

PrecisionSwirl TM

3A1935E

O.

Precision Dispense System

Orbital dispenser used to apply sealant and adhesive materials for a variety of applications.

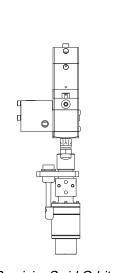
Not for use in explosive atmospheres or hazardous locations. For professional use only.



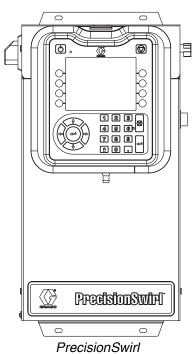
Important Safety Instructions

Read all warnings and instructions in this manual. Save these instructions.

See page 4 for model information, maximum working pressure, and approvals.



PrecisionSwirl Orbital
Dispenser (sold separately)



Control Center

IMPORTANT:

This manual does not apply to some PrecisionSwirl systems. See note on page 3 to verify this is the correct manual for your PrecisionSwirl system.

CE

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Related Manuals

The following is a list of component manuals written in English. These manuals and any available translations can be found at www.graco.com.

Manual	Description
310554	Original PrecisionSwirl Instructions - Parts (see the note below)
309403	PrecisionSwirl Orbital Dispenser

NOTE: If your PrecisionSwirl comes with the control center pictured on the cover of this manual, use this manual. If not, use manual 310554.

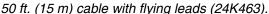
Models

Control Centers

The following control centers are ETL approved.

Part	Description	Automation Gateway Module	Automation Gateway Module Part
16K601	100 - 240 Vac	DeviceNet	15V759
16K602	100 - 240 Vac	EtherNet/IP	15V760
16K603	100 - 240 Vac	PROFIBUS	15V761
16K604	100 - 240 Vac	PROFINET	15V762
16K605	100 - 240 Vac	◆ Discrete	24B681
16K606	24 Vdc	DeviceNet	15V759
16K607	24 Vdc	EtherNet/IP	15V760
16K608	24 Vdc	PROFIBUS	15V761
16K609	24 Vdc	PROFINET	15V762
16K610	24 Vdc	◆ Discrete	24B681

◆ Discrete Gateway systems do not include automation interface cables. The following Graco accessories are available for wiring to the automation system. Installers should follow **Appendix B - Discrete Gateway Module** (**DGM**) **Connection Details**, page 56, for custom wiring.





Intertek

9902471 Certified to CAN/CSA C22.2 No. 61010-1 Conforms to UL 61010-1

This product has been tested to the requirements of CAN/CSA-C22.2 No. 61010-1, second edition, including Amendment 1, or a later version of the same standard incorporating the same level of testing requirements.

Expansion Swirl Enclosure Assemblies

The following enclosures are ETL approved. Assemblies 16K601-16K610 are setup for one PrecisionSwirl Orbital Dispenser. If you wish to have additional swirl dispensers, order one expansion PrecisionSwirl assembly below for each. Systems with a Discrete Gateway Module (DGM) as the automation gateway can have up to two swirl dispensers total. Systems with a Communications Gateway Module (CGM) as the automation gateway can have up to four swirl dispensers total.

Part	Description
16M350	100 - 240 Vac
16M351	24 Vdc

PrecisionSwirl Orbital Dispenser Assemblies

See manual 309403.

Version	Part, Series	Coupler Offset	Typical Application	Maximum Working Pressure
Standard	243402, B	0.012 in. for narrow bead widths	Hem flange and after hem	
Standard	243403, B	0.028 in. for wide bead widths	Seam sealing	0500:
Compact	289262, A	0.012 in. for narrow bead widths	Hem flange and after hem	3500 psi (24.1 MPa, 241 bar)
Compact	289261, A	0.018 in. for medium bead widths	Seam sealing	241 Dai)
Standard	26B185, A	0.018 in. for medium bead widths	Seam sealing	

PrecisionSwirl Orbital Dispenser Cable Assemblies

Part	Description	
233125 6 ft (1.8 m) motor extension cable assembly		
233124	233124 9 ft (2.7 m) motor extension cable assembly	
233123	233123 15 ft (4.6 m) motor extension cable assembly	
133161 55 ft (16.8 m) cable extension, precswirl, flex		
617870	55 ft (16.8 m) communication cable, control box to swirl motor	

Automation Gateway Assemblies

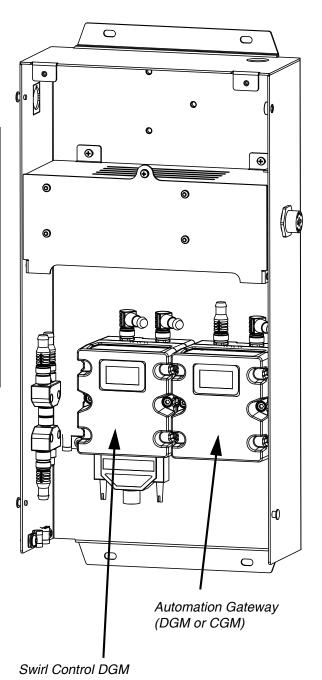
Each control center comes with one automation gateway assembly. The automation gateway module is either a Discrete Gateway Module (DGM) or one of the Communications Gateway Modules (CGM). To order a replacement automation gateway, see the following table.

Model	User Interface Description	Gateway Part Number To Order	Rotary Switch Position
16K605, 16K610	Discrete (DGM)	24B681	0
16K601, 16K606	DeviceNet [™] (CGM)	15V759	Any
16K602, 16K607	EtherNet/IP [™] (CGM)	15V760	Any
16K603, 16K608	PROFIBUS [™] (CGM)	15V761	Any
16K604, 16K609	PROFINET [™] (CGM)	15V762	Any

Swirl Control DGM

All control centers and expansion swirl enclosures contain one swirl control DGM used to control one Swirl Dispenser. To order a replacement, see the following table.

Assembly	Part Number To Order	Rotary Switch Position
All control centers and expansion swirl enclosures	24B681	1, 2, 3, or 4; see Swirl Control DGM on page 15



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Warnings

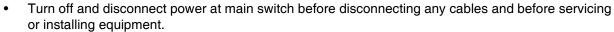
The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

WARNING



ELECTRIC SHOCK HAZARD

This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock.



- Connect only to grounded power source.
- All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.



SKIN INJECTION HAZARD

High-pressure fluid from dispensing device, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. Get immediate surgical treatment.



- Do not point dispensing device at anyone or at any part of the body.
- Do not put your hand over the fluid outlet.
- Do not stop or deflect leaks with your hand, body, glove, or rag.
- Follow the Pressure Relief Procedure from manual 309403 when you stop dispensing and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses and couplings daily. Replace worn or damaged parts immediately



FIRE AND EXPLOSION HAZARD

Flammable fumes, such as solvent and paint fumes, in work area can ignite or explode. To help prevent fire and explosion:



Use equipment only in well ventilated area.



Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).



Keep work area free of debris, including solvent, rags and gasoline.



- Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.
- Ground all equipment in the work area. See Grounding instructions.
- Use only grounded hoses.
- Hold gun firmly to side of grounded pail when triggering into pail.
- If there is static sparking or you feel a shock, stop operation immediately. Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.

MARNING



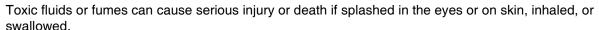
EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Data** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Data** in all
 equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information
 about your material, request MSDS forms from distributor or retailer.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- · Keep children and animals away from work area.
- Comply with all applicable safety regulations.



TOXIC FLUID OR FUMES HAZARD





- Read MSDS's to know the specific hazards of the fluids you are using.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.



PERSONAL PROTECTIVE EQUIPMENT

You must wear appropriate protective equipment when operating, servicing, or when in the operating area of the equipment to help protect you from serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- · Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer

System Configurations

Typical Installation - Single Swirl Dispenser

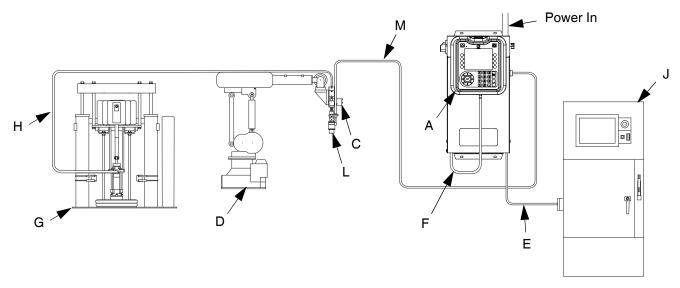


Fig. 1: Typical Stand-Alone Swirl System Installation

Key:

- A *Control Center (User Interface)
- C Applicator/Dispense Valve
- D Sealer Automation
- E Automation Interface Cable
- F *CAN Cable
- G Fluid Supply System
- H Fluid Supply Hose
- J Automation Controller
- L *Swirl Dispenser
- M *Swirl Motor Cable

^{*} Included

Typical Installation - Multiple Swirl Dispensers

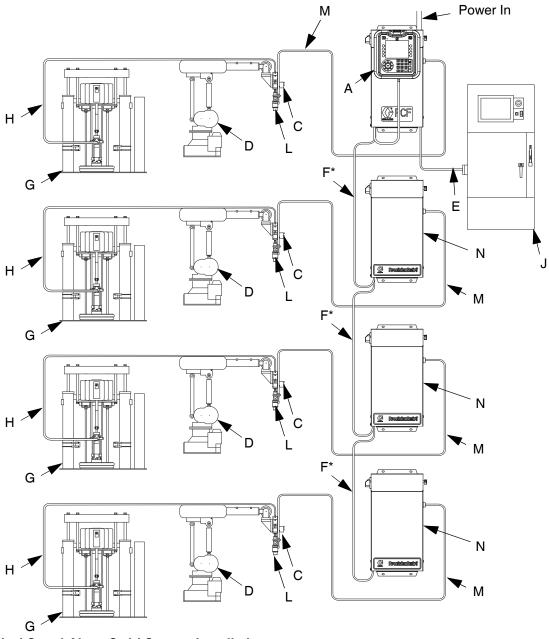


Fig. 2: Typical Stand-Alone Swirl System Installation

Key:

- A *Control Center (User Interface)
- C Applicator/Dispense Valve
- D Sealer Automation
- E Automation Interface Cable
- F *CAN Cable
- G Fluid Supply System
- H Fluid Supply Hose
- J Automation Controller
- L *Swirl Dispenser
- M *Swirl Motor Cable

- N ◆Expansion Swirl Enclosure
- * Included
- ◆ Optional

Overview

System Components

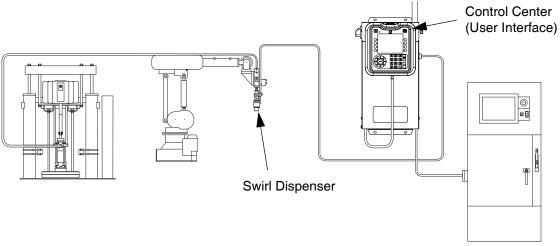
The diagram in Fig. 3 shows an example of the PrecisionSwirl module and cables.

Control Center (User Interface)

The control center communicates with the swirl orbiter and can receive input from the automation controller to determine communication to the swirl dispenser.

PrecisionSwirl Orbital Dispenser (Swirl Dispenser), Sold Separately

The swirl dispenser dispenses material in a circular pattern at speeds from 6600 to 24000 rpm. A Precision-Swirl system can have up to four swirl dispensers. See manual 309403 for detailed information.



System shown with one swirl dispenser

Fig. 3: PrecisionSwirl System Components

Control Center Assembly Overview

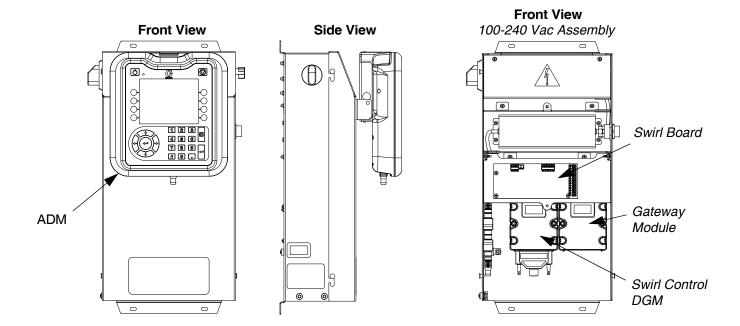


Fig. 4: Control Center Components

The control center includes the following components:

- Advanced Display Module (ADM) with USB; see page 13 for details.
- USB enables users to download job, event, and data logs; save and restore system settings; and customize the language. See USB Data on page 29.
- 24 Vdc and 100-240 Vac customer-wired options available.

- Swirl Control DGM (the module on the left) and Swirl Board.
- Automation Gateway Module (the module on the right), which can be one of the following five types:
 - Discrete
 - DeviceNet
 - EtherNet/IP
 - PROFIBUS
 - PROFINET

Expansion Swirl Enclosure

If more than one swirl dispenser is installed, the system will have one Expansion Swirl Enclosure for each additional swirl dispenser. The Expansion Swirl Enclosure is similar to the primary control center, but it does not include the ADM or the Automation Gateway module.

Advanced Display Module (ADM)

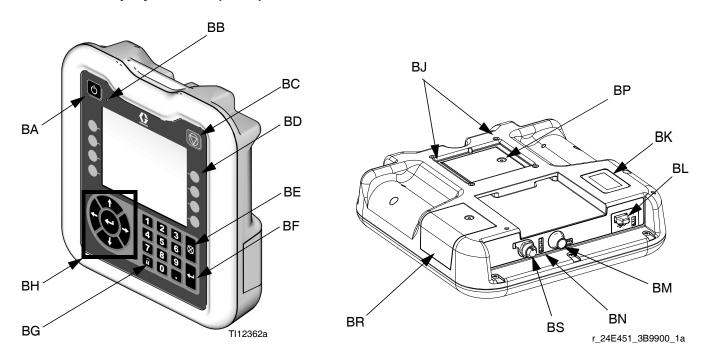


Fig. 5: Advanced Display Module Component Identification

KEY:

Callout	Function
BA	Power On/Off Button
	Enables/disables system.
BB	System Status Indicator LED Displays system status. Green LED indicates the system is active. Orange LED indicates the system is off. Solid LEDs (green or orange) indicate the system is in Run mode. Flashing LEDs (green or orange) indicate the system is in Setup mode.
ВС	Stop Button Stops all system processes. However, it is not a safety or emergency stop.
BD	Soft Keys Functions vary depending on the screen.
BE	Cancel Button Clears system errors and cancels a selection or number entry while in the process of entering a number or making a selection.
BF	Enter Button Acknowledge changing a value or making a selection.
BG	Lock/Setup Toggle between run and setup screens. If setup screens are password protected, button toggles between run and password entry screens.

Callout	Function
ВН	Navigation Buttons
	Navigate within a screen or to a new screen.
BJ	Flat Panel Mount
	Mounts to control center bracket (optional).
BK	Model Number Tag
	Model number.
BL	USB Module Interface
	USB port and USB indicator LEDs.
BM	CAN Connector
	Power connection.
BN	Module Status LEDs
	See LED Diagnostic Information, page 33, for
	signal definitions.
BP	Battery Cover
BR	Token Access Cover
BS	Digital I/O Port for Light Tower

NOTICE

To prevent damage to the soft key buttons, do not press the buttons with sharp objects such as pens, plastic cards, or fingernails.

Automation Gateway Module

See the following table for the appropriate rotary switch position for your automation gateway module.

Model	User Interface Description	Gateway Part Number To Order	Rotary Switch Position
16K605, 16K610	Discrete (DGM)	24B681	0
16K601, 16K606	DeviceNet [™] (CGM)	15V759	Any
16K602, 16K607	EtherNet/IP [™] (CGM)	15V760	Any
16K603, 16K608	PROFIBUS [™] (CGM)	15V761	Any
16K604, 16K609	PROFINET [™] (CGM)	15V762	Any

NOTE: See Control Center Assembly Overview on page 12 for automation and swirl control DGM identification.

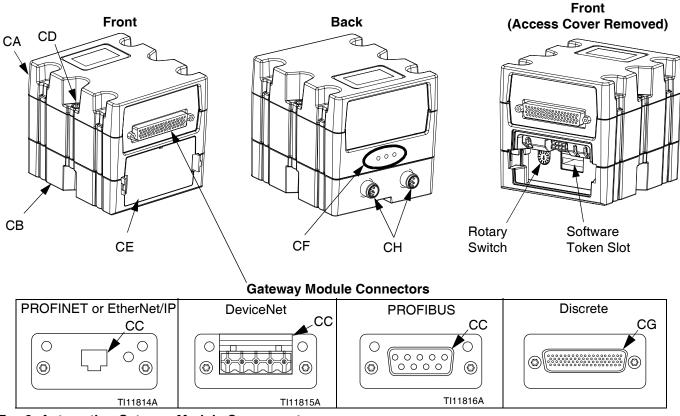


Fig. 6: Automation Gateway Module Components

Key:

- CA Gateway Module
- CB Base
- CC Fieldbus Connector (see Appendix C Communications Gateway Module (CGM) Connection

 Details, page 61, for more information)
- CD Module Connection Screws
- CE Access Cover
- CF Module Status LEDs (see **LED Diagnostic Information**, page 33)
- CG D-Subminiature (D-Sub) Connector (see **Appendix B Discrete Gateway Module (DGM) Connection Details**, page 56, for pinout details)
- **CH CAN Connectors**

Swirl Control DGM

One swirl control DGM is included in the control center and in the expansion swirl enclosure. Each Swirl control DGM controls one swirl orbiter.

Each swirl control DGM must have a unique rotary switch position. The rotary switch position determines the number assigned to the swirl dispenser attached to that DGM. If the rotary switch position must be changed, do so with the power off.

Each integrated swirl control center and swirl enclosure comes with a pre-installed cable between the swirl control DGM and the swirl board. The customer does not need to make any external connections with the swirl control DGM.

DGM Function	Rotary Switch Position
Swirl Control 1	1
Swirl Control 2	2
Swirl Control 3	3
Swirl Control 4	4

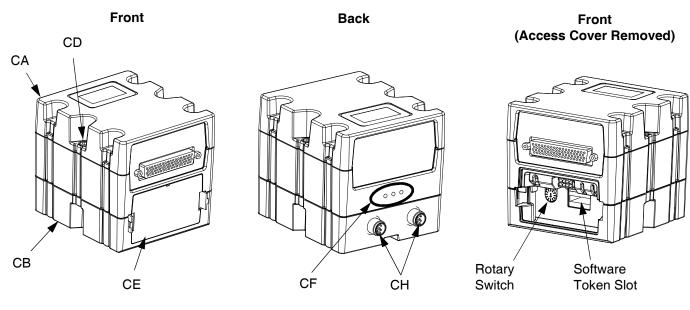


Fig. 7: Swirl Control DGM

Key Tokens

The ADM must have a key token installed in order to operate. If the incorrect key token is installed, the module will not operate. The DGM does not require a key token.

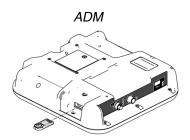


Fig. 8

If a new ADM is installed, follow the instructions on page 38 to upgrade the software in the new module and to install the key token from the old module in the new module.

The following is a list of key token part numbers. If you lose your key token be sure to order the correct item to ensure proper system operation.

Part	Description
16M218	ADM Key Token, PrecisionSwirl

Installation

Before Installation

- Have all system and component documentation available during installation.
- See component manuals for specific data on component requirements. Data presented here applies to the PrecisionSwirl assemblies only.
- Be sure all accessories are adequately sized and pressure-rated to meet system requirements.

Overview

The basic steps to install a PrecisionSwirl system are shown below. See the separate component manuals for detailed information.



To avoid injury and damage to equipment, use at least two people to lift, move, or disconnect the system. The system is too heavy for one person to lift or move.

Installation Steps

- 1. Mount control center, page 18.
- 2. For systems with multiple swirl dispensers, mount expansion Swirl enclosures, page 18.
- 3. Connect and ground control center and expansion swirl enclosures, page 19.
- Install each swirl dispenser onto outlet of a dispense valve.
- 5. Connect other fluid and air lines to additional system components as instructed in their manuals.
- 6. Install swirl and gateway cable assemblies, page 20.
- 7. Install Gateway interface, page 22.

Install Control Center

NOTE: This section applies to both the control center and the expansion swirl enclosures.

Mount

Ensure the following criteria are met before mounting the PrecisionSwirl control center:

- Select a location for the control center that allows adequate space for installation, service, and use of the equipment.
- For best viewing, the ADM should be 60-64 in. (152-163 cm) from the floor.
- Ensure there is sufficient clearance around the control unit to run 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 control center.
- Ensure there is easy access to the power switch.
- Ensure the mounting surface can support the weight of the control center and the cables attached to it.

Secure the control center with appropriate size bolts through the 0.27 in. (7 mm) diameter holes in the mounting tabs. See the following mounting dimensions.

Table 1: Control Center Assembly Measurement

Α	10.50 in. (267 mm)			
В	5.75 in. (146 mm)			
С	22.00 in. (559 mm)			
D	21.25 in. (540 mm)			

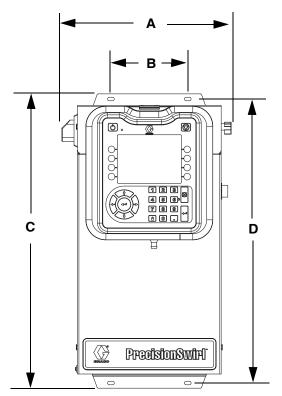


Fig. 9: Control Center Dimensions

Electrical Connections







To reduce the risk of fire, explosion, or electric shock, when grounding, connecting cables, connecting to a power source or making other electrical connections:

- The control center must be electrically connected to a true earth ground; the ground in the electrical system may not be sufficient. Refer to your local code for the requirements for a "true earth ground" in your area.
- All wires used for grounding must be 18 AWG minimum.
- A qualified electrician must complete all grounding and wiring connections.
- For 24 Vdc wiring refer to Fig. 10.
- For 100-240 Vac wiring refer to Fig. 11.
- Incoming power wiring must be guarded from the enclosure. Use a protective grommet where the power wiring enters the enclosure to prevent wear.

NOTICE

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

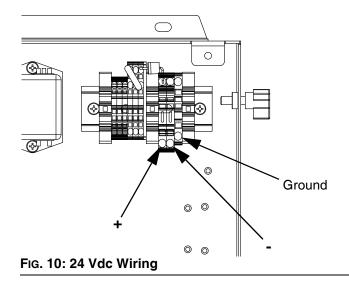
DC Powered Expansion Swirl Installation

The following conditions must be true in order to connect the expansion swirl unit to an AC powered PCF or PrecisionSwirl system:

- The 24 VDC power supply for the expansion swirl enclosure must be isolated.
- The negative (-) power supply signal for expansion swirl enclosures must be connected to Protective Earth in near proximity to the PCF or PrecisionSwirl enclosure.

The following applies if the expansion swirl unit is to be connected to a DC powered PCF or PrecisionSwirl system:

 The negative (-) power supply signal for expansion swirl enclosures must be connected to the negative (-) power supply signal of the PrecisionSwirl or PCF control center.



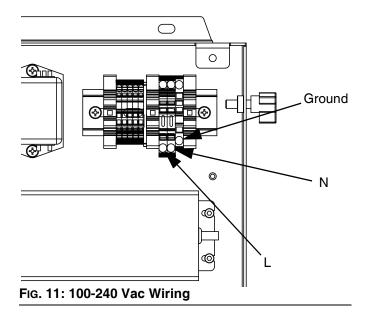
AC Powered Expansion Swirl Installation

The following applies if the expansion swirl unit is to be connected to an AC powered PCF or PrecisionSwirl system:

 Both the PCF or PrecisionSwirl system and the expansion swirl unit must be connected to Protective Earth in near proximity.

The following applies if the expansion swirl unit is to be connected to a DC powered PCF or PrecisionSwirl system:

The negative (-) power supply signal for the PrecisionSwirl or PCF control center must be connected to Protective Earth in near proximity to the expansion swirl enclosure.



Connect Light Tower Accessory

- Order the 255468 Light Tower Accessory as a diagnostic indicator for the PrecisionSwirl system.
- 2. Connect the cable from the light tower to the digital I/O port (BS) on the ADM.

See Table 3 for a description of light tower signals.

Table 2: Light Tower Signals

Signal	Description
Green	No errors.
Yellow	An advisory exists.
Yellow flashing	A deviation exists.
Red solid	An alarm exists.

NOTE: See Errors, page 34, for error definitions.

Ground







To reduce the risk of fire, explosion, or electric shock, when grounding, connecting cables, connecting to a power source or making other electrical connections:

- The control center must be electrically connected to a true earth ground; the ground in the electrical system may not be sufficient. Refer to your local code for the requirements for a "true earth ground" in your area.
- All wires used for grounding must be 18 AWG minimum.
- A qualified electrician must complete all grounding and wiring connections.
- For 24 Vdc wiring refer to Fig. 10.
- For 100-240 Vac wiring refer to Fig. 11.
- Incoming power wiring must be guarded from the enclosure. Use a protective grommet where the power wiring enters the enclosure to prevent wear.

NOTICE

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

Air and Fluid Hoses

For static dissipation, use only electrically conductive hoses or ground the applicator / dispense valves.

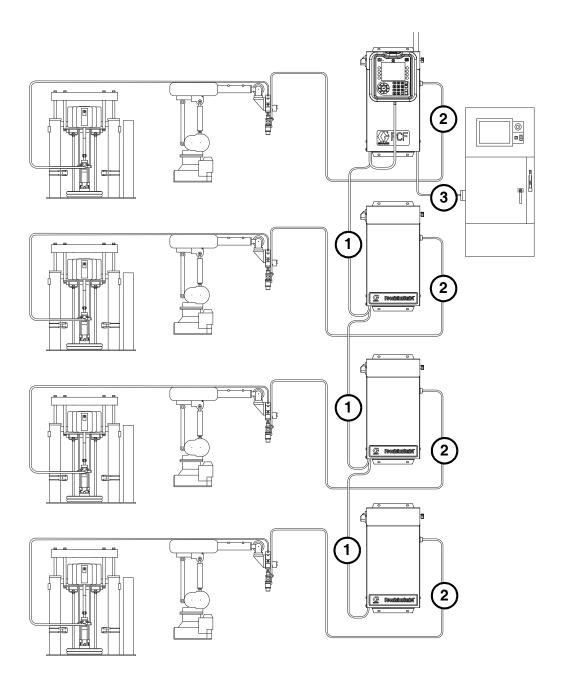
Dispense Valve

Follow the grounding instructions in the dispense valve manual.

Install Cable Assemblies

NOTE: See Fig. 12 on page 21.

- For systems with more than one swirl dispenser:
 Use a CAN cable to connect control center to one
 expansion swirl enclosure. Use additional CAN
 cables to connect any other expansion swirl enclosures together in sequence.
- 2. Use motor cable to connect each swirl dispenser to an expansion swirl enclosure or to the control center.
- Use the automation interface cable (not provided) to connect the Gateway module to the automation controller.



Multiple Swirl System Shown

Fig. 12: Cable Installation Diagram

Install Gateway Module Interface

NOTE: All systems will have two gateway modules in the control center. The gateway module on the left is the swirl control DGM module, and does not need any setup or modification. The gateway module on the right is the automation Gateway module. This section covers the automation Gateway module.

Fieldbus Communications Gateway Module

Module Description

The Communications Gateway Module (CGM) provides a control link between the PrecisionSwirl system and a selected fieldbus. This provides the means for remote monitoring and control by external automation systems.

See Appendix B - Discrete Gateway Module (DGM) Connection Details, page 56, or Appendix C - Communications Gateway Module (CGM) Connection Details, page 61 for details on controlling the Precision-Swirl system through the Gateway module.

Data Exchange

Data is available by block transfer, cyclic transfer, change of state triggered, and explicit access to individual attributes as defined by the fieldbus specification. Refer to **Appendix C - Communications Gateway Module (CGM) Connection Details**, page 66, for details about PrecisionSwirl/fieldbus data map.

NOTE: The following system network configuration files are available at www.graco.com

- EDS file: DeviceNet or EtherNet/IP fieldbus networks
- GSD file: PROFIBUS fieldbus networks
- SDML: PROFINET fieldbus networks

CGM Status LED Signals

Signal	Description		
Green on	System is powered up		
Yellow	Internal communication in progress		
Red Solid	CGM hardware failure		
*Red	Data map load failure		
(7 flashes)	Incorrect data map for fieldbus type		
	No data map loaded		

^{*}The red LED (CF) will flash a code, pause, then repeat.

Installation

NOTE: The following installation instructions assume the person implementing the PrecisionSwirl fieldbus connection fully comprehends the fieldbus being used. Ensure the installer understands the automation controller communication architecture and the fieldbus being used.

- Install interface cables between the PrecisionSwirl system and the automation controller per the fieldbus standards. Refer to Appendix C - Communications Gateway Module (CGM) Connection Details, page 61, for details.
- Turn on system power. Navigate to the Gateway setup screens and ensure the data map name is: PCF standard. Refer to Appendix A - Advanced Display Module (ADM), page 48, for details about the data map.
- Set the PrecisionSwirl Gateway configuration values as required to interface with automation controller. Refer to Appendix A Advanced Display Module (ADM), page 48, for details about the configuration settings.
- 4. Retrieve the appropriate fieldbus configuration file for the fieldbus being used from www.graco.com.
- Install the configuration file on the automation controller (fieldbus master). Configure it for communication with the PrecisionSwirl Gateway (fieldbus slave).
- 6. Establish communication between the automation controller and the PrecisionSwirl Gateway to confirm the successful configuration of the hardware and data.

NOTE: Use the ADM screens for troubleshooting field-bus data communication problems. Refer to Appendix A - Advanced Display Module (ADM), page 48, for details. Also, use the LED status indicators on the PrecisionSwirl Gateway module for fieldbus status information. Refer to Appendix C - Communications Gateway Module (CGM) Connection Details, page 61, for details.

Discrete Gateway Module

Module Description

The Discrete Gateway Module (DGM) provides a control link between the PrecisionSwirl system and an automation controller through discrete input and output connections. This provides the means for remote monitoring and control by external automation systems.

See Appendix B - Discrete Gateway Module (DGM) Connection Details, page 56, or Appendix C - Communications Gateway Module (CGM) Connection Details, page 61 for details on controlling the Precision-Swirl system through the Gateway module.

Connect D-Sub Cable

The DGM provides all I/O through the D-Sub cable. Graco offers two options for connecting a D-Sub cable to the D-Sub connector (CG). Both options are accessories and must be ordered separately.

D-Sub cable (24K463). See Appendix B - Discrete Gateway Module (DGM) Connection
 Details, page 56, for details and cable interface signals.

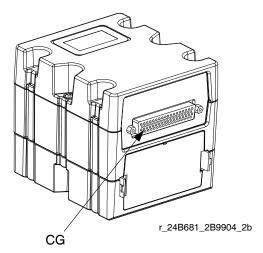


Fig. 13: Connect D-Sub Cable

DGM Status LED Signals

See **LED Diagnostic Information**, page 33, for signal definitions.

DGM Rotary Switch Position

The Discrete Gateway Module (DGM) rotary switch must be in position 0 for Automation Gateway DGMs and positions 1-4 for Swirl Control DGMs in order for the DGM to operate. See **Automation Gateway Module** on page 14 and **Swirl Control DGM** on page 15.

System Setup

Overview

After material is loaded into the supply system, set up the PrecisionSwirl system using the Setup screens. The following procedure outlines the major system setup steps. The following subsections provide instructions to complete each setup step. Once these steps are complete the module is ready for operation.

NOTE: See the Advanced Display Module (ADM) section, page 13, and Appendix A - Advanced Display Module (ADM), page 48, for detailed operating instructions for the display keypad and each screen.

- 1. Configure System, page 24.
- 2. Configure Swirl settings, page 24.
- 3. Configure Gateway Settings, page 24.
- 4. Configure Advanced Settings, page 24.

Configure System

Define the number of installed swirl dispensers. All "Dispensers" should be listed as "Uninstalled".

- With the system in setup mode, navigate to the System screen.
- 2. Press to access the fields to make changes.
- 3. Use the arrow keys to navigate to the desired field.
- 4. Press to open the drop-down list, and select the desired setting. Press to accept the selection
- Repeat for the other Dispensers and Swirl Dispensers.

6. Press to exit edit mode.

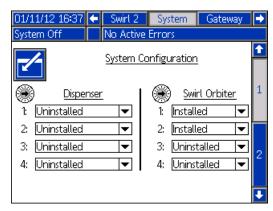


Fig. 14

Configure Swirl Settings

Set the individual Swirl settings for each installed Swirl.

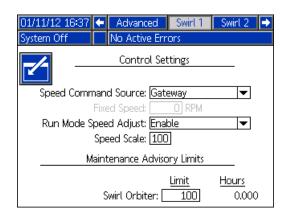


Fig. 15

Configure Gateway Settings

Gateway settings differ for each system. See **Automation Gateway Setup Screens**, page 51, for guidelines on configuring each type of Gateway interface.

Configure Advanced Settings

Use the advanced settings to set or change the format and display units, such as the language, date format, and pressure units, for all PrecisionSwirl screens. See **Setup Mode**, page 50, for advanced setting guidelines.

Operation

Startup

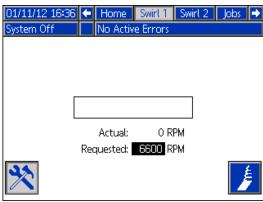
Initial Startup

- Ensure the PrecisionSwirl control center is installed and all of the proper connections to and from the control center have been made. Ensure fittings are tight.
- Read and understand the Operation (page 25) and Advanced Display Module (ADM) (page 13) sections of this manual.
- 3. Continue startup with step 2 in Standard Startup.

Standard Startup

- Carefully inspect the entire system for signs of leakage or wear. Replace or repair any worn or leaking components before operating the system.
- 2. Press the Stop button (BC). See Fig. 5 on page 13.
- 3. Turn on electrical power to the system.
- 4. Turn on the main power to supply power to the PrecisionSwirl.
- Check Interface Signals: If this is a new installation, power on each system input and verify that each input is being received.
- 6. Turn on the material supply system.

Maintenance Mode Operation



Swirl Maintenance Screen

Operating from maintenance mode enables manually starting the swirl dispenser (). The system starts the swirl dispenser when the user presses . The swirl dispenser continues to run until is pressed again.

There is one maintenance screen for each installed Swirl.

Verify System Operation

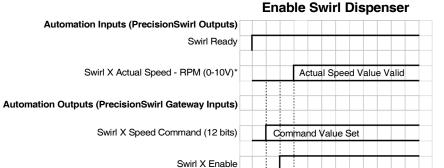
Use maintenance mode to manually check the operation of the PrecisionSwirl system components before switching over to automation control (normal operation). See **Operate Swirl Dispenser From Maintenance Screen**, page 26, for instructions on operating from maintenance mode.

NOTE: Perform the following procedures while in maintenance mode.

Operate Swirl Dispenser From Maintenance Screen

- Navigate to the Swirl x screen for the desired Swirl
 Dispenser.Press to enter maintenance screen.
- 2. To change the RPM, use the arrow keys to navigate to the RPM box then enter the desired RPM.
- 3. Press and verify that the Swirl Dispenser begins rotating. Press again to stop the Swirl Dispenser.
- 4. Press again to exit maintenance screen.

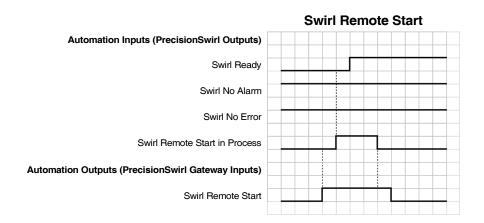
Swirl Control Charts



NOTE: Swirl orbiter may take a few seconds to reach full speed.

 * Swirl speed is only available for systems with a DGM automation gateway.

Full Speed



PrecisionSwirl State

Swirl X On

Pressure Relief Procedure

Follow pressure relief procedure in manual 309403.

Shutdown



1. Press the Stop button (BC).



Fig. 16: ADM - Stop Button

- 2. Shut off the material supply to the dispense valve.
- 3. Follow the Pressure Relief Procedure in manual 309403.
- 4. Turn main power switch on control panel to the OFF position.

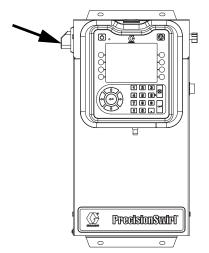


Fig. 17: Control Center Main Power Switch

USB Data

All files downloaded from the USB are put in a DOWN-LOAD folder on the drive. For example: "E:\GRACO\12345678\DOWNLOAD\"

The 8-digit numeric folder name matches the 8-digit ADM serial number. When downloading from multiple ADMs, there will be one sub-folder in the GRACO folder for each ADM.

USB Logs

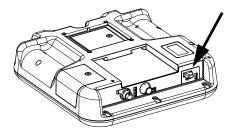


Fig. 18: ADM USB Port

During operation, PrecisionSwirl stores system and performance related information to memory in the form of log files. PrecisionSwirl maintains three types of log files: a job log, an event log, and dispense data logs. Follow the **Download Procedure**, page 31, to retrieve log files.

Event Log

The event log file name is 1-EVENT.CSV and is stored in the DOWNLOAD folder.

The event log maintains a record of the last 1,000 events. Each event record in the log file contains the date and time the event occurred, the event type, event code, and event description.

System Configuration Settings File

The system configuration settings file name is SETTINGS.TXT and is stored in the DOWNLOAD folder.

A system configuration settings file automatically downloads each time a USB flash drive is inserted. Use this file to back up system settings for future recovery or to easily replicate settings across multiple PrecisionSwirl systems. Refer to the **Upload Procedure**, page 31, for instructions on how to use this file.

It is recommended to retrieve the SETTINGS.TXT file after all system settings are set as desired. Store the file for future use as a backup in case the settings are changed and need to be quickly changed back to the desired setup.

NOTE: System settings may not be compatible between different versions of the PrecisionSwirl software.

NOTE: Do not modify the contents of this file.

Custom Language File

The custom language file name is DISPTEXT.TXT and is stored in the DOWNLOAD folder.

A custom language file automatically downloads each time a USB flash drive is inserted. If desired, use this file to create a user-defined set of custom language strings to be displayed within the ADM.

The PrecisionSwirl system is able to display the following Unicode characters. For characters outside of this set, the system will display the Unicode replacement character, which appears as a white question mark inside of a black diamond.

- U+0020 U+007E (Basic Latin)
- U+00A1 U+00FF (Latin-1 Supplement)
- U+0100 U+017F (Latin Extended-A)
- U+0386 U+03CE (Greek)
- U+0400 U+045F (Cyrillic)

Create Custom Language Strings

The custom language file is a tab-delimited text file that contains two columns. The first column consists of a list of strings in the language selected at the time of download. The second column can be used to enter the custom language strings. If a custom language was previously installed, this column contains the custom strings. Otherwise the second column is blank.

Modify the second column of the custom language file as needed and then follow the **Upload Procedure**, page 31, to install the file.

The format of the custom language file is critical. The following rules must be followed in order for the installation process to succeed.

- The file name must be DISPTEXT.TXT.
- The file format must be a tab-delimited text file using Unicode (UTF-16) character representation.
- The file must contain only two columns, with columns separated by a single tab character.
- Do not add or remove rows to the file.
- Do not change the order of the rows.
- Define a custom string for each row in the second column.

Download Procedure

- Insert USB flash drive into USB port (BL). See Fig. 18 on page 29.
- The menu bar and USB indicator lights indicate that the USB is downloading files. Wait for USB activity to complete. A pop-up will be present until the transfer is complete if it is not acknowledged.
- 3. Remove USB flash drive from USB port (BL).
- 4. Insert USB flash drive into USB port of computer.
- The USB flash drive window automatically opens. If it does not, open USB flash drive from within Windows[®] Explorer.
- 6. Open Graco folder.
- Open system folder. If downloading data from more than one system, there will be more than one folder. Each folder is labeled with the corresponding serial number of the ADM (The serial number is on the back of the ADM.)
- 8. Open DOWNLOAD folder.
- Open LOG FILES folder labeled with the highest number. The highest number indicates the most recent data download.
- Open log file. Log files open in Microsoft[®] Excel[®] by default as long as the program is installed. However, they can also be opened in any text editor or Microsoft[®] Word.

NOTE: All USB logs are saved in Unicode (UTF-16) format. If opening the log file in Microsoft Word, select Unicode encoding.

Upload Procedure

Use this procedure to install a system configuration file and/or a custom language file.

- 1. If necessary, follow the **Download Procedure**, page 31, to automatically generate the proper folder structure on the USB flash drive.
- 2. Insert USB flash drive into USB port of computer.
- The USB flash drive window automatically opens. If it does not, open USB flash drive from within Windows Explorer.
- 4. Open Graco folder.
- Open system folder. If working with more than one system, there will be more than one folder within the Graco folder. Each folder is labeled with the corresponding serial number of the ADM. (The serial number is on the back of the module.)
- 6. If installing the system configuration settings file, place SETTINGS.TXT file into UPLOAD folder.
- 7. If installing the custom language file, place DISPTEXT.TXT file into UPLOAD folder.
- 8. Remove USB flash drive from computer.
- Install USB flash drive into PrecisionSwirl system USB port.
- 10. The menu bar and USB indicator lights indicate that the USB is downloading files. Wait for USB activity to complete.
- 11. Remove USB flash drive from USB port.

NOTE: If the custom language file was installed, users can now select the new language from the Language drop-down menu in the Advanced Setup Screen 1.

Troubleshooting



NOTE: Check all possible solutions in the chart below before you disassemble the system.

Troubleshooting for swirl dispenser is also discussed in the swirl manual. Refer to **Related Manuals** on page 3. Also refer to **Event and Error Codes and Troubleshooting**, page 35, for detailed information on how error codes are communicated.

Swirl Dispenser

Problem	Cause	Solution
Motor not running (motor fault alarm active)	Cable disconnected	Verify cable connections to swirl board, swirl motor cable, and swirl orbiter
	CAN cable inside control center or expansion Swirl enclosure was re-connected with system power on (amber LED on swirl board will be on, this indicates circuit protection was triggered)	Cycle system power
	Shorted motor cable (amber LED on swirl board will be on, this indicates circuit protection was triggered)	Replace swirl motor cable (55 ft) then cycle power
	Faulty swirl orbiter	Replace swirl orbiter
Motor not running (motor fault alarm not active)	Cable disconnected	Verify cable connections to swirl board, swirl board power cable, and swirl control DGM
	No "Swirl Enable" signal from automation unit	Check input from automation unit
	Swirl not installed	Verify that the proper swirl orbiter is installed in the system setup screen
Motor not responding to change in speed command	No "Swirl Speed Command" signal from automation unit	Check input from automation unit
	Swirl speed source incorrectly set	Verify Speed Command Source in Swirl Setup screen

Gateway Module

Problem	Cause	Solution
No communication	Incorrect wiring	Check wiring per fieldbus standard. Refer to PrecisionSwirl Gateway LED status indicators and Appendix C - Communications Gateway Module (CGM) Connection Details, page 61.
	Incorrect fieldbus set- tings	Confirm fieldbus settings at automation controller (fieldbus master) and PrecisionSwirl Gateway (fieldbus slave). Refer to Appendix A - Advanced Display Module (ADM) , page 48, for information on PrecisionSwirl Gateway configuration settings.
Incorrect data	Incorrect fieldbus configuration file installed on automa- tion controller (field- bus master)	Download PrecisionSwirl fieldbus configuration file from www.graco.com, and install on automation controller (fieldbus master).
	Incorrect map installed on Precision-Swirl Gateway	Confirm correct PrecisionSwirl data map is installed on Precision-Swirl Gateway. Refer to Appendix A - Advanced Display Module (ADM) , page 48, for information on how to determine installed data map. If necessary, install a new Gateway data map. Refer to Upgrade Gateway Module Fieldbus Map , page 39, for instructions, and Control Center and Expansion Swirl Enclosure Parts , page 46, for map token part number.

LED Diagnostic Information

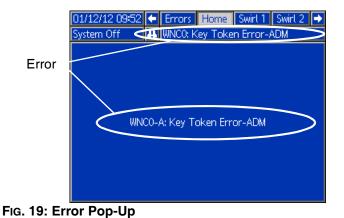
The following LED signals, diagnosis, and solutions apply to the Advanced Display Module and Gateway module.

Module Status LED Signal	Diagnosis	Solution
Green on	System is powered up	-
Yellow	Internal communication in progress	-
Red solid	Hardware failure	Replace module
Red flashing fast	Uploading software	-
Red flashing slow	Token error	Remove token and upload software token again.
Red flashes three times, pauses, then repeats	Invalid rotary switch position (DGM only)	Change rotary switch position to a valid position then restart the system. See page 14.

Errors

View Errors

When an error occurs, an error pop-up is displayed that takes up the entire screen until the error is acknowledged by pressing . Active errors are displayed in the menu bar.



The previous 200 errors are displayed on the error report screens. See **Run Mode**, page 54, for instructions on navigating to and through the error report screens.

There are three levels of errors: alarms, deviations, and advisories. Alarms cause the system to shut down. Deviations and advisories do not shut down the system.

NOTE:

- Alarms set the swirl ready signal LOW.
- Advisories and deviations do not set the swirl ready signal LOW.

Diagnose Errors

See **Event and Error Codes and Troubleshooting** on page 35 for error codes, possible causes, and solutions.

Event and Error Codes and Troubleshooting

Error codes are stored in the events log and are displayed on the error report screens.

Error codes shown as XYZ_ represent error codes XYZ1, XYZ2, XYZ3, XYZ4, where the last digit represents the number of the swirl dispenser to which the error applies. Error codes in the following table are sorted by event code.

System Events and Errors

Event Code	Event Name	Event Description	Event Type	Cause	Solution
		System	Events and Err	ors	
	No Active Errors	No errors			No action necessary
EC0X	Setup Values Changed	Setup change notification	Record only	A setup value was changed on the display	No action necessary if changes were desired
EL0X	Power Up	Control box power up	Record only		No action necessary
EM0X	Power Down	Control box power down	Record only		

Control Center Events and Errors

Event Code	Event Name	Event Description	Event Type	Cause	Solution		
	Control Center Events and Errors						
CBG0	Gateway Reset	Gateway reset	Advisory (self-clearing)	Gateway setting(s) changed	Wait for reset to complete before attempting automation control		
CCG_	Fieldbus Communication Error	Fieldbus Communication Error	Alarm	The automation gateway lost communication with the automation controller.	Restore communications.		
EAUX	Download to USB in Process	Information is currently being downloaded to USB	Advisory (self-clearing)		No action necessary		
EBUX	Download to USB Complete	Download to the USB is complete	Advisory (self-clearing)		No action necessary		
EVUX	USB Disabled	USB download attempted, however, USB activity is disabled.	Advisory (self-clearing)	Transfers are disabled in Advanced Setup screen 2.	Clears when drive is removed.		
MMUX	USB Log 90% Full	One or more USB log is 90% full.	Advisory	Data in the jobs or events log has not been downloaded recently and logs are nearly full.	Download the data or disable USB errors.		
V1G0	DGM Unpowered	The Discrete Gateway Module does not have logic power supplied to it.	Advisory	24 Vdc has not been connected to the power pins.	Connect power according to Appendix B - Dis- crete Gateway Module (DGM) Connection Details on page 56.		
WMG0	Gateway Error Detected	Gateway error detected; includes any error not covered by another more specific error	Alarm				

Event Code	Event Name	Event Description	Event Type	Cause	Solution
		Control Ce	nter Events and	Errors	
WNC0	ADM Key Token Error	Missing or invalid key token	Alarm	An ADM key token is required to run the sys-	Verify the key token is installed
				tem	Verify the key token part number is correct for the PrecisionSwirl ADM
WNG0	Gateway Map Error	Missing or invalid map	Advisory	Missing or invalid Gate- way map	Install PrecisionSwirl map in Gateway
WSG0	Gateway Setup Error	System settings are incompatible with Discrete Gateway Module.	Advisory	Swirl 1 is not installed. Or Swirl 3 or Swirl 4 is installed.	Install Swirl 1, uninstall swirls 3 and 4.
WSU0	USB configuration error	USB configuration error	Advisory	USB configuration invalid or not present	Reinstall system software on display

Swirl Events and Errors

Event	Event Event					
Code	Event Name	Description	Event Type	Cause	Solution	
		Swirl E	vents and Erro	ors		
CBR_	Swirl Communica- tion Error	Swirl communication error with ADM	Alarm	The ADM lost communication with the Swirl Control DGM	Restore communications	
CDR_	Duplicate Module	Duplicate Swirl Control DGM Detected	Alarm	Two or more Swirl Control DGMs have the same rotary switch setting	Verify that all Swirl Control DGMs have proper rotary switch settings. Reset module after changing rotary switch setting. Refer to Swirl Control DGM section, page 15.	
EAD_	Maintenance Mode Entered	Maintenance mode entered	Advisory (self-clearing)	Swirl maintenance mode entered	No action required	
EBD_	Maintenance Mode Exited	Maintenance mode exited	Advisory (self-clearing)	Swirl maintenance mode exited	No action required	
MBD_	Maintenance Due - Orbiter	Maintenance due on swirl orbiter	Advisory	Swirl active time totalizer exceeded limit setting	Service Component If necessary, reset total- izer	
WBD_ Swirl Motor I	Swirl Motor Fault	Swirl Motor Fault Motor speed is outside the +/- 50% tolerance range for at least 5 seconds while operating	+/- 50% tolerance range	Cable disconnected	Verify cable connections to swirl board, swirl motor cable, and swirl orbiter	
				Shorted motor cable (amber LED on swirl board will be on)	Replace swirl motor cable (55 ft)	
				Orbiter bearing failure	Replace bearing	
				Motor defective	Replace swirl orbiter	

Maintenance



Prior to performing any maintenance procedures, follow the **Pressure Relief Procedure** on page 28.

Maintenance Schedule

The following tables list the recommended maintenance procedures and frequencies to operate the equipment safely. Maintenance must be performed by trained personnel per this schedule to assure safety and reliability of the equipment.

Electrical

Task	Weekly
Check cables for wear	✓
Verify cable connections	✓
Verify operation of "System Stop" button	✓

^{*} Check Component Manual for more detailed maintenance information.

Swirl Dispensers

See manual 309403 for maintenance schedule.

Advanced Display Module (ADM)

Upgrade Software

NOTE: Back up the custom language file (if installed) before upgrading software. See **USB Data**, page 29, for more information.

- 1. Turn off power to the system.
- 2. Remove token access panel, and then remove the key token (do not discard token).

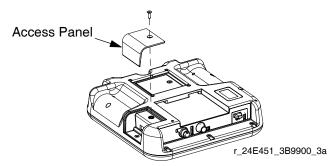


Fig. 20: Remove Access Panel

3. Insert and press software token firmly into slot.

NOTE: There is no preferred orientation of token.



Fig. 21: Insert Token

- Turn on power to the system. The red indicator light (BL) will flash until new software is completely loaded.
- 5. After the red indicator light shuts off, turn off power to the system.
- Remove software token.
- 7. Reinstall key token, and replace token access panel.

Cleaning

Use any alcohol-based household cleaner, such as glass cleaner, to clean the display.

Upgrade Gateway Module Software

NOTE: The Gateway module connection to the system is temporarily disabled during the use of upgrade tokens. The following instructions apply to all Gateway modules.

- 1. Turn off power to the system.
- Remove the access cover.

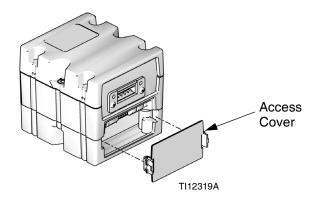


Fig. 22: Remove Access Cover

3. Insert and press token firmly into slot.

NOTE: There is no preferred orientation of token.

 Turn on power to the system. The red indicator light (CK) will flash until new software is completely loaded.

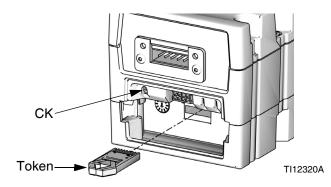


Fig. 23: Insert Token

- 5. After the red indicator light shuts off, turn off power to the system.
- Remove token.
- 7. Replace access cover.

Upgrade Gateway Module Fieldbus Map

NOTE: The fieldbus connection is temporarily disabled during the use of a map token. The following instructions apply to all Gateway modules.

- Perform Upgrade Gateway Module Software.
 Software must be upgraded before upgrading the fieldbus map.
- 2. Remove the access cover.

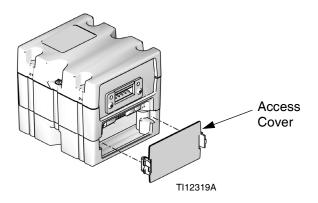


Fig. 24: Remove Access Cover

3. Insert and press map token firmly into slot.

NOTE: There is no preferred orientation of the token.

 Press and hold the push button for three seconds and then release. The red indicator light (CK) will flash twice, pause, and then once after the data map is uploaded.

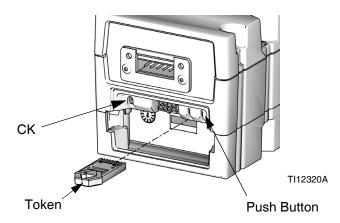


Fig. 25: Insert Token

- 5. Remove map token (CC) when software has successfully uploaded.
- 6. Replace access cover.

Repair

Control Center Assembly



Prepare Control Center for Repair

- 1. Power off the display.
- Disconnect main power to the control center assembly.
- 3. Remove the control center assembly front cover (20).

Replace Gateway Module

- 1. Prepare Control Center for Repair, page 40.
- 2. Remove the automation communications cable (AE).
- 3. Remove the two screws holding the Gateway module (5) to the base (3), and remove the module.

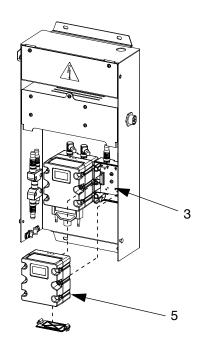


FIG. 26

- Attach a new Gateway module to the base using two screws.
- Reconnect the automation interface cable.

6. Upgrade software, page 38, then upgrade fieldbus map, page 39.

Replace Gateway Module Base

- 1. Prepare Control Center for Repair, page 40.
- 2. Remove the Gateway module (5); follow **Replace Gateway Module**. (Leave automation communications cable (AE) attached to Gateway module.)
- 3. Disconnect the CAN cable (19) and power supply cable (6) from the base (3).
- 4. Remove the four screws (16) and grounding screw (12) from the base and replace it with a new base.

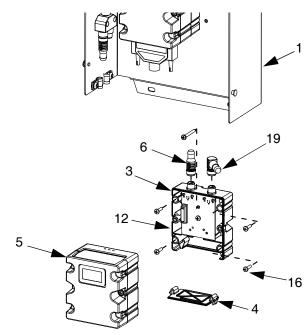


Fig. 27

- Secure the new base to rear cover (1) using the five screws.
- Reattach Gateway module; follow Replace Gateway Module.
- 7. Load gateway map token.

Replace Swirl Board 16K570:

- 1. Prepare Control Center for Repair, page 40.
- 2. Remove screw (a) from swirl board cover. Open swirl board cover.
- 3. Remove cable connectors (b) from swirl board.
- 4. Remove the four screws (c) from the swirl board. Replace with new board and secure using the four screws (c).
- 5. Insert cable connectors (b) into the new board.
- 6. Reassemble the swirl board cover using screw (a).

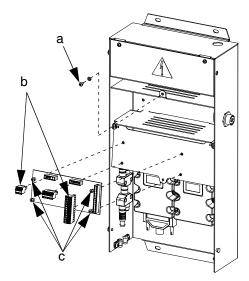


Fig. 28

Replace Advanced Display Module

- 1. Prepare Control Center for Repair, page 40.
- 2. Disconnect the CAN cable (18) from the ADM (2).

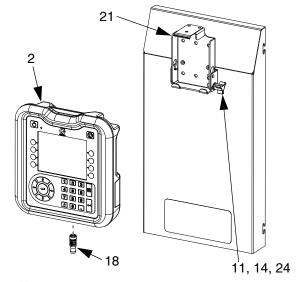


Fig. 29

- 3. Remove the ADM by snapping it out of the mounting bracket.
- 4. On old ADM, remove token access panel then remove key token. Do not discard token.
- 5. Connect the CAN cable to the new ADM.
- 6. Upgrade new ADM software, page 38.
- 7. Insert key token into new ADM. Replace token access panel.
- 8. Install the new ADM by snapping it into the mounting bracket.

Replace Advanced Display Module Bracket

- 1. Prepare Control Center for Repair, page 40.
- 2. Remove the ADM (2); follow **Replace Advanced Display Module**. (Leave the CAN cable attached to the ADM.)
- 3. Remove the speed clips (25) and rivets (26) from the mounting bracket (21).

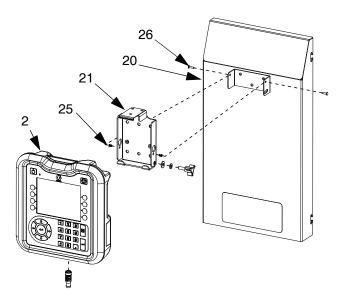


FIG. 30

- 4. Remove the mounting bracket from the front cover (20) and replace with a new bracket.
- 5. Secure the new bracket to the front cover with speed clips and rivets.
- 6. Reinstall the ADM.

Replace DIN Rail Assembly

- 1. Prepare Control Center for Repair, page 40.
- Remove both screws (22) and washers (28) from the line voltage assembly cover (7). Remove the cover.

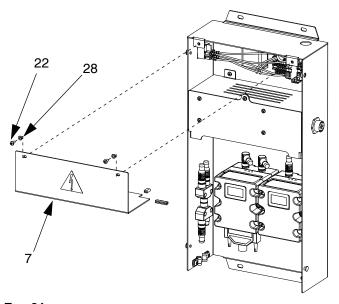


Fig. 31

- Disconnect all wiring from the din rail module and filter.
- 4. Remove the four screws (40) from the din rail and filter.
- 5. Disconnect wires from rocker/rotary switch. Take note of wire positions for easy connection in Step 7.

 Remove the din rail, filter, and rocker switch (snaps into place). Replace with new components. Secure din rail and filter to the rear control center assembly cover (1) using the four screws (40). Snap rocker/rotary switch into position.

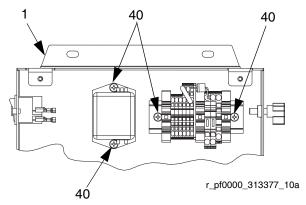


Fig. 32: 24 Vdc Din Rail Assembly

- 7. Reconnect all wiring to the din rail module, filter, and rocker/rotary switch.
- 8. Reassemble the line voltage assembly cover using the screws and washers.

Replace Fuses

Replace fuses on the din rail assembly.

- For 24 Vdc control centers: see Technical Data on page 67 for fuse specifications.
- For 100-240 Vac control centers: Order fuse 115805.

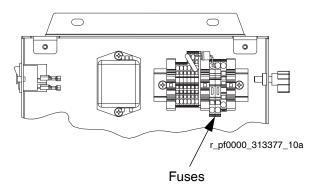


Fig. 33: Fuse Location

Repair

Parts

Control Centers

Software Upgrade Tokens

Part	Description
★ ± 16K743	Includes PrecisionSwirl software for the ADM, CGM, and DGM
★ * 16N601	PrecisionSwirl Gateway map token: Installs the CGM map starting on page 61.

Control Center Key Token Part Numbers

See **Key Tokens** on page 16 for more information about key tokens.

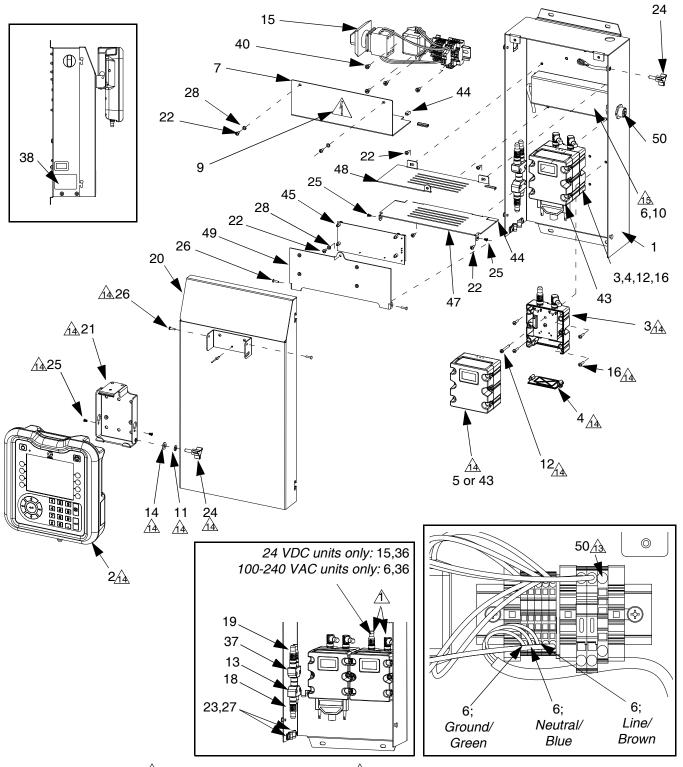
Part	Description
★16M218	ADM Key Token

Gateway Module Part Numbers

Model	User Interface Description	Gateway Part Number To Order
16K605, 16K610	Discrete	★24B681
16K601, 16K606	DeviceNet [™]	★ 15V759
16K602, 16K607	Ether- Net/IP [™]	★ 15V760
16K603, 16K608	PROFIBUS™	★ 15V761
16K604, 16K609	PROFINET™	★15V762

NOTE: A PrecisionSwirl system can be upgraded to a PCF in order to add flow control capabilities. To upgrade, order kit 16N590 and one of the fluid plate kits listed in PCF manual 3A2098.

Control Center and Expansion Swirl Enclosure Parts



Add ferrite (36) to cable. Locate as close to cable connector as possible.

100-240 Vac models only.

Control centers only. Not included in expansion swirl enclosures.

Control Center Assembly Parts

Ref.	Part	Description	Qty.
1		COVER, rear	1
2₩	24E451	DISPLAY, with USB	1
3♦	289697	BASE, cube	1
4◆	277674	ENCLOSURE, cube door	1
5₩		MODULE, Gateway; see table on	1
		page 45 for part number	
6†‡		SUPPLY, power	1
7‡ �		COVER, line voltage	1
8‡�		GROMMET	1
9▲‡	196548	LABEL, warning, electric shock	1
10†‡		SCREW, cap, socket hd; m4 x 6	4
11 🏶		WASHER, lock	1
12♦	121820	SCREW, mach, pan hd; m4 x 35	1
13	121807	CONNECTOR, splitter	1
14*	110755	WASHER, plain	1
15‡❖		MODULE, line voltage	1
16◆	195875	SCREW, mach, pan hd	4
18	121001	CABLE, CAN, female / female 1.0m	
19	121000	CABLE, CAN, female / female 0.5m	
20		COVER, front	1
21🏶		BRACKET, mounting	1
22‡�		SCREW, mach, pan hd	2
23	120143	GUIDE, strain relief	2
24	121253		2
25❖		CLIP, speed, tubular	2
26❖		RIVET, aluminum	1
27	112925	SCREW, cap	2 2 2 1 2 2 2 1
28	100020	WASHER, lock	2
36	121901	SUPPRESSOR, box snap, ferrite	2
37	124654		1
38		LABEL	1
40		SCREW, mach, pan hd	4
43₽	24B681	MODULE, DGM	1

Ref.	Part	Description	Qty.
44		GUARD, edging	1
45	16K570	BOARD, circuit, swirl	1
46		BRACKET, display pivot	1
47		COVER, swirl, hinge side	1
48		COVER, swirl, latch side	1
49		COVER, swirl, lid	1
50	24K455	CABLE, swirl board, panel mount	1
51	24K458	CABLE, SWIRL-DGM	1
52	121597	CABLE, CAN, 90 female/90 female	1

- ▲ Replacement Danger and Warning labels, tags, and cards are available at no cost.
- ‡ Parts included with 100-240 Vac Module kit 24B928.
- ❖ Parts included with 24 Vdc Module kit 24B929.
- Parts included with Display Mounting Bracket kit 24B930.
- Base electronic components do not have Precision-Swirl-specific software installed. Use software upgrade token (16K743) to install software before use.
- * Fieldbus Gateway modules do not have a Precision-Swirl-specific map installed. Use map token (16N601) to install map before use.

--- Not for sale.

Appendix A - Advanced Display Module (ADM)

Display Overview

The ADM display is divided into two main functions: Setup Mode and Run Mode.

Setup Mode Functions

The setup mode functions enable users to:

- configure installed system components
- set units, adjust values, set formats, and view software information for each component
- set or change information regarding the Gateway module
- view information regarding the particular Gateway module used
- set controls

Run Mode Functions

The run mode functions enable users to:

- adjust the speed scale
- manually turn on the swirl dispenser
- view a chronological list of system errors
- view a preventative maintenance schedule for the swirl dispenser

Display Details

Power Up Screen

The following screen appears when the ADM is powered up. It remains on while the ADM runs through initialization and establishes communication with other modules in the system.



Menu Bar

The menu bar appears at the top of each screen.



Date and Time

The date and time are always displayed in one of the following formats. The time is always displayed as a 24-hour clock.

- DD/MM/YY HH:MM
- MM/DD/YY HH:MM
- YY/MM/DD HH:MM

Arrows

The left and right arrows indicate screen navigation.

Screen Menu

The screen menu indicates the currently active screen, which is highlighted. It also indicates the associated screens that are available by scrolling left and right.

System Mode

There are four modes: Active, Display Control, Swirl Setup, and System Off. The current system mode is displayed at the left of the menu bar.

Alarm/Deviation

If there is an active system error, one of the following icons is displayed in the middle of the menu bar. There are four possibilities:

Icon	Function	Description
NI. I.	No information or	
No Icon	no error has occurred	
_	CCCATTCA	
Δ	Advisory	Informational
4	Deviation	Important
Ą	Alarm	Very important

Status

The current system status is displayed at the right of the menu bar.

Soft Keys

Icons next to the soft keys indicate which mode or action is associated with each soft key. Soft keys that do not have an icon next to them are not active in the current screen.

NOTICE

To prevent damage to the soft key buttons, do not press the buttons with sharp objects such as pens, plastic cards, or fingernails.

Jump In/Jump Out

In screens that have editable fields, press to access the fields and make changes. When changes are complete press again to exit edit mode.

Navigation within Screens

Press to open drop-down menus on Setup screens. Also, press to enter changes or make a selection.

Press to navigate to new screens and to navigate left and right within a screen.

Press 1 to navigate to new screens and to navi-

gate up and down within a screen. Also press to move between fields within a drop-down menu, and to increment or decrement numbers within a field.

Setup Mode

Setup mode screens are divided into three sections: System setup, Advanced setup, and Gateway setup.

While in Run mode, press to enter Setup mode.

Press to navigate through the Setup mode screens.

If the setup screens are password protected, a password entry screen will appear after pressing . The password is defined in the Advanced setup screen. If the password is set to 0000, the password is disabled.

Advanced Setup Screens

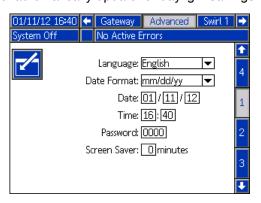
There are four Advanced setup screens, which enable users to set units, adjust values, set formats, define USB settings, and view software information for each

component. Press to scroll through the Advanced setup screens. Once in the desired Advanced setup screen, press to access the fields to make changes. Press to exit edit mode.

NOTE: Users must be out of edit mode to scroll through the Advanced setup screens.

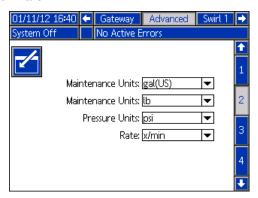
Advanced Setup Screen 1

This screen enables users to set the language, date format, current date and time, password, and number of minutes before the screen saver comes on. The time does not automatically update for daylight savings time.



Advanced Setup Screen 2

This screen enables users to set the units of measure for maintenance volume, maintenance mass, pressure, and flow rate.



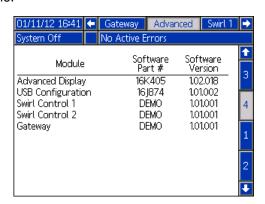
Advanced Setup Screen 3

This screen enables users to setup USB-related settings. The Disable USB Log Errors option disables recording events when the logs are at least 90% full.



Advanced Setup Screen 4

This screen displays the software part number and version for the ADM, USB configuration, and Gateway module.



Automation Gateway Setup Screens

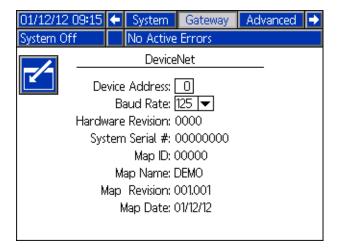
There are up to three automation Gateway Setup screens (depending on fieldbus), which enable users to set or change information regarding the automation Gateway module used on the PrecisionSwirl system. These screens also enable users to view information regarding the particular automation Gateway module used.

Press to scroll through the Gateway Setup screens. Once in the desired Advanced Setup screen, press to access the fields to make changes. Press to exit edit mode.

NOTE: Users must be out of edit mode to scroll through the Gateway Setup screens.

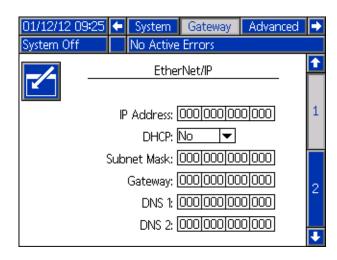
Gateway Setup Screen 1 - DeviceNet

This screen enables users to set the device address and the baud rate. The DeviceNet screen displays the hardware revision number, system serial number, map ID, name, revision number, and install date.



Gateway Setup Screen 1 - EtherNet/IP

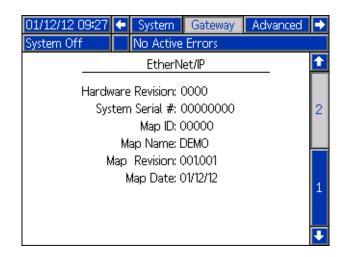
This screen enables users to set the IP address, subnet mask, Gateway, DNS 1, DNS 2, and if a DHCP is used.



Gateway Setup Screen 2 - EtherNet/IP

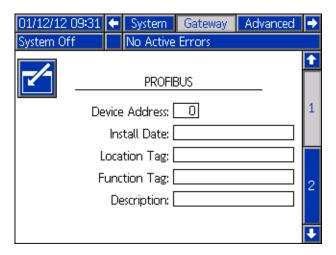
This screen is the same for EtherNet/IP and PROFIBUS. It enables users to view the following information regarding the Gateway module used on the Precision-Swirl system:

- hardware revision number
- system serial number
- map ID number
- · map name
- map revision number
- date the map was created



Gateway Setup Screen 1 - PROFIBUS

This screen enables users to set the device address, install date, location tag, function tag, and system description.

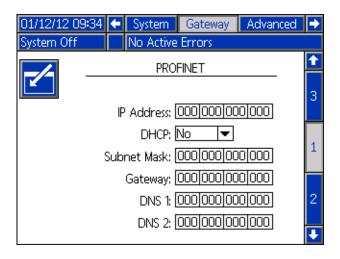


Gateway Setup Screen 2 - PROFIBUS

This screen is the same for EtherNet/IP and PROFIBUS. See **Gateway Setup Screen 2 - EtherNet/IP**, page 51, for details.

Gateway Setup Screen 1 - PROFINET

This screen enables users to set the IP address, subnet mask, Gateway, DNS 1, DNS 2, and if a DHCP is used.



Gateway Setup Screen 2 - PROFINET

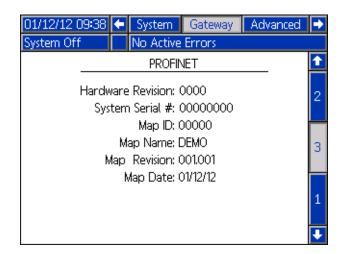
This screen enables users to set the device address, install date, location tag, function tag, and system description.



Gateway Setup Screen 3 - PROFINET

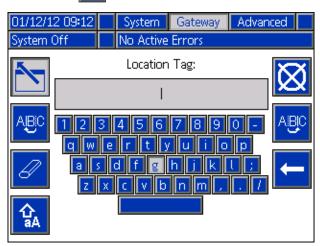
This screen enables users to view the following information regarding the Gateway module used on the PrecisionSwirl system:

- hardware revision number
- system serial number
- map ID number
- map name
- map revision number
- date the map was created



Keyboard Screen

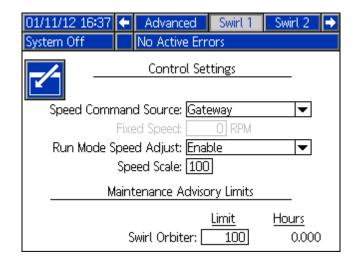
The keyboard screen appears when text is edited. Use all four arrow buttons to select each letter; press to enter the letter. To back space, press . To delete the entire name entered, press . To enter the name, press . To cancel the entry and exit the keyboard screen, press .



Swirl Setup Screen

This screen enables users to:

- Set the Speed Command Source to Display or Gateway. If it is set to Display, users can set the fixed speed
- Set the Run Mode Speed Adjust to Enable or Disable
- Set the speed scale from 50-150%
- Set the Swirl Orbiter Maintenance Advisory Limit



Run Mode

Run mode screens are divided into five sections: home, swirls, events, errors, and jobs. While in Setup mode

press to enter Run mode. Press to navigate through the Run mode screens.

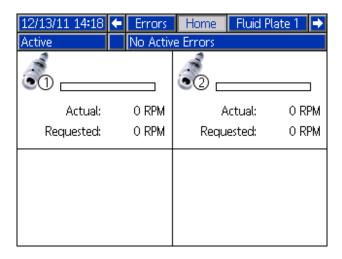
NOTE: The jobs screen is not used in PrecisionSwirl systems.

Swirl Home Screen

NOTE: This screen only appears if more than one Swirl Dispenser is installed.

The Swirl Home screen shows an overview for each of the individual Swirl Dispensers. The screen displays the following items:

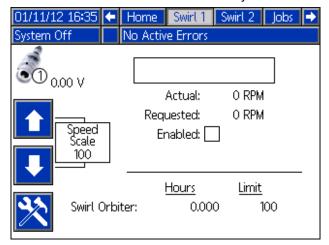
- Requested motor speed
- Actual motor speed
- Progress bar indicating requested and actual motor speed



Swirl X Screen

There is one Swirl X run screen for each installed swirl dispenser. This screen displays the following items:

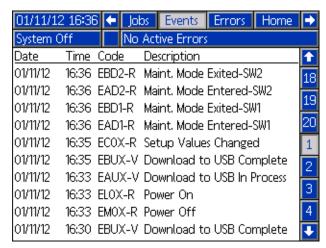
- Swirl Enable signal from the automation interface
- Speed command voltage from automation interface
- Actual and requested speed
- · Active time and maintenance advisory limit



Event Report Screens

The event report screens display a chronological list of system events. These screens display the last 200 events. Each event report screen displays the date, time, event code, and description for each event.

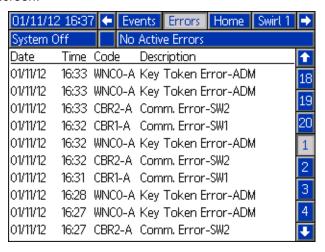
Press to scroll through each event report screen.



Error Report Screens

The error report screens display a chronological list of system errors. These screens display the last 200 errors. Each error report screen displays the date, time, error code, and description for each error. See **Errors**, page 34, for more information on errors, a list of error codes, and information on error troubleshooting.

Press to scroll through each error report screen.



Appendix B - Discrete Gateway Module (DGM) Connection Details

D-Sub Cable 24K463

The input and outputs below are referenced with respect to the DGM.

NOTE: See Appendix D - I/O Signal Descriptions on page 66.

Wire Color	Description	Pin Type	D-Sub Pin No.	Voltage (Vdc)
Red	Isolated Logic Power Supply	Supply	51 + 27	10-30
Gray	Isolated Logic GND	Supply	70	0
Gray/Pink	Analog GND	Analog GND	2	0
Brown	Swirl 1 Ready	Digital Output	9	0 - Logic Supply
Pink	Alarm Swirl 1	Digital Output	10	0 - Logic Supply
White	Error Swirl 1	Digital Output	11	0 - Logic Supply
Red/Blue	Swirl 2 Ready	Digital Output	12	0 - Logic Supply
Gray/Brown	Alarm Swirl 2	Digital Output	13	0 - Logic Supply
Orange	Error Swirl 2	Digital Output	14	0 - Logic Supply
Blue	Remote Start in Process	Digital Output	16	0 - Logic Supply
White/Yellow	Swirl 1 Speed Command	Analog Input	21	0-10
White/Green	Swirl 2 Speed Command	Analog Input	23	0-10
Brown/Green	Swirl 1 Actual Speed	Analog Output	40	0-10
Yellow/Brown	Swirl 2 Actual Speed	Analog Output	42	0-10
Black	Remote Start	Digital Input	59	0-30
Violet	Swirl 1 Enable	Digital Input	75	0-30
Yellow	Swirl 2 Enable	Digital Input	76	0-30

Pin References

NOTE: To avoid ground loops and noise immunity issues, do not ground the shield of the D-subminiature connector cable; it is already grounded through the mounting screw on the base of the DGM.

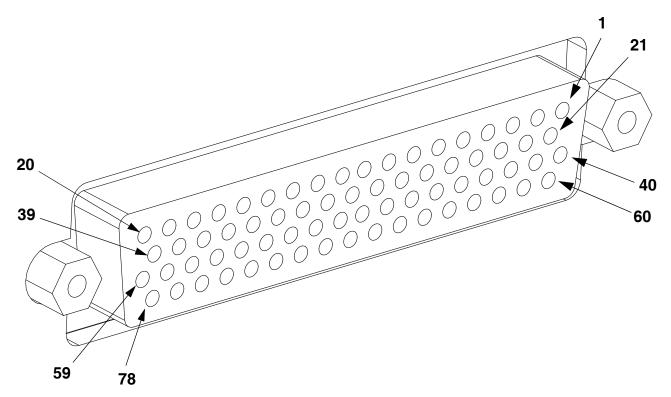


Fig. 34: D-Subminiature Connector - Pin References

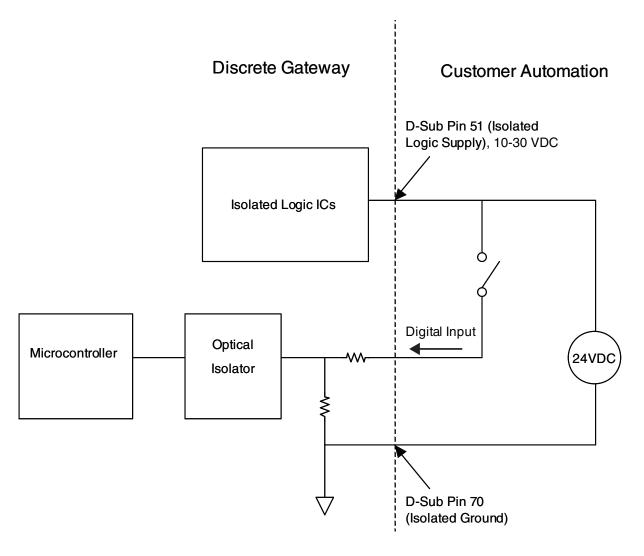
DGM Digital Input

The digital inputs function only when power is supplied to pin 51 and there is a ground connection to pin 70. See **Pin References**, page 57, for details. The digital input is rated at 0-30 Vdc, and requires an NEC Class 2 power supply connected to pin 51. The DGM provides optical isolation as shown in the following illustration.

Pins: 52 – 59, 71-78

Type: Sinking

• Maximum current draw: 3.6 mA

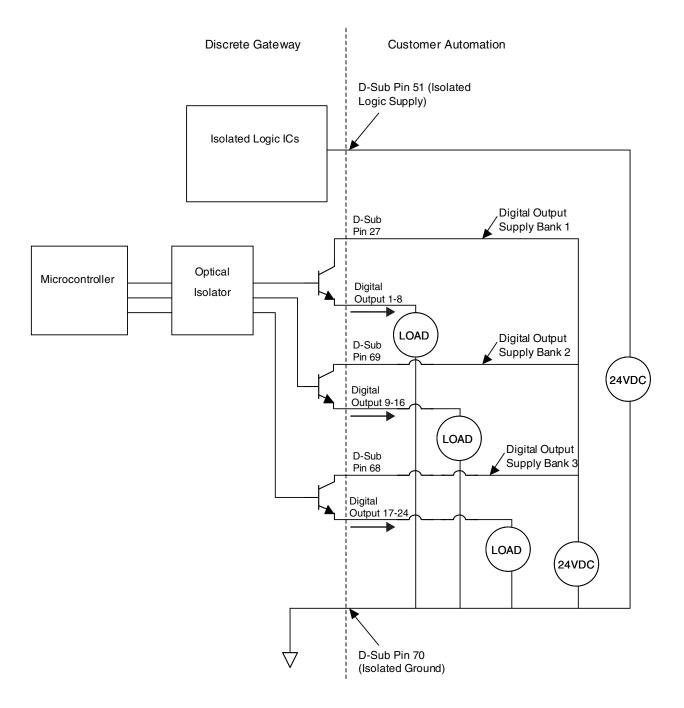


DGM Digital Outputs

The digital outputs function only when power is supplied to pins 27, 68, and 69 and there is a ground connection to pin 70. See **Pin References**, page 57, for details. The digital output is rated at 0-30 Vdc, and requires an NEC Class 2 power supply connected to pin 27 for supply bank 1, pin 69 for supply bank 2, and pin 68 for supply bank 3. The DGM provides optical isolation as shown in the following illustration.

Pins: 9-20, 28-39Type: Sourcing

- Maximum continuous current output: 350 mA (sourced from customer supply)
- Recommended continuous current: 100 mA



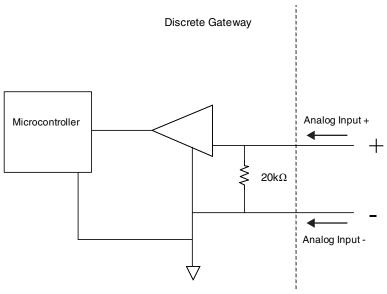
DGM Analog Inputs

The analog inputs function only when the DGM is connected to a power supply through the CAN connection. Each analog input has a corresponding reference (ground) pin. See **Pin References**, page 57, for details.

Type: Sinking

Voltage Rating: 0-10 Vdc

Input Impedance: 20 kΩ

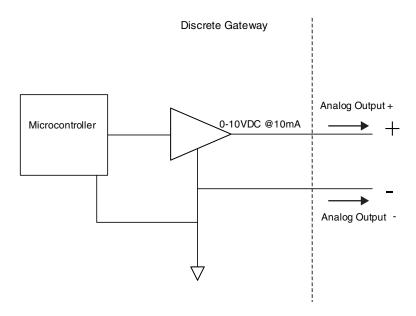


DGM Analog Outputs

The analog outputs function only when the DGM is connected to a power supply through the CAN connection. Each analog output has a corresponding reference (ground) pin. See **Pin References**, page 57, for details.

Type: Sourcing

Voltage Rating: 0-10 Vdc, 10 mA at 10 Vdc



Appendix C - Communications Gateway Module (CGM) Connection Details

Install Fieldbus Connections

Connect cables to fieldbus per fieldbus standards.

PROFINET

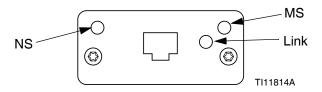


Fig. 35: PROFINET Fieldbus Connections

The Ethernet interface operates at 100Mbit, full duplex, as required by PROFINET. The Ethernet interface is auto-polarity sensing and auto-crossover capable.

Network Status (NS)

State	Description	Comments
Off	Offline	No power No connection with IO Controller
Green	On-line, (RUN)	 Connection with IO Controller established IO Controller with RUN state
Flashing Green	On-line, (STOP)	 Connection with IO Controller established IO Controller in STOP state

Module Status (MS)

State	Description	Comments
Off	Not initial- ized	No power or module in "SETUP" or "NW_INIT" state
Green	Normal operation	Diagnostic event(s) present
Flashing Green	Initialized, diagnostic event(s) present	Used by engineering tools to identify node on network
Red	Exception error	Module in state "EXCEPTION"
Red (1 flash)	Configura- tion error	Expected Identification differs from Real Identification
Red (2 flashes)	IP Address not set	Set IP address via system monitor or DNS server
Red (3 flashes)	Station Name not set	Set Station Name via system monitor
Red (4 flashes)	Major Inter- nal Error	Cycle system power; replace module

Link/Activity (Link)

State	Description
Off	No Link, no communication present
Green	Link established, no communication present
Green, flashing	Link established, communication present

EtherNet/IP

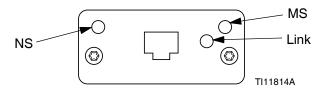


Fig. 36: EtherNet/IP Fieldbus Connections

The Ethernet interface operates at 100Mbit, full duplex, as required by PROFINET. The Ethernet interface is auto-polarity sensing and auto-crossover capable.

Network Status (NS)

State	Description
Off	No power or no IP address
Green	On-line, one or more connections established (CIP Class 1 or 3)
Flashing Green	On-line, no connections established
Red	Duplicate IP address, FATAL error
Flashing Red	One or more connections timed out (CIP Class 1 or 3)

Module Status (MS)

State	Description
Off	No power
Green	Controlled by a Scanner in Run state
Flashing Green	Not configured, or Scanner in Idle state
Red	Major fault (EXCEPTION-state, FATAL error etc.)
Flashing Red	Recoverable fault(s)

LINK/Activity (Link)

State	Description
Off	No link, no activity
Green	Link established
Flashing Green	Activity

DeviceNet

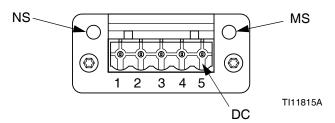


Fig. 37: DeviceNet Fieldbus Connections

Network Status (NS)

State	Description
Off	Not online / No power
Green	On-line, one or more connections are established
Flashing Green (1 Hz)	On-line, no connections established
Red	Critical link failure
Flashing Red (1 Hz)	One or more connections timed-out
Alternating Red/Green	Self test

Module Status (MS)

State	Description
Off	No power or not initialized
Green	Initialized
Flashing Green (1 Hz)	Missing or incomplete configuration, device needs commissioning
Red	Unrecoverable Fault(s)
Flashing Red (1 Hz)	Recoverable Fault(s)
Alternating Red/Green	Self test

DeviceNet Connector (DC)

Pin	Signal	Description
1	V-	Negative bus supply voltage
2	CAN_L	CAN low bus line
3	SHIELD	Cable shield
4	CAN_H	CAN high bus line
5	V+	Positive bus supply voltage

PROFIBUS

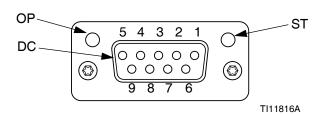


Fig. 38: PROFIBUS Fieldbus Connections

Operation Mode (OP)

State	Description
Off	Not online / No power
Green	On-line, data exchange
Flashing Green	On-line, clear
Flashing Red (1 flash)	Parameterization error
Flashing Red (2 flashes)	PROFIBUS Configuration error

Status Mode (ST)

State	Description
Off	No power or not initialized
Green	Initialized
Flashing Green	Initialized, diagnostic event(s) present
Red	Exception error

PROFIBUS Connector (DC)

Pin	Signal	Description
1	-	-
2	-	-
3	B Line	Positive RxD/TxD, RS485 level
4	RTS	Request to send
5	GND Bus	Ground (isolated)
6	+5V Bus Output	+5V termination power (isolated)
7	-	-
8	A Line	Negative RxD/TxD, RS485 level
9	-	-
Housing	Cable Shield	Internally connected to the Anybus protective earth via cable shield filters according to the PROFIBUS standard.

CGM I/O Data Map

See Appendix D - I/O Signal Descriptions on page 66.

Automation Inputs (signals from PrecisionSwirl)

	Input		
Byte	Bit	Description	Zone
0-20	100-		
0-20	I167		
	I168	Swirl Ready	
•	I169	Swirl No Alarm	
	I170	Swirl No Error	
21	1171		Swirl 1
21	l172		Jowin
•	I173		
	1174		
•	I175	Swirl Remote Start in Process	
	I176	Swirl Ready	
•	1177	Swirl No Alarm	
•	I178	Swirl No Error	
22	l179		Swirl 2
22	I180		JWIIIZ
•	I181		
	l182		
•	1183	Swirl Remote Start in Process	
	I184	Swirl Ready	
	I185	Swirl No Alarm	1
	l186	Swirl No Error	1
23	l187		Swirl 3
20	I188		
	1189		1
	I190		1
	l191	Swirl Remote Start in Process	
	1192	Swirl Ready	
24	l193	Swirl No Alarm	
	l194	Swirl No Error	
	l195		Swirl 4
	I196		
	l197]
	1198]
	l199	Swirl Remote Start in Process	
25	l200-		
20	1207		

Automation Outputs (signals to PrecisionSwirl)

O	Byte	Output Bit	Description	Zone
O07		O00-	-	
1	U	O07		
1		008	Swirl Enable	
1		O09	Swirl Remote Start	
O12				
O12	_	011		0
O14	1	012		Swiri 1
O15		013		
2-5		014		
O48		015		
O47	0.5	016-		
O49 Swirl Command - 2	2-5	047		
O50		O48	Swirl Command - 1	
6		O49	Swirl Command - 2	
6		O50	Swirl Command - 4	
O52				
O53 Swirl Command - 32	6			Swirl 1
O55 Swirl Command - 128			Swirl Command - 32	
O55 Swirl Command - 128		O54	Swirl Command - 64	
O56 Swirl Command - 256		O55		
O57 Swirl Command - 512 O58 Swirl Command - 1024 O59 Swirl Command - 2048 O60			Swirl Command - 256	
O58 Swirl Command - 1024 O59 Swirl Command - 2048 O60			Swirl Command - 512	
7				
The state of the	_	O59		
O62	/	O60		Swiri 1
8		061		
8		062		
8		O63		
9		O64-		
9	8	071		
9		072	Swirl Enable	
9		073	Swirl Remote Start	
9		074		
076 077 078 079 10- 080- 13 0111 0112 Swirl Command - 1 0113 Swirl Command - 2 0114 Swirl Command - 4 0115 Swirl Command - 8 0116 Swirl Command - 16 0117 Swirl Command - 32 0118 Swirl Command - 64		075		0
O78	9	076		Swiri 2
O79		077		
10-		078		
13 O111		079		
13 O111	10-	O80-		
14 O112 Swirl Command - 1 O113 Swirl Command - 2 O114 Swirl Command - 4 O115 Swirl Command - 8 O116 Swirl Command - 16 O117 Swirl Command - 32 O118 Swirl Command - 64	13			
O114 Swirl Command - 4 O115 Swirl Command - 8 O116 Swirl Command - 16 O117 Swirl Command - 32 O118 Swirl Command - 64			Swirl Command - 1	
O114 Swirl Command - 4 O115 Swirl Command - 8 O116 Swirl Command - 16 O117 Swirl Command - 32 O118 Swirl Command - 64			Swirl Command - 2	
14 O115 Swirl Command - 8 O116 Swirl Command - 16 O117 Swirl Command - 32 O118 Swirl Command - 64			Swirl Command - 4	
O116 Swirl Command - 16 O117 Swirl Command - 32 O118 Swirl Command - 64	, ,			Swirl 2
O117 Swirl Command - 32 O118 Swirl Command - 64	14			
O118 Swirl Command - 64				

Byte	Output Bit	Description	Zone
	O120	Swirl Command - 256	
	0121	Swirl Command - 512	
	0122	Swirl Command - 1024	
15	O123	Swirl Command - 2048	Swirl 2
10	0124		- Swiii Z
	0125		
	O126		
	0127		
16	O128-		
10	O135		
	O136	Swirl Enable	
	O137	Swirl Remote Start	
	O138		
47	O139		0
17	O140		Swirl 3
	0141		
	0142		
	0143		
18-	0144-		
21	0175		
	0176	Swirl Command - 1	
	0177	Swirl Command - 2	
	0178	Swirl Command - 4	
	0179	Swirl Command - 8	
22	O180	Swirl Command - 16	Swirl 3
	0181	Swirl Command - 32	
	0182	Swirl Command - 64	
	0183	Swirl Command - 128	
	0184	Swirl Command - 256	
	O185	Swirl Command - 512	
	0186	Swirl Command - 1024	
	0187	Swirl Command - 2048	
23	O188		Swirl 3
	O189		
	O190		
	0191		
	O192-		
24	O199		
	O200	Swirl Enable	
	0201	Swirl Remote Start	
	0202		
	O203		
25	O204		Swirl 4
	O205		
	O206		
	0207		
26-	O207		
29	O208-		
29	0239	Swirl Command - 1	
	0240	Swirl Command - 2	
	0241	Swirl Command - 4	
	_		
30	0243	Swirl Command - 8	Swirl 4
	O244 Swirl Command - 16		
	O245	Swirl Command - 32	
	O246	Swirl Command - 64	
	O247	Swirl Command - 128	1

Byte	Output Bit	Description	Zone
	O248	Swirl Command - 256	
	O249	Swirl Command - 512	
	O250	Swirl Command - 1024	
31	O251	Swirl Command - 2048	Swirl 4
31	0252		SWIII 4
ŀ	O253		
	O254		
•	O255		
32-	O256-		
41	O335		

Appendix D - I/O Signal Descriptions

This section provides details about the CGM and DGM Automation Input and Output signals.

Automation Inputs

Swirl Ready

This signal is 0 on power up. This signal will be 1 when both of the following conditions are met:

- The system is in an active state
- The swirl does not have an active alarm

Swirl No Alarm

DGM only: This signal is 0 when the swirl does not have an alarm, and 1 otherwise.

CGM only: This signal is 1 when the swirl does not have an alarm, and 0 otherwise.

Swirl No Error

DGM only: This signal is 0 when the swirl does not have an error (alarm, deviation, or advisory), and 1 otherwise. *CGM only:* This signal is 1 when the swirl does not have an error (alarm, deviation, or advisory), and 0 otherwise.

Swirl Remote Start in Process

This signal is 0 on power up. This signal will be 1 when a swirl remote start is in process. The signal will remain asserted until the swirl has achieved Swirl Ready Status.

Automation Outputs

Swirl Remote Start

This bit is used to restart the system from any "not-ready" state. If the system is already in a Swirl Ready state, the signal has no effect.

Swirl X Enable

This bit is used to signal the on and off status of each swirl dispenser motor.

Swirl Command Value

This 12-bit value indicates a swirl speed command from 0-10 volts. 0 volts (ox000) represents a speed of 6,600 rpm and 10 volts (0xFFF) represents 24,000 rpm.

Technical Data

Control Center Assembly Technical Data

	100 - 240 Vac Assemblies	24 Vdc Assembly
Voltage	100-240 Vac	24 Vdc
Phase	1	
Frequency	50-60 Hz	
Full Load Current	1.4 A	4.0 A
Fuse Rating	250 Vac, 2.5A T	125 Vac, 4A F
Weight	44 lb (20.2 kg)	

Swirl Dispenser Technical Data

Refer to manual 309403.

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Original instructions. This manual contains English. MM 3A1935

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