valves.
		Material was dispensed when a Dispense Gun 1 signal was activated, but no flow was read.	No flow meter signal.	Check cable and sensor.
12	High Outlet Pressure 1	Output pressure to the PrecisionFlo XL regulator 1 is above the upper limit set for operation. If this fault occurred while doing a pressure calibration, pressure calibration could not determine optimum values and default values were used.	Incorrect limit set.	Verify limit is set correctly.
			Dispense hose/device plugged.	Clean/replace hose/device.
			Failed transducer.	Check transducer, replace if failed.
			Regulator is not closing completely when it should.	Repair regulator.
13	High Outlet Pressure 2	Output pressure to the PrecisionFlo XL regulator 2 is above the upper limit set for operation. If this fault occurred while doing a pressure calibration, pressure calibration could not determine optimum values and default values were used.	Incorrect limit set.	Verify limit is set correctly.
			Dispense hose/device plugged.	Clean/replace hose/device.
			Failed transducer.	Check transducer, replace if failed.
			Regulator is not closing completely when it should.	Repair regulator.
14	Low Outlet Pressure 1	Output pressure of the PrecisionFlo XL regulator 1 is below the limit set for operation. If this fault occurred while doing a pressure calibration, system pressure was too low (<500 psi [3.4 MPa, 34 bar] at the regulator outlet) to complete the calibration.	Incorrect limit set.	Verify limit is set correctly.
			No or insufficient material flow.	Increase material flow rate.
			Dispense valve needle is stuck closed.	Dislodge and inspect needle.
			Dispense valve leaking.	Repair dispense valve.
			No power to motor.	Apply power to motor.
			Pump wink passed through outlet.	Recalibrate PrecisionFlo XL or increase pump pressure.
			Failed transducer.	Check transducer, replace if failed.
15	Low Outlet Pressure 2	Output pressure of the PrecisionFlo XL regulator 2 is below the limit set for operation. If this fault occurred while doing a pressure calibration, system pressure was too low (<500 psi [3.4 MPa, 34 bar] at the regulator outlet) to complete the calibration.	Incorrect limit set.	Verify limit is set correctly.
			No or insufficient material flow.	Increase material flow rate.
			Dispense valve needle is stuck closed.	Dislodge and inspect needle.
			Dispense valve leaking.	Repair dispense valve.
			No power to motor.	Apply power to motor.
			Pump wink passed through outlet.	Recalibrate PrecisionFlo XL or increase pump pressure.
			Failed transducer.	Check transducer, replace if failed.
16	High Inlet Pressure 1	Input pressure to the PrecisionFlo XL regulator 1 is above the upper limit set for operation.	Incorrect limit set.	Verify limit is set correctly.
			Material supply pressure is too high.	Decrease material supply pressure.
			Failed transducer.	Check transducer, replace if failed.

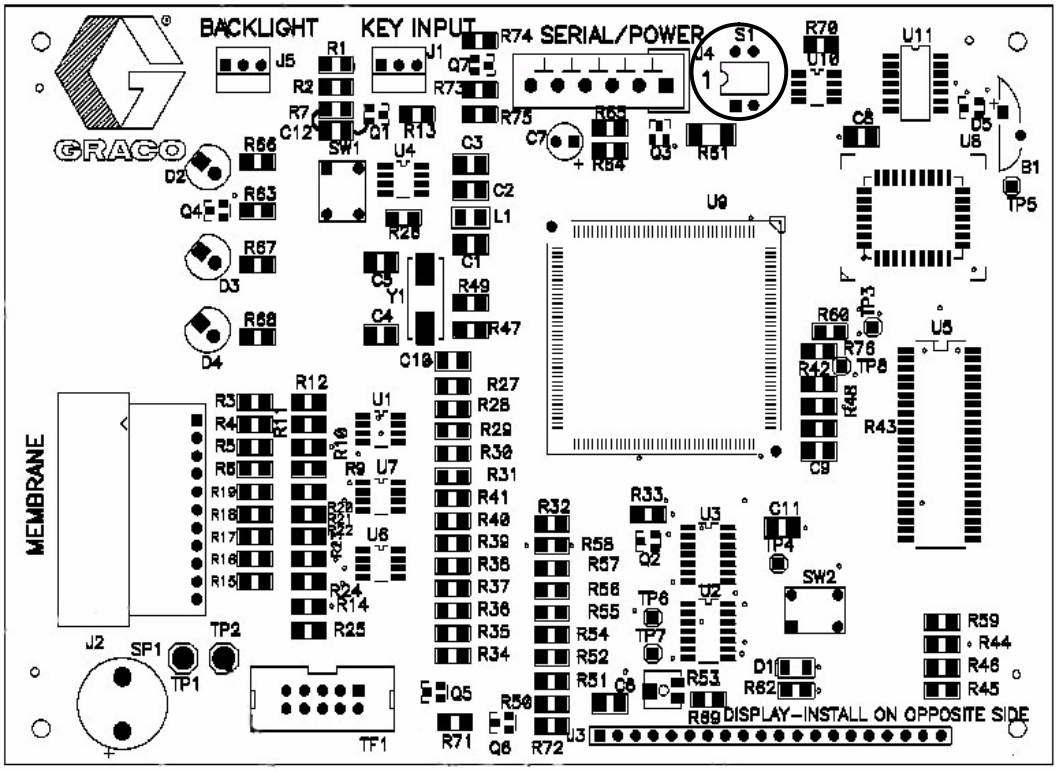
Table 48 — Fault Code Table *(continued)*

Fault Code	Fault Name	Fault Description	Causes	Solutions
17	High Inlet Pressure 2	Input pressure to the PrecisionFlo XL regulator 2 is above the upper limit set for operation.	Incorrect limit set.	Verify limit is set correctly.
			Material supply pressure is too high.	Decrease material supply pressure.
			Failed transducer.	Check transducer, replace if failed.
22	Swirl Fault 1	Swirl orbiter 1 did not reach speed setpoint when swirl was enabled.	Swirl orbiter failure.	Inspect swirl orbiter system.
			No swirl orbiter used and signal not jumpered to +24 VDC	See schematic in manual 309364.
			Number of orbiters set in the system configuration screen is incorrect.	Set correct number of orbiters in system configuration.
			Swirl orbiter cable failed.	Replace cable.
23	Swirl Fault 2	Swirl orbiter 2 did not reach speed setpoint when swirl was enabled.	Swirl orbiter failure.	Inspect swirl orbiter system.
			No swirl orbiter used and signal not jumpered to +24 VDC	See schematic in manual 309364.
			Number of orbiters set in the system configuration screen is incorrect.	Set correct number of orbiters in system configuration.
			Swirl orbiter cable failed.	Replace cable.
24	Temperature Not Within Limits	Temperature conditioning fault signal is low. This warning tells the PrecisionFlo XL that the temperature conditioning unit is not operating properly.	Conditioning system is turned off.	Turn conditioning system on.
			Over/under temperature fault.	Inspect temperature conditioning system.
			No temperature conditioning unit and signal not jumpered to +24 V.	See schematic in manual 309364.
25	Flow Calibration Error	System was not able to complete a flow calibration	Flow setpoint higher than the flow rate the system can deliver.	Lower calibration flow setpoint.
				Increase dispense valve tip size or dispense hose diameter.
				Increase supply pressure.
			A dispense command in flow mode was received without a valid flow calibration being performed.	Perform a flow calibration.
26	Volume Comp Limit 1	Peak value of flow compensation for regulator 1 has reached the 25% or 400% limit.	Fluid supply too low to achieve desired flow rate.	Increase fluid supply pressure or check for clogged filter.
			Regulator is not able to close completely.	Repair regulator.
			Major change to fluid or fluid system downstream of the regulator.	Check fluid viscosity. Check hoses and tips for problems. Perform a new calibration if necessary.

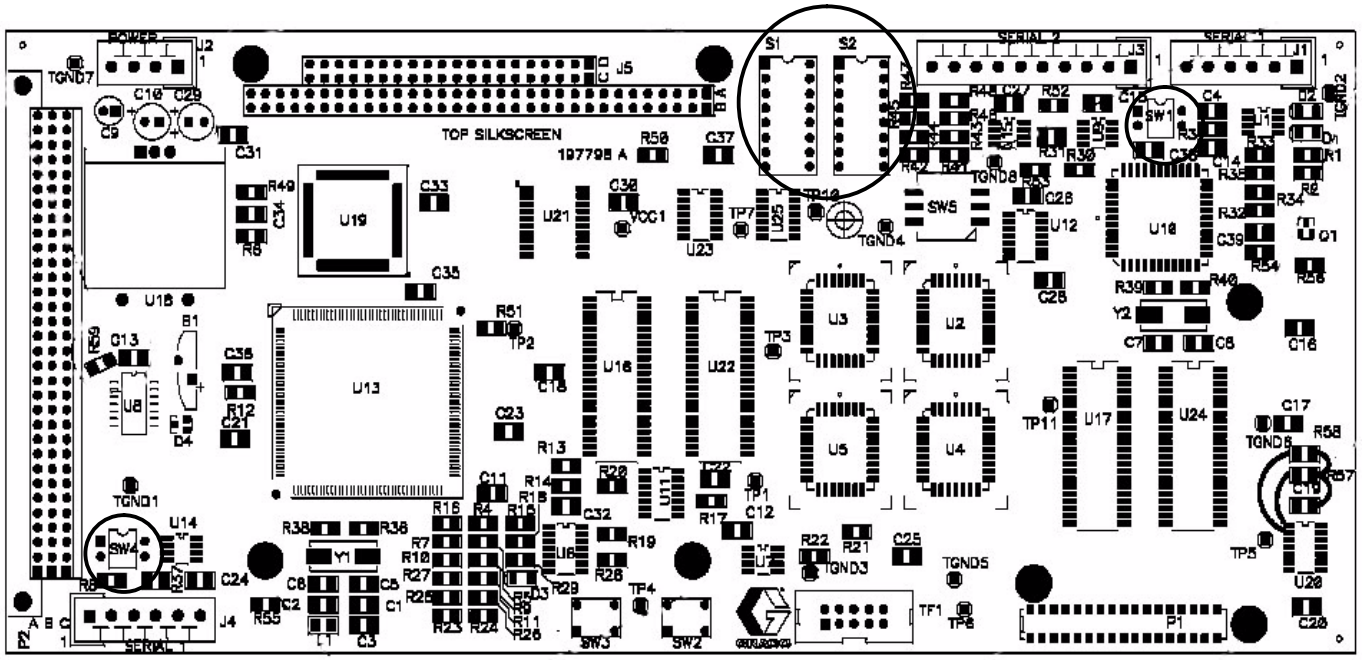
Table 48 — Fault Code Table *(continued)*

Fault Code	Fault Name	Fault Description	Causes	Solutions
27	Volume Comp Limit 2	Peak value of flow compensation for regulator 2 has reached the 25% or 400% limit.	Fluid supply too low to achieve desired flow rate.	Increase fluid supply pressure or check for clogged filter.
			Regulator is not able to close completely.	Repair regulator.
			Major change to fluid or fluid system downstream of the regulator.	Verify material characteristics. Check hoses and tips for problems. Recalibrate if necessary.
28	Computed Target	The requested volume differs from the entered process target by more than the entered tolerance for style requested.	Entered process target incorrectly .	Enter correct process target.
			Entered tolerance incorrectly.	Enter correct tolerance.
			Requested volume incorrect.	Check robot program.
			Robot analog problem.	Verify robot analog is correct.

Dip Switch Settings



244993 Display Board: All DIP switches on S1 should be set to OFF.



244665 Control Board:

- *EasyKey Display* – All DIP switches on SW1, SW4, S1, and S2 should be set to OFF.
- *Touch Screen Display* – DIP switches on SW1 and SW4 should be set to OFF.
  S1 DIP 3 should be ON, all others OFF. S2 DIP 6 should be ON, all other OFF.

Fig. 78

Frequently Asked Questions

Q: What is the difference between running in Pressure Mode versus Flow Mode?

A: In **Pressure Mode**, the control will maintain a specific pressure at the fluid regulator outlet. If the viscosity of the fluid changes or the nozzle becomes restricted, that pressure will result in a different flow rate. If you have a flow meter installed, it can still monitor the job volume for faults. Pressure mode is sometimes desirable for spray applications to maintain a specific spray pattern.

In **Flow Mode**, the fluid regulator is still reacting to the fluid pressure for quick adjustment, but the control also monitors the flow meter. If the flow rate does not agree with the flow command, the pressure target is adjusted. This method gives you the quick response of a pressure transducer, while maintaining the rate accuracy of a flow meter.

Q: How do I adjust the flow rate up or down without changing my robot commands?

A: There is an adjustment called **Flow Scale**, which appears on the EasyKey Overview screen or on the TouchScreen Settings screen. This can be set from 50–150% of command flow. To change the Flow Scale, turn the key switch to the right to enter Setup mode. The Setup modes screen allows you to change the Flow Scale percentage. To change to the new setting, press the Enter key on the EasyKey interface or press the up or down arrows on the TouchScreen interface The new value will be stored when you turn the key switch back to Run mode.

Q: Why do I get a warning for “Volume Comp Limit”?

A: Something has changed since you calibrated your regulator. The control has changed the regulator pressure set point too far away from the calibration point. This happens in Flow Mode when the control is monitoring the flow meter and trying to maintain the proper flow rate. The cause is some factor that has changed the pressure, downstream of the regulator, at the desired flow rate. This might be a plugged nozzle or a fluid viscosity change. The viscosity difference could be caused by a change in temperature or a new batch of material. If the pressure needs to increase to maintain the desired flow rate, but the fluid regulator is already fully open, the volume compensation continues to increase the desired pressure target until the limit is reached. The fluid feed pressure at the regulator inlet needs to be increased. If the fluid and equipment are all right, you need to recalibrate to your flow target.

Q: How is a fluid control regulator calibration performed?

A: There are two steps: Pressure Calibration and Flow Calibration. You must always do a Pressure Calibration for each regulator. If you are using a flow meter and will run in Flow mode, you must also do a Flow Calibration after the Pressure Calibration is complete. To calibrate pressure and flow, see page 1.

Q: How do I determine my maximum flow limit for Flow Calibration?

A: The maximum flow limit entered on the **Flow Calibration** screen will be the target flow rate at a 10 volt analog flow command signal. This should be the highest rate at which you will dispense. The maximum limit can be entered as cc/min on line three, or if your process calls for a specific bead diameter, enter that diameter on line two, along with your maximum robot tip speed on line one. The PrecisionFlo control unit calculates the maximum flow rate automatically. The **Max Flow Rate** line at the bottom of the screen shows the highest flow rate that the regulator could attain during its fluid control regulator calibration.

Q: How do I know if the fluid control regulator calibration was successful?

A: On the TouchScreen display, calibration was successful if the red calibration status bar at the bottom turns green. On the EasyKey display, calibration was successful if there is no error message in the alarm bar at the bottom of the screen.

Q: Why will my fluid control regulator not calibrate in the Pressure screen?

A: You may not have enough fluid pressure downstream of the regulator — at least 500 psi (3.5 MPa, 34.5 bar) is required. Try a smaller nozzle on the dispense valve.

Q: Why will my fluid control regulator not calibrate in the Flow screen?

A: You might not have selected a flow meter in the **Config–General** screen. You may not have been able to reach the maximum flow rate you entered. To reach a higher flow rate, you can increase the feed pressure or increase the dispense valve nozzle size.

Q: Why will my dispense valve not operate?

A: The valve will not dispense in Flow Mode if the flow calibration has failed. Calibrate the flow rate as instructed on page 1.

Q: Does Pressure Mode use a flow meter?

A: Running in Pressure Mode does not require a flow meter. However, without a flow meter, you cannot monitor the job volume limits or log the job volumes. The number of flow meters installed must be selected on the **Config–General** screen.

Q: Why is the psi/volt setting important?

A: The psi/volt setting is important if you are only running in the Pressure Mode. This is what sets the relationship between the robot analog signal and the desired pressure. For example, a psi/volt setting of 200 will produce 1000 psi (7 MPa, 70 bar) outlet pressure at an analog signal of 5 volts. The psi/volt setting is calculated and set automatically if you have a flow meter installed and do a flow calibration to your maximum desired flow rate. The psi/volt setting is 10% of the Flow Calibration maximum pressure.

Q: Why are the digital speed settings important if I am running off of a 0–10 volt analog signal from a robot?

A: **1.) Low Flow Rate setting:** If the analog signal drops below 1 volt, the PrecisionFlo XL control will default to the Low Flow Rate setting. If you are working through a wide analog range, this setting could be very useful to you.

2.) Medium Flow Rate setting: This setting affects how well the flow compensation works across the middle to upper flow range. The Medium Flow Range percent setting should be set to your average robot analog signal. *For example:* If you run between 5–8 volts, the average is 6.5 volts or a 65% setting.

3. High Flow Rate setting: This setting has no effect when you are running in the analog robot mode.

Q: How can I verify that my I/O interface wiring is correct before loading and running the dispense equipment?

A: *With the TouchScreen interface,* select the **Module I/O** tab, or the **Robot I/O** tab, to view the status of all inputs and outputs. *With the EasyKey interface,* check the status of LED lights on the robot I/O board, using the table on page 114.

Q: How do I know my flow and volume measurements are accurate?

A: Calibrate the flow meter as instructed on page 115. This is strongly recommended as many sealants are compressible, and the flow meter measures the fluid while it is under pressure. Calibrating the meter makes it accurate for your fluid at ambient pressure. Periodic calibration is also important to monitor your meter for wear.

Q: Can I have the robot control turn on the PrecisionFlo XL temperature control at a preset time to warm up the system before shift start?

A: Yes. There is an input for **Remote Temp Enable**. This input at J5–19 is normally jumpered high but can be controlled by the robot. Remove the jumper and connect the proper robot interface wires.

Q: I have flow, but how do I know if my fluid regulator is working?

A: If a fluid regulator fails, it can no longer hold back fluid pressure. If the outlet pressure climbs up to equalize with the inlet pressure when you stop dispensing, the regulator has lost the ability to shutoff or fully regulate flow. If you have pressure limits set, you will get an **Outlet Pressure High** alarm. If you have job volume limits set, you will get a **High Volume On Last Job** alarm.

Q: Is there a way to put the fluid plate control regulator in a bypass mode, to still operate the dispense valve when I have a problem?

A: With the air operated regulators, you can move the air tube that feeds the E/P valve directly to the fluid regulator air inlet. Turn off the air supply before moving tubes. With the electric regulators, it is best to remove the fluid seat from the regulator housing or bypass the regulator with a hose and valve.

Q: How do I download job logs or alarm logs from the PrecisionFlo XL control?

A: There is an external phone-style connection on the right side of the control enclosure. You need a PC or laptop computer with terminal emulation software and part number 233657 accessory cable kit. If you have the TouchScreen interface, you can also communicate via ethernet connection. See **Communicating with PrecisionFlo XL**, page 41.

Q: Will I lose any of my Setup parameters or logged information if power is lost?

A: The only parameters lost will be the Autotune Temp Zone PID values, which return to defaults. All other setup parameters, job logs, and alarm logs are saved to flash memory and do not need any power. This is non-volatile memory, similar to the cards used with digital cameras. There also is no battery to replace.

Q: Can I cause an error or system problem while looking at screens when production is running?

A: If the key switch is turned to the left or removed, which means the system is in Run mode, you view the four monitor screens, but you cannot change any parameters. You can still select Manual or Automatic mode on the user interface, which would stop the robot initiated dispensing.

Q: Can I change my Setup values while the machine is running?

A: Yes. If you turn the key switch to Setup mode, you have complete control of the system. Changes to control modes, pressure values, time delays, alarms, etc. become effective when you press Enter and the changes are saved to memory when the key switch is turned back to Run mode.

Q: How can I get out of Setup without saving the changes I have entered?

A: You can turn the power off before turning the key switch back to Run mode. When you turn the power back on, the changes made since Setup was last entered will not be there. However, you would not want to turn off the power during production.

Q: What is the difference between Swirl Mode Manual, and Swirl Mode Auto?

A: In Manual Swirl Mode you are setting the swirl speed as a percentage. 0% equals 6600 rpm and 100% equals 24000 rpm. In Auto Swirl Mode, the 50–150% you set applies that factor to the robot swirl analog signal. At 100% setting, a 5 volt signal equals a 50% swirl speed signal. At 150%, a 5 volt signal equals a 75% swirl speed signal. This gives the operator the ability to adjust the robot swirl command from the dispenser control station. The actual command to the swirl motor will always be capped at 10 volts or 24000 rpm.

Q: How do I set my pressures?

A: **First, set the dispense pressure.** A dispense valve hose and nozzle should be used, which will maintain at least 500 psi (3.5 MPa, 34.5 bar) back pressure at the fluid control regulator outlet at your lowest flow rate setting.

Second, set the feed pressure. Once you are running, back down the feed pressure to a point where the regulator inlet pressure stays at least 500 psi (3.5 MPa, 34.5 bar) greater than the regulator outlet pressure, when dispensing at your maximum flow rate. If you will have multiple valves open at the same time, being fed by the same feed pump, do this check with all of those valves open. Excessive feed pressure will cause excessive wear.

Q: What is the recovery procedure if the TouchScreen or EasyKey panel lock-up?

A: The process can continue to run. When you are not dispensing, cycle the power to reboot the display.

Q: How do I determine the best dispense hose to use?

A: The best hose is the shortest length and the smallest diameter that will fit your application. The smaller the diameter and the shorter the length, the faster the system response time. Diameters that are too small for the viscosity of your material will cause increased pressure losses. Testing by Graco or your distributor can help determine the best dispense hose for your application.

Q: Can the pneumatic regulators be used for stitching applications?

A: The pneumatic regulator will work for most stitching applications. By adding the Regulator Pre-charge Kit 245896, faster stitching with good bead starts and stops can be achieved. The pre-charge value should be set as low as possible to allow for a wider regulator pressure adjustment range during dispensing.

Technical Data

PrecisionFlo XL

*Minimum Flow Rates	50 cc/minute with G3000 meter 100 cc/minute with helical flow meter 100 cc/minute with coriolis meter
*Maximum Flow Rates	2000 cc/minute with G3000 meter 7500 cc/minute with Helical meter 9999 cc/minute with coriolis meter
Maximum Fluid Working Pressure	
Feed Pressure to Fluid Panel	5000 psi (34.5 MPa, 345 bar)
With Electric Heated Hoses	3000 psi (21 MPa, 210 bar)
At Regulator Outlet	3500 psi (24.0 MPa, 241 bar)
Minimum Fluid Working Pressure	
At Regulator Outlet	500 psi (3.5 MPa, 34.5 bar)
Minimum Back Pressure	
Between Regulator Outlet and Dispense Nozzle	500 psi (3.5 MPa, 34.5 bar)
Air Supply Pressure Range	60–120 psi (414–828 kPa, 4.1–8.3 bar) Filtration required
Fluid Filtration Required	30 mesh (500 micron) minimum
*Viscosity Range of Fluids	5000 to 50000 cps with G3000 meter 10000 to 500000 cps with Helical meter 2000 to 500000 cps with coriolis meter
*Minimum Dispensed Shot Size	6 cc with G3000 meter 7 cc with Helical meter 100 cc with coriolis meter
Wetted Parts	
Meters and Fluid Panels	303, 304, 17–4 stainless steel; tungsten carbide (with nickel binder), PTFE, Plated carbon steel, Polymite™
Power Requirements	See page 23
Power Supply Voltage Range	
120 VAC nominal	85–164 VAC, 50–60 Hz, single phase
220 VAC nominal	200–240 VAC, 50–60 Hz, single phase
440 VAC nominal	400–480 VAC, 50–60 Hz, single phase
Operating Temperature Range	
Controller	40°–122°F (4°–50°C)
Fluid Panel	40°–185°F (4°–85°C)
Operating Humidity Range	0–90% non-condensing

* Flow rates and viscosities are general estimates. Flow rates drop as viscosity increases. Fluids are expected to shear under pressure. New applications or fluids should always be tested to determine proper line sizes and equipment selections.

See your Graco Authorized distributor for other capabilities

Polymite™ is a registered trademark for Parker Seals.

Regulator Plates

Mounting dimensions and parts breakdowns for the Air-Operated Regulator Fluid Plates are in Manual 309375.

	Cartridge Regulator	**Mastic Regulator**	**Electric Regulator**
Regulator Manual	308647	307517	309382
Weight – No Flow Meter	25.5 lbs (11.6 kg)	33 lbs (15 kg)	32.25 lbs (14.6 kg)
Weight – W/G3000	30 lbs (13.6 kg)	N/A	38.25 lbs (17.4 kg)
Weight – W/SRZ–40	40 lbs (18 kg)	48 lbs (22 kg)	47.25 lbs (21.5 kg)
Fluid Port Inlet	1/2 in. npt(f)	3/4 in. npt(f)	1/2 in. npt(f)
Fluid Port Outlet	1/2 in. npt(f)	3/4 in. npt(f)	3/8 in. npt(f)
Maximum Inlet Pressure	5000 psi (34 MPa, 340 bar)	5000 psi (34 MPa, 340 bar)	5000 psi (34 MPa, 340 bar)
Maximum Working Pressure*	5000 psi (34 MPa, 340 bar)	5000 psi (34 MPa, 340 bar)	3500 psi (24 MPa, 241 bar)
Air Supply	1/4 in. npt(f)	1/4 in. npt(f)	1/4 in. npt(f)
Maximum Air Pressure	120 psi (0.8 MPa, 8.2 bar)	120 psi (0.8 MPa, 8.2 bar)	120 psi (0.8 MPa, 8.2 bar)
Minimum Air Pressure	60 psi (0.4 MPa, 4.1 bar)	60 psi (0.4 MPa, 4.1 bar)	60 psi (0.4 MPa, 4.1 bar)
Maximum Operating Temperature	185°F (85°C)	185°F (85°C)	176°F (80°C)
Minimum Flow Rate – G3000	50 cc/min	N/A	50 cc/min
Minimum Flow Rate – SRZ–40	100 cc/min	100 cc/min	100 cc/min
Minimum Flow Rate – Coriolis	100 cc/min	100 cc/min	100 cc/min

*Maximum system pressure depends on dispense valve.

Sound Pressure Levels (dBa) (measured at 1 meter from unit)

Input Fluid Pressures	
1500 psi (10.5 MPa, 105 bar)	**4000 psi (28 MPa, 276 bar)**
79.0 dB(A)	86.6 dB(A)

Sound Power Levels (dBa) (tested in accordance with ISO 9614–2)

Input Fluid Pressures	
1500 psi (10.5 MPa, 105 bar)	**4000 psi (28 MPa, 276 bar)**
75.7 dB(A)	86.3 dB(A)

Sound levels were taken using a streaming valve, which results in the highest sound levels of the various dispense techniques offered.

Dispense Valves

	AutoPlus Valve	EnDure Valve	1K Valve
Ambient Part Numbers	236670 Valve 244930 Manifold	244910	243482
Temperature Conditioned Part Numbers	236670 Valve 244930 Manifold**	244910***	N/A
Electric Heat (240 V) Part Numbers	N/A	244962	N/A
Instruction Form	308813	309376	308876
Wetted Materials	Stainless steel, Carbide, UHMW Polyethylene, Delrin® PEEK, Chemically resistant fluoroelastomer, PTFE	Stainless steel, Carbide, Aluminum, Parker Polymite®, Ethylene Propylene, Delrin®, PTFE, Viton®	Stainless steel, Carbide, Parker Polymite®, Ethylene Propylene, Delrin®, PTFE
Weight	35 oz* (1.0 kg)	71 oz* (2.0 kg)	32 oz* (0.9 kg)
Fluid Port Inlet	3/8 in. npt(f) on manifold	1/2 in. npt(f)	1/4 in. npt(f)
Fluid Port Outlet	7/8–14 with tip nut	5/8–18 and nut with 1/8 npt(f)	3/4–16 JIC 45°
Maximum Inlet Pressure	5000 psi (34 MPa, 340 bar)	5000 psi (34 MPa, 340 bar)	4000 psi (28 MPa, 276 bar)
Maximum Working Pressure	4000 psi (28 MPa, 276 bar)	3500 psi (24 MPa, 241 bar)	2000 psi downstream (14 MPa, 138 bar)
Air to open	1/8 in. npt(f)	1/8 in. npt(f)	1/8 in. npt(f)
Air to close	N/A	1/8 in. npt(f)	1/8 in. npt(f)
Spring to close	Yes	Yes	No
Maximum Air Pressure	120 psi (0.8 MPa, 8.2 bar)	120 psi (0.8 MPa, 8.2 bar)	120 psi (0.8 MPa, 8.2 bar)
Minimum Air Pressure	60 psi (0.4 MPa, 4.1 bar)	60 psi (0.4 MPa, 4.1 bar)	60 psi (fluid pressure/30) (0.4 MPa, 4.1 bar)
Maximum Operating Temperature	140°F (60°C)	200°F (121°C)	200°F (121°C)
Sensor Properties (Electric Heat)	N/A	100 Ω Platinum RTD, 108 Ω @ 70°F (21°C) pins 3 and 4	N/A
Heater Properties (Electric Heat)	N/A	200 Watts, 288 Ω +/– 29 Ω pins 1 and 2	N/A

*Weights with inlet manifolds

**233670 bare valve is used with the 244930 valve inlet manifold, which has one 1/4 npt water inlet, two 1/8 npt water outlets, and one 1/8 npt water port for an RTD sensor. The same valve and manifold are used for ambient or temperature conditioned applications. Valve and manifold are ordered separately.

***244910 valve with valve inlet manifold has one 1/4 npt water inlet, four 1/8 npt water outlets, and one 1/8 npt water port for an RTD sensor. Replacement valve only is 244535. The same valve and manifold are used for ambient or temperature conditioned applications.

Parts

Part No. 244994 – Instruction Manual Binder

Control Unit

Refer to the drawing on page 139.

Control Boards

Ref. No.	Part No.	Description
1	244355	BOARD, PrecisionSwirl (SW1 or SW2)
2	244670	BOARD, Motor Amplifier (AMP)
3	244667	BOARD, Robot I/O, 24 VDC (RIO)
4	244668	BOARD, Robot I/O, 120 VAC (RIO)
5	244665	BOARD, Expandable Control Board (ECB)
6	244666	BOARD, System I/O (SIO)
7	198050	BOARD, DeviceNet
8	198051	BOARD, Profibus
9	198052	BOARD, Interbus
10	198053	BOARD, ControlNet
11	233675	CARD, PC104 (TouchScreen)
12	244993	BOARD, Display (EasyKey)
13	233738	CARD, Compact Flash (Touch-Screen)

Control Board Covers

Ref. No.	Part No.	Description
21	198251	COVER, PrecisionSwirl board
22	198248	COVER, motor amp board
23	198286	COVER, Robot I/O board, 24 VDC
24	198250	COVER, Robot I/O board, 120 VAC
25	198258	COVER, ECB board
26	198249	COVER, I/O board
27	198288	COVER, display board
28	116782	STAND-OFF, cover support

Miscellaneous Control Parts

Ref. No.	Part No.	Description
31	116653	SWITCH, key
32	116728	KEY, spare
33	115940	RELAY
34	196975	POWER SUPPLY, 24 VDC
35	244808	USER INTERFACE, EasyKey, Complete
36	197408	USER INTERFACE, TouchScreen
37	115388	TRANSFORMER
38	198529	DISPLAY ONLY (no board)
39	233696	KIT, display software chip, display
40	233697	KIT, software chip, main board
41	197981	BEACON
42	198065	KEYPAD MEMBRANE

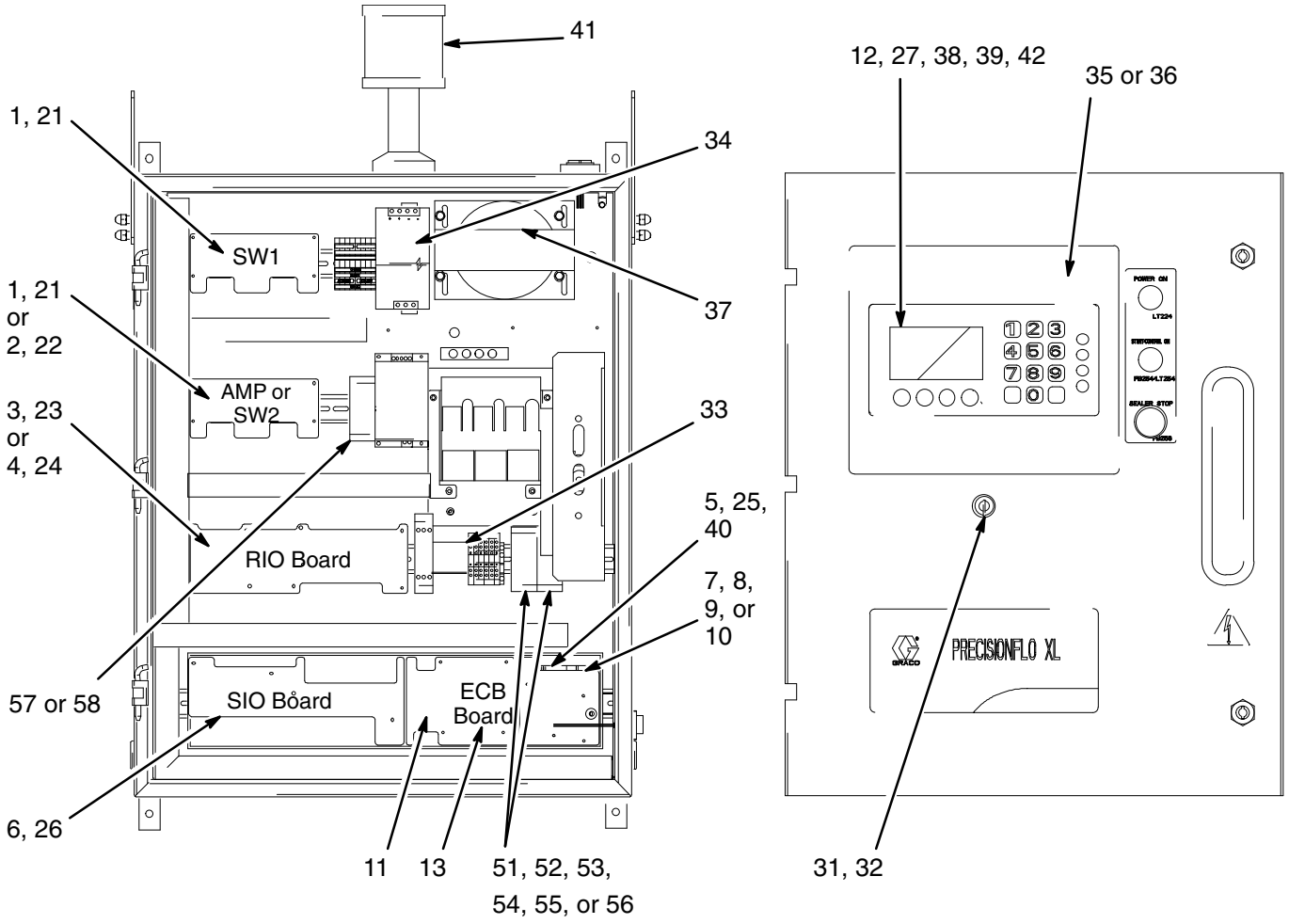
Cables (not shown) on standard packages

Part No.	Description
198296	CABLE, Operations, 60 ft (18.3 m)
617706	CABLE, Motor Power, 60 ft (18.3 m)
617870	CABLE, PrecisionSwirl, 55 ft (16.7 m)
198459	CABLE, Robot Digital, 40 ft (12 m)
198460	CABLE, Robot Analog, 40 ft (12 m)
233125	CABLE, PrecisionSwirl Extension, 6 ft (1.8 m)
233124	CABLE, PrecisionSwirl Extension, 9 ft (2.7 m)
233123	CABLE, PrecisionSwirl Extension, 15 ft (4.6 m)
233657	CABLE KIT, use to connect PrecisionFlo XL control to a computer for job down-loads and software updates.

Fuses

Where Used	Ref. No.	With Input Voltage	Schematic* Fuse No.	Graco Part No.	Fuse Designation	Amp Rating	Qty.
Main Control	51	110–120 VAC	FU 2080	116505	LPJ–8SP	8	1
	52	110–120 VAC	FU 2081	116505	LPJ–8SP	8	1
	53	220–240 VAC	FU 2080	116506	LPJ–5SP	5	1
	54	220–240 VAC	FU 2081	116506	LPJ–5SP	5	1
	55	400–480 VAC	FU 2080	116620	LPJ–3SP	3	1
	56	400–480 VAC	FU 2081	116620	LPJ–3SP	3	1
	57	200–240 VAC	FU 216	116505	LPJ–8SP	8	1
	58	400–480 VAC	FU 216	116505	LPJ–8SP	8	1

**Schematics in document 309364.*



#11 – PC104 card mounts the ECB board (5) if the Touch Screen is used or if there is a remote display.

#7, 8, 9, or 10 Network I/O cards. If one is used, it is mounted on the right side of the ECB board (5). If a network I/O card is used you will not have a Robot I/O (RIO) board.

If one swirl card is installed, the board (SW1) will always be in the top position. If an electric regulator is used, the AMP board (2) will always be in the position second from the top. If the electric regulator is not used, a second swirl board (SW2) may be added in the second position.

Standard Hoses

Type	Part No.	Size	Core Material	Working Pressure	Temp. Rating	Coupling Size	Coupling Material	Bend Radius
Dispense*	116760	.50 in. ID x 6 ft	Neoprene	4000 psi	212°F	7/8–14 37° (f)	Steel	3.5 in.
Dispense*	116762	.62 in. ID x 6 ft	Neoprene	3625 psi	212°F	1-1/16–12 37° (f)	Steel	4.0 in.
Dispense*	116761	.50 in. ID x 10 ft	Neoprene	4000 psi	212°F	7/8–14 37° (f)	Steel	3.5 in.
Dispense*	116763	.62 in. ID x10 ft	Neoprene	3625 psi	212°F	1-1/16–12 37° (f)	Steel	4.0 in.
Feed	C12383	1.0 in. ID x10 ft	Neoprene	5000 psi	212°F	1 npt (m)	Steel	12 in.
Feed	C12218	1.0 in. ID x 20 ft	Neoprene	5000 psi	212°F	1 npt (m)	Steel	12 in.
Co-Axial Feed	116749	1.0 in. ID x10 ft	Synthetic Rubber	5500 psi	212°F	1 npt (f)	Steel	12 in.
Co-Axial Feed	116748	1.0 in. ID x 20 ft	Synthetic Rubber	5000 psi	212°F	1 npt (f)	Steel	12 in.

*Abrasion resistant for automated use.

Fluid Module Components

Pneumatic Regulators

Part No.	Description	Manual No.
244734	**Cartridge Regulator**	**308647**
238748	Fluid Section Repair Cartridge	
238747	Fluid Diaphragm Repair Kit	
244740	**Mastic Regulator**	**307517**
233131	Fluid Section Repair Kit	
	Common Pneumatic Regulator Repair Parts	
198082	Pressure Sensor	
244669	Pressure Sensor Amplifier Board	
551348	Solenoid Valve	
195942	Regulator (V/P)	
C50239	Hose Swivel 5000 psi 1/2 in. npt(f) both ends	
245896	**Regulator Pre-charge Kit**	

Electric Regulators

Part No.	Description	Manual No.
244920	**Electric Regulator, Low Flow**	**309382**
233681	Fluid Section Repair Kit	
244920	Fluid Section Spare	
244921	**Electric Regulator, High Flow**	**309382**
233680	Fluid Section Repair Kit	
244921	Fluid Section Spare	

Flow Meters

Part No.	Description	Manual No.
246190	**Helical Meter with sensor**	
196840	Sensor	
239716	**G3000 Spur Gear Meter with sensor**	
239719	Meter Only	
239717	Sensor	

Dispensing Devices

Dispense Valves

Valve Model	AutoPlus	EnDureValve	1K Valve
Valve Part No.	233670	244535	243482
Manual No.	308813	309376	308876
Repair Kit Part No.	N/A	15E012	570268
Shaft/Needle Part No.	239807	15E014	626068
Seat Part No.	233671	N/A	N/A
Inlet Gasket Part No.	189970	N/A	N/A
Seat Gasket Part No.	192443	N/A	N/A

PrecisionSwirl Orbiters

Manual No. 310558

Part No.	Description
243402	Orbiter, Narrow Pattern
243403	Orbiter, Wide Pattern
	Orbiter Repair Parts and Accessories
246293	Tube/Bearing Repair Kit, Narrow Pattern, Viton Bellows (standard)
243437	Tube/Bearing Repair Kit, Narrow Pattern, Buna–N Bellows
246292	Tube/Bearing Repair Kit, Wide Pattern, Viton Bellows (standard)
918620	Tube/Bearing Repair Kit, Wide Pattern, Buna–N Bellows
241479	Motor Kit

Part No.	Description
246290	Bellows, Viton 12-pack (standard)
243647	Bellows, Buna–N, 12-pack
241569	Bearing Tool Repair Kit
233125	Extension Cable, 6 ft
233124	Extension Cable, 9 ft
233123	Extension Cable, 15 ft
617870	Primary Cable, 55 ft

Filtering Accessories

Part Number	Description
C59725	Dual Filter Bank with inlet/outlet fluid gauges, isolation ball valves, drain valves, and 30 mesh elements. 1-1/4 in. npt(f) inlet and 1-1/4 in. npt(f) outlet with 1 in. npt(f) bushing
C59547	Single Filter Kit with inlet/outlet fluid gauges, isolation ball valves, drain valve and 30 mesh element. 1 in. npt(f) inlet and outlet

Accessory Cables in Non-Standard Lengths

Part Number	Description	Length
198730	Swirl cable from box	110 ft (33.5 m)
198731	OP cable from box to fluid plate	20 ft (6.1 m)
198732	OP cable from box to fluid plate	125 ft (38 m)
198733	RDR cable, digital from robot control	20 ft (6.1 m)
198734	RDR cable, digital from robot control	125 ft (38 m)
198735	RAR cable, analog from robot control	20 ft (6.1 m)
198736	RAR cable, analog from robot control	125 ft (38 m)
198737	Motor cable from box to fluid plate	20 ft (6.1 m)
198738	Motor cable from box to fluid plate	125 ft (38 m)

PrecisionFlo XL Remote Control Box

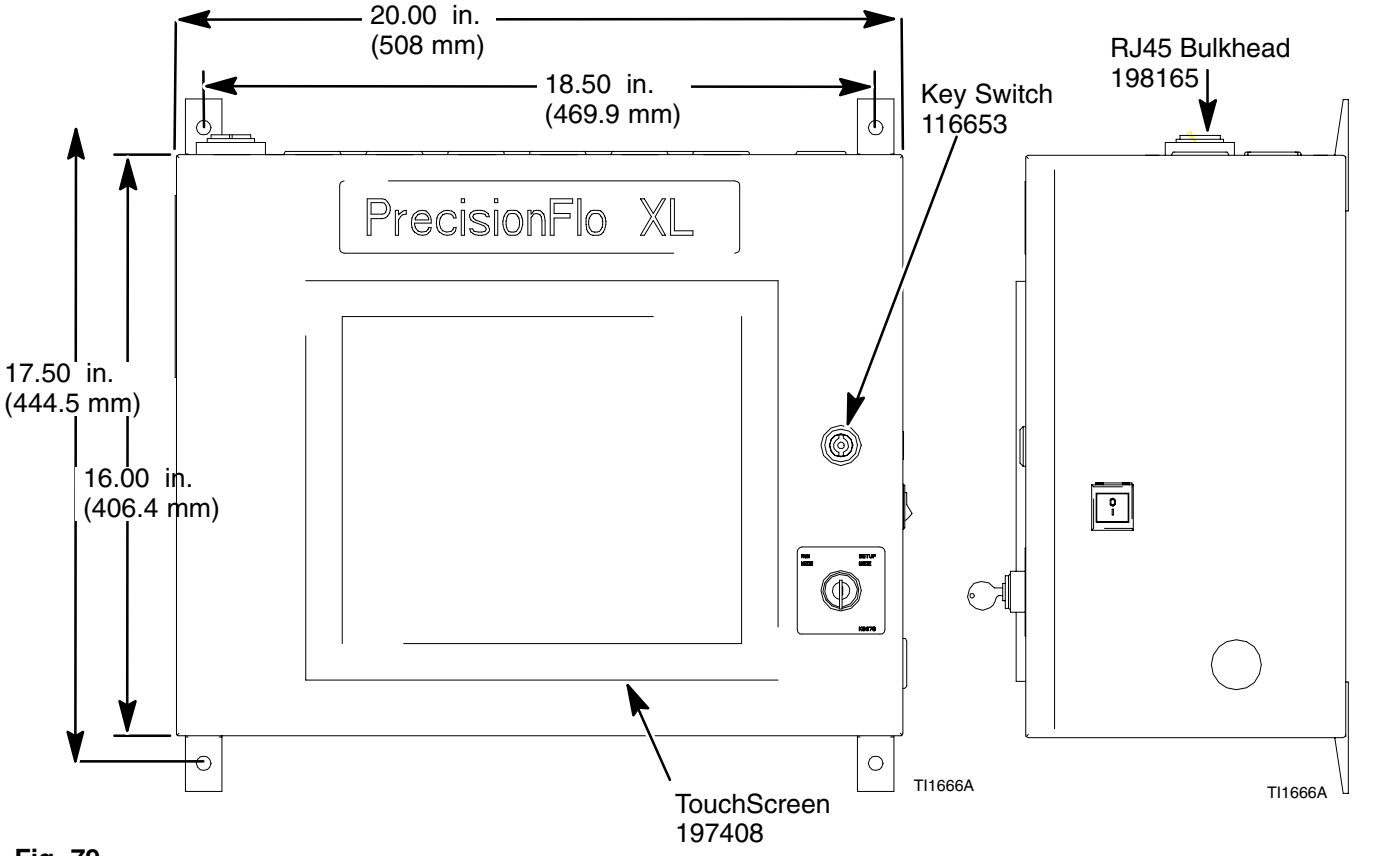


Fig. 79

⚠ WARNING

Install the Remote Screen Interface where the screen operator can see all of the dispensing points controlled by the screen. Performing a manual dispense without being able to see the dispense point could cause injuries if the dispense area is not clear of personnel.

Adding Local Stations to a Remote Box

The top of your remote screen box has 11 plugged holes that can be opened to add additional local stations. To add stations to a remote box, perform the following steps:

1. Loosen wing nut from inside box and remove the hole plug.
2. Insert bulkhead connector in hole and tighten connector nut.
3. Connect CAT5 patch cable to connector and plug the other end into the next available Ethernet port.
4. Repeat steps 1 through 3 for each local station you wish to connect.

NOTE: Ports 16MDI–X and 16MD are never used.

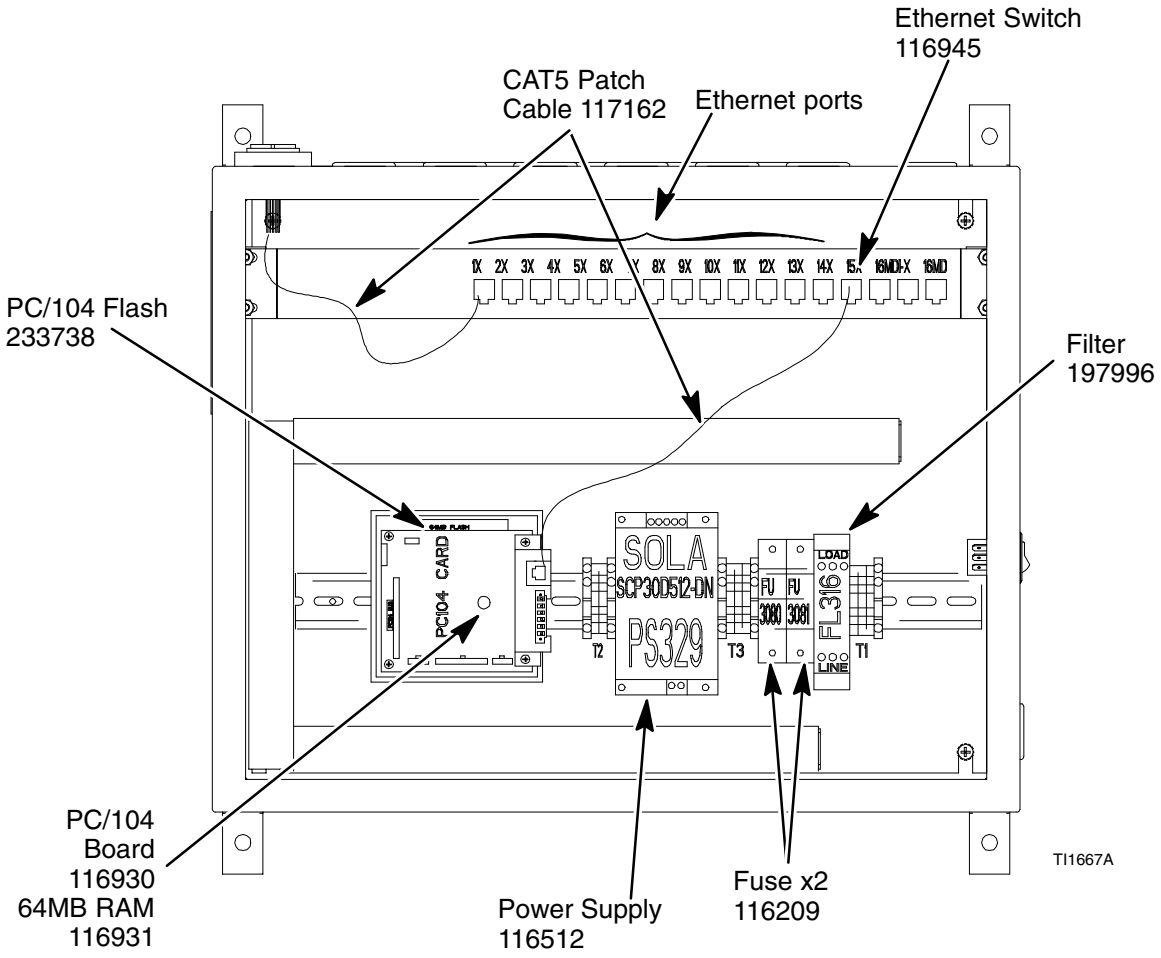


Fig. 80

Adding Swirl Capability to an Existing Control Box

Connection harnesses are available for adding swirl capability to existing PrecisionFlo XL control boxes. If your box is controlling one or two pneumatic regulator-type fluid plates, you can have one or two swirl control boards. If your box is controlling an electric regulator fluid plate, you will have an AMP board mounted in the second position down, and can add a swirl control board in the top position. Verify that you have space open for the board(s) by referring to the layout on page 139. Swirl boards can be installed one above the other in the upper left section of the control box if there are empty spaces.

How to install a swirl board

1. Add connector hole in the sheet metal on top of the box. A template is supplied with the harness kit. Metal chips must be contained and removed without allowing them to fall into the box.
2. Install the Swirl 1 or Swirl 2 harness kit. These kits include prewired connectors with terminated and labeled wires.
3. Install the Swirl card(s) by snapping them onto the DIN rail.
4. Plug on the board connectors.
5. Connect seven wires to other connectors on the SIO board.
6. Connect two wires to the 24 VDC power supply
7. Install cover spacers and cover(s).

Part No.	Description	Qty
233732	HARNESS, position 1	1
233735	HARNESS, position 2 (Use only of you are adding a second board to position 2.)	1
244355	CONTROL BOARD, swirl	1 or 2
198251	BOARD COVER, swirl	1 or 2

Notes for Figures 81 and 82:

1. All wire ends are terminated with appropriate size ferrule and tagged with appropriate wire I.D.
2. Wires are bundled together where appropriate.
3. Connectors shown are supplied. Connections in dashed boxes are field wiring.
4. A template for mounting the external Amphenol connector is included.
5. Refer to schematics in manual 309364 for detailed information.

Swirl 1 Upgrade

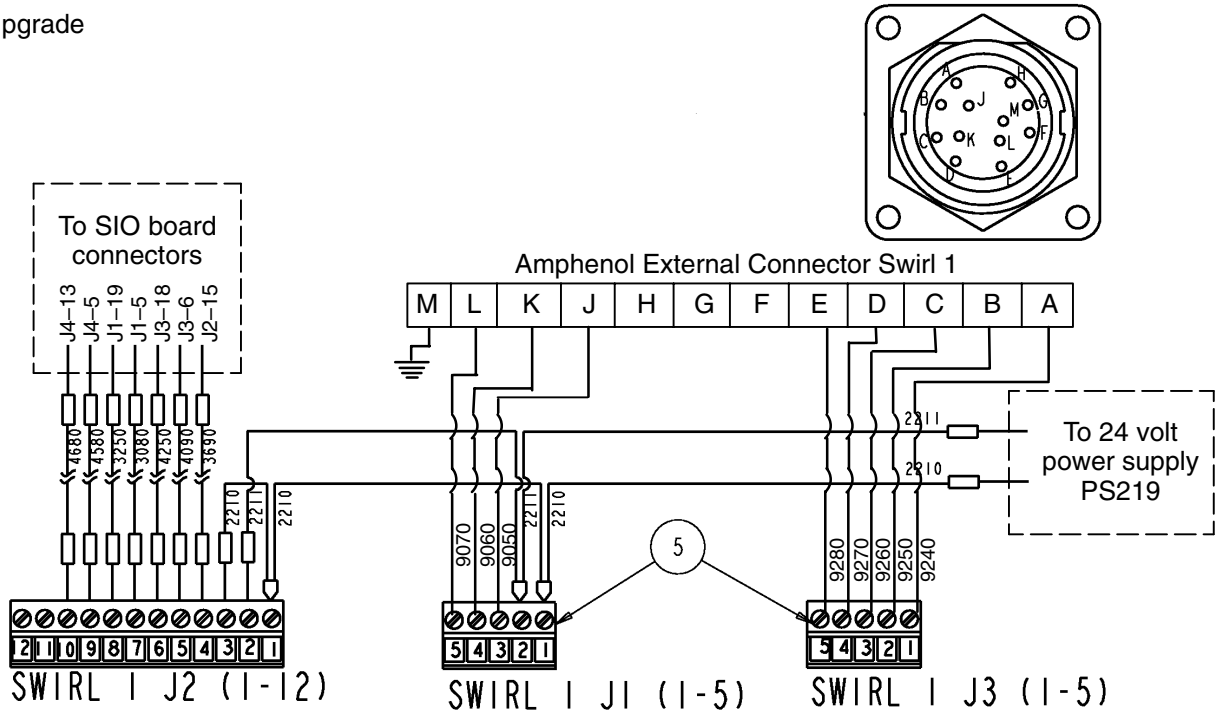


Fig. 81

Swirl 2 Upgrade

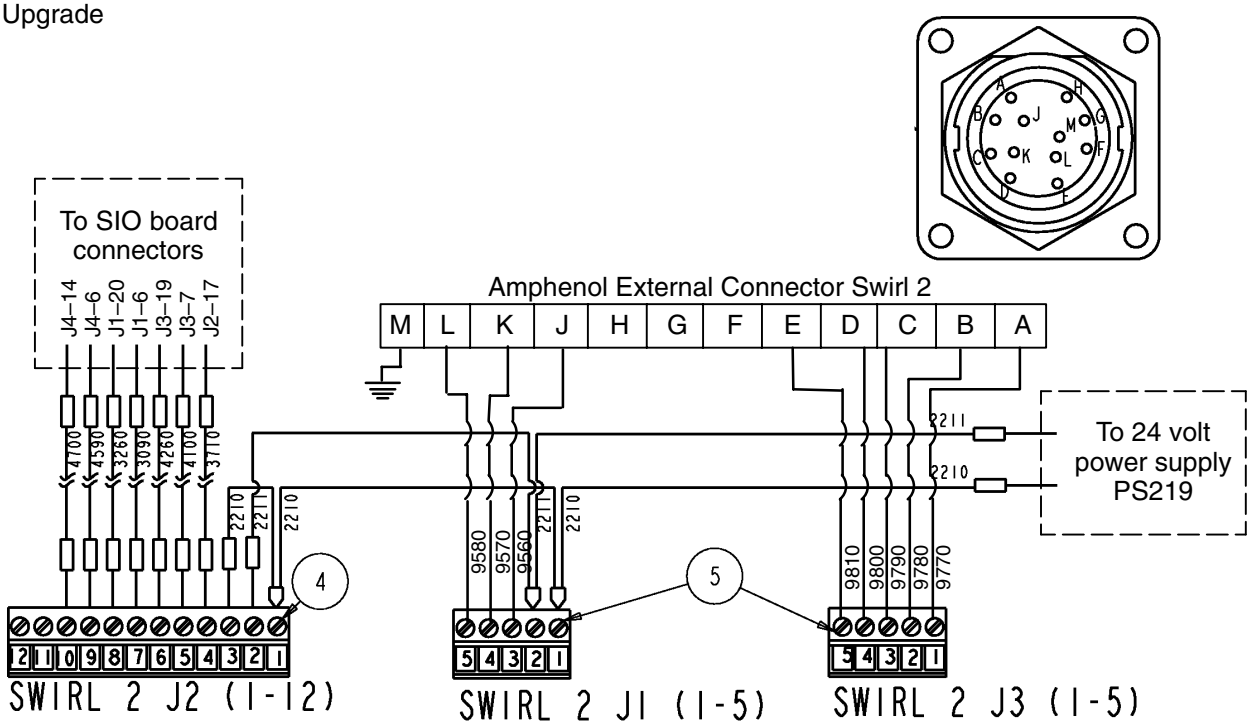


Fig. 82

Temperature Control

Temperature-Conditioned Package (St. Clair Systems)

The water-circulation, temperature-conditioning equipment is manufactured and supplied specifically for the PrecisionFlo XL by St. Clair Systems of Romeo, Michigan. Their complete instruction manual is included with each unit. St. Clair Systems can be contacted by phone at **(810) 336–0700** and by email at **stclairsys.com**.

Combinations and Capabilities

- The temperature-conditioning control comes fully integrated with the PrecisionFlo XL control unit.
- Either Heat Only or Heating and Cooling is available.
- A single 240 VAC or 480 VAC only power drop controls both panels.
- The temperature-conditioning control panel is self-contained, but all of the temperature control functions are accessed through the PrecisionFlo XL user interface, including temperature set point, alarms, and PID values.
- The unit includes 1 zone of heat control.
- To activate temperature control remotely, remove Remote Temp. Activate jumper and use your own switch.

  Remote Temp. Activate: RDR–B3, Wire 8730, Connector J5–19, normally jumpered to 704 RIO J1–3.

Temperature-Conditioning Components

Part No.	Description
198457	RTD Sensor
198458	RTD Sensor Cable, 6 ft Whip
198490	RTD Main Cable, 70 ft (21.3 m)

Temperature-Conditioning Jackets

Part No.	Description
116770	Jacket for 6 ft dispense hoses (1/2 in. and 5/8 in. ID)
116769	Jacket for 10 ft dispense hoses (1/2 in. and 5/8 in. ID)
233639	Jacket for G3000 flow meter
233659	Jacket for SRZ40 flow meter
198667	Jacket for electric regulator head
198447	Jacket for 1/2 in. pneumatic regulator
198448	Jacket for 3/4 in. pneumatic regulator
198749	Insulation only jacket for orbiter

Fuses for Temperature-Conditioning Control

Where Used	With Input Voltage	Schematic* Fuse No.	Graco Part No.	Fuse Designation	Amp Rating	Qty.
Temperature Conditioning Control	220–240 VAC	100 FU1		LPJ–25SP	25	2
	400–480 VAC	100 FU1	116219	LPJ–15SP	15	2
	220–240 VAC	100 FU2	116505	LPJ–182SP	8	2
	400–480 VAC	100 FU2	116217	LPJ–15SP	15	1
	All	108 FU	116222	LPJ–12SP	12	1
	All	109 FU		LPJ–6SP	6	1

**Schematics in St. Clair instruction manual.*

Co-Axial Water Jacketed Feed Hoses

Part No.	Size	Core Material	Working Pressure	Temp. Rating	Coupling Size	Coupling Material	Bend Radius
116749	1.0 in. ID x 10 ft	Synthetic Rubber	5000 psi	212°F	1 npt (f)	Steel	12 in.
116748	1.0 in. ID x 20 ft	Synthetic Rubber	5000 psi	212°F	1 npt (f)	Steel	12 in.

Electric Heat Package

Combinations and Capabilities

- The electric heat control comes fully integrated with the PrecisionFlo XL control unit.
- A single 240 VAC or 480 VAC only power drop controls both panels.
- The electric heat panel is self-contained, but all of the temperature control functions are accessed through the PrecisionFlo XL user interface, including temperature set point, alarms, and PID values.
- The unit is standard with up to 4 zones of heat control; unused zones can be turned off.

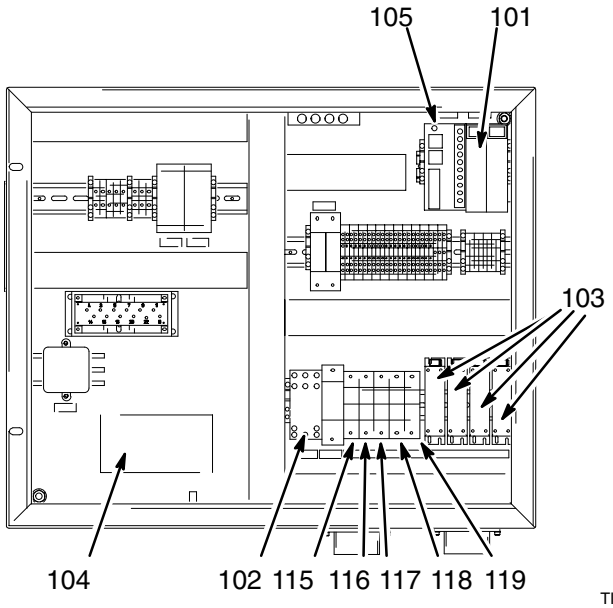
Heat zones on the electric heat option are set up as follows:

Connector	Zone Number	Description	Maximum Wattage
1	1	Feed Hose	1250
	2	Fluid Plate	750
2	3	Dispense Hose	750
	4	Dispense Valve	400

This control package is compatible with any of Graco's Therm-O-Flow Plus 240 volt heated hoses and accessories.

Electric Heat Control Components

Ref. No.	Part No.	Description
101	116503	Two Zone Controller Module
102	116201	Control Relay, 12 V coil
103	116204	Zone Relay, (order 4)
104	233589	Transformer for heat
105	116502	Control Module



Fuses for Electric Heat Control

Where Used	Ref. No.	With Input Voltage	Schematic* Fuse No.	Graco Part No.	Fuse Designation	Amp Rating	Qty.
Electric Heat Control		200–240 VAC	FU 3040	116822	LPJ–20SP	20	1
		400–480 VAC	FU 3040	116821	LPJ–10SP	10	1
		200–240 VAC	FU 3041	116822	LPJ–20SP	20	1
		400–440 VAC	FU 3041	116821	LPJ–10SP	10	1
	115	All	FU 338	116211	FNQ–R–1	1	1
	116	All	FU 354	116208	FNQ–R–6	6	1
	117	All	FU 356	116212	FNQ–R–3-1/2	3-1/2	1
	118	All	FU 358	116212	FNQ–R–3-1/2	3-1/2	1
	119	All	FU 360		FNQ–R–2	2	1

**Schematics in document 309364.*

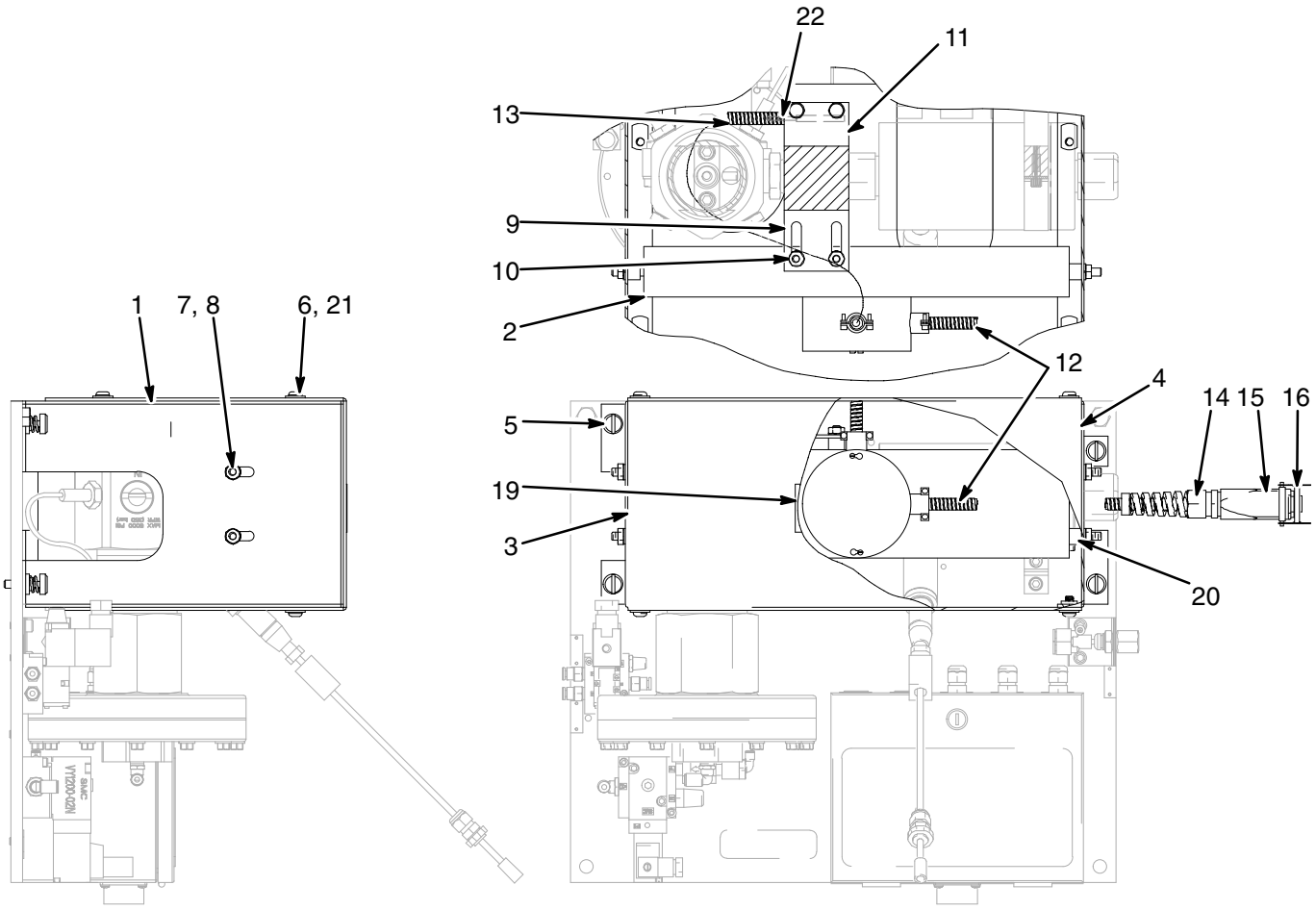
240 V Electrically Heated Hoses

Type	Part No.	Size	Core Material	Working Pressure	Temp. Rating	Coupling Size	Coupling Material	Wattage
Dispense	115875	.50 in. ID x 6 ft	PTFE	3000 psi	400°F	7/8–14 37° (f)	Stainless	300
Dispense	115903	.62 in. ID x 6 ft	PTFE	3000 psi	400°F	1-1/16–12 37° (f)	Stainless	300
Dispense	115876	.50 in. ID x 10 ft	PTFE	3000 psi	400°F	7/8–14 37° (f)	Stainless	500
Dispense	115880	.62 in. ID x10 ft	PTFE	3000 psi	400°F	1-1/16–12 37° (f)	Stainless	500
Feed	115885	.87 in. ID x 10 ft	PTFE	3000 psi	400°F	1-5/16–12 37° (f)	Stainless	500
Feed	115887	.87 in. ID x 20 ft	PTFE	3000 psi	400°F	1-5/16–12 37° (f)	Stainless	1000

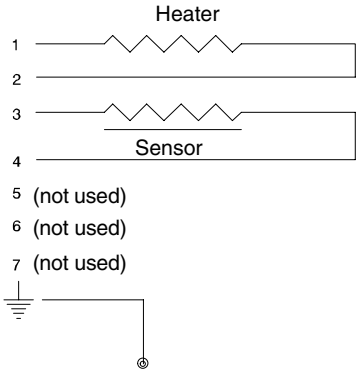
Fluid Plate Electric Heat Kits

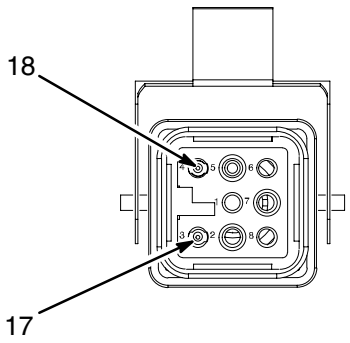
Mounting Fluid Module

Best heat control is obtained by mounting the fluid module horizontal or vertical, with fluid components toward the floor. If the fluid components are toward the ceiling, the heater/sensor assembly should be reversed.



Electrical Schematic Diagram





TI1482A

Fluid Plate Electric Heat Kits

The heat kits are designed to be used with the PrecisionFlo XL optional heat control. The kit should only be connected to output connector No. 1, Zone No. 2. Refer to the drawing on page 150.

Heat Type: radiant
VAC: 240
Watts: 720
Maximum Temperature: 180°F (82°C)

Part No. 233692

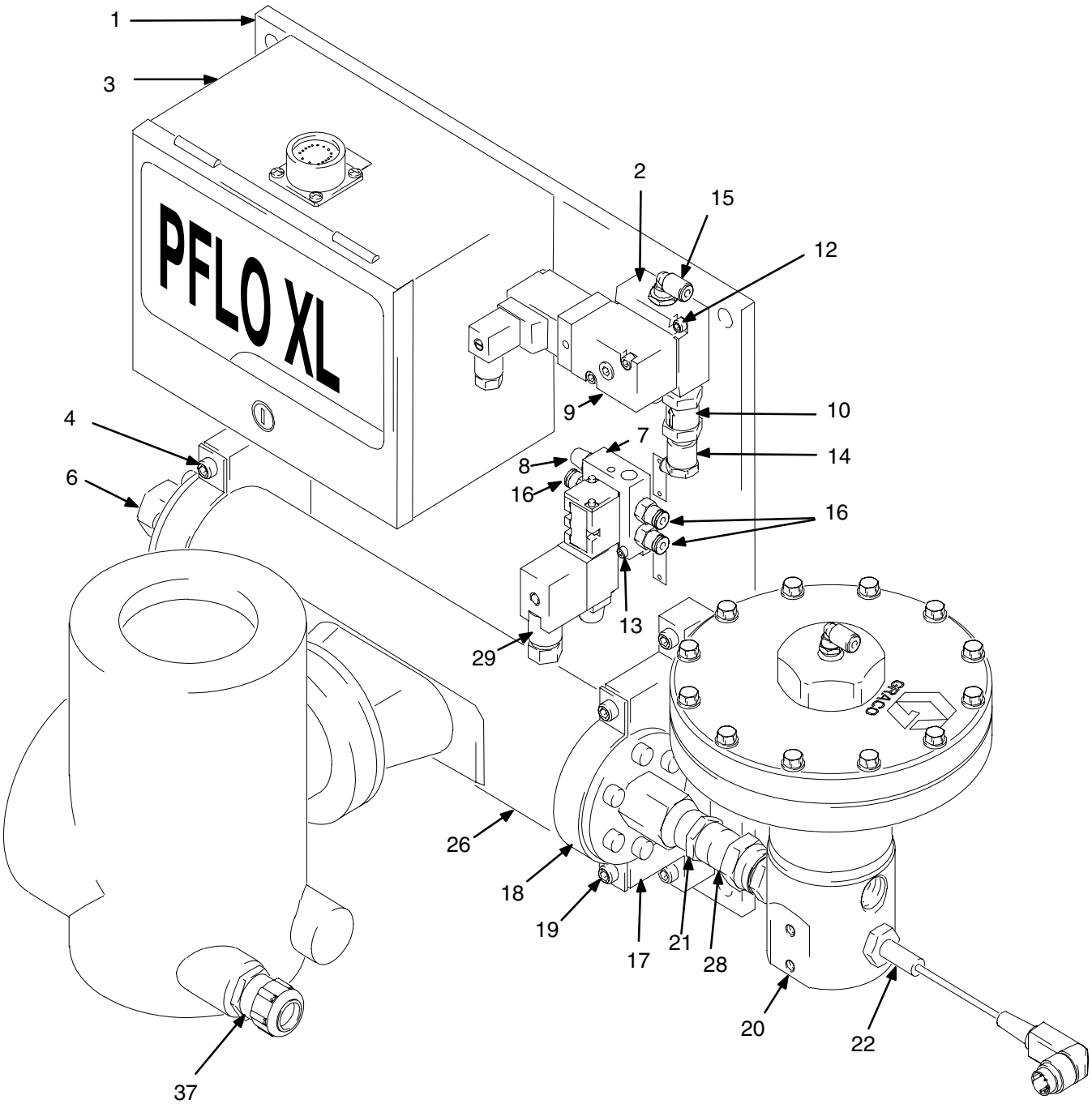
For Pneumatic Controlled Fluid Modules
(Part Nos. – 198245, 198246, 198247)

Part No. 233693

For Electric Servo Controlled Fluid Modules
(Part Nos. – 233652, 233653, 233654, 233672, 233673)

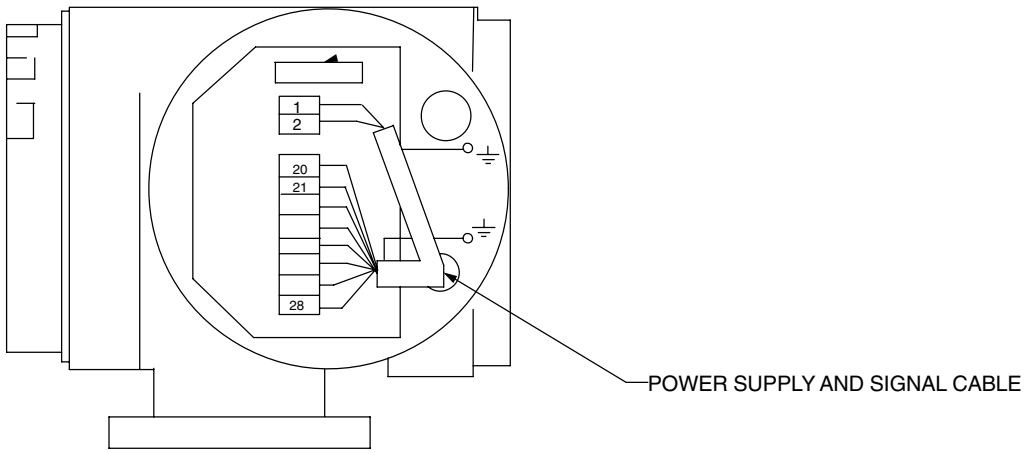
		Kit 233692		Kit 233693	
Ref. No.	**Description**	**Part No.**	**Qty.**	**Part No.**	**Qty.**
1	ENCLOSURE, heat shield	198633	1	198750	1
2	HEATER, electric	198233	1	198233	1
3	COVER, heat, enclosure	198635	1	198751	1
4	COVER, heat, enclosure	198634	1	198752	1
5	SCREW, 1/4-20, quick disconnect	116779	4	116779	4
6	SCREW, cap, skt, button head	111831	8	111831	8
7	WASHER, lock	100016	8	100016	8
8	NUT, hex mscr	100015	4	100015	4
9	BRACKET	198528	1	198528	1
10	SCREW, cap, hex head	100157	2	100270	2
11	BRACKET, sensor	198588	1	198753	1
12	CORD, flex, valve 1K	116675	1	116675	2
13	SENSOR, temperature	C32255	1	C32255	1
14	BUSHING, strain relief	116673	1	116673	1
15	CONNECTOR, cable coupler hood	116637	2	116637	2
16	INSERT, male	115860	1	115860	1
17	CONTACT, connector	116640	6	116640	6
18	CONNECTOR, male, crimp	115862	1	115862	1
19	LABEL, heated surface	C14005	1	C14005	1
20	SPACER	116778	4	116778	4
21	WASHER, plain	–	–	110755	9
22	SCREW, set	–	–	105672	1

Coriolis Flow Meter Kit



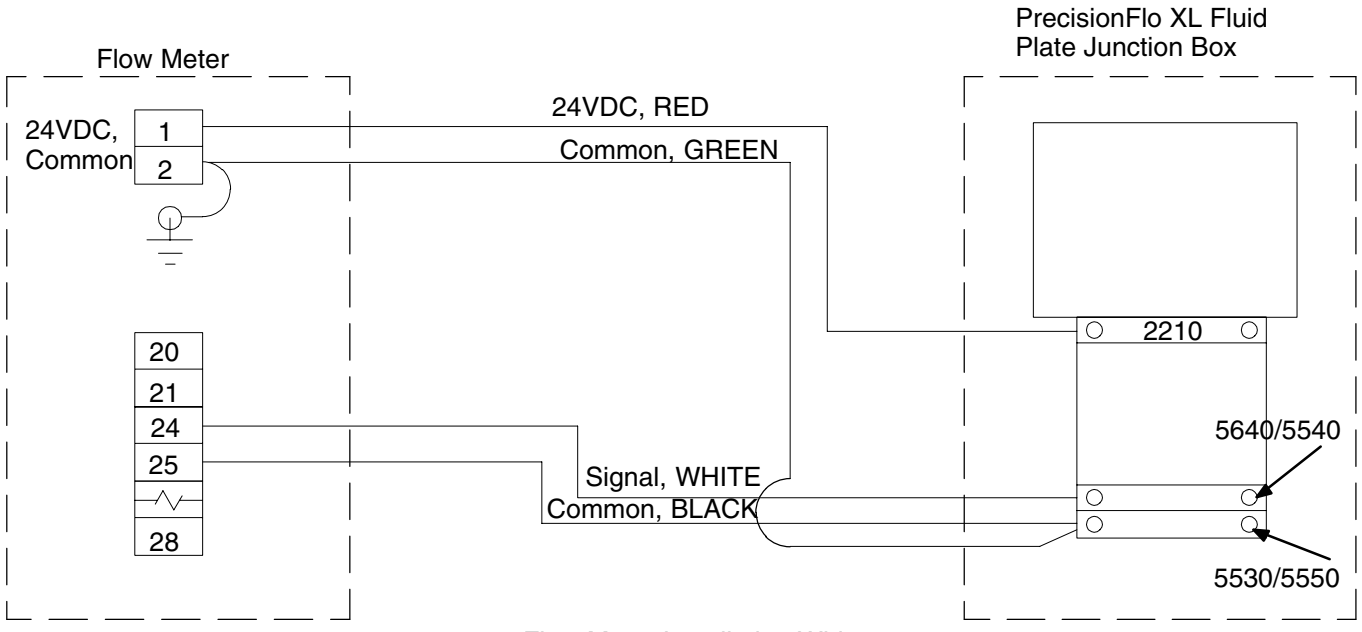
Coriolis Flow Meter Kit

Ref. No.	Part No.	Description	Qty.
1	15D846	PLATE, LASD, coriolis	1
2	195942	REGULATOR	1
3	198183	BOX, junction	1
4	107530	SCREW, hex head ,	6
7	551348	VALVE, 1/8 npt	1
8	006061	MUFFLER, 1/4 npt	2
9	517449	MUFFLER, 1/4 npt (not shown)	1
10	115714	MUFFLER, inline filter	1
12	112671	SCREW, cap	2
13	198182	SCREW, cap	2
14	198176	FITTING, elbow	1
15	198178	FITTING, elbow	1
16	198177	FITTING, push	3
17	198066	BRACKET	2
18	198067	CLAMP	2
19	108328	SCREW, cap, skt, hd	8
20	244734	REGULATOR, ASSY.	1
21	156877	NIPPLE	1
22	198082	TRANSDUCER, pressure control	2
26	15D877	METER, mass flow	1
28	156684	UNION, adapter	1
29	196108	PLUG ASSY, 100V	1
37	119319	BUSHING	1



	TERMINAL CONNECTION: "HART" INTERFACE (CURRENT OUTPUT)
3 SHLD	GROUND CONNECTION (GROUND WIRE)
1 BLK 2 WHT	L– (Common) L+ (24 VDC)
60 Series 20 (+) 21 (–) 83 Series 24 (+) 25 (–)	PULSE/FREQUENCY OUTPUT
28 SHLD	GROUND CONNECTION (GROUND WIRE)

Fig. 83



248301 Flow Meter Installation Wiring

Fig. 84

Install the Flow Meter

Install the flow meter in the fluid feed line as close to the flow regulator as practical. The flow meter must be solidly mounted. Refer to E & H Promass 83 manual, pages 13–18, for full information.

Set the K–Factor in the PrecisionFlo XL

Refer to **Setting Flow Meter K-factors**, page 35, **Verification and Calibration**, page 115 and EasyKey dispense setup on page 50, and TouchScreen dispense setup on page 62. The meter is factory set for 2000 pulses/L.

Test Procedure

Setting flow meter parameters –

6. Enter the operating matrix by pressing the E key.
7. Navigate through the menus using the +/– keys as necessary.
8. Toggle to the “Systems–Units” group.
9. Select this group by pressing the E key.
10. When prompted for an access code, enter 83.
11. Set the following values in the “Systems–Units” group:

Parameter	Value
Mass Flow Unit	g/min
Mass Unit	g
Volume Flow Unit	cm^3/min
Volume Unit	cm^3
Gallons/Barrel	US 42 Gal/Ba
Density Unit	g/cc
Temperature Unit	F
Nom. Diam. Unit	in.

Commission the Meter (83 Series)

Calibration should be performed at least once when the system is being commissioned.

12. Adjust the dispense system so that static pressure of the supply hose (not the display pressure on the PrecisionFlo) is 1500 +/– 500 psi.
13. Make sure the applicator is closed and there are no leaks.
14. Navigate the flow meter menu to “System Parameter.”
15. Choose “Zeropoint Adjust.”
16. Choose “Start” (remember, password is 83).
17. Go back to the main screen by pushing E for three seconds.

To ensure calibration was done correctly, dispense material into a cup and compare the actual measured volume to the displayed volume. Adjust the K factor if necessary. Refer to page 115 for instructions.

83 Series Coriolis Flow Meter Settings

NOTE: The password for the 83 Series Meter is 83.

Group	Parameter	Value
System Units	Unit Mass Flow	g/m
	Unit Mass	g
	Unit Volume Flow	cc/m
	Unit Volume	cc
	Unit Density	g/cc
	Unit Temperature	F
	Unit Length	in.
Operation	Language	Eng
Relays	Assign Line 1	Volume Flow
	Assign Line 2	Totalizer
	Format	x.xxxx
	Display Damping	1 s
Current Output	Assign Current	Volume Flow
Pulse/Freq. Output	Operation Mode	Pulse
	Assign Pulse	Volume Flow
	Pulse Value	0.5 cc/P
	Pulse Width	.05 s
	Output Signal	Passive/Positive
	Failsafe Mode	Fallback Value
Communication	FieldBus Address	0
	Hart Protocol	On
Process Parameter	Assign LF Cutoff	Volume Flow
	On–Val. LF–Cutoff	50 g/min
	Empty Pipe Det.	On
	EPD Value Low	0.2 g/cc
	Density Set Value	1.6209
Sensor Data	K–Factor	1.969
	Zeropoint	–192
	Nominal Diameter	1/2 in.

Notes

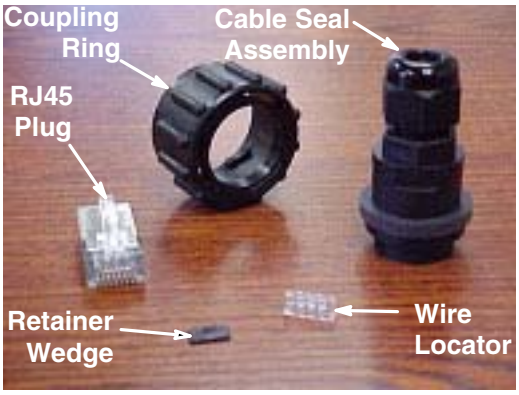
Appendix A
Wiring RJ45 Ethernet Connector

⚠ WARNING

ELECTRIC SHOCK HAZARD
All wiring must be done by a qualified electrician. You must disconnect the circuit before following this procedure.

Follow these instructions to wire an RJ45 ethernet connector.

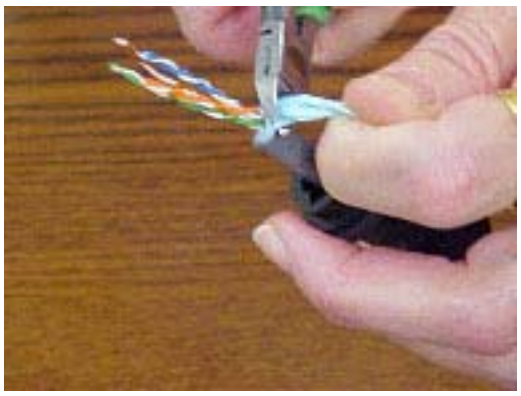
Part No. XXXXXX ethernet plug as it appears after wiring is complete.



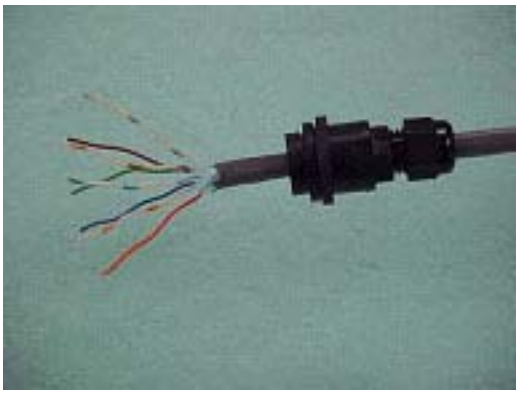
Part No. XXXXXX components

1. Pull cable through cable seal assembly.

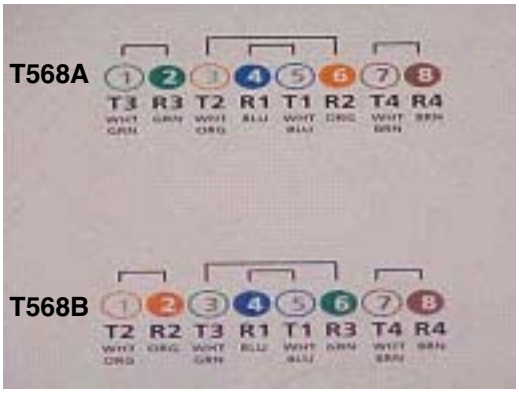
2. Pull shielding back approximately 1.5 inches.



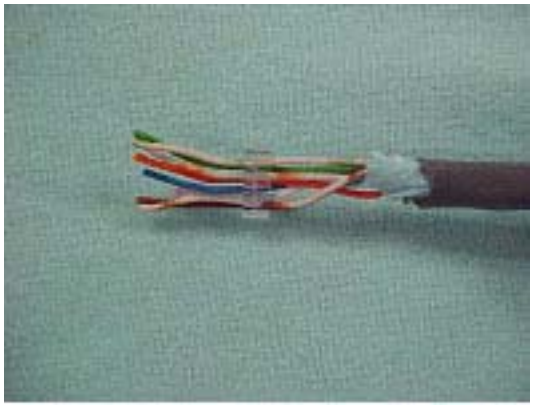
3. Cut shielding back to cable within 1/8 inch of jacket.



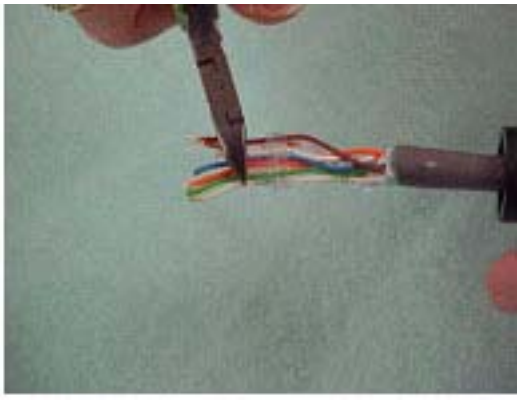
4. Fan wires.



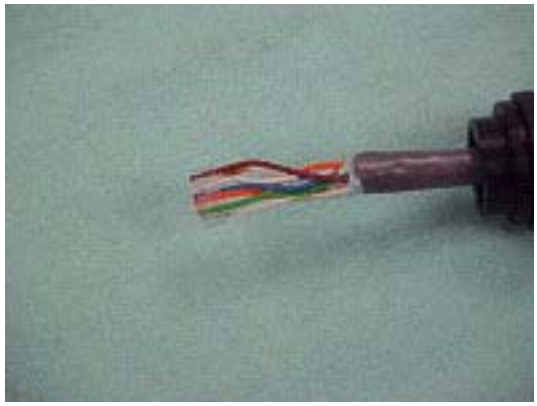
5. Two most popular wiring schemes.



6. Slide wires into wire locator, taking care to maintain proper wire code.

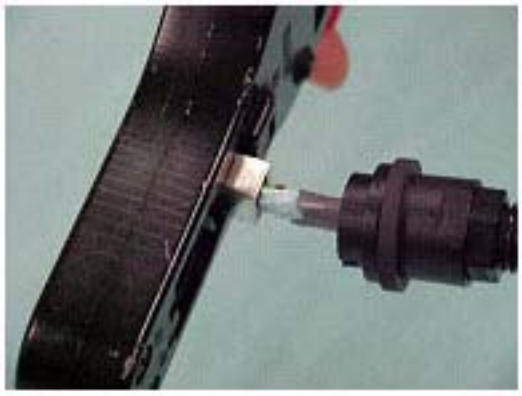


7. Clip wires back to the front of the wire locator.



8. At this point, the front of the wire locator should be flush to the front of the wires, and the wires should be coded correctly.

9. Push the wire bundle and locator into the back of the RJ45 housing until it bottoms out.



10. Use a hand crimper to crimp the assembly together.

11. Slide the RJ45 plug into the cable assembly until it bottoms out.

12. Use the wedge to lock the RJ45 plug into place permanently.

13. Slide the wedge, curved edge facing upward, into the slot at the top of the cable assembly.

14. Push the wedge in until it is flush to the top of the cable seal assembly.

15. Slide the coupling ring onto the wire, and push it toward the back of the cable seal assembly until it is firmly in place.

16. Slide the gasket seal over the front of the assembly, and seat it firmly against the cable seal assembly.

17. Tighten the nut on the back of the Cable Seal Assembly until the nut and cable are secure. See complete plug on page 158.

Ethernet and FTP

TouchScreen Only

Overview

NOTE: Ethernet and FTP communication can only be used with systems with a TouchScreen user interface. EasyKey user interface must use serial communication.

Alarm and data log files can be transferred from the PrecisionFlo XL directly to another computer. This appendix describes how to connect a laptop computer to the PrecisionFlo XL and transfer its alarm and data logs to the laptop. A nearby workstation or desktop computer could be used in place of the laptop.

Before You Start

This appendix is written for users with basic PC and Microsoft® Windows knowledge, as well as familiarity with networking concepts. You should understand how Ethernet, TCP/IP, and FTP work to carry out the following procedures.

Because networking multiple computers together requires proper setup and configuration of these computers, you may need to contact your IS department (or equivalent) for assistance. You will need an IP address assigned to the PrecisionFlo XL by your system administrator.

Ethernet

Ethernet is a common type of communications network. An Ethernet network uses a star or bus topology and supports multiple types of cabling media.

PrecisionFlo XL Ethernet specifications

The PrecisionFlo XL conforms to IEEE Standard 802.3, a widely used specification that was established to standardize Ethernet networks.

The PrecisionFlo XL uses 10/100 Mbps Ethernet twisted pair cables that use RJ45 connectors. Most commonly used in office settings, these cables can be used for runs up to 100 meters. They are generally used in networks with a star topology, which requires the use of a network hub. No termination resistors are required. These cables are also known as Category 5 communication cables or *CAT 5 cable*.

The CAT 5 cable supports 10 Mbps or 100 Mbps communication rates. A short length of either of these cables, with connectors installed on both ends, is commonly called a *patch cable*.

TCP/IP

TCP/IP stands for Transmission Control Protocol/Internet Protocol. It is a suite of communication protocols widely used in Ethernet networks. One of its main functions is to route packets of information from one computer to another. This is accomplished by assigning every computer on the network a unique IP address, which has the format nnn.nnn.nnn.nnn, where ‘nnn’ is a number between 1 and 254. While the specifics are beyond the scope of this manual, in general, the address is made up of two parts. One part designates the network itself, the other part uniquely identifies the computer (also called a ‘host’) on the network. On a computer network where two or more computers are communicating using TCP/IP, all computers involved must have addresses that have the same network identifier but unique host identifiers.

PrecisionFlo XL TCP/IP specifications

The default address used on the PrecisionFlo XL is 192.111.223.110. The network portion of the address is 192.111.223 and the host portion is 110. Any other computer connected to the same physical network as the PrecisionFlo XL must use an address like 192.111.223.nnn, where nnn is any number between 1 and 254, except 110.

Your company may have specific IP address standards or regulations. Contact your IS department (or equivalent) to find out what IP address you should use. To change the IP address of the PrecisionFlo XL, navigate to the IP Address Setup screen on the TouchScreen. Change the IP address to the address recommended by your IS department.

FTP

FTP stands for File Transfer Protocol. It is a popular communications protocol designed specifically to transfer files between computers.

What is Needed?

To properly set up communications, you need to configure the laptop network settings and make the physical network connection. The PrecisionFlo XL is fully configured at the factory and no software configuration or modification is required. Network settings and physical connection are described below.

Network Settings on the Laptop

Companies have varying policies on who is allowed to modify parameters such as network settings. Check with your IS department for approval before proceeding. The procedure shown illustrates the steps for Windows 98; other Windows platforms are similar.

1. In Windows 98, click on Start→Settings→Control Panel.

2. When the Control Panel appears, double-click on the Network icon.

3. A dialog box appears. In the list displayed at the top, there should be a line representing the physical network card (also called network adapter) installed on your computer. *For example,* “Network of Xircom CreditCard 10/100+Modem 56” (see Fig. 85).

   Further down in the same list, there should be another line that indicates the TCP/IP protocol is installed. *For example,* “TCP/IP→ Network of Xircom CreditCard 10/100+Modem” (see Fig. 86).

4. Select the “TCP/IP → Network of …” line and click on Properties.

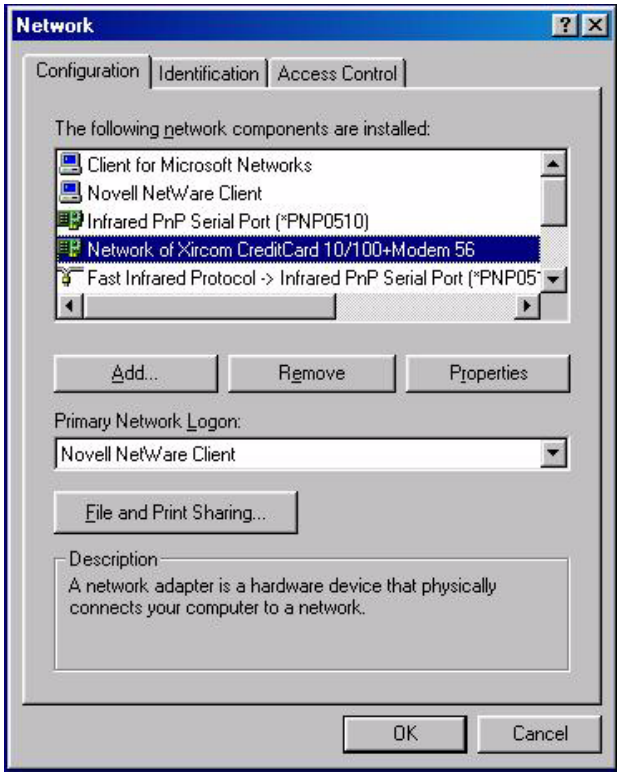


Fig. 85

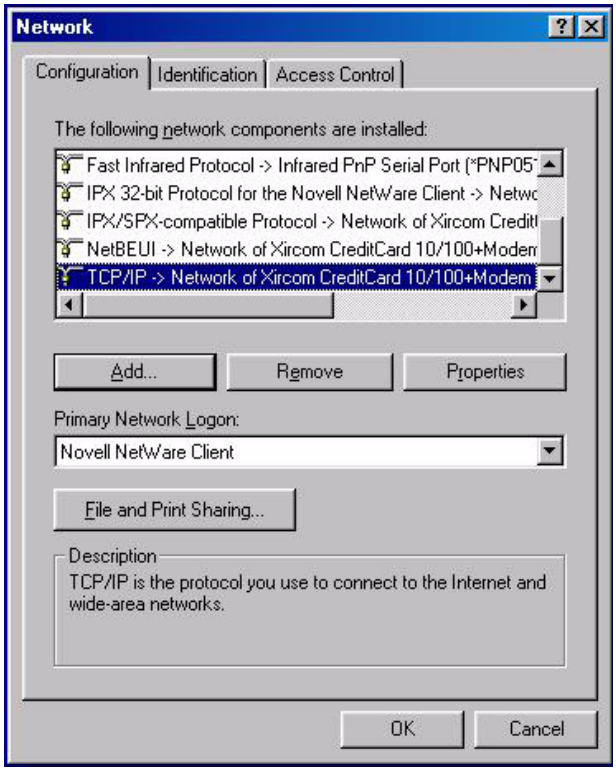


Fig. 86

5. Another dialog box appears; select the IP Address tab. Select “Specify an IP address” and fill in the blanks as shown in Fig. 87.

   If you prefer, the last number of the IP address can be something different (see previous explanation of TCP/IP). The rest of the tabs on this dialog box can be left as they are.

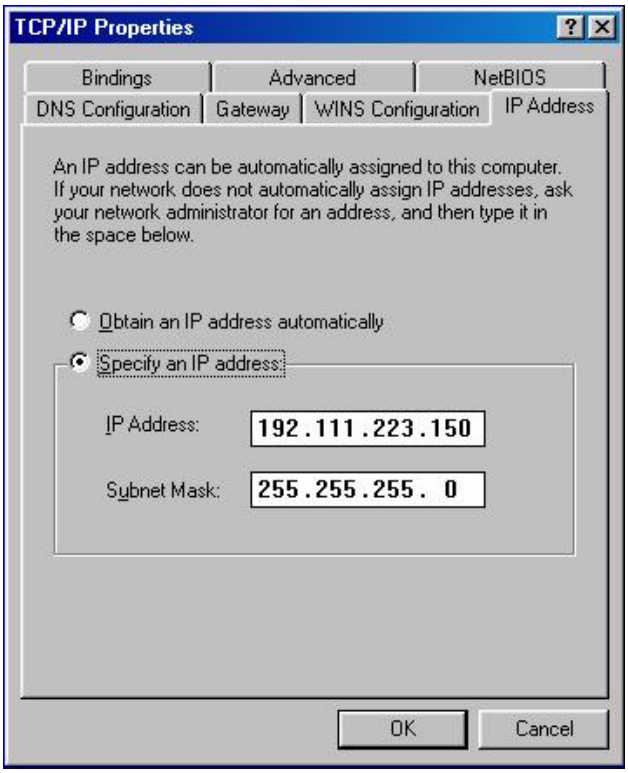


Fig. 87

6. Click OK to close this dialog box.

7. Click OK to close the first dialog box.

8. A message from Windows appears, stating that you need to reboot for the changes to take effect. Reboot the computer.

NOTE: If a network card or the TCP/IP protocol has not been installed, consult the documentation that came with your network card for installation instructions.

Physical Connection to PrecisionFlo XL

There are two common ways to connect to the PrecisionFlo XL. The first way is to use a CAT 5 crossover cable to directly connect the PrecisionFlo XL computer to the laptop. The second way is to use a network hub and CAT 5 patch cables.

Direct Computer Connection

Connect one end of a CAT 5 crossover cable to the PrecisionFlo XL RJ45 port and the other cable end to the laptop RJ45 port.

Network Hub Connection

Connect a CAT 5 patch cable to the laptop RJ45 port and the other cable end to an available hub port. Connect a CAT 5 patch cable from the hub to the PrecisionFlo XL RJ45 port. Apply power to the hub.

Testing Communication

Anybody Home?

A quick test to try when everything is powered up and plugged in is the ping test. The ping test uses a utility built into Windows called ping.exe. Ping.exe sends an "Are you there?" message to another node on the network. If the message gets to the other node and it's up and running, it will return the message to the sender. To try this, open a DOS window and type:

```
c:\ping 192.111.223.110
```

Use the appropriate IP address if you have changed it from the default. If the laptop is configured correctly and the physical connections are okay, you will see something like:

```
Pinging 192.111.223.110 with 32 bytes of data:

Reply from 192.111.223.110: bytes=32 time=1ms
 TTL=255
Reply from 192.111.223.110: bytes=32 time<10ms
 TTL=255
Reply from 192.111.223.110: bytes=32 time=1ms
 TTL=255
Reply from 192.111.223.110: bytes=32 time<10ms
 TTL=255

Ping statistics for 192.111.223.110:
Packets: Sent = 4, Received = 4, Lost = 0
  (0% loss),
Approximate round trip times in milli-seconds:
 Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

If it's not set up right, you'll see something like this:

```
Pinging 192.111.223.110 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.111.223.110:
Packets: Sent = 4, Received = 4, Lost = 0
 (0% loss),
Approximate round trip times in milli-seconds:
 Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

If you receive the latter message, do not continue the test. If the ping test fails, FTP will also fail. There are various possible causes for ping test failure. Some things to check are:

1. Check the physical network connections.
2. The green link LED on the laptop's external network card connector should be on.
3. Try pinging the laptop from the laptop. That is, on the laptop, type "ping <IP address>", where <IP address> is the laptop IP address. If this fails, the network configuration is incorrect.
4. Check the laptop IP address settings.

Two very common causes of problems are invalid laptop network settings or a faulty cable.

Transferring Files

The laptop must have an FTP client software package installed on it. There are several FTP packages available. A default Windows installation includes an FTP client called ftp.exe. To help make the ftp.exe utility easier to use, follow the instructions below to create a batch file to automate ftp.exe to do the necessary FTP commands for you.

1. Create the two following text files:

   getlogs.bat:

   ```
   ftp -s:logs.txt %1
   ```

   logs.txt:

   ```
   pfloftp
   pfloftp
   prompt
   ascii
   mget *.log
   bye
   ```

NOTE: Be sure to enter the text *exactly* as shown above. A single typo will cause the operation, below, to fail.

2. Create a directory to use for file transfer. For the purposes of this example, this directory is called c:\graco.

3. Move the getlogs.bat and logs.txt files created above into the file transfer directory.

4. Open a DOS window and change working directories to c:\graco. At the command prompt, run the batch file:

   ```
   c:\getlogs 192.111.223.110<Enter>
   ```

The .bat file will invoke the FTP utility, pass the IP address entered on the command line to it, and execute the commands listed in the logs.txt file. The commands will instruct the FTP utility to fetch a copy of all the alarm and data logs from the PrecisionFlo XL and put them in the current directory on the laptop.

The commands in logs.txt will fetch a copy of the log files from the PrecisionFlo XL. The original files will still reside on the PrecisionFlo XL and will not be deleted.

Notes

Appendix B

TouchScreen and Remote Screen Configuration and Calibration

Before You Start

NOTE: The TouchScreen comes from the factory preconfigured and calibrated. You will need to follow this procedure if you replace your TouchScreen or the CompactFlash™ memory for the TouchScreen. This procedure also applies if you configure a remote TouchScreen to one or more PrecisionFlo XL stations.

In order to configure the TouchScreen, you must first understand a few things about the hardware. A TouchScreen consists of two main components: the actual screen and the PC/104 board, where the CompactFlash memory resides.

The screen component is typically mounted in the PrecisionFlo XL control unit. The screen is comparable to a monitor on a personal computer (PC). The PC/104 component is the circuit board that contains the processor for the TouchScreen and is comparable to the central processing unit (CPU) on a PC.

When you configure a TouchScreen, you are actually configuring the PC/104 board (Fig. 88). The parameters that you configure are stored in the CompactFlash memory on the PC/104 board. For this reason, if you change your screen, PC/104 board, or CompactFlash memory, you may need to reconfigure your TouchScreen interface.

PC/104 Board

Fig. 88

PC/104 Board Configurations

There are the three types of PC/104 board configuration.

1. **Standalone** (default) – A standalone TouchScreen (Fig. 89) is the most common configuration. This is a PC/104 board mounted in the PrecisionFlo XL control unit. This PC/104 board is not communicating with any remote screens. It is displaying information on the screen mounted on the outside of the control unit.

Standalone Station

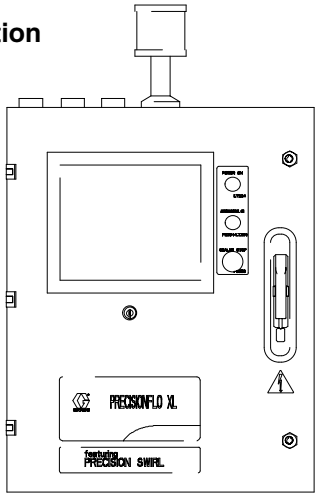


Fig. 89

2. **Local** – A local PC/104 configuration (Fig. 90) is used in conjunction with a remote screen. The local station is the PC/104 board that is mounted in the PrecisionFlo XL control unit. This control unit typically does not have a screen mounted on it. This PC/104 board will communicate with the remote station via the Ethernet connection on the PrecisionFlo XL control unit. Up to 12 stations can be networked to a remote station. These stations are connected to the remote station with user-supplied CAT 5 (Ethernet) patch cables.

Local Station

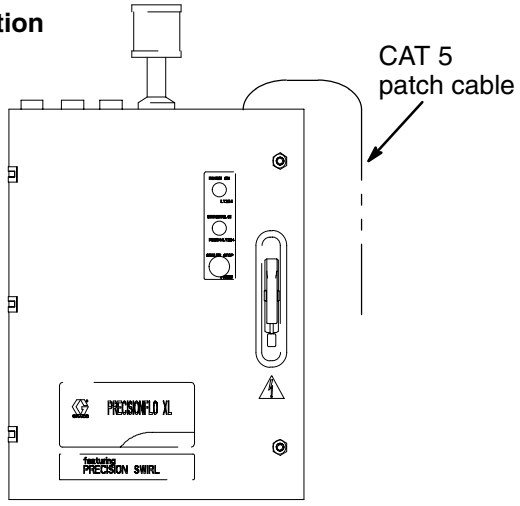


Fig. 90

3. **Remote** – The remote PC/104 board is located in the remote control unit (Fig. 91). This PC/104 board displays information on the screen mounted on the outside of the remote unit. It is communicating with the local station via the Ethernet connection on the remote unit.

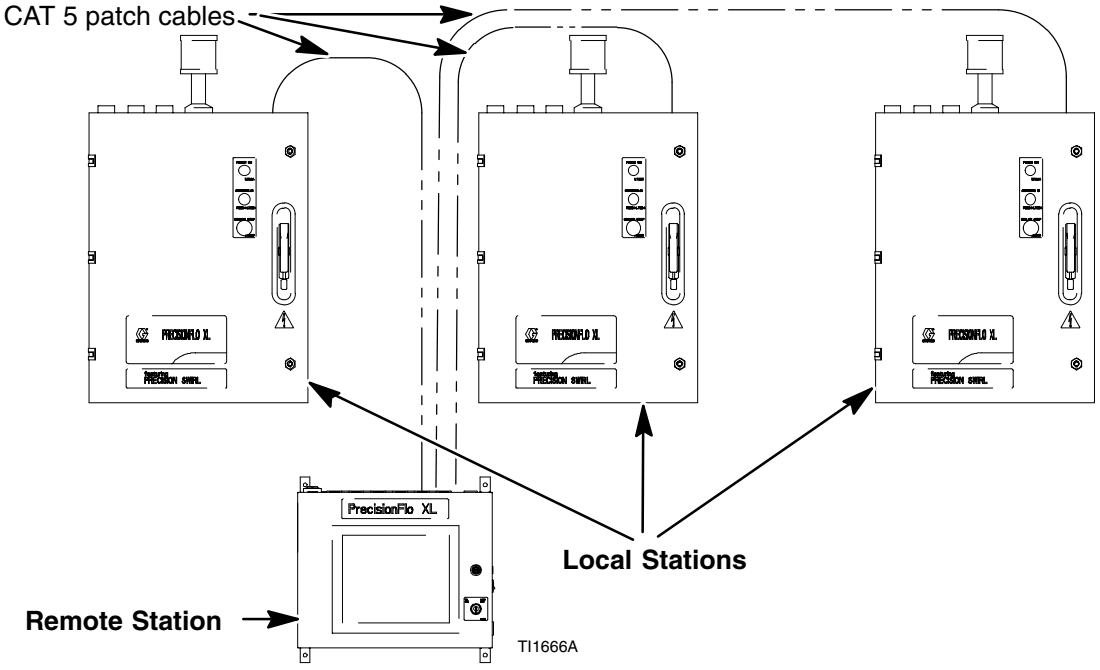


Fig. 91

Configuration Mode

To enter Configuration mode, turn off power to the system, jumper wires together in the control unit, then turn power back on. To return to normal Operating mode, turn off power, remove the jumper wires and turn power back on.

The following table shows the jumper options on the main control unit. These terminals are located on a connector mounted near the base of the PC/104 board.

Function	Terminal Block #
Configuration Mode Bit	1
Data Bit 0	3
Data Bit 1	4
Jumper Bit (GND)	6

To enable a specific bit, run a jumper wire from its corresponding terminal block number to the Jumper Bit (terminal block #6). The following table shows jumpers that must be added in order to go into the different configuration modes. (See Fig. 92.)

Desired Operation	Jumpers
Standalone station	Config Mode (1–6), Data 1 (4–6)
Local station	Config Mode (1–6), Data 0 (3–6)
Remote station	Config Mode (1–6), Data 0 (3–6), Data 1 (4–6)
Calibration Only	Config Mode (1–6)

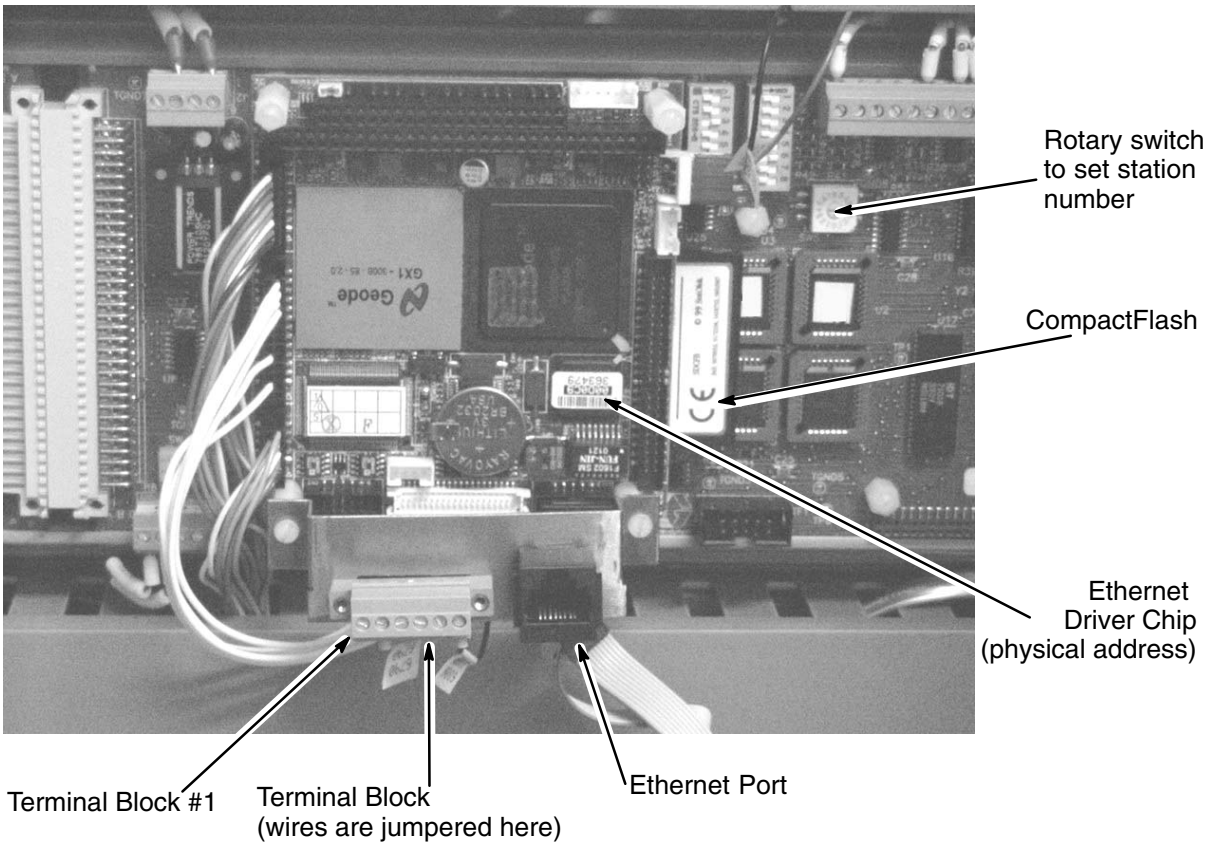


Fig. 92

Setting up a standalone station

To set up a standalone station, attach the appropriate jumpers from the jumper table on page 170, then turn on power to the system. As the system reboots, you will notice messages on the screen as the unit configures itself, then the system goes to TouchScreen calibration.

To calibrate the TouchScreen:

Calibration aligns the internal circuitry of the PC/104 board with the TouchScreen, so that when you touch an element on the screen, the board correctly interprets which function you wish to accomplish. When calibrating, be careful not to lean on the TouchScreen or contact it with anything other than the tool you are using to touch with (touching with a small, blunt instrument such as the eraser on a pencil works the best).

NOTE: If you should accidentally touch the screen while you are calibrating it, you must repeat the configuration process.

Touch the targets that appear on the screen. Fig. 93 shows all the target points. When you are calibrating the TouchScreen only one target is visible at a time. The Current Position field shows the screen coordinates of the target position currently displayed. When calibration is complete, the system tells you that it is now okay to turn off the unit. Remove the jumpers, turn power back on, and you are ready to operate as a standalone station.

Fig. 93

Setting up local stations

Since there is no screen on a local station, you will have no indication that configuration is taking place or when it is complete. Attach the appropriate jumpers from the jumper table on page 170, turn on power to the system, and wait at least 2 minutes. Then, turn power off, remove the jumpers, turn power back on and you are ready to operate as a local station. If this local station is going to be part of a PrecisionFlo XL network, you must also set it's station number on the Expandable Control Board (ECB). See Fig. 92 for the location of the rotary switch used to set the station number. This switch should be in one of the settings on the table below before you power up the system with the jumpers. Any other setting for the rotary switch will result in the system being set up as station 1. Be sure that each station number is used only once. Network problems will result if the same number is assigned to more than one station.

NOTE: Changing the setting on the rotary switch is only effective when the configuration jumpers are in place while turning on the PrecisionFlo XL. If you change the setting on the rotary switch without setting the jumpers and cycling power to the system, the station number will not change.

Rotary Switch Setting	Station Number
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	11
C	12

Setting up a remote station

To set up a remote station, attach the appropriate jumpers from the jumper table on page 170, then turn on power to the system. As the system reboots, you will notice messages on the screen as the unit configures itself. After this, the system goes into TouchScreen calibration. See instructions on how to calibrate the TouchScreen on page 171. When configuration is complete, the system will tell you that it is now okay to turn off the unit. Remove the jumpers, cycle power on the system, and you are ready to operate as a remote station.

PrecisionFlo XL Remote Screen Interface

This section is applicable only if your system is configured to control one or more local stations from a single remote TouchScreen. You can control up to 12 local stations from the remote TouchScreen.

Setting Up Local Stations

Before you can communicate with the local stations, you must enter the Ethernet physical address for each active station. The physical address is found on the sticker affixed to the Ethernet driver chip on the PC/104 board (see Fig. 94). Write down the physical address and station number for each local station you will be using.

When your system is configured with a remote TouchScreen, the screen shown in Fig. 95 appears when you enter setup mode (key switch clockwise). To enter the physical address for each local node, perform the following steps.

1. With the system in setup mode, touch the physical address field for the station you want to enter the address for (Fig. 95).

2. The address entry keypad (Fig. 96) appears. Touch the keys to enter the 12-character physical address.

NOTE: Be sure to enter the physical address of the local station and not the station that you are configuring (remote station). The physical address of the local station is 12 characters with no spaces. Be sure to enter these numbers correctly so the remote TouchScreen can communicate with the PrecisionFlo XL.

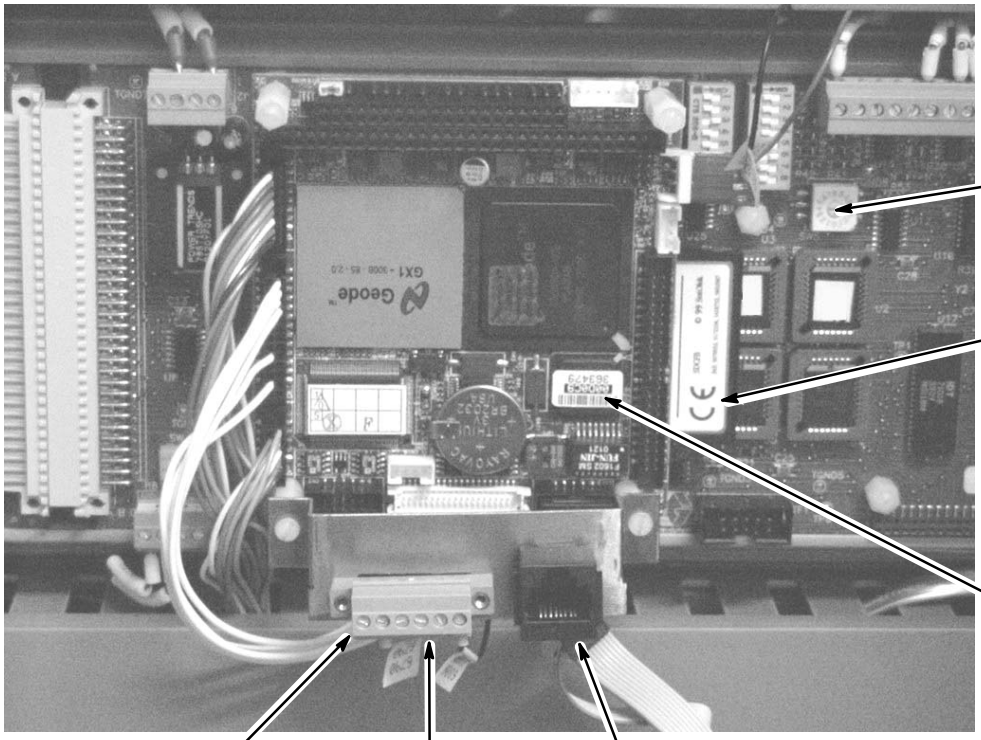
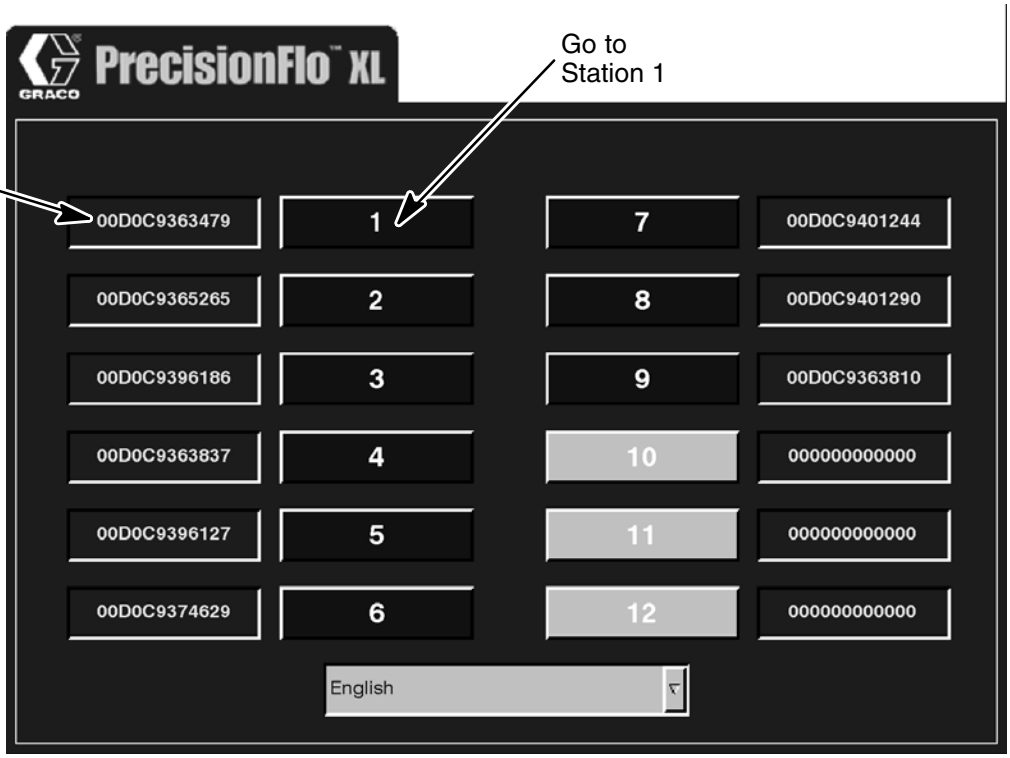


Fig. 94



NOTE: The numbers shown on this sample screen are for reference only. You will enter the actual addresses found on the Ethernet chip on the local stations.

Fig. 95

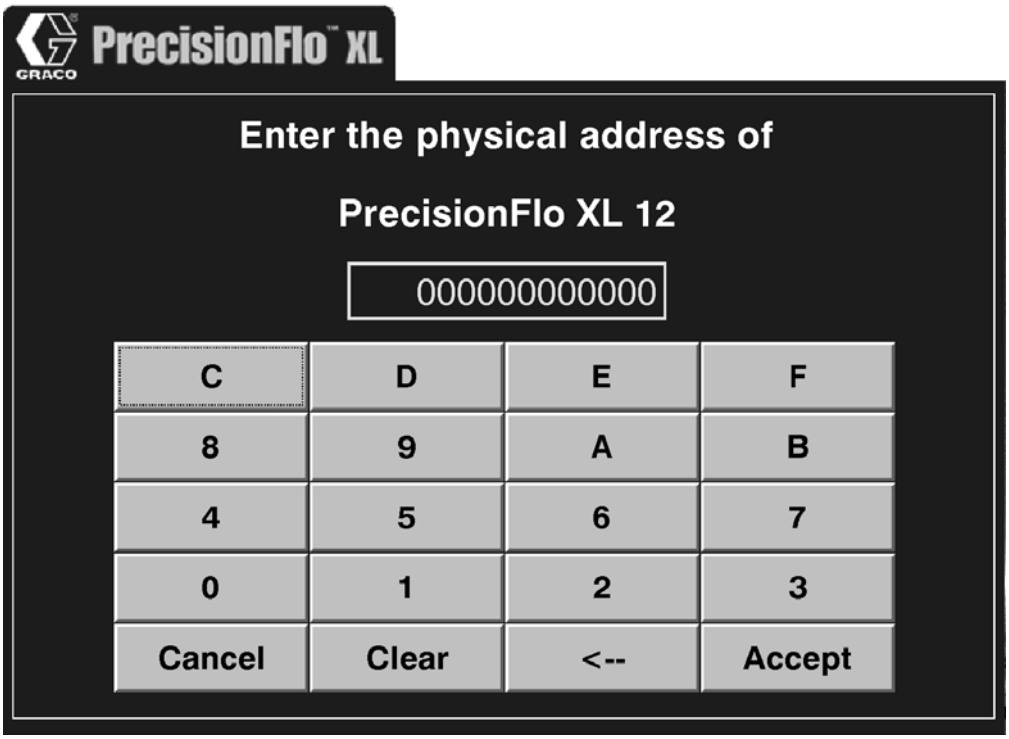


Fig. 96

Operating from a Remote TouchScreen

When the PrecisionFlo XL key switch is turned to run mode, the screen shown in Fig. 97 appears. Touch the station number of a configured station to view and control functions on that station. The button is dark for an enabled station number. A station is enabled when it is correctly configured and is communicating properly with the remote station. If a station button should be enabled is not, check the network cable connections, make sure that the station is turned on, and verify that the physical address has been entered correctly.

When operating with a remote TouchScreen, the run screens are the same as with an integrated TouchScreen except that a small icon at the top of each screen indicates which local station you are controlling. Touching this icon returns you to the home screen so you can navigate to another local station. (See Fig. 98).

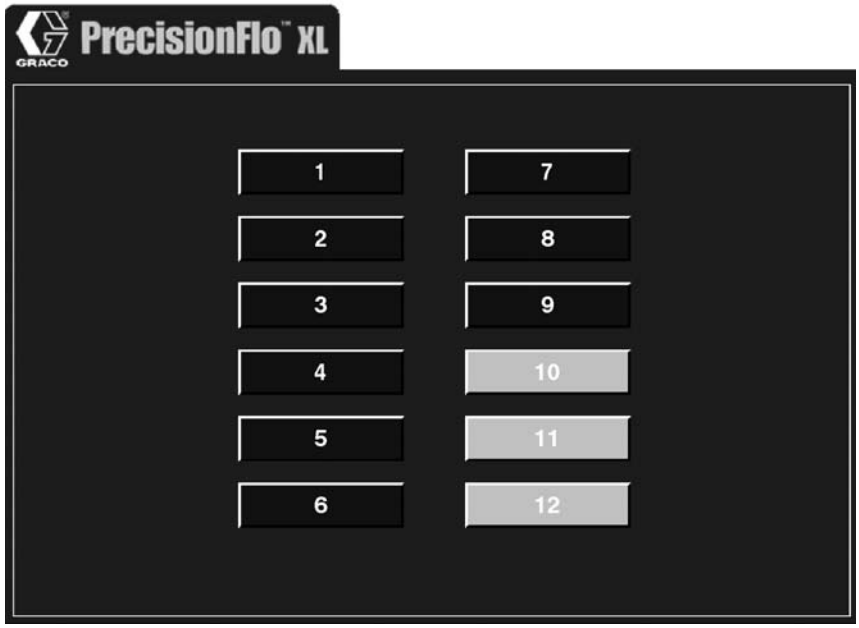


Fig. 97

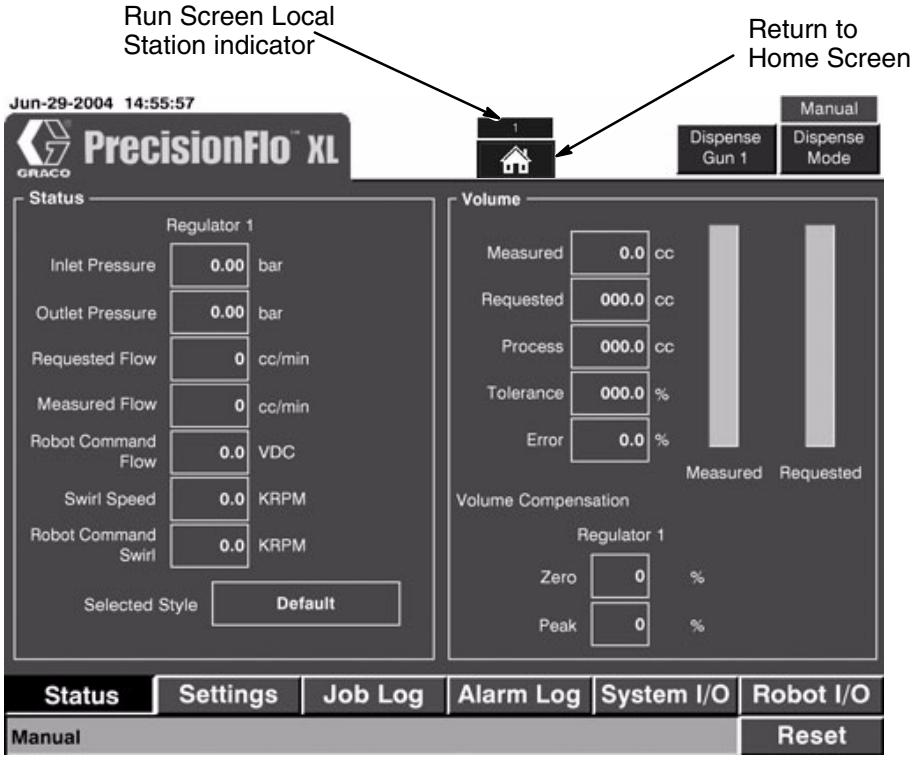


Fig. 98

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