

Operation



ProMix® PD2K Proportioner for Automatic Spray Applications

332564B
EN

Electronic positive displacement proportioner for fast-setting two-component materials. Automatic system with Advanced Display Module. For professional use only.

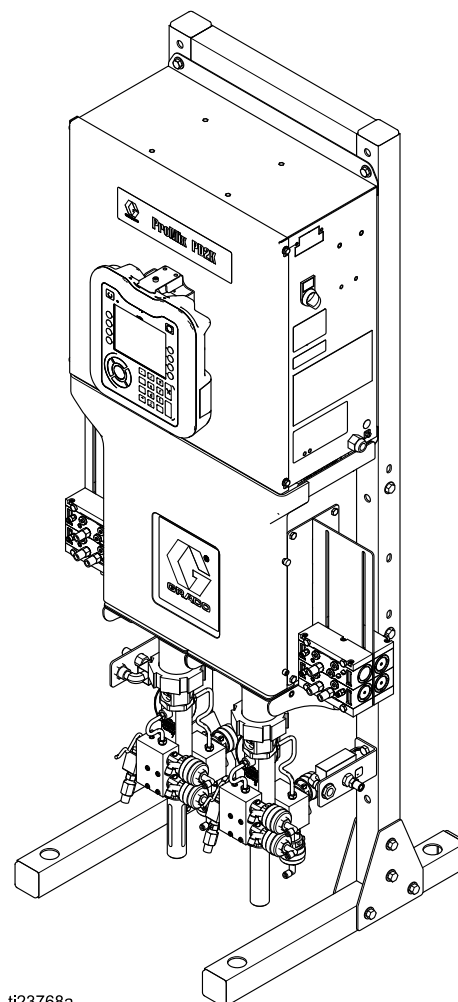


Important Safety Instructions

Read all warnings and instructions in this manual and in your installation, repair, and associated component manuals.

Save these instructions.

See page 3 for model part numbers and approvals information.



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Contents

Related Manuals	3	Home Screen	58
Models	4	Spray Screen	62
Warnings	6	Fill Screen	63
Important Isocyanate (ISO) Information	9	Usage Screen	64
General Information	10	Jobs Screen	65
Advanced Display Module (ADM)	11	Errors Screen	65
ADM Display	11	Events Screen	65
USB Download Procedure	11	Setup Mode Screens	66
USB Upload Procedure	12	Password Screen	66
ADM Keys and Indicators	13	System Screen 1	67
Soft Key Icons	14	System Screen 2	68
Navigating the Screens	16	System Screen 3	69
Screen Icons	16	System Screen 4	70
Pre-Operation Tasks	17	System Screen 5	71
Pre-operation Checklist	17	Recipe Screen	72
Power On	17	Flush Screen	73
Initial System Setup	18	Pump Screen 1	74
Flush Before Using Equipment	18	Pump Screen 2	75
Valve Settings	18	Pump Screen 3	76
Pressure Relief Procedure	19	Pressure Alarm and Deviation Limits	76
Without Color Change	19	Calibration Screens	77
With Color Change	19	Maintenance Screens	80
Operation Using Automatic Display Module		Advanced Screen 1	82
(ADM)	20	Advanced Screen 2	83
Prime and Fill the System	20	Advanced Screen 3	83
Spraying	21	Calibration Checks	84
Purging	22	Pump Pressure Check	84
Shutdown	23	Pump Volume Check	85
Operation Using a Programmable Logic		Solvent Meter Calibration	86
Controller (PLC)	24	Color Change	87
Network Communications and Discrete		Single Color Systems	87
I/O	24	Multiple Color Systems	87
Discrete I/O	24	System Errors	88
Communication Gateway Module (CGM)		To Clear Error and Restart	88
Details	27	Gun Trigger Input Function	88
Network Communication I/O Data Map	28	Error Codes	89
Operation Flow Charts	42	Maintenance	102
Network Communication - Dynamic		Preventive Maintenance Schedule	102
Command Structure (DCS)	47	Flushing	102
Flow Control System	57	Cleaning the ADM	102
Run Mode Screens	58	Technical Data	103
Opening Screen	58	Graco Standard Warranty	104

Related Manuals

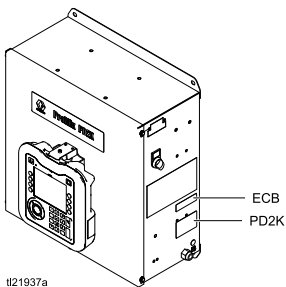
Current manuals are available at www.graco.com.

Manual No.	Description
332709	ProMix PD2K Proportioner for Automatic Spray Applications, Repair-Parts
332458	ProMix PD2K Proportioner for Automatic Spray Applications, Installation
332339	Dosing Pumps, Instructions/Parts
332454	Color/Catalyst Dispense Valves, Instructions/Parts

Manual No.	Description
332455	Color Change Kits, Instructions-Parts
333282	Color Change and Remote Mix Manifold Kits, Instructions-Parts
332456	Pump Expansion Kits, Instructions-Parts

Models

See Figs. 1–6 for component identification labels, including approval information and certification.

Part No.	Series	Maximum Air Working Pressure	Maximum Fluid Working Pressure	Location of PD2K and Electrical Control Box (ECB) Labels
AC1000	A	100 psi (0.7 MPa, 7.0 bar)	300 psi (2.068 MPa, 20.68 bar)	
AC2000	A	100 psi (0.7 MPa, 7.0 bar)	1500 psi (10.34 MPa, 103.4 bar)	



ProMix® PD2K / PD1K
Electronic Proportioner





II 2 G
Ex ia IIA T3
FM13 ATEX 0026
IECEX FMG 13.0011

TP

MAX AIR WPR

.7	7	100
MPa	bar	PSI

MAX FLUID WPR

2.068	20.68	300
MPa	bar	PSI

MAX TEMP 50°C (122°F)

Intrinsically Safe (IS) System. Install per IS Control Drawing No. 16P577. Control Box IS Associated Apparatus for use in non hazardous location, with IS Connection to color change and booth control modules Apparatus for use in: Class I, Division 1, Group D T3 Hazardous Locations

Read Instruction Manual
Warning: Substitution of components may impair intrinsic safety.

PART NO. SERIES SERIAL

--	--	--

MFG. YR.

--

GRACO INC.
P.O. Box 1441
Minneapolis, MN
55440 U.S.A.

Artwork No. 294021 Rev. D

Figure 1 Model AC1000 (Low Pressure) Identification Label

ProMix® PD2K / PD1K

PART NO. SERIES NO. MFG. YR.

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GRACO INC.
P.O. Box 1441
Minneapolis, MN
55440 U.S.A.

Um: 250 V

POWER REQUIREMENTS

VOLTS 90-250 ~

AMPS 7 AMPS MAX

50/60 Hz

Ex II (2) G
[Ex ia] IIA Gb
FM13 ATEX 0026
IECEX FMG 13.0011

CE 0359

Artwork No. 294024 Rev. C

Figure 2 24M672 Control Box Identification Label

Continued on the next page.

ProMix® PD2K / PD1K Electronic Proportioner			Intrinsically Safe (IS) System. Install per IS Control Drawing No. 16P577. Control Box IS Associated Apparatus for use in non hazardous location, with IS Connection to color change and booth control modules Apparatus for use in: Class I, Division 1, Group D T3 Hazardous Locations Read Instruction Manual Warning: Substitution of components may impair intrinsic safety.												
 II 2 G Ex ia IIA T3 FM13 ATEX 0026 IECEx FMG 13.0011	 0359	 APPROVED Intrinsically safe equipment for Class I, Div 1, Group D, T3 Ta = 2°C to 50°C													
															
MAX AIR WPR <table border="1"> <tr> <td>.7</td> <td>7</td> <td>100</td> </tr> <tr> <td>MPa</td> <td>bar</td> <td>PSI</td> </tr> </table>				.7	7	100	MPa	bar	PSI						
.7	7	100													
MPa	bar	PSI													
MAX FLUID WPR <table border="1"> <tr> <td>10.34</td> <td>103.4</td> <td>1500</td> </tr> <tr> <td>MPa</td> <td>bar</td> <td>PSI</td> </tr> </table>			10.34	103.4	1500	MPa	bar	PSI							
10.34	103.4	1500													
MPa	bar	PSI													
MAX TEMP 50°C (122°F)															
Artwork No. 294022 Rev. D			<table border="1"> <tr> <td>PART NO.</td> <td>SERIES</td> <td>SERIAL</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>MFG. YR.</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>	PART NO.	SERIES	SERIAL				MFG. YR.					
PART NO.	SERIES	SERIAL													
MFG. YR.															
 GRACO INC. P.O. Box 1441 Minneapolis, MN 55440 U.S.A.															

Figure 3 Model AC2000 (High Pressure)
Identification Label

ProMix® PD2K / PD1K COLOR CHANGE CONTROL										
PART NO.	SERIES	SERIAL	MFG. YR.	MAX AIR WPR <table border="1"> <tr> <td>.7</td> <td>7</td> <td>100</td> </tr> <tr> <td>MPa</td> <td>bar</td> <td>PSI</td> </tr> </table>	.7	7	100	MPa	bar	PSI
.7	7	100								
MPa	bar	PSI								
 GRACO INC. P.O. Box 1441 Minneapolis, MN 55440 U.S.A.										
Artwork No. 294057 Rev. C										

Figure 4 Non-Intrinsically Safe Color Change Control (Accessory) Identification Label

ProMix® PD2K / PD1K COLOR CHANGE CONTROL										
PART NO.	SERIES	SERIAL	MFG. YR.	MAX AIR WPR <table border="1"> <tr> <td>.7</td> <td>7</td> <td>100</td> </tr> <tr> <td>MPa</td> <td>bar</td> <td>PSI</td> </tr> </table>	.7	7	100	MPa	bar	PSI
.7	7	100								
MPa	bar	PSI								
 APPROVED Intrinsically safe equipment for Class I, Div 1, Group D, T3 Ta = 2°C to 50°C Install per 16P577	 0359	 II 2 G Ex ia IIA T3 Gb FM13 ATEX 0026 IECEx FMG 13.0011	 GRACO INC. P.O. Box 1441 Minneapolis, MN 55440 U.S.A.							
Artwork No. 294055 Rev. B										

Figure 5 Intrinsically Safe Color Change Control
(Accessory) Identification Label

ProMix® PD2K / PD1K				EXPANSION PUMP								
PART NO.	SERIES	SERIAL	MFG. YR.	MAX AIR WPR <table border="1"> <tr> <td>.7</td> <td>7</td> <td>100</td> </tr> <tr> <td>MPa</td> <td>bar</td> <td>PSI</td> </tr> </table>			.7	7	100	MPa	bar	PSI
.7	7	100										
MPa	bar	PSI										
 GRACO INC. P.O. Box 1441 Minneapolis, MN 55440 U.S.A.					MAX TEMP 50°C (122°F)							
Artwork No. 294116 Rev. C				MAX FLUID WPR <table border="1"> <tr> <td>10.34</td> <td>103.4</td> <td>1500</td> </tr> <tr> <td>MPa</td> <td>bar</td> <td>PSI</td> </tr> </table>			10.34	103.4	1500	MPa	bar	PSI
10.34	103.4	1500										
MPa	bar	PSI										

Figure 6 Pump Expansion Kit (Accessory) Identification Label

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 symbol refers to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, 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	
   	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. Do not use pail liners unless they are antistatic or conductive. • Stop operation immediately if static sparking occurs or you feel a shock, Do not use equipment until you identify and correct the problem. • Keep a working fire extinguisher in the work area.
 	ELECTRIC SHOCK HAZARD This equipment must be grounded. Improper grounding, setup, or usage of the system can cause electric shock. • Turn off and disconnect power at main switch before disconnecting any cables and before servicing or installing equipment. • Connect only to grounded power source. • All electrical wiring must be done by a qualified electrician and comply with all local codes and regulations.

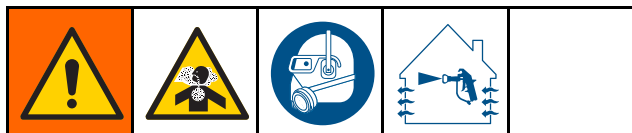
 WARNING	
	INTRINSIC SAFETY Intrinsically safe equipment that is installed improperly or connected to non-intrinsically safe equipment will create a hazardous condition and can cause fire, explosion, or electric shock. Follow local regulations and the following safety requirements. • Be sure your installation complies with national, state, and local codes for the installation of electrical apparatus in a Class I, Group D, Division 1 (North America) or Class I, Zones 1 and 2 (Europe) Hazardous Location, including all of the local safety fire codes (for example, NFPA 33, NEC 500 and 516, OSHA 1910.107, etc.). • To help prevent fire and explosion: • Do not install equipment approved only for a non-hazardous location in a hazardous location. See model ID label for the intrinsic safety rating of your model. • Do not substitute system components as this may impair intrinsic safety. • Equipment that comes in contact with the intrinsically safe terminals must be rated for Intrinsic Safety. This includes DC voltage meters, ohmmeters, cables, and connections. Remove the unit from the hazardous area when troubleshooting.
	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 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.
	MOVING PARTS HAZARD Moving parts can pinch, cut or amputate fingers and other body parts. • Keep clear of moving parts. • Do not operate equipment with protective guards or covers removed. • Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, follow the Pressure Relief Procedure and disconnect all power sources.
	TOXIC FLUID OR FUMES Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed. • Read MSDSs 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. • Always wear chemically impermeable gloves when spraying, dispensing, or cleaning equipment.

 WARNING	
	PERSONAL PROTECTIVE EQUIPMENT Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This protective 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.
 	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 from distributor or retailer. • Do not leave the work area while equipment is energized or under pressure. • Turn off all equipment and follow the Pressure Relief Procedure when equipment is not in use. • Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only. • Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards. • Make sure all equipment is rated and approved for the environment in which you are using it. • 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.

Important Isocyanate (ISO) Information

Isocyanates (ISO) are catalysts used in two component materials.

Isocyanate Conditions



Spraying or dispensing materials containing isocyanates creates potentially harmful mists, vapors, and atomized particulates.

Read and understand material manufacturer's warnings and material MSDS to know specific hazards and precautions related to isocyanates.

Prevent inhalation of isocyanate mists, vapors, and atomized particulates by providing sufficient ventilation in the work area. If sufficient ventilation is not available, a supplied-air respirator is required for everyone in the work area.

To prevent contact with isocyanates, appropriate personal protective equipment, including chemically impermeable gloves, boots, aprons, and goggles, is also required for everyone in the work area.

Eventually a film will form on the surface and the ISO will begin to gel, increasing in viscosity.

NOTICE

Partially cured ISO will reduce performance and the life of all wetted parts.

- Always use a sealed container with a desiccant dryer in the vent, or a nitrogen atmosphere. **Never** store ISO in an open container.
- Keep the ISO pump wet cup or reservoir (if installed) filled with appropriate lubricant. The lubricant creates a barrier between the ISO and the atmosphere.
- Use only moisture-proof hoses compatible with ISO.
- Never use reclaimed solvents, which may contain moisture. Always keep solvent containers closed when not in use.
- Always lubricate threaded parts with an appropriate lubricant when reassembling.

NOTE: The amount of film formation and rate of crystallization varies depending on the blend of ISO, the humidity, and the temperature.

Keep Components A and B Separate



Cross-contamination can result in cured material in fluid lines which could cause serious injury or damage equipment. To prevent cross-contamination:

- **Never** interchange component A and component B wetted parts.
- Never use solvent on one side if it has been contaminated from the other side.

Changing Materials

NOTICE

Changing the material types used in your equipment requires special attention to avoid equipment damage and downtime.

- When changing materials, flush the equipment multiple times to ensure it is thoroughly clean.
- Always clean the fluid inlet strainers after flushing.
- Check with your material manufacturer for chemical compatibility.
- When changing between epoxies and urethanes or polyureas, disassemble and clean all fluid components and change hoses. Epoxies often have amines on the B (hardener) side. Polyureas often have amines on the A (resin) side.

Moisture Sensitivity of Isocyanates

Exposure to moisture (such as humidity) will cause ISO to partially cure; forming small, hard, abrasive crystals, which become suspended in the fluid.

General Information

- Reference numbers and letters in parentheses in the text refer to numbers and letters in the illustrations.
- Be sure all accessories are adequately sized and pressure-rated to meet system requirements.
- To protect the screens from paints and solvents, clear-plastic protective shields (10 per pack) are available. Order Part No. 197902 for the Advanced Display Module. Clean the screens with a dry cloth if necessary.

Advanced Display Module (ADM)

ADM Display

The ADM display shows graphical and text information related to setup and spray operations.

For detail on the display and individual screens, see [Run Mode Screens, page 58](#), or [Setup Mode Screens, page 66](#).

Keys are used to input numerical data, enter setup screens, navigate within a screen, scroll through screens, and select setup values.

NOTICE

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

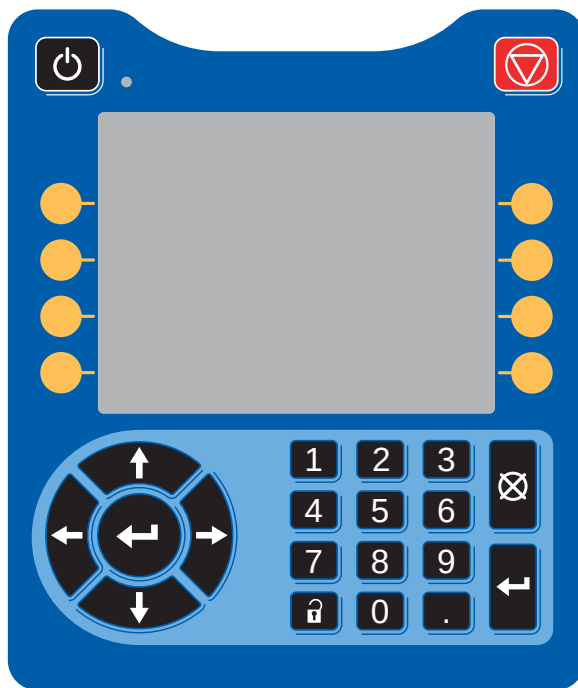


Figure 7 Advanced Display Module

USB Download Procedure

Use the USB port on the ADM to download or upload data.

1. Enable USB downloads. See [Advanced Screen 3, page 83](#).
2. Remove the cover from the USB port on the bottom of the ADM. Insert the USB drive.
3. During the download, USB BUSY appears on the screen.
4. When the download is complete, USB IDLE appears on the screen. The USB drive may then be removed.

NOTE: If the download operation takes longer than 60 seconds, the message disappears. To determine if the USB is busy or idle, check the Error Status bar on the screen. If idle, remove the USB.

5. Insert the USB flash drive into the USB port of the computer.
6. The USB flash drive window automatically opens. If it does not, open the USB flash drive from within Windows® Explorer.
7. Open Graco folder.
8. 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.)
9. Open DOWNLOAD folder.
10. Open LOG FILES folder labeled with the highest number. The highest number indicates the most recent data download.
11. Open log file. Log files open in Microsoft® Excel® by default if the program is installed. They also can be opened in any text editor of Microsoft® Word.

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

12. Always reinstall the USB cover after removing the USB, to keep the drive free of dirt and dust.

USB Upload Procedure

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

1. If necessary, follow the **USB Download Procedure**, to automatically generate the proper folder structure on the USB flash drive.
2. Insert the USB flash drive into the USB port of the computer.
3. The USB flash drive window automatically opens. If it does not, open the USB flash drive from within Windows Explorer.
4. Open the Graco folder.
5. Open the 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 DISPTXT.TXT file into UPLOAD folder.
8. Remove the USB flash drive from the computer.
9. Install the USB flash drive into the USB port of the ProMix PD2K system USB port.
10. During the upload, USB BUSY displays on the screen.
11. Remove the USB flash drive from the USB port.

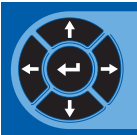
NOTE: If the custom language file was installed, users can now select the new language from the Language drop-down menu in the Advanced Setup Screen 1.

ADM Keys and Indicators

NOTICE

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

Table 1 : ADM Keys and Indicators

Key	Function
 Startup/Shutdown Key and Indicator	Press to startup or shutdown the pump/motor. • Solid green indicates that power is applied to the motor. • Solid yellow indicates that power to the motor is off. • Blinking green or yellow indicates that the system is in Setup mode.
 Stop	Press to immediately stop the system and remove motor power.
 Soft Keys	Press to select the specific screen or operation shown on the display directly next to each key. The top left soft key is the Edit key, which allows access to any settable fields on a screen.
 Navigation Keys	• <i>Left/Right Arrows:</i> Use to move from screen to screen. • <i>Up/Down Arrows:</i> Use to move among fields on a screen, items on a dropdown menu, or multiple screens within a function.
Numeric Keypad	Use to input values. See ADM Display, page 11 .
 Cancel	Use to cancel a data entry field.
 Setup	Press to enter or exit Setup mode.
 Enter	Press to choose a field to update, to make a selection, to save a selection or value, to enter a screen, or to acknowledge an event.

Soft Key Icons

The following icons appear in the ADM display, directly to the left or right of the soft key which activates that operation.

NOTICE

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

Table 2 : Soft Key Functions

Key	Function
 Enter Screen	Press to enter screen for editing. Highlights editable data on a screen. Use Up/Down arrows to move between data fields on the screen.
 Exit Screen	Press to exit screen after editing.
 Accept	Press to accept calibration value.
 Cancel	Press to cancel or reject calibration value.
 Prime Pump	Press to start a pump priming procedure.
 Line/Fill/Run	Press to start a line fill procedure.
 Mix	Press to start a spray procedure.
 Purge	Press to start a purge procedure.

Key	Function
 Standby	Press to stop all pumps and put system in Standby.
 Stop	
 Pressure Check	Press to start a pump pressure check.
 Volume Check	Press to start a pump volume check.
 Job Complete	Press to log the material usage and increment the job number.
 Counter Reset	Press to reset the current usage counter.
 Move Cursor to Left	Appears on the User ID Keyboard screen. Use to move cursor to the left.
 Move Cursor to Right	Appears on the User ID Keyboard screen. Use to move cursor to the right.
 Erase All	Appears on the User ID Keyboard screen. Use to erase all characters.
 Backspace	Appears on the User ID Keyboard screen. Use to erase one character at a time.
 Upper Case/Lower Case	Appears on the User ID Keyboard screen. Use to change case (upper/lower).

Navigating the Screens

There are two sets of screens:

- The Run screens control mixing operations and display system status and data.
- The Setup screens control system parameters and advanced features.

Press  on any Run screen to enter the Setup screens. If the system has a password lock, the Password screen displays. If the system is not locked (password is set to 0000), System Screen 1 displays.

Press  on any Setup screen to return to the Home screen.

Press the Enter soft key  to activate the editing function on any screen.

Press the Exit soft key  to exit any screen.

Use the other softkeys to select the function adjacent to them.

Screen Icons

As you move through the screens, you will notice that icons are used frequently to simplify global communication. The following descriptions explain what each icon represents.

Screen Icons	
 User ID	 Job Number
 Potlife	 Target Ratio
 Recipe Number	 Flow Rate
 Pressure	 Volume
 Material A	 Material B
 Material A+B	 Solvent
 Calendar	 Time
 Alarm/Advisory	 Deviation

Pre-Operation Tasks

Pre-operation Checklist

Go through the Pre-Operation Checklist daily, before each use.

✓	Checklist
	System grounded Verify all grounding connections were made. See Grounding in the Installation manual.
	All connections tight and correct Verify all electrical, fluid, air, and system connections are tight and installed according to the Installation manual.
	Fluid supply containers filled Check component A and B and solvent supply containers.
	Dose valves set Check that dose valves are set 1–1/4 turns open. Start with the settings recommended in Valve Settings, page 18 , then adjust as needed.
	Fluid supply valves open and pressure set The recommended component A and B fluid supply pressures are 1/2 to 2/3 of the target spray pressure. NOTE: Low pressure systems may be set within a range of ± 100 psi (0.7 MPa, 7 bar); high pressure systems may be set within a range of ± 300 psi (2.1 MPa, 21 bar). If the inlet pressure is higher than the outlet pressure, ratio accuracy may be affected.
	Solenoid pressure set 85-100 psi inlet air supply (0.6-0.7 MPa, 6-7 bar).

Power On

1. Turn the AC Power Switch (P) ON (I = ON, 0 = OFF).
2. The Graco logo will display while the system initializes, followed by the Home screen.
3. Press the Start key . The system status will change from "System Off" to "Startup." Once the pumps are powered and are in the Home position, the system status will change from "Startup" to "Standby."

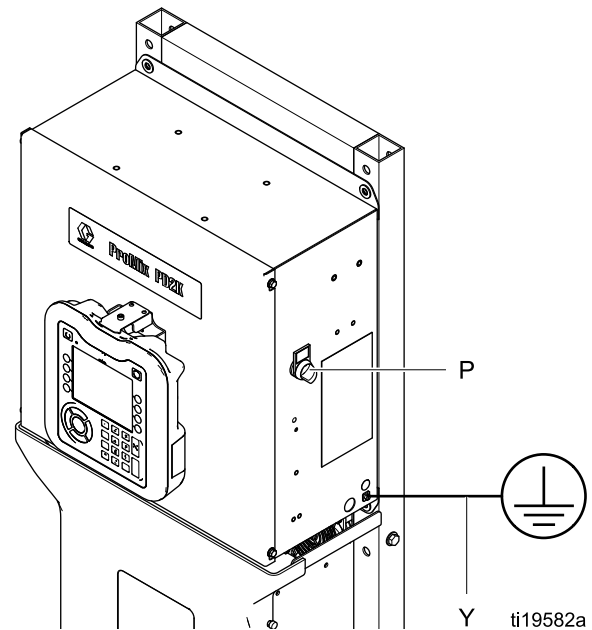


Figure 8 Power Switch

Initial System Setup

1. Change optional setup selections to desired parameters, as described in [Setup Mode Screens, page 66](#).
2. Set recipe and flush information as described in [Recipe Screen, page 72](#) and [Flush Screen, page 73](#).

Flush Before Using Equipment

The pump fluid section was tested with lightweight oil, which is left in the fluid passages to protect parts. To avoid contaminating your fluid with oil, flush the equipment with a compatible solvent before using the equipment.

Valve Settings

Dose valves and purge valves are factory set with the hex nut (E) 1-1/4 turns out from fully closed.

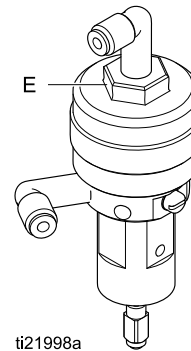


Figure 9 Valve Adjustment

Pressure Relief Procedure



Follow the **Pressure Relief Procedure** whenever you see this symbol.

This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as skin injection, splashing fluid and moving parts, follow the Pressure Relief Procedure when you stop spraying and before cleaning, checking, or servicing the equipment.				

Without Color Change

NOTE: The following procedure relieves all fluid and air pressure in the system. Use your control interface to issue the necessary commands to your system.

1. Turn off the supply pumps. Open the drain valve on the supply line fluid filter to relieve pressure in the supply line.
2. Command the system to Standby. Trigger the spray device to relieve pressure.
3. Flush the remote mix manifold and spray device. See [Flush Mixed Material, page 22](#).
4. Shut off the solvent supply pump. To relieve pressure, command the system to Purge and trigger the spray device. When the pressure is relieved, command the system to Standby to avoid getting a Purge Incomplete alarm.
5. If pressure remains in the solvent line between the solvent supply pump and the solvent valve:
 - VERY SLOWLY loosen a fitting to relieve pressure gradually.
 - Loosen the fitting completely.

With Color Change

NOTE: The following procedure relieves all fluid and air pressure in the system.

1. Turn off the supply pumps. Open the drain valve on the supply line fluid filter to relieve pressure in the supply lines. Do this for each color.

If using an electrostatic gun, shut off the electrostatics before flushing the gun.				

2. Trigger the gun to relieve pressure. From Maintenance Screen 4 on the ADM, check the box in the field labeled Gun for each color in the system.
3. Command the system to Purge. Hold the gun trigger open after the solvent valve shuts off to relieve all pressure.
4. Set the system to Recipe 0 to flush the pumps and to purge to the spray device. When flushing is complete the system will go to Standby.
5. Shut off the solvent supply pump. Set the system to Recipe 0 to flush solvent from the pumps and to purge to the spray device. Command the system to Standby after just a couple of seconds, to avoid getting a Purge Incomplete alarm.
6. If pressure remains in the solvent line between the solvent supply pump and the solvent valve:
 - VERY SLOWLY loosen a fitting to relieve pressure gradually.
 - Loosen the fitting completely.
7. Verify on the ADM Home Screen that neither pump is showing any pressure.

NOTE: If pressure remains in the solvent line between the solvent supply pump and the solvent valve, VERY SLOWLY loosen a fitting to relieve pressure gradually.

Operation Using Automatic Display Module (ADM)

Prime and Fill the System

NOTE: See [Run Mode Screens, page 58](#), for further screen information, if needed.

NOTE: You must prime the input lines to the pumps or the inputs to the color change valves before priming the pump and filling the entire system.

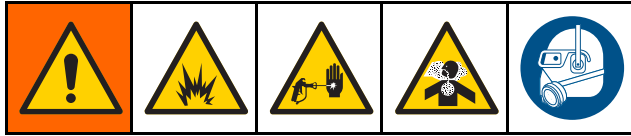


1. If using an electrostatic gun, shut off the electrostatics before filling the lines.
2. Adjust the main air pressure. To ensure proper operation, set the main air pressure as close to 100 psi (0.7 MPa, 7.0 bar) as possible. Do not use less than 85 psi (0.6 MPa, 6.0 bar).
3. If this is the first time starting up the system, or if lines may contain air, purge as instructed under [Flush the System, page 23](#). The equipment was tested with lightweight oil, which should be flushed out to avoid contaminating your material.
4. **If the system is powered down**, press  on the ADM. Make sure that the system is in Standby mode.
5. Verify that the recipes and the flush sequences are programmed correctly by checking the [Recipe Screen, page 72](#) and the [Flush Screen, page 73](#).
6. Enable the manual override on System Screen 5.
7. Go to the [Fill Screen, page 63](#).
8. Select the desired color to load. Press the Prime Pump key . The color will load the pump through the color stack and out the outlet stack dump valve.
NOTE: In a single color system, skip step 7 and prime the pump out to the gun.
9. Press the Fill Line key  to run color out to the remote mix manifold. The pump will run until you press the Stop key  to stop the pump.
10. Trigger the gun into a grounded reservoir or purge receptacle until the line is full, then press the Stop key .
11. Repeat for all material lines.

Spraying

To spray in a multiple color system, also see [Multiple Color Systems, page 87](#).

NOTE: See [Run Mode Screens, page 58](#), for further screen information, if needed.



1. Command the system to Mix. The system will load the correct mixed material volume.

NOTE: The system will automatically run a Mix Fill if the recipe is not currently loaded into the system. The Mix Fill volume calculation includes the remote mix manifold volume and the mixed material hose volume. The mixed material hose volume is determined by the gun hose length and diameter entered in [System Screen 3, page 69](#), and the remote to mix hose length and diameter also entered in [System Screen 3, page 69](#).

2. Adjust the flow rate by changing the target pressure (in Pressure Mode) or the target flow rate (in Flow Mode) on the Spray Screen or through the PLC. The fluid flow rate shown on the Spray screen is the combined total of component A and B out of the spray device.

NOTE: If spray pressure is adjusted at the ADM while spraying, it is not saved in the recipe until the system is put in Standby. This changes the pressure in the desired recipe.

3. Turn on atomizing air to the gun. Check the spray pattern as instructed in your spray gun manual.

NOTICE

Do not allow a fluid supply tank to run empty. This can damage the pumps and lead to the proportioning of fluid and air that meets the ratio and tolerance settings of the equipment. This can further result in spraying uncatalyzed or poorly catalyzed material.

Purging

To purge one color and fill with a new color, see [Color Change, page 87](#).

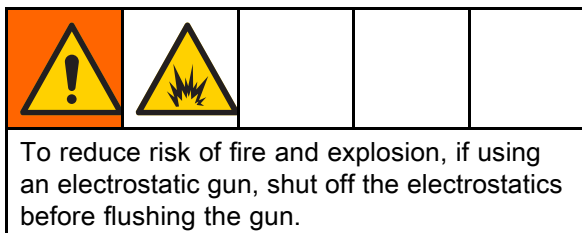
Flush Mixed Material



There are times when you only want to purge the remote mix manifold and the spray device, such as:

- end of potlife
- breaks in spraying that exceed the potlife
- overnight shutdown or end of shift
- before servicing the remote mix manifold, hose or gun.

1. Command the system to Standby.
2. If you are using a high pressure spray device or an electrostatic gun, shut off the atomizing air.



3. Trigger the spray device to relieve pressure.
 4. Set the solvent supply pressure regulator at the lowest pressure possible. Generally a setting of 25–50 psi (0.18–0.35 MPa, 1.8–3.5 bar) is sufficient.
 5. Command the system to Purge A or Purge B. Trigger the spray device into a grounded metal pail until the purge sequence is complete. When done purging, the system automatically switches to Standby mode, signalling the spray device to stop spraying.
 6. If the system is not completely clean, repeat Step 5.
- NOTE:** For optimal efficiency, adjust purge sequence times so only one cycle is required.
7. Trigger spray device to relieve pressure.
 8. Adjust the solvent supply regulator back to its normal operating pressure.

NOTE: The remote mix manifold and gun remain full of solvent after purging.

Flush the System

To avoid fire and explosion, always ground equipment and waste container. To avoid injury from splashing, always flush at lowest possible pressure.

Follow this procedure before:

- the first time material is loaded into the equipment
- servicing
- shutting down equipment for an extended period of time
- putting equipment into storage

Single Color System

1. Relieve the pressure. See [Pressure Relief Procedure, page 19](#).
2. Disconnect the color and catalyst supply lines from the pump inlet manifolds, and connect regulated solvent supply lines.
3. Set the solvent supply pressure regulator at the lowest pressure possible. Generally a setting of 25–50 psi (0.18–0.35 MPa, 1.8–3.5 bar) is sufficient.
4. Enable manual override on [System Screen 5, page 71](#).
5. On the ADM, go to the Fill screen. Set the . The system will pump solvent through pump A all the way to the gun.
6. Hold a metal part of the spray device firmly to a grounded metal pail. Trigger the spray device until clean solvent dispenses.
7. On the ADM, go to the Fill screen. Set the . The system will pump solvent through pump B all the way to the gun.
8. Relieve the pressure. See [Pressure Relief Procedure, page 19](#)

Color Change System

1. Relieve the pressure. See [Pressure Relief Procedure, page 19](#).
2. Attach regulated solvent supply lines as follows:
 - **Multiple color/single catalyst system:** On the color side, do not disconnect the color supply line from the inlet manifold of Pump A. Instead, connect a regulated solvent supply line to the designated solvent valve on the color valve manifold. On the catalyst side, disconnect the catalyst supply line from the inlet manifold of Pump B, and connect a regulated solvent supply line.
 - **Multiple color/multiple catalyst system:** Connect regulated solvent supply lines to the designated solvent valves on the color and catalyst valve manifolds. Do not connect solvent supply lines directly to the inlet manifolds of the pumps.
3. Set the solvent supply pressure regulator at the lowest pressure possible. Generally a setting of 25–50 psi (0.18–0.35 MPa, 1.8–3.5 bar) is sufficient.
4. On the ADM, go to the Fill screen. Set the . The system will pump solvent from the color valve inlet all the way to the gun.
5. Hold a metal part of the gun firmly to a grounded metal pail. Trigger the gun until clean solvent dispenses.
6. Repeat for each color line.
7. Relieve the pressure. See [Pressure Relief Procedure, page 19](#)

Shutdown

1. Flush out the mixed material to avoid potlife errors and fluid setup in the lines. See [Purging, page 22](#).
2. Follow the [Pressure Relief Procedure, page 19](#).
3. Close the main air shutoff valve on the air supply line and on the control box.
4. Press  on the Display Module to turn off power to the pumps.
5. Shut off system power (0 position).

Operation Using a Programmable Logic Controller (PLC)

Network Communications and Discrete I/O

The ProMix PD2K Automatic system does not use a Booth Control module. Instead, it uses Network Communications and has optional Discrete I/O features to drive the system remotely.

Some automation control elements of the ProMix PD2K can be driven by a discrete input *or* network communications. These options need to be configured at the ADM (see [System Screen 5, page 71](#)). The following features can be set to 'Discrete' or 'Network':

- **Flow Control** – Means of adjusting the control set point (see **Flow Control Set Point** below).
- **Gun Trigger** – Means of signaling the ProMix PD2K when the spray device is triggered.

NOTE: The Manual Override check box enables a user to operate the system before the automation (PLC) is available. Manual Override can be used to run all functions of the system if a proper gun trigger signal is provided. It is not intended to be the main mode of control. Graco recommends that Manual Override be disabled during normal operation to avoid driving the system in a way that conflicts with the automation sequence.

Discrete I/O

The ProMix PD2K does not supply power for Discrete I/O. A clear understanding of these inputs is necessary to properly integrate the ProMix PD2K with the PLC or networking device. Input and output connections are made at the Discrete I/O terminal strips on the Enhanced Fluid Control Module (EFCM) inside the control box.

Table 3 and Figure 2 show where discrete I/O connections are made on the ProMix PD2K.

Table 3 PD2K Discrete I/O Connections

I/O Description	EFCM Connector	Pins	Type
Gun Trigger Input	6	1,2	Normally Open Contact
Control Set Point	7	1,2	4-20 mA Input
Safety Interlock Input	7	11,12	Normally Open Contact

Digital Inputs

- **Safety Interlock:** This normally open contact works like a soft emergency stop button. If the ProMix PD2K reads the input as CLOSED it interrupts system operation and removes power from the pumps regardless of the current operating mode. If the input is read as OPEN, the system operates normally

NOTE: This digital input is always enabled.

Do not toggle this input to put the system into Standby mode.

- **Gun Trigger:** This normally open (maintained) contact provides a signal to the system to indicate whether or not a spray device is triggered. This input provides timing for alarm functions and also drives the flow control algorithm. If the input is OPEN the system operates as though the spray device is off. The input must be maintained CLOSED to signal that the spray device is triggered.

NOTE: The Gun Trigger discrete input must be enabled via Configure Screen 5 on the ADM. If it is set to 'Network' the discrete input is ignored and the spray device trigger signal is handled via the network communications.

If enabled, it is imperative that this signal be sent any time the spray device is triggered. Without the signal, the flow control features will not work.

Analog Inputs

Flow Control Set Point: When enabled, this 4-20mA signal input is used to set and adjust the operating flow control set point. The ProMix PD2K scales the set point linearly from 0 to the Max Set Point setting (see [System Screen 5, page 71](#)). *Examples,*

- **In Flow Control Mode:** If the Max Set Point is 500 cc/min, a 4mA signal is 0 cc/min and a 20mA signal is 500 cc/min.
- **In Pressure Control Mode:** If the Max Set Point is 500 psi, a 4mA signal is 0 psi and a 20mA signal is 500 psi.

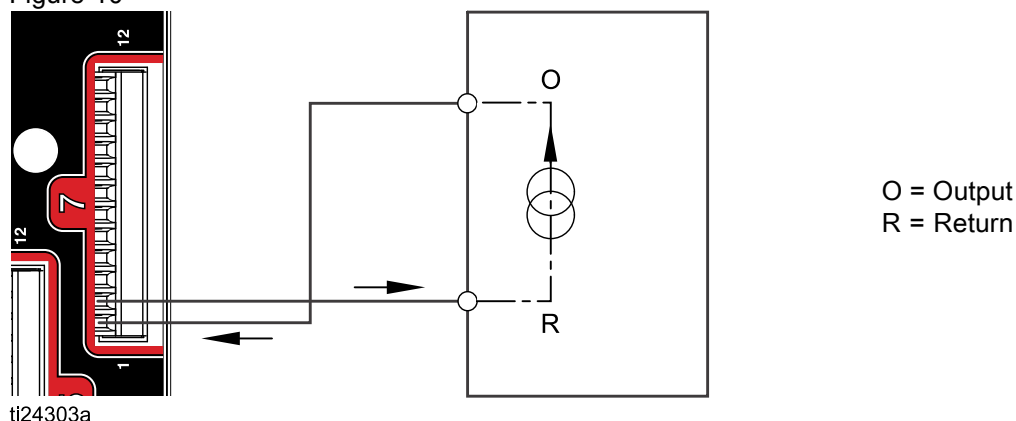
NOTE: The Flow Control discrete input must be enabled via Configure Screen 5 on the ADM. If set to 'Network' the discrete input is ignored and set point adjustment is handled via the network communications.

4–20 mA Flow Control Set Point Input

PD2K Discrete Input

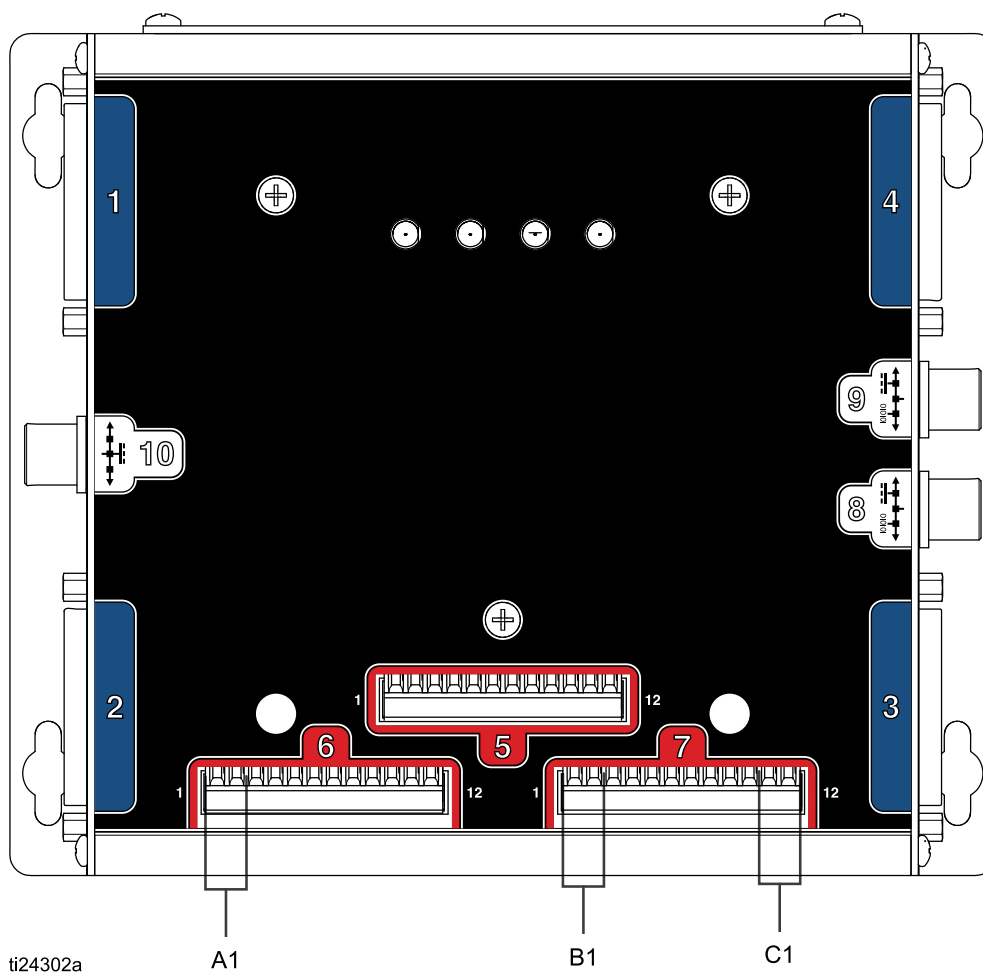
PLC (4–20 MA Signal)

Figure 10



Discrete I/O Connections on EFCM

Figure 11



KEY

- A1 Gun Trigger Input
- B1 Analog Set Point Input
- C1 Safety Interlock Input

Communication Gateway Module (CGM) Details

CGM Overview

The CGM provides a control link between the PD2K system and a selected fieldbus. This linkage provides the means for remote monitoring and control by external automation systems.

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
- GSDML file: PROFINET fieldbus networks

CGM Kits

The PD2K system comes with a Modbus TCP CGM. Kits for other communication protocols are available.

Each kit includes all parts needed to install the CGM, along with Manual 334494, which contains installation instructions applicable to any kit. See Manual 312864 or Manual 334183 for information specific to each protocol, plus repair parts for each assembly.

CGM Part No.	Fieldbus	Manual
CGMDNO	DeviceNet	312864
CGMEPO	EtherNet/IP	312864
CGMPBO	PROFIBUS	312864
CGMPNO	PROFINET	312864
24W462	Modbus TCP	334183

Network Communication I/O Data Map

ProMix PD2K Network Outputs

The ProMix PD2K Network Outputs are Read-Only and should be treated as inputs to a PLC or other networking device. These registers

provide various system and component status, measurement, and set point values. See [Network Output Data Map \(Read Only\)](#), page 33.

OUTPUT REGISTER 00: Current System Mode

The Current System Mode register contains a number that indicates the current operation mode of the PD2K system.

Number	Operation Mode	Description
1	Pump Off	The pumps are currently powered down and the system is not in operation.
2	Recipe Change	The system is in the process of a color change sequence.
3	Recipe Change: Purge A	The system is purging material A as part of a recipe change.
4	Recipe Change: Purge B	The system is purging material B as part of a recipe change.
5	Recipe Change: Fill	The system is filling the hose from the remote valves to the mix manifold with material as part of a recipe change.
6	Mix Fill	The system is mixing material at ratio through the mix manifold and out the gun.
7	Mix	The system is currently mixing/spraying material.
8	Mix Idle	The system has paused mix operation due to the absence of a gun trigger signal.
9	Purge A	The system is purging material A while in Standby.
10	Purge B	The system is purging material B while in Standby.
11	Standby: Mix Ready	The system has a valid recipe loaded out to the gun.
12	Standby: Fill Ready	The system has a valid recipe loaded in the pumps, but not in the gun.
13	Standby: Mix Not Ready	The system requires that a recipe change operation be completed.
14	Standby: Alarm	The system has an active alarm.

OUTPUT REGISTERS 01, 02, 03, and 04: Pump Status

The Pump Status registers contain a number that indicates the state of Pumps 1 — 4. This status can be used for general monitoring of the pump state, or as an indicator for driving independent pump operations. See [INPUT REGISTER 02: Flush/Prime Pump Command](#), page 36.

Table 4 Pump States for Output Registers 01–04

Nu- m- ber	Pump State	Description
0	Off	The pump is powered down or not enabled.
1	Standby	The pump is powered but not currently active.
2	Busy	The pump is currently in a recipe change or mixing operation.
3	Flushing	The pump is currently flushing with solvent
4	Priming	The pump is currently priming with material.

OUTPUT REGISTER 05: Actual Mix Flow

The Actual Mix Flow register reports back the instantaneous mixing flow rate in cc/min.

NOTE: This register is valid only during a mix operation.

OUTPUT REGISTER 06: Actual Mix Ratio

The Actual Mix Ratio register contains the instantaneous calculated mix ratio.

- The value reported is the ratio antecedent multiplied by 100. The ratio consequent is always 1.

Example: Value = 250 >> A mix ratio of 2.5:1 (Material A to Material B)

- If the current recipe ratio is 0:1 (1K recipe) this value will be 0.

This register is valid only during a mix operation.

OUTPUT REGISTER 07: Actual Mix Potlife Remaining

The Actual Potlife Remaining register contains the current amount of time remaining in the active recipe's potlife in seconds.

NOTE: If potlife is disabled for the active recipe or at initial startup this value will be 0xFFFFFFFF.

OUTPUT REGISTER 08: Active Recipe Number

The Active Recipe Number register contains the number of the active recipe (1 – 60).

- This value is 0 if the system was flushed.
- This value is 61 if the system does not know the current loaded recipe, if the recipe is invalid, or at initial startup.

OUTPUT REGISTER 09: Active Recipe Material A

The Active Recipe Material A register contains the number of the Color (1 – 30) that is associated with the current recipe.

- This value is 0 if the system was flushed.
- This value is 61 if the current recipe is invalid or at initial startup.

OUTPUT REGISTER 10: Active Recipe Material B

The Active Recipe Material B data register contains the number of the Catalyst (31 – 34) that is associated with the current recipe.

- This value is 0 if the system was flushed.
- This value is 61 if the current recipe is invalid or at initial startup.
- This value is 0 if the current recipe ratio is 0:1 (1K recipe).

OUTPUT REGISTER 11: Active Recipe Material A Flush Sequence

The Active Recipe Material A Flush Sequence register contains the number of the Flush Sequence (1 – 5) that is associated with the Color pump of the current recipe.

If the current recipe is invalid this value reflects the Flush Sequence associated with Material A pump of recipe 0.

OUTPUT REGISTER 12: Active Recipe Material B Flush Sequence

The Active Recipe Material B Flush Sequence register contains the number of the Flush Sequence (1 – 5) that is associated with the Catalyst pump of the current recipe.

- If the current recipe is invalid this value reflects the Flush Sequence associated with Material B pump of recipe 0.
- This value is 0 if the current recipe ratio is 0:1 (1K recipe)

OUTPUT REGISTER 13: Active Recipe Ratio Set Point

The Active Recipe Ratio Set Point data register contains the ratio set point associated with the current recipe.

- The value reported is the ratio antecedent multiplied by 100. The ratio consequent is always 1.

Example: Value = 250 >> A mix ratio of 2.5:1 (Material A to Material B)

- This value is 0 if the current recipe ratio is 0:1 (1K recipe)

OUTPUT REGISTER 14: Active Recipe Potlife Timeout Set Point

The Active Recipe Potlife Timeout Set Point register contains the set point for the potlife time associated with the current recipe in minutes.

- This value is 0 if the potlife time is disabled for the current recipe.

OUTPUT REGISTER 15: Actual Pump 1 Flow Rate

OUTPUT REGISTER 16: Actual Pump 2 Flow Rate

OUTPUT REGISTER 17: Actual Pump 3 Flow Rate

OUTPUT REGISTER 18: Actual Pump 4 Flow Rate

These registers contain the instantaneous flow rate of Pumps 1–4 in cc/min.

This is **NOT** the mix flow rate. For mix flow rate see *Actual Mix Flow*.

OUTPUT REGISTER 19: Actual Pump 1 Fluid Pressure

OUTPUT REGISTER 20: Actual Pump 2 Fluid Pressure

OUTPUT REGISTER 21: Actual Pump 3 Fluid Pressure

OUTPUT REGISTER 22: Actual Pump 4 Fluid Pressure

These registers contain the instantaneous fluid pressure on the outlet of pumps 1–4 in PSI.

OUTPUT REGISTER 23: Gun 1 Trigger Input Status

The Gun 1 Trigger Input Status register contains the status of the Gun Trigger Discrete Input.

- The value is 0 if the input is OPEN (gun not triggered).
- The value is 1 if the input is CLOSED (gun triggered).

This data register is valid only for systems configured to use the discrete input for the Gun Trigger. See *Gun Trigger Signal, page 71*.

OUTPUT REGISTER 24: Gun 2 Trigger Input Status

OUTPUT REGISTER 25: Gun 3 Trigger Input Status

OUTPUT REGISTER 26: Gun 4 Trigger Input Status

These registers are not used.

OUTPUT REGISTER 27: Safety Interlock Input Status

The Safety Interlock Input Status register contains the status of the Safety Interlock Discrete Input.

- The value will be 0 if the input is OPEN (Normal).
- The value will be 1 if the input is CLOSED (Safety Stop).

See *Safety Interlock in Digital Inputs, page 25*.

OUTPUT REGISTERS 28 – 36: DCS Command Structure

See *Dynamic Command Description, page 47*.

OUTPUT REGISTER 37: Time

The Time register contains a count of total seconds since the Unix Epoch (January 1, 1970).

- The actual value reported is not important. This register should be used for diagnosing status of communication between the ProMix PD2K and the networking device.

This register is NOT currently available with the Modbus Communications Gateway Module.

OUTPUT REGISTER 38 – 40: Software Version

The Software Version registers contain the “major,” “minor,” and “build” revisions of the ADM software.

These registers are NOT currently available with the Modbus Communications Gateway Module.

Notes

[illegible]

Network Output Data Map (Read Only)

Network Output ID	Modbus Register	Parameter Name	Data Type	Units	Range
00	40100	Current System Mode	uint32	NONE	1 = Pump Off 2 = Recipe Change 3 = Recipe Change: Purge A 4 = Recipe Change: Purge B 5 = Recipe Change: Fill 6 = Mix Fill 7 = Mix 8 = Mix Idle 9 = Purge A 10 = Purge B 11 = Standby: Mix Ready 12 = Standby: Fill Ready 13 = Standby: Mix Not Ready 14 = Standby: Alarm
01	40102	Pump 1 Status	uint32	NONE	0 = Off 1 = Standby 2 = Busy 3 = Flushing 4 = Priming
02	40104	Pump 2 Status	uint32	NONE	0 = Off 1 = Standby 2 = Busy 3 = Flushing 4 = Priming
03	40106	Pump 3 Status	uint32	NONE	0 = Off 1 = Standby 2 = Busy 3 = Flushing 4 = Priming

Operation Using a Programmable Logic Controller (PLC)

04	40108	Pump 4 Status	uint32	NONE	0 = Off 1 = Standby 2 = Busy 3 = Flushing 4 = Priming
05	40110	Actual Mix Flow	uint32	cc/min	1 - 1600
06	40112	Actual Mix Ratio	uint32	NONE	0 - 5000
07	40114	Actual Mix Potlife Remaining	uint32	sec	0 - 59940
08	40116	Active Recipe Number	uint32	NONE	0 - 61
09	40118	Active Recipe Material A	uint32	NONE	1 - 30, 61
10	40120	Active Recipe Material B	uint32	NONE	31 - 34, 61
11	40122	Active Recipe Material A Flush Sequence	uint32	NONE	1 - 5
12	40124	Active Recipe Material B Flush Sequence	uint32	NONE	1 - 5
13	40126	Active Recipe Ratio Set Point	uint32	NONE	0 - 5000
14	40128	Active Recipe Potlife Time Set Point	uint32	min	0 - 999
15	40130	Actual Pump 1 Flow Rate	uint32	cc/min	0 - 800
16	40132	Actual Pump 2 Flow Rate	uint32	cc/min	0 - 800
17	40134	Actual Pump 3 Flow Rate	uint32	cc/min	0 - 800
18	40136	Actual Pump 4 Flow Rate	uint32	cc/min	0 - 800
19	40138	Actual Pump 1 Fluid Pressure	uint32	PSI	0 - 1500
20	40140	Actual Pump 2 Fluid Pressure	uint32	PSI	0 - 1500
21	40142	Actual Pump 3 Fluid Pressure	uint32	PSI	0 - 1500
22	40144	Actual Pump 4 Fluid Pressure	uint32	PSI	0 - 1500

23	40146	Gun 1 Trigger Input Status	uint32	NONE	0 = Gun not triggered 1 = Gun triggered
24	40148	Gun 2 Trigger Input Status	uint32	NONE	0 = Gun not triggered 1 = Gun triggered
25	40150	Gun 3 Trigger Input Status	uint32	NONE	0 = Gun not triggered 1 = Gun triggered
26	40152	Gun 4 Trigger Input Status	uint32	NONE	0 = Gun not triggered 1 = Gun triggered
27	40154	Safety Interlock Input Status	uint32	NONE	0 = Open 1 = Closed
28	40200	Command Acknowledge	uint32	NONE	0 := NOP 1 = BUSY 2 = ACK 3 = NAK 4 = ERR
29	40202	Command Return 0	uint32	N/A	N/A
30	40204	Command Return 1	uint32	N/A	N/A
31	40206	Command Return 2	uint32	N/A	N/A
32	40208	Command Return 3	uint32	N/A	N/A
33	40210	Command Return 4	uint32	N/A	N/A
34	40212	Command Return 5	uint32	N/A	N/A
35	40214	Command Return 6	uint32	N/A	N/A
36	40216	Command Return 7	uint32	N/A	N/A
37	N/A	Time	uin32	sec	0 – 4,294,967,295
38	N/A	Software Version – Major	uint32	NONE	0 – 99
39	N/A	Software Version – Minor	uint32	NONE	0 – 99
40	N/A	Software Version – Build	uint32	NONE	0 – 999

 These registers are not used.
  DCS Register

ProMix PD2K Network Inputs

The ProMix PD2K Network Inputs are Write-Read capable, but should be treated as outputs from a PLC or other networking device. These registers allow the user to control system operation and configure system settings remotely. Invalid values (i.e. out of bounds or not consistent with system configuration) will be ignored by the ProMix PD2K. All values must be written as integers. Floating point numbers are not supported.

Do not rely on these registers for Read status, other than to confirm data that has been written and accepted.

NOTE: The PD2K system does not refresh the values for these registers. At power up all input registers initialize to invalid values.

INPUT REGISTER 00: System Mode Command

The System Mode Command register accepts a number that represents a command to the PD2K system to initiate a particular operation. Some operation modes may be initiated only under certain conditions (see Figures 5 – 9 for details).

Number	Operation Mode	Description
1	No OP	The system takes no action.
2	Power Pumps	The system powers on or powers off the pumps.
3	Remote Stop	The system stops all current operations and turns off power to the pumps.
4	Recipe Change	The system initiates a recipe change. (See also Register 7.)
5	Mix Fill	The system fills the mix manifold and gun with material at ratio for a valid recipe.
6	Mix	The system initiates a mix/spray cycle.
7	Purge A	The system purges only Material A out through the gun.
8	Purge B	The system purges only Material B out through the gun.
9	Standby	The system puts all active pumps into Standby mode.

INPUT REGISTER 01: Pump Flush Sequence/Prime Material Selection

The Pump Flush Sequence/Prime Material Selection register is used in conjunction with the Flush/Prime Pump Command register (see INPUT REGISTER 02 below) to independently prime or flush an inactive pump.

- Write a value between 1 and 5 if flushing a pump.
- Write a value between 1 and 30 if priming a Color pump.
- Write a value between 31 and 34 if priming a Catalyst pump.

NOTE: It is important that the user know which material is assigned to each pump. An invalid selection will be ignored by the ProMix PD2K.

INPUT REGISTER 02: Flush/Prime Pump Command

The Flush/Prime Pump Command register is used in conjunction with the Pump Flush Sequence/Prime Material Selection register (see INPUT REGISTER 01) to independently prime or flush an inactive pump. The desired pump **MUST** be in Standby mode. Confirm by reading the corresponding Pump Status output register (see OUTPUT REGISTERS 01 – 04).

If an invalid Flush Sequence or invalid material number is written to the Pump Flush Sequence/Prime Material Selection register then the Flush/Prime command will be ignored. The user must know what material is assigned to each pump. (See Color Change Kits Instruction Manual 332455 for color/catalyst pump mapping.)

NOTE: If two pumps are currently mixing and an inactive pump is commanded to flush or prime it will continue its operation to completion without affecting the system mode status. When the mixing operation is complete, the system status will reflect Standby mode while the flushing/priming pump completes its operation.

INPUT REGISTER 03: Mix (Pump 1) Control Set Point

The Mix Control Set Point register is used to set and adjust the mixing fluid control set point. It also is used as the fluid control set point for pump 1 when running a 1K recipe. It can be changed at any time, and the system will immediately adjust to the new set point.

- If the system is configured for Flow Control this value can be set between 5 and 1600 cc/min for a 2K recipe, and between 5 and 800 for a 1K recipe. See Fluid Control on [System Screen 5, page 71](#).
- If the system is configure for Pressure Control this value can be set between 0 and the maximum pump pressure in PSI. See Fluid Control on [System Screen 5, page 71](#).

NOTE: The Flow Control must be configured to 'Network' via System Screen 5 on the ADM. If set to 'Discrete' this register is ignored and set point adjustment is handled via the discrete input. See [Analog Inputs, page 25](#).

INPUT REGISTER 04: Pump 2 Control Set Point

INPUT REGISTER 05: Pump 3 Control Set Point

INPUT REGISTER 06: Pump 4 Control Set Point

These registers are not used.

INPUT REGISTER 07: Go to Recipe Number

The Go to Recipe Number register is used as a queue for the next recipe to be loaded when a recipe change is initiated. A number between 0 and 60 can be written to this register. However, a recipe must be enabled via the ADM before it can be loaded. See [Recipe Screen, page 72](#).

NOTE: Writing to this register does not trigger a recipe change. See [Color Change Sequence, page 44](#).

INPUT REGISTER 08: Clear Active Alarm

The Clear Active Alarm register is used to acknowledge an alarm remotely so that the system may resume operation. Be sure that the alarm condition has been alleviated. Write a 1 to this register to acknowledge the latest active alarm. If more than one alarm is currently active only the most recent alarm will be acknowledged. A repeated write should be performed to clear any remaining active alarms. See figure 9.

(See [System Errors, page 88](#) for more information on clearing alarms.)

NOTE: This register is not polled by the ProMix PD2K. An alarm is cleared only when a value of '1' is written to this register. It is recommended that the automation reset this register by writing a 0 to it at all other times to avoid inadvertently clearing an alarm.

INPUT REGISTER 09: Job Complete

The Job Complete register is used to log the current job remotely. Write a '1' to the register to command the ProMix PD2K to flag a job complete.

(See [Usage Screen, page 64](#) for more information on Job Logs and Job Complete.)

NOTE: This register is not polled by the ProMix PD2K. A job is logged only when a value of '1' is written to this register. It is recommended the automation reset this register by writing a 0 to it at all other times to avoid inadvertently logging a job.

INPUT REGISTER 10: Gun 1 Trigger

The Gun 1 Trigger register is used to signal the ProMix PD2K when the automatic spray device is triggered. This signal should be sent any time the spray device is triggered. The state of this register provides timing for alarm functions and also drives the flow control algorithm.

NOTE: If enabled, it is imperative that this signal be sent any time the spray device is triggered. Without it the flow control features will not work.

- Write a value of '1' to signal that the gun is triggered.
- Write a value of '0' to signal that the gun is NOT triggered.

NOTE: This register is used only if the Gun Trigger is set to 'Network' via System Screen 5 on the ADM. If it is set to 'Discrete' this register is ignored and gun trigger is handled via the discrete input. See [Digital Inputs, page 25](#). **NOTE: Because timing is so critical for flow control Graco recommends that users provide a discrete input to minimize latency effects.**

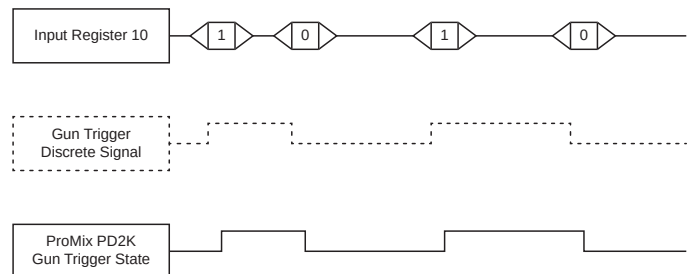


Figure 12 Gun Trigger Timing (Network and Discrete Signals Shown)

INPUT REGISTER 11: Gun 2 Trigger

INPUT REGISTER 12: Gun 3 Trigger

INPUT REGISTER 13: Gun 4 Trigger

These registers are not used.

INPUT REGISTERS 14 – 21: DCS Command Structure

See [Dynamic Command Description, page 47](#).

Notes

[illegible]

Network Input Data Map (Write/Read)

Network Input ID	Modbus Register	Parameter Name	Data Type	Units	Range
00	40156	System Mode Command	uint32	NONE	0 = No 1 = Power Pumps 2 = Remote Stop 3 = Recipe Change 4 = Mix Fill 5 = Mix 6 = Purge A 7 = Purge B 8 = Standby
01	40158	Pump Flush Sequence #/Prime Material #	uint32	NONE	1 - 5, 1 - 34
02	40160	Flush/Prime Pump Command	uint32	NONE	0 = No OP 1 = Flush Pump 1 2 = Prime Pump 1 3 = Flush Pump 2 4 = Prime Pump 2 5 = Flush Pump 3 6 = Prime Pump 3 7 = Flush Pump 4 8 = Prime Pump 4
03	40162	Mix (Pump 1) Control Set Point	uint32	cc/min or PSI	1 - 1600
04	40164	Pump 2 Control Set Point	uint32	cc/min or PSI	1 - 1600
05	40166	Pump 3 Control Set Point	uint32	cc/min or PSI	1 - 1600
06	40168	Pump 4 Control Set Point	uint32	cc/min or PSI	1 - 1600
07	40170	Go to Recipe Number	uint32	NONE	0, 1 - 60
08	40172	Clear Active Alarm	uint32	NONE	1 = Clear Active Alarm
09	40174	Job Complete	uint32	NONE	1 = Trigger job complete
10	40176	Gun 1 Trigger	uint32	NONE	0 = Gun not triggered 1 = Gun triggered
11	40178	Gun 2 Trigger	uint32	NONE	0 = Gun not triggered 1 = Gun triggered

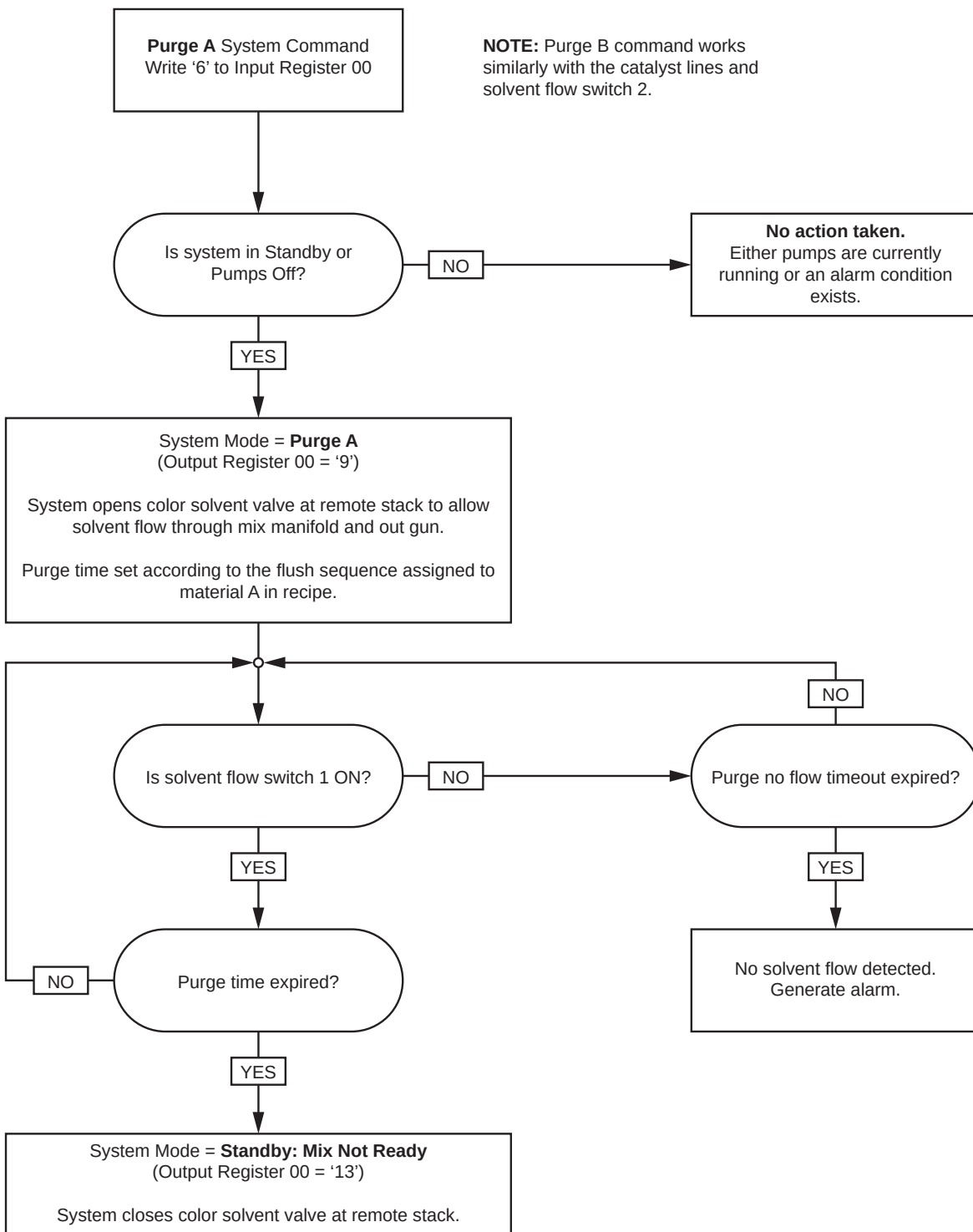
Operation Using a Programmable Logic Controller (PLC)

12	40180	Gun 3 Trigger	uint32	NONE	0 = Gun not triggered 1 = Gun triggered
13	40182	Gun 4 Trigger	uint32	NONE	0 = Gun not triggered 1 = Gun triggered
14	40184	Command Argument 0	uint32	NONE	N/A
15	40186	Command Argument 1	uint32	NONE	N/A
16	40188	Command Argument 2	uint32	NONE	N/A
17	40190	Command Argument 3	uint32	NONE	N/A
18	40192	Command Argument 4	uint32	NONE	N/A
19	40194	Command Argument 5	uint32	NONE	N/A
20	40196	Command Argument 6	uint32	NONE	N/A
21	40198	DCS Command	uint32	NONE	See Command Table

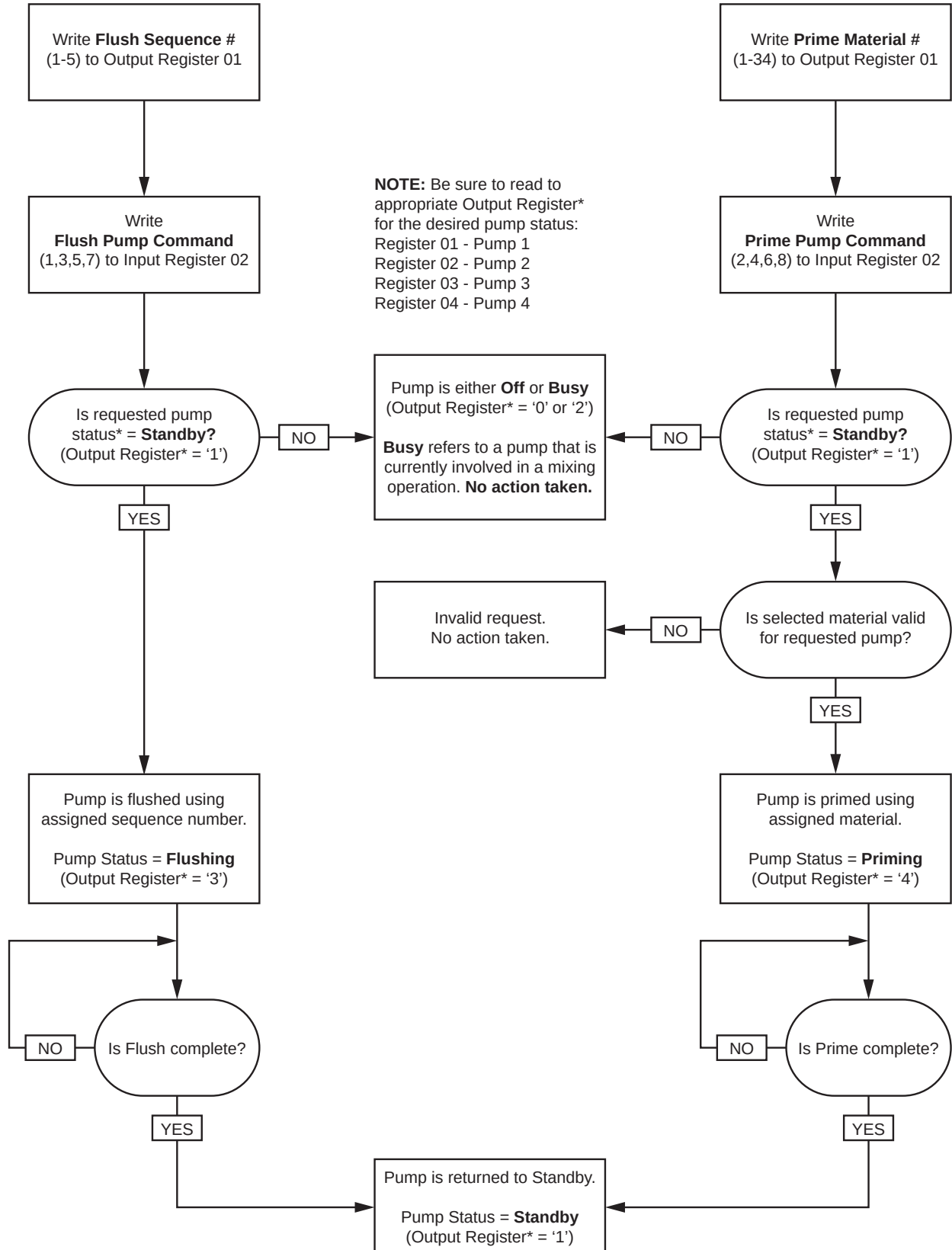
	These registers are not used.		DCS Register
--	-------------------------------	--	--------------

Operation Flow Charts

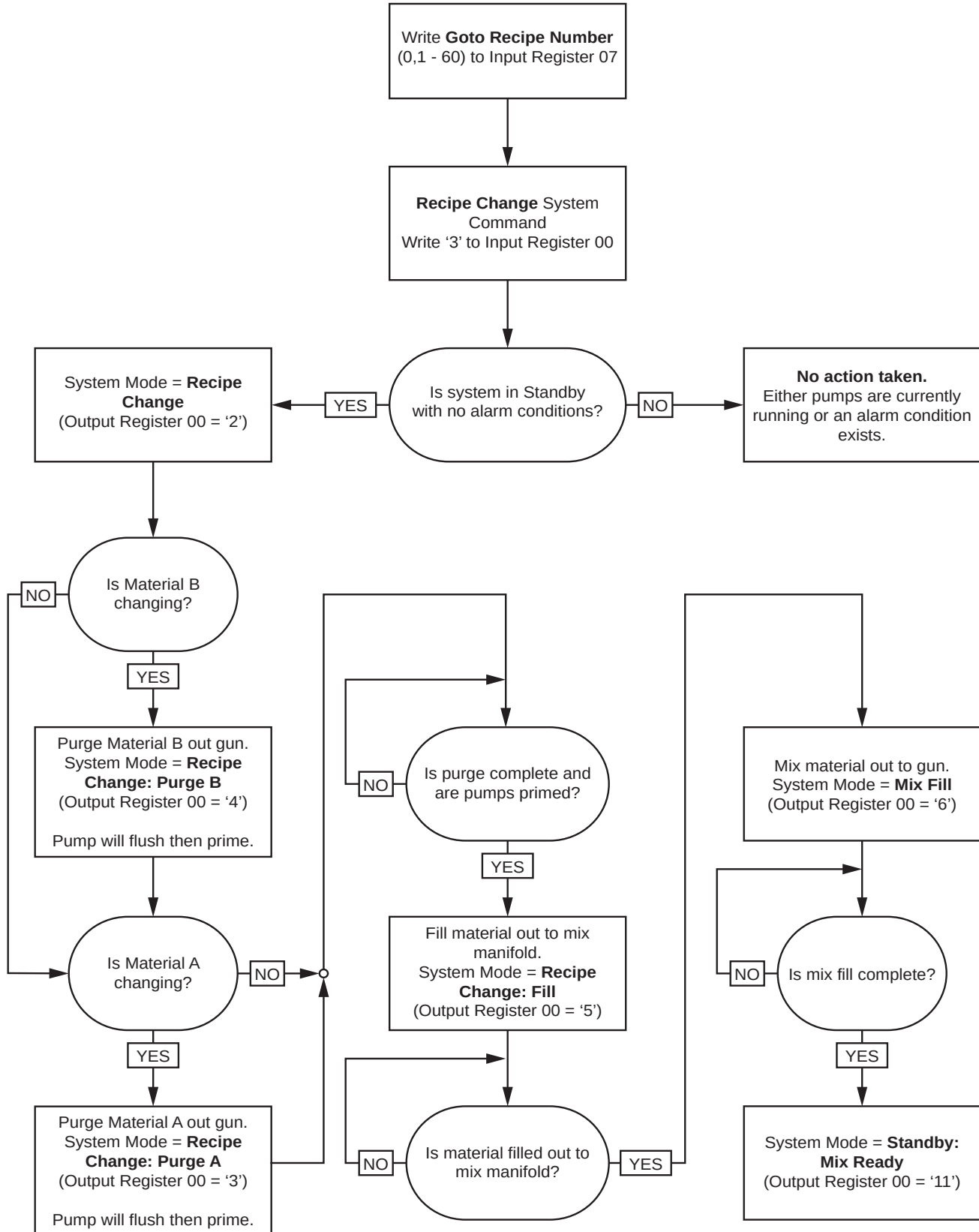
Purge Mode Sequence



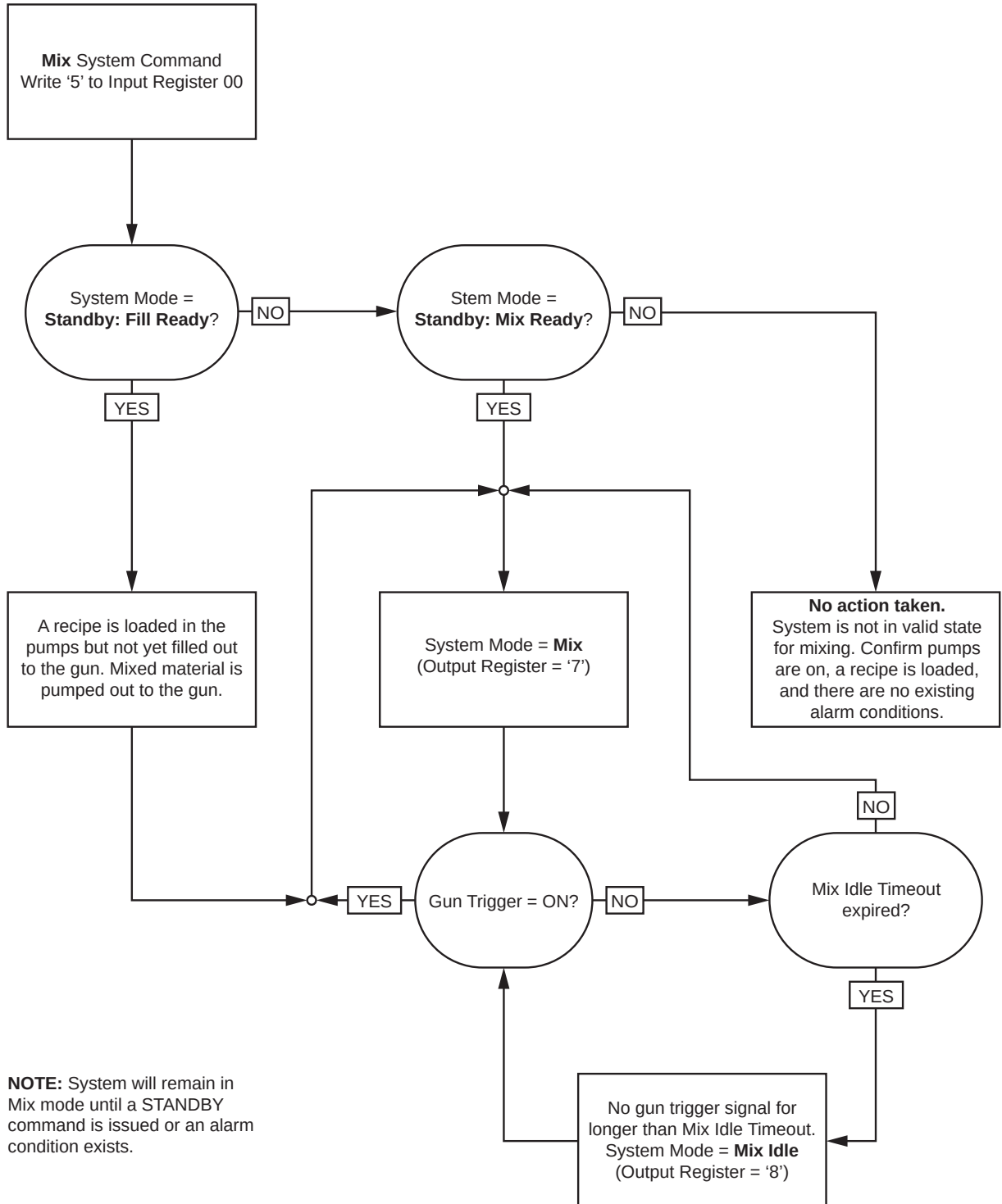
Inactive Pump Flush and Prime Sequences



Color Change Sequence

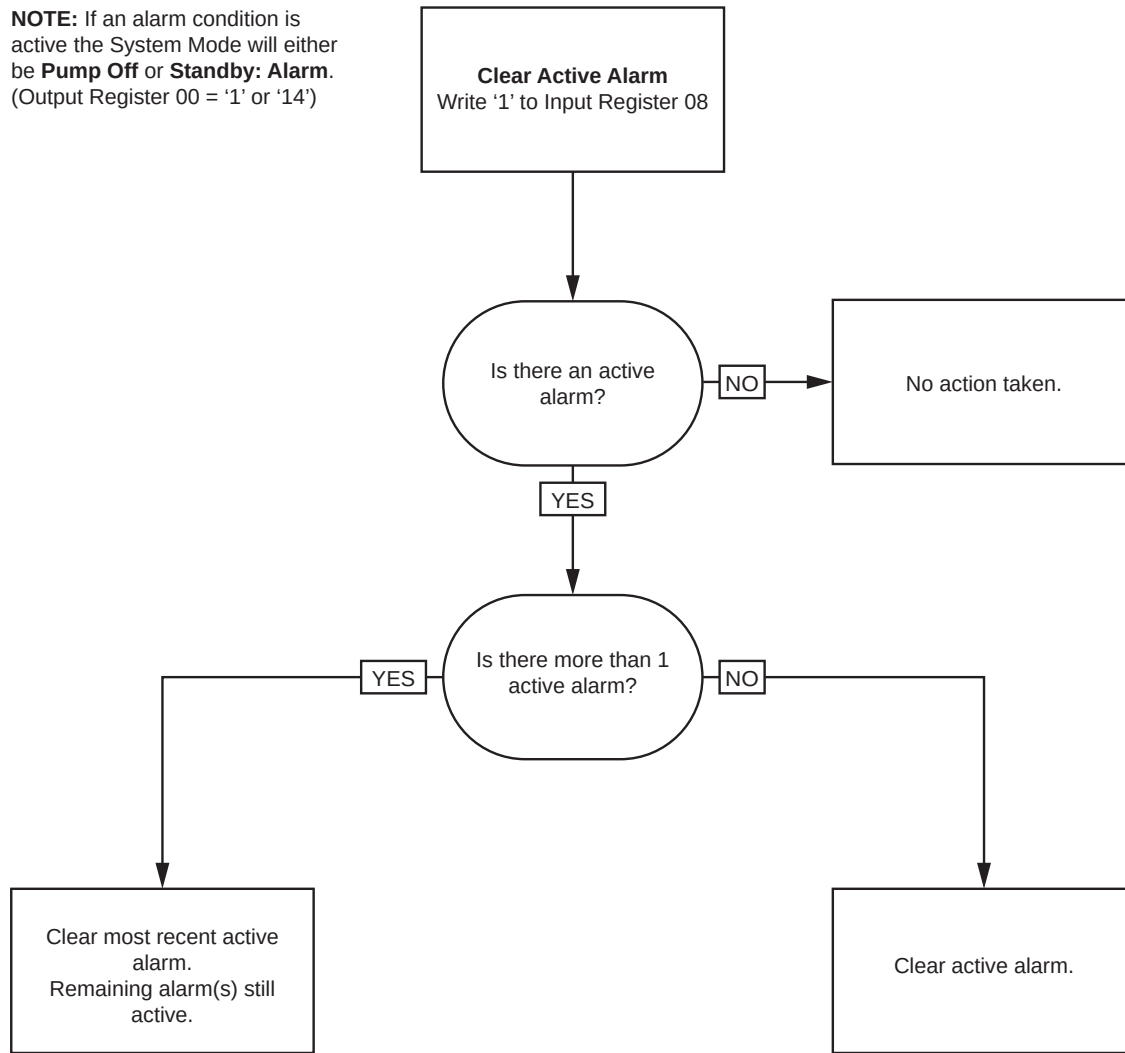


Mixing Sequence



Alarm Clearing Sequence

NOTE: If an alarm condition is active the System Mode will either be **Pump Off** or **Standby: Alarm**.
(Output Register 00 = '1' or '14')



NOTE: If more than 1 active alarm exists a repeated write of '1' to Input Register 08 is required for each.

Network Communication - Dynamic Command Structure (DCS)

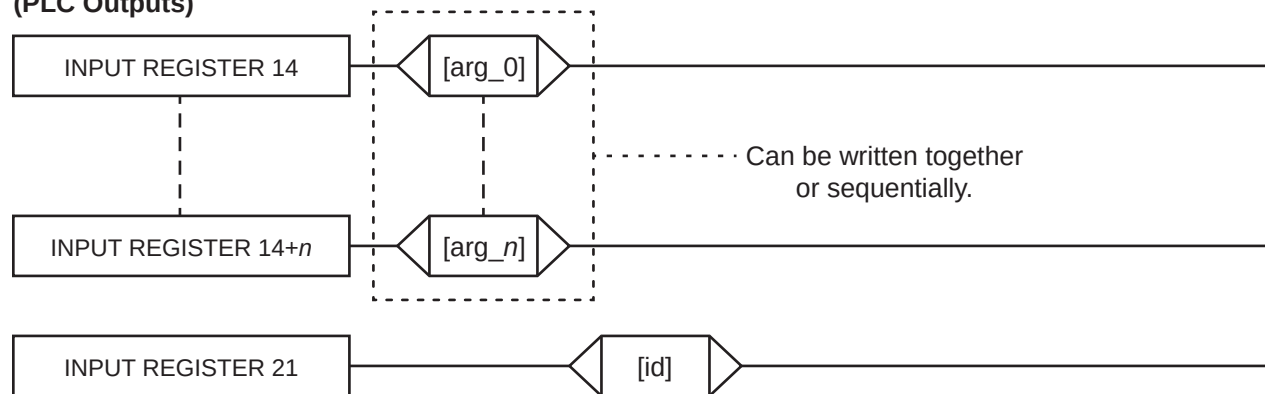
Dynamic Command Description

The Dynamic Command Structure (DCS) is used to 1) access data that requires some form of argument(s) or 2) consolidate data that requires multiple registers. The DCS uses a static set of network communication input and output registers (see [Network Input Data Map \(Write/Read\)](#), page 40 and [Network Output Data Map \(Read Only\)](#), page 33).

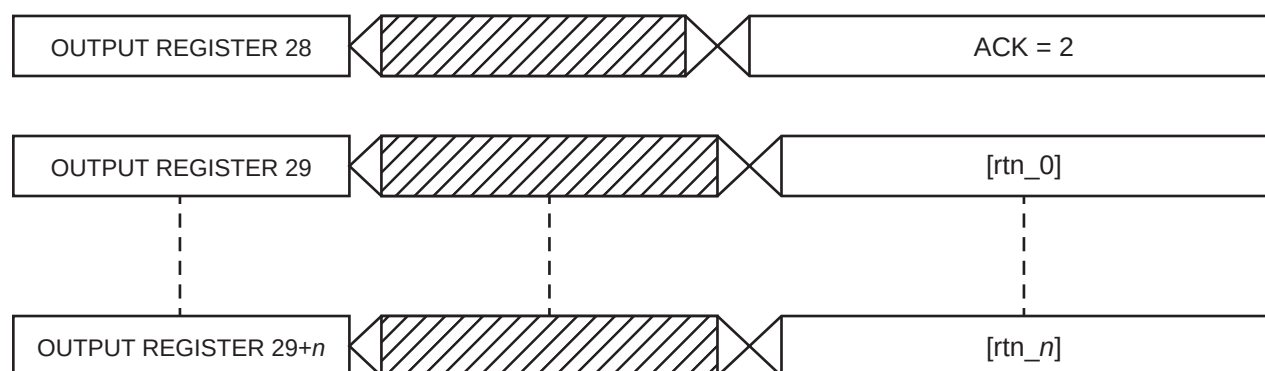
Use the following sequence for the DCS.

1. Write the appropriate command arguments to INPUT REGISTERS 14 – 20. These commands may be written sequentially or sent all at once.
2. Once all arguments have been passed, write the command ID to INPUT REGISTER 21.
3. The ProMix PD2K will respond to a valid command by writing a 2 (Acknowledge) to OUTPUT REGISTER 28.
4. The ProMix PD2K will write appropriate return values to OUTPUT REGISTERS 29 – 36.

ProMix PD2K Inputs (PLC Outputs)



ProMix PD2K Outputs (PLC Inputs)



13 Dynamic Command Structure Timing

Figure

List of DCS Commands

Table 5 Dynamic Commands with Command ID

ID	Command
0	No OP
1	Write User ID
2	Write Recipe
3	Write Flush Sequence
4	Write Fluid Control Mode
10	Read User ID
11	Read Recipe
12	Read Flush Sequence
13	Read Fluid Control Mode
14	Read Job Info
15	Read Alarm Info
16	Read Event Info

Write User ID

The Write User ID command allows users to assign a User ID to a Job Log. See [Usage Screen, page 64](#), for more details on Job Log and User ID. The User ID can be up to ten ASCII characters in length and is packaged as three little endian segments of ASCII characters. The return registers will echo the arguments received.

NOTE: The User ID character string must be terminated with a null character.

Example: Write a User ID of "John Doe" to the ProMix PD2K.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Write User ID	uint32	NONE	1	0 - 16
Argument 0	User ID characters [3:0] (ASCII)	uint32	NONE	0x6E686F4A = ['n', 'h', 'o', 'J']	N/A
Argument 1	User ID characters [7:4] (ASCII)	uint32	NONE	0x656F4420 = ['e', 'o', 'D', ' ']	N/A
Argument 2	User ID characters [9:8] (ASCII)	uint32	NONE	0x0 = [null]	N/A
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	User ID characters [3:0] (ASCII)	uint32	NONE	0x6E686F4A	N/A
Return 1	User ID characters [7:4] (ASCII)	uint32	NONE	0x656F4420	N/A
Return 2	User ID characters [9:8] (ASCII)	uint32	NONE	0x0	N/A

Write Recipe

The Write Recipe command allows users to configure an entire recipe remotely. See [Recipe Screen, page 72](#), for more details on recipes and recipe parameters. The return registers will echo the arguments received.

NOTE: The recipe must be enabled via the ADM before it can be loaded for mixing.

Example: Configure Recipe 6 for Color = 2, Catalyst = 1, Color Flush Sequence = 2, Catalyst Flush Sequence = 3, Mix Ratio Set Point = 1.50:1, and Potlife = 10 minutes.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Write Recipe	uint32	NONE	2	0 - 16
Argument 0	Recipe Number	uint32	NONE	6	0 - 60
Argument 1	Material A	uint32	NONE	2	0 - 30
Argument 2	Material B	uint32	NONE	31	0, 31 - 34
Argument 3	Material A Flush Sequence	uint32	NONE	2	1 - 5
Argument 4	Material B Flush Sequence	uint32	NONE	3	1 - 5
Argument 5	Mix Ratio Set Point	uint32	NONE	150 = 1.50:1	0 - 5000
Argument 6	Potlife Time Set Point	uint32	min	10	0 - 999
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Recipe Number	uint32	NONE	6	0 - 60
Return 1	Material A	uint32	NONE	2	0 - 30
Return 2	Material B	uint32	NONE	31	0, 31 - 34
Return 3	Material A Flush Sequence	uint32	NONE	2	1 - 5
Return 4	Material B Flush Sequence	uint32	NONE	3	1 - 5
Return 5	Mix Ratio Set Point	uint32	NONE	150	0 - 5000
Return 6	Potlife Time Set Point	uint32	min	10	0 - 999

Write Flush Sequence

The Write Flush Sequence command allows users to configure an entire flush sequence remotely. See [Flush Screen, page 73](#), for more details of flush sequence parameters. The return registers will echo the arguments received.

Example: Configuring Flush Sequence 4 for Gun Purge Time = 10 sec, Initial Flush Volume = 125 cc, Final Flush Volume = 250 cc, Wash Cycles = 1, Strokes per Cycle = 2.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Write Flush Sequence	uint32	NONE	3	0 - 16
Argument 0	Flush Sequence #	uint32	NONE	4	1 - 5
Argument 1	Gun Purge Time	uint32	sec	10	0 - 999
Argument 2	Initial Flush Volume	uint32	cc	125	0 - 9999
Argument 3	Final Flush Volume	uint32	cc	250	0 - 9999
Argument 4	# Wash Cycles	uint32	NONE	1	0 - 99
Argument 5	Strokes per Wash Cycle	uint32	NONE	2	0 - 99
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Flush Sequence #	uint32	NONE	4	1 - 5
Return 1	Gun Purge Time	uint32	sec	10	0 - 999
Return 2	Initial Flush Volume	uint32	cc	125	0 - 9999
Return 3	Final Flush Volume	uint32	cc	250	0 - 9999
Return 4	# Wash Cycles	uint32	NONE	1	0 - 99
Return 5	Strokes per Wash Cycle	uint32	NONE	2	0 - 99

Write Fluid Control Mode

The Write Fluid Control Mode command allows users to remotely change Fluid Control between 'Flow' and 'Pressure'. See [System Screen 5, page 71](#), for more details on Fluid Control mode. The return registers will echo the arguments received.

NOTE: The Fluid Control mode should be changed only when the system is in Standby or when the pumps are powered off. Do not change Fluid Control modes during a mix operation.

Example: Change to Flow Control mode.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Write Fluid Control Mode	uint32	NONE	4	0 - 16
Argument 0	Fluid Control Mode	uint32	NONE	0 = Flow Mode	0 = Flow 1 = Pressure
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Fluid Control Mode	uint32	NONE	0	0 = Flow 1 = Pressure

Read User ID

The Read User ID command reads back the current User ID. See [Usage Screen, page 64](#), for more details on Job Log and User ID. The User ID can be up to ten ASCII characters in length and is packaged as three little endian segments of ASCII characters. No arguments are required.

Example: Read User ID that is currently "John Doe".

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read User ID	uint32	NONE	10	0 - 16
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	User ID characters [3:0] (ASCII)	uint32	NONE	0x6E686F4A = ['n', 'h', 'o', 'J']	N/A
Return 1	User ID characters [7:4] (ASCII)	uint32	NONE	0x656F4420 = ['e', 'o', 'D', ' ']	N/A
Return 2	User ID characters [9:8] (ASCII)	uint32	NONE	0x0 = [null]	N/A

Read Recipe

The Read Recipe command returns all configured recipe parameters for a desired recipe number. The number of the recipe to be read is the only argument.

Example: Read Recipe 5 data as it is currently configured with Color = 3, Catalyst = 2 (32), Color Flush Sequence = 1, Catalyst Flush Sequence = 4, Mix Ratio Set Point = 3.25:1, and Potlife = 35 min.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read Recipe	uint32	NONE	11	0 - 16
Argument 0	Recipe #	uint32	NONE	5	0 - 60
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Recipe #	uint32	NONE	5	0 - 60
Return 1	Material A	uint32	NONE	3	0 - 30, 61
Return 2	Material B	uint32	NONE	32	0, 31 - 34, 61
Return 3	Material A Flush Sequence	uint32	NONE	1	1 - 5
Return 4	Material B Flush Sequence	uint32	NONE	4	1 - 5
Return 5	Mix Ratio Set Point	uint32	NONE	325	0 - 5000
Return 6	Potlife Time Set Point	uint32	min	35	0 - 999

Read Flush Sequence

The Read Flush Sequence command returns all configured parameters for a desired flush sequence. The number of the flush sequence to be read is the only argument.

Example: Read Flush Sequence 1 as it is currently configured with Gun Purge Time = 20 sec, Initial Flush Volume = 0 cc, Final Flush Volume = 500 cc, Wash Cycles = 2, and Strokes per Cycle = 1.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read Flush Sequence	uint32	NONE	12	0 - 16
Argument 0	Flush Sequence #	uint32	NONE	1	1 - 5
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Flush Sequence #	uint32	NONE	1	1 - 5
Return 1	Gun Purge Time	uint32	sec	20	0 - 999
Return 2	Initial Flush Volume	uint32	cc	0	0 - 9999
Return 3	Final Flush Volume	uint32	cc	500	0 - 9999
Return 4	# Wash Cycles	uint32	NONE	2	0 - 99
Return 5	Strokes per Wash Cycle	uint32	NONE	1	0 - 99

Read Fluid Control Mode

The Read Fluid Control Mode command is used to read the current Fluid Control mode of the system is currently operating under. No arguments are required.

Example: Read Fluid Control as currently set to Pressure mode.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read Fluid Control Mode	uint32	NONE	13	0 - 16
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Fluid Control Mode	uint32	NONE	1 = Pressure	0 = Flow
					1 = Pressure

Read Job Info

The Read Job Info command is used to access data from any of the most recent 200 job logs. The argument is the *chronological index* of the job log, where 0 is the most recent job log and 199 is the 200th most recent.

The date is returned as four-byte packet with each byte holding a two-digit value for (from MSB to LSB) year, month, day, and day of the week (Monday = 01).

The time is returned as a three-byte packet with each byte holding a two-digit value. Starting from the MSB, the first byte can be ignored, then hour, minute, and second.

NOTE: The argument is an index not a job number. The actual job number will, however, be one of the returned parameters. These records will match what is reported on the Jobs screen of the ADM.

(See [Usage Screen, page 64](#), for more details on Job Log)

Example: Read back the most recent job log, job 25, which ran recipe 2 for a total of 1234 cc's of material under User ID "John Doe". The job was logged on Thursday May 29, 2014 at 11:22:14 AM.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read Job Info	uint32	NONE	14	0 - 16
Argument 0	Job Index	uint32	NONE	0	0 - 199
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Job Date	uint32	[YY:MM:DD-DW]	0x0E051D04 = [14:05:29:04]	N/A
Return 1	Job Time	uint32	[xx:HH:MM-SS]	0x0B160E = [11:22:14]	N/A
Return 2	Job Number	uint32	NONE	25	0 - 9999
Return 3	Recipe #	uint32	NONE	2	0 - 60
Return 4	A+B Volume	uint32	cc	1234	N/A
Return 5	User ID [3:0] (ASCII)	uint32	NONE	0x6E686F4A = ['n', 'h', 'o', 'J']	N/A
Return 6	User ID [7:4] (ASCII)	uint32	NONE	0x656F4420 = ['e', 'o', 'D', ' ']	N/A
Return 7	User ID [9:8] (ASCII)	uint32	NONE	0	N/A

Read Alarm Info

The Read Alarm Info command allows remote access to any of the last 200 alarms logged by the ProMix PD2K. The argument is the *chronological index* of the alarm log, where 0 is the most recent alarm and 199 is the 200th most recent.

The date is returned as a four-byte packet with each byte holding a two-digit value for (from MSB to LSB) year, month, day, and day of the week (Monday = 01).

The time is returned as a three-byte packet with each byte holding a two-digit value. Starting from the MSB, the first byte can be ignored, then hour, minute, and second.

The alarm code is a four-character little endian ASCII string

See [System Errors, page 88](#), for more details on these Event Types.

An example decoding algorithm is provided below.

Example: Read back the second most recent alarm, which was a Position Pump 1 (DK01) recorded on Tuesday June 3, 2014 at 8:11 AM.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read Alarm Info	uint32	NONE	15	0 - 16
Argument 0	Alarm Index	uint32	NONE	1	0 - 199
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Alarm Date	uint32	[YY:MM:DD:DW]	0x0E060302 = [14:06:03:02]	N/A
Return 1	Alarm Time	uint32	[xx:HH:MM:SS]	0x080B0B = [08:11:11]	N/A
Return 2	Alarm Code Char[3:0]	uint32	NONE	0x31304B44 = ['1', '0', 'K', 'D']	N/A

Example ASCII Character String Decode Algorithm:

```

character_str[0] = Return_2 & 0xFF;
character_str[1] = (Return_2 >> 8) & 0xFF;
character_str[2] = (Return_2 >> 16) & 0xFF;
character_str[3] = (Return_2 >> 24) & 0xFF;
character_str[4] = '\0';

```

Read Event Info

The Read Event Info command allows remote access to any of the last 200 events logged by the ProMix PD2K. The argument is the *chronological index* of the events log, where 0 is the most recent event and 199 is the 200th most recent.

The date is returned as a four-byte packet with each byte holding a two-digit value for (from MSB to LSB) year, month, day, and day of the week (Monday = 01).

The time is returned as a three-byte packet with each byte holding a two-digit value. Starting from the MSB, the first byte can be ignored, then hour, minute, and second.

The event code is a four-character little endian ASCII string.

The example decoding algorithm provided above for the Alarm Code may be used for Events equivalently.

Example: Read back the fifth most recent event, which was a Setup Value(s) Changed (EC00) recorded on Tuesday June 3, 2014 at 8:11 AM.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read Event Info	uint32	NONE	16	0 - 16
Argument 0	Event Number	uint32	NONE	4	0 - 199
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Event Date	uint32	[YY:MM:DD-DW]	0x0E060302 = [14:06:03:02]	N/A
Return 1	Event Time	uint32	[xx:HH:MM:SS]	0x080B0B = [08:11:11]	N/A
Return 2	Event Code Char[3:0]	uint32	NONE	0x30304345 = ['0', '0', 'C', 'E']	N/A

Flow Control System

Overview

Flow control is an optional feature that precisely regulates the flow of material to an automatic spray device, to help ensure adequate coverage and avoid sags or runs in the finish coat. The ProMix PD2K system can control fluid flow by directly controlling the proportioning pumps. The pumps accurately dispense a fixed volume of fluid during each stroke. For this reason, the flow rate of a given pump is directly proportional to the velocity of the pump. As long as the gun is open and the system is stable, flow control is the most effective method for controlling flow rate.

The flow control system relies on two main inputs for controlling flow rate: Gun Trigger and Control Set Point. **NOTE: These inputs are timing critical. Graco recommends that users wire them discretely to the controller.** Alternatively these two inputs can be driven by the network communications, but latency could be an issue for systems requiring precise timing.

See [System Screen 5, page 71](#), for more details on configuring these options for 'Discrete' or 'Network'.

NOTE: Flow control cannot be selected with a manual gun system.

Normal Flow Control

The ProMix PD2K will directly control the speed of the pump(s) to the programmed flow control set point to maintain accurate flow rate and ratio. The flow control set point is set by Network Communications or the Discrete Input.

The system is considered to be stable when the pressure readings do not fluctuate and the flow rate is maintained. While the system is considered stable it will store ("learn") the associated pump pressures to a table that is used if the gun trigger signal is lost or removed.

Pressure Control

When the gun trigger signal is removed the system automatically switches to pressure control mode to avoid over pressurizing the fluid lines and to allow smooth transition to flow control if the gun trigger signal returns. It also works to maintain a consistent flow rate even though it has transitioned to pressure control mode if the gun trigger signal is inadvertently lost.

Gun On/Off Prediction

The pressure table also is used to predict if the gun has been turned on or off (without a change to the gun trigger input). The flow control system continually monitors the desired outlet pressure compared to the actual outlet pressure. If the actual pressure remains 50% higher than the desired pressure for longer than 10msec, then the system predicts that the gun trigger has been released. If the actual pressure drops below the desired pressure longer than 10msec, then the system predicts that the gun has been triggered.

The gun on/off prediction is used in the flow control algorithm to prevent the fluid pressure from becoming too high or too low due to a system disturbance. For example, if a gun off prediction occurs while the gun trigger input is high, the system will begin to control to the pressure value last stored in the pressure table for the current flow set point.

System Startup and Defaults

The pressure table is stored in volatile memory, so the table values will be lost after a power cycle of the ProMix PD2K controller. This issue is not significant because the system generally is able to recalculate new pressure table values within a few seconds (depending on the stability of the fluid system).

Run Mode Screens

NOTE: Selection fields and buttons that are grayed-out on the screens are not currently active.

Opening Screen

At power up, the Graco logo will display for approximately 5 seconds, followed by the Home screen.



Figure 14 Opening Screen

Home Screen

The Home screen displays the current status of the system. The following table details the information shown.

To view pump flow rates and pressures (as shown), select “Diagnostic Mode” on [System Screen 1, page 67](#).

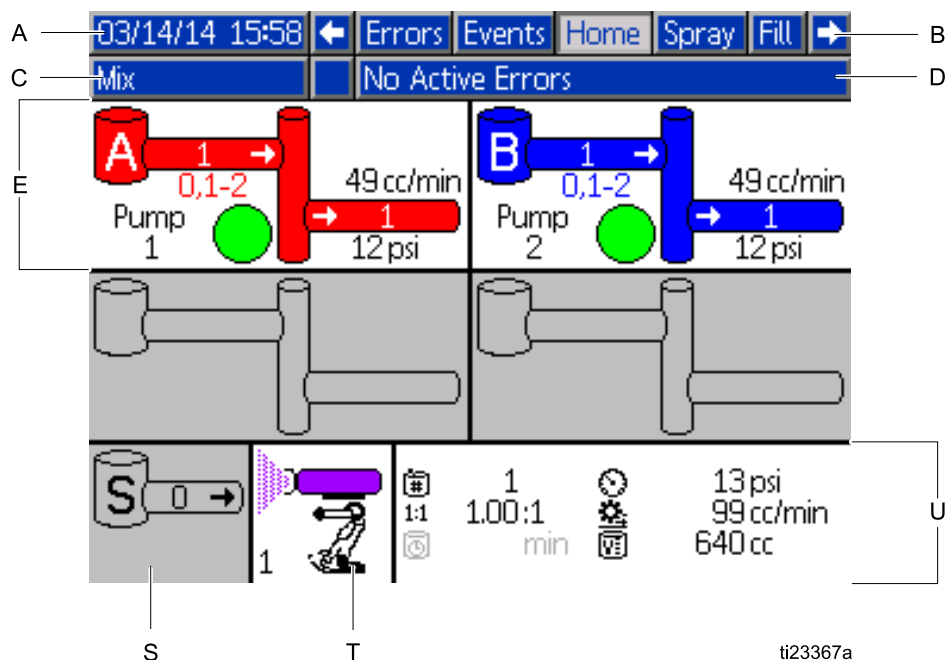


Figure 15 Home Screen, in Mix Mode with Diagnostics On

Home Screen Key

Key	Description	Details	
A	Date and Time	See Advanced Screen 1, page 82 , to set.	
B	Menu Bar	Run Screens. Use left and right arrow keys to scroll through the different Run screens: • Home (shown in Diagnostic Mode) • Spray (see Spray Screen, page 62) • Fill (see Fill Screen, page 63), available only if manual override is enabled on System Screen 5, page 71. • Usage (see Usage Screen, page 64) • Jobs (see Jobs Screen, page 65) • Errors (see Errors Screen, page 65) • Events (see Events Screen, page 65)	
C	Status Bar	System Status: Displays the current mode of operation:	
		• Pump Off • Standby • Startup • Mix • Fill • Purge • Shutdown	• Change Recipe • Idle • Prime Pump • Calibrate • Stall Test • Maintenance Test
D	Error Status	Displays any active error code.	

Key	Description	Details
E	Pump Animation and Diagnostic Information	
F	Pump Number (1–4)	
G	Material (A or B)	
H	Available Colors	
J	Pump Inlet Color	
L	Pump Flow Rate	
M	Pump Outlet Color	
N	Pump Outlet Pressure	
P	Pump Indicator Light • Clear = power off • Yellow = standby • Green = active	
S	Solvent Flow Rate	Shows solvent flow rate, if a solvent meter is attached.
T	Spray Device Animation	Shows mixed material in the spray device and displays active recipe at the spray device. Gun animation changes to show: (Mix Fill) (Mix With Gun Triggered) (Recipe Standby) (Purge) (Solvent Standby) (Mix With Gun Not Triggered)

Key	Description	Details
U	Active Recipe (📅)	📅 1:1 🕒 V 1.00:1 44 min U 1 🕒 50 psi 500 cc/min ⚙️ 222 cc Y Z ti22008a W X
V	Current Ratio (1:1)	
W	Potlife Time Remaining (🕒)	
X	Total Volume for the Current Job (📊)	
Y	Current Flow Rate (⚙️)	
Z	Current Pressure (🕒)	

Spray Screen

NOTE: In normal operating mode, controlled by a PLC, the Spray Screen is display only. No changes can be made. This section provides information about the Spray Screen if manual override is enabled on [System Screen 5, page 71](#). The screens show a system in manual override mode.

The Spray screen includes the following information:

- Active Recipe (can be changed on this screen)
- Target Ratio
- Actual Ratio
- Target Pressure (if Pressure Mode is selected on System Screen 5) or Target Flow (if Flow Mode is selected). Target pressure or flow can be changed on this screen).
- Actual Pressure
- Actual Flow
- Potlife Remaining
- Gun Animation

In addition, the Spray screen includes three soft keys:



Press to put the system in Standby.



Press to spray mixed material.



Press to purge the gun.

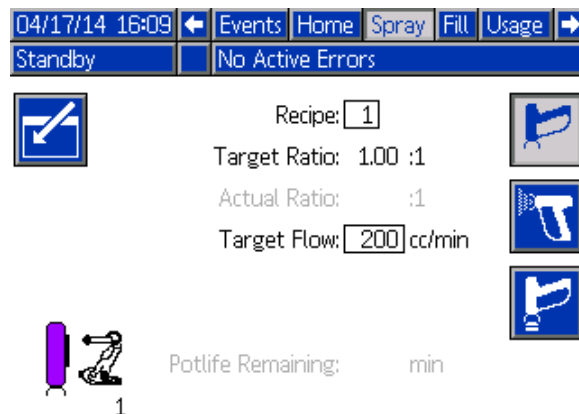


Figure 16 Spray Screen, in Standby Mode

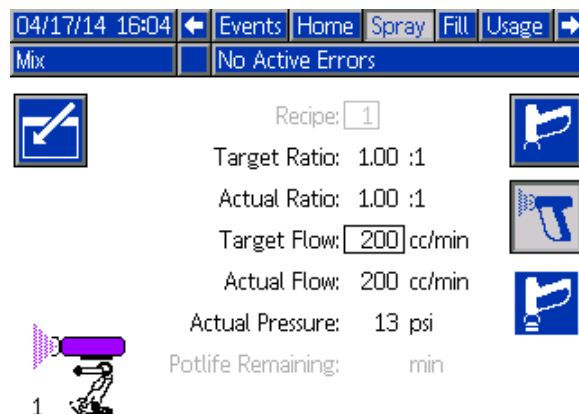


Figure 17 Spray Screen, in Mix Mode

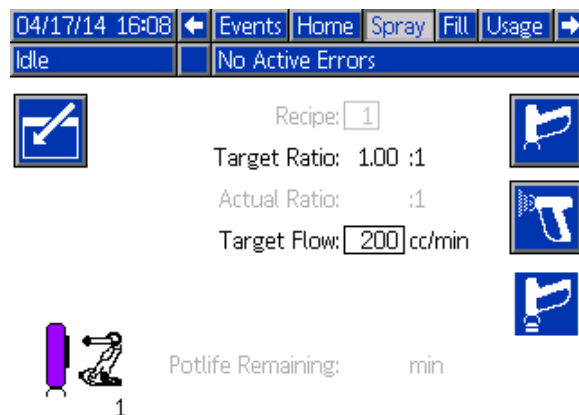


Figure 18 Spray Screen, in Idle Mode

Fill Screen

NOTE: This screen is visible only if manual override is enabled on [System Screen 5, page 71](#).

The Fill screen displays the following information for the pump assigned to the current color:

- Material. Select Color (A), Catalyst (B), or Solvent. The pump animation at the top of the screen will show the selected material.
- Flush Line (only for systems with color change). Select this box if you want to flush the specified material line. The system uses flush sequence 1.

To prime the pumps and fill the lines, first read [Prime and Fill the System, page 20](#).

1. Press the Edit softkey  to open the screen for editing.
2. Select Color (A).
3. If the selected material is not already loaded, press the Prime softkey . The system will prime Color (A) into the selected pump through the selected color valve and out the outlet dump valve.
4. Press the Fill softkey . The system will attempt to fill the Color (A) lines until the user presses Stop . Trigger the gun into a waste container.
5. Repeat for Catalyst (B).

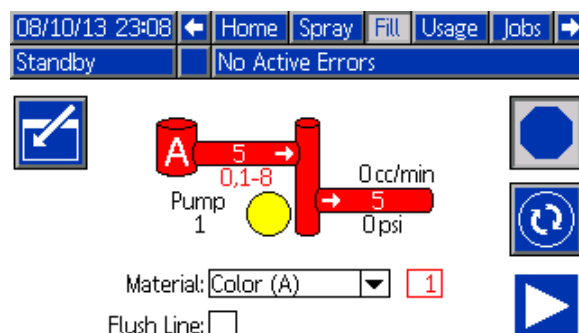


Figure 19 Fill Screen, Color (A) Selected

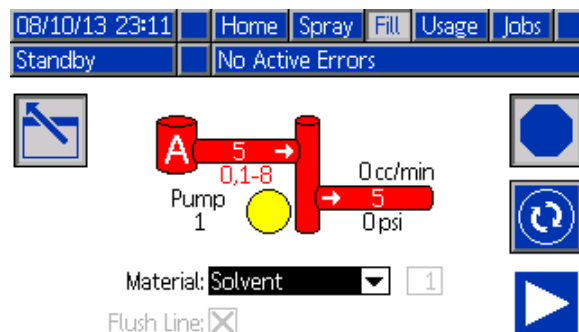


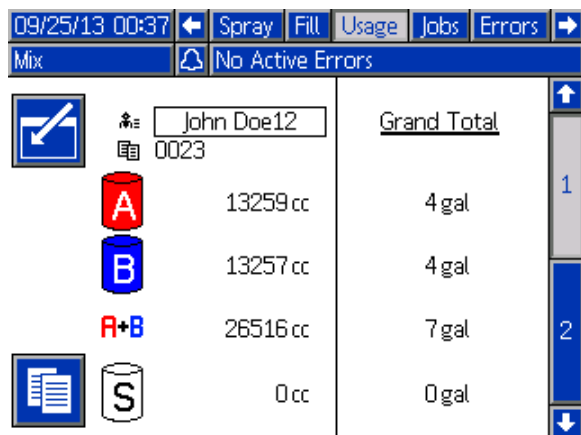
Figure 20 Fill Screen, Solvent Selected

Usage Screen

The first Usage screen displays the current job usage and grand total usage of component A, B, A+B, and solvent (S). Edits may be made only if manual override is enabled on [System Screen 5, page 71](#). The second Usage screen displays the total volume pumped for all available materials.

1. Press the Edit softkey  to open the screen for editing.
2. To enter or change the User ID (✎), select the field to open the User ID Keyboard screen, and enter the desired name (10 characters maximum).
3. To log the current job, press the Job Complete softkey . This will clear the current usage fields and increment to the next job number. The Grand Totals cannot be cleared. See the [Jobs Screen, page 65](#), to review past jobs.

4. Press the Edit softkey  to close the screen.



Component	Usage (cc)	Usage (gal)
A	13259 cc	4 gal
B	13257 cc	4 gal
A+B	26516 cc	7 gal
S	0 cc	0 gal

Figure 21 Usage Screen

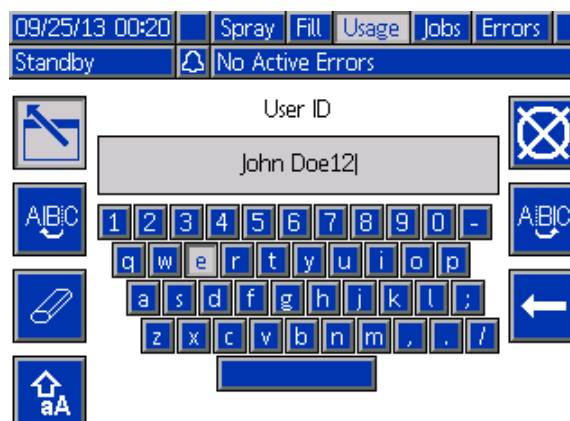
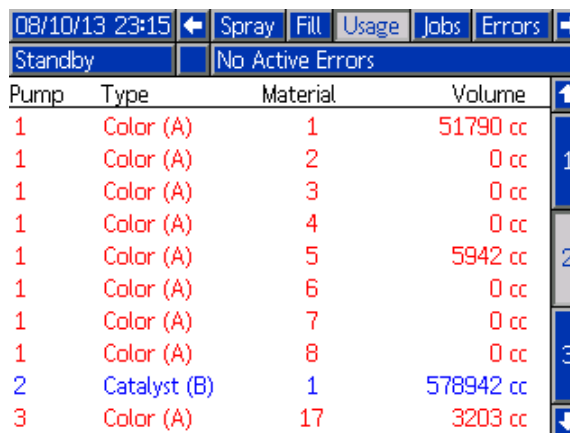


Figure 22 User ID Keyboard Screen



Pump	Type	Material	Volume
1	Color (A)	1	51790 cc
1	Color (A)	2	0 cc
1	Color (A)	3	0 cc
1	Color (A)	4	0 cc
1	Color (A)	5	5942 cc
1	Color (A)	6	0 cc
1	Color (A)	7	0 cc
1	Color (A)	8	0 cc
2	Catalyst (B)	1	578942 cc
3	Color (A)	17	3203 cc

Figure 23 Usage Log

Jobs Screen

The Jobs screen displays the 200 most recent job numbers, recipes, and A+B volumes in a log, with date, time, and User ID.

09/25/13 00:24		◀	Fill	Usage	Jobs	Errors	Events	▶
Mix		No Active Errors						
09/25/13	00:23	John Doe12	0022	1	55 cc			
09/25/13	00:23	John Doe12	0021	1	168 cc	3		
09/25/13	00:23	John Doe12	0020	1	7 cc			
09/25/13	00:23	John Doe12	0019	1	11 cc			
09/25/13	00:23	John Doe12	0018	1	10 cc	1		
09/25/13	00:23	John Doe12	0017	1	8 cc			
09/25/13	00:23	John Doe12	0016	1	32 cc			
09/25/13	00:23	John Doe12	0015	1	184 cc	2		
09/25/13	00:23	John Doe12	0014	1	173 cc			
09/25/13	00:23	John Doe12	0013	1	219 cc			

Figure 24 Jobs Screen

Errors Screen

The Errors screen displays the 200 most recent Error Codes in a log, with date, time, and description.

08/10/13 23:17		◀	Jobs	Errors	Events	Home	▶
Idle		No Active Errors					
							
08/10/13	22:44	DK04-A	Position Pump 4				
08/10/13	22:44	DK03-A	Position Pump 3				
08/10/13	22:44	DK02-A	Position Pump 2				
08/10/13	22:44	DK01-A	Position Pump 1				
08/10/13	22:44	CA0X-A	Comm. Error ADM				
08/10/13	22:44	P6D4-A	Press. Sens. Removed Outlet 4				
08/10/13	22:44	P6D3-A	Press. Sens. Removed Outlet 3				
08/10/13	22:44	P6D2-A	Press. Sens. Removed Outlet 2				
08/10/13	22:44	P6D1-A	Press. Sens. Removed Outlet 1				
08/10/13	22:44	DK04-A	Position Pump 4				

Figure 25 Errors Screen

Events Screen

The Events screen displays the 200 most recent Event Codes in a log, with date, time, and description.

08/10/13 23:17		←	Errors	Events	Home	Spray	→
Idle		No Active Errors					
08/10/13	22:52	EC00-R	Setup Value(s) Changed				
08/10/13	22:51	EVUX-V	USB Disabled				
08/10/13	22:49	EBUX-R	USB Drive Removed				
08/10/13	22:48	EVUX-V	USB Disabled				
08/10/13	22:46	EBUX-R	USB Drive Removed				
08/10/13	22:46	EC00-R	Setup Value(s) Changed				
08/10/13	22:45	EQU0-V	USB Idle				
08/10/13	22:45	EQU1-R	Sys. Settings Downloaded				
08/10/13	22:45	EQU3-R	Custom Lang. Downloaded				
08/10/13	22:45	EQU5-R	Logs Downloaded				

Figure 26 Events Screen

Setup Mode Screens

Press  on any Run screen to enter the Setup screens.

NOTE: Selection fields and buttons that are grayed-out on the screens are not currently active.

If the system has a password lock, the Password screen displays. See [Password Screen, page 66](#).

Password Screen

05/18/12 09:41	Password
System Off	EMIX: Pump Power Off

Password:

Figure 27 Password Screen

Enter the 4 digit password, then press . System screen 1 will open, allowing access to the other Setup screens.

Entering an incorrect password clears the field. Reenter the correct password.

To assign a password, see [Advanced Screen 1, page 82](#).

System Screen 1

System screen 1 includes the following fields which define your system.

04/17/14 14:39 ← Advanced System Recipe Flush →

Standby No Active Errors

Diagnostic Mode: ☐

Color Pumps:

Catalyst Pumps:

Non-Mix Pressure: psi

Solvent Meter: ☐

Solvent K-Factor:

↑ 4 5 1 2 3 ↓

Figure 28 System Screen 1, During Standby

Diagnostic Mode

Select this box to display flow rate and pressure for each pump on the [Home Screen, page 58](#).

Color Pumps

Enter the number of color pumps in your system.

Catalyst Pumps

Enter the number of catalyst pumps in your system.

Non-Mix Pressure

Enter a lower pressure for use when not mixing and spraying (for example during fill or flushing).

NOTE: Low pressure systems may be set 100 psi (0.7 MPa, 7 bar) lower than target pressure; high pressure systems may be set 300 psi (2.1 MPa, 21 bar) lower than target pressure.

Solvent Meter

Select this box if your system uses a solvent meter. The Solvent K-Factor field will then become active.

Solvent K-Factor

Enter the solvent meter K-Factor.

System Screen 2

System screen 2 sets the following system operating parameters.

04/17/14 14:39 Advanced **System** Recipe Flush

Standby No Active Errors

Mix Pressure Tolerance: %

Stall Test Pressure: psi

Pump Stall Test: seconds

Max Leak Rate: cc/min

Mix Idle Timeout: seconds

Mix No Flow Timeout: seconds

Low flow tolerance: %

Low flow timeout: seconds

Figure 29 System Screen 2, in Standby Mode

Mix Pressure Tolerance

The pressure of one component must be within a percentage ($\pm$) of the pressure of the other component during spray or mix. Set the desired Mix Pressure Tolerance in this field. The default is 75%.

Stall Test Pressure

Set the minimum stall test pressure. The setting should be approximately 50 psi (0.35 MPa, 3.5 bar) higher than the highest inlet pressure.

Pump Stall Test

Set the duration for the pump stall test. See [Calibrate Screen 1, page 77](#).

Maximum Leak Rate

Enter the maximum allowable leak rate for a pump stall test.

Mix Idle Timeout

The Gun Trigger Input signals that the device is triggered. If you are not using a gun trigger signal,

the system does not know if the spray device is spraying. If a pump failed you could spray pure resin or catalyst without knowing. This should be caught by the Mix No Flow Timeout; the default is 5 seconds. The Mix Idle Timeout will trigger Idle mode, which will run a pump stall test to check for leaks, then put the pumps in Standby (holding their current position) after the designated period of time. Enter the desired Mix Idle Timeout in this field.

See [Digital Inputs, page 25](#).

Mix No Flow Timeout

The Gun Trigger Input signals that the gun is triggered. If the Gun Trigger Input indicates that the gun is triggered, but there is no fluid flow through a pump, you could spray pure resin or catalyst without knowing. The Mix No Flow Timeout will cause the system to shutdown after the designated period of time. The default is 5 seconds. Enter the desired shutdown time in this field.

See [Digital Inputs, page 25](#).

Low Flow Tolerance

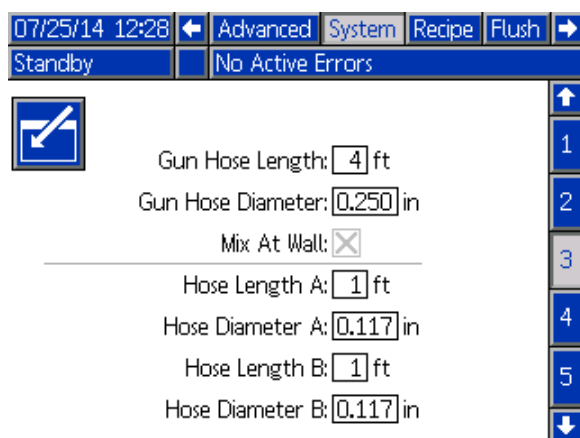
This field is active in systems set to Flow Control. The system will detect if the flow rate falls below a designated percentage of the target flow rate. Set that percentage in this field. For example, you might want the system to time out if it detects a flow rate that is 10 percent of the target, rather than waiting until a no flow timeout occurs.

Low Flow Timeout

The low flow timeout causes the system to shut down after the designated period of time if the flow rate continues to be at or below the low flow tolerance set in the previous section. The default is 5 seconds. Enter the desired shutdown time in this field.

System Screen 3

System screen 3 sets the following system operating parameters.



The screenshot shows the 'System' tab selected in the top navigation bar. The status bar at the top indicates 'Standby' and 'No Active Errors'. The main display area contains the following settings:

- Gun Hose Length: 4 ft
- Gun Hose Diameter: 0.250 in
- Mix At Wall: ☒
- Hose Length A: 1 ft
- Hose Diameter A: 0.117 in
- Hose Length B: 1 ft
- Hose Diameter B: 0.117 in

On the right side of the screen, there is a vertical column of five numbered buttons (1-5) and up/down arrow buttons.

Figure 30 System Screen 3

Gun Hose Length

Enter the length of the hose from the remote mix manifold to the spray device.

Gun Hose Diameter

Enter the diameter of the hose from the remote mix manifold to the spray device. The minimum diameter is 1/8 in. (3 mm).

Mix At Wall

This field is always enabled in Automatic systems.

Hose Length and Diameter

Enter the length and diameter of the hose from the remote color stack to the remote mix manifold, for both A and B hoses.

System Screen 4

System screen 4 sets the following system operating parameters.

The screenshot shows the 'System' tab selected in a navigation bar. The status bar at the top indicates 'Standby' and 'No Active Errors'. The main area contains the following fields:

- Gateway: Modbus TCP - 1 (dropdown menu)
- Enable: ☐
- DHCP: ☐
- IP: 10 33 131 238
- Subnet: 255 255 0 0
- Gateway: 10 33 1 1
- DNS1: 10 33 1 45
- DNS2: 10 33 1 47

On the right side of the form, there is a vertical column of buttons labeled 1 through 5, with an up arrow at the top and a down arrow at the bottom.

Figure 31 System Screen 4

Gateway ID

Select the desired Gateway ID from the dropdown menu.

Enable

Uncheck Enable while setting the IP Address, Subnet mask, Gateway, DNS1 or DNS2. When the settings are loaded, check the Enable box to write the new settings to the selected Gateway.

Check this box to enable the selected Gateway so that the PLC can communicate with it.

DHCP

Select this box if your system has a Dynamic Host Configuration Protocol (DHCP). This protocol assigns unique IP addresses to devices, then releases and renews these addresses as devices leave and rejoin the network. If selected, the IP Address, Subnet, and Gateway fields will not be editable and will display the addresses supplied by the DHCP.

TCP/IP

Use the remaining fields to set the IP address, subnet mask, Gateway, DNS1, and DNS2.

System Screen 5

System screen 5 sets the following system operating parameters.

The screenshot shows the 'System' tab selected in a navigation bar at the top, which also includes 'Advanced', 'Recipe', and 'Flush'. The date and time '04/30/14 14:23' are displayed on the left. Below the navigation bar, a status bar shows 'Standby' and 'No Active Errors'. The main area contains several controls: a 'Fluid control' dropdown menu set to 'Flow', a 'Manual Override' checkbox, a 'Gun Trigger' dropdown menu set to 'Discrete', a 'Flow Control' dropdown menu set to 'Network', a 'Max set point' label, and two numeric input fields for 'Step up gain' and 'Step down gain', both set to '0'. On the right side of the screen, there is a vertical column of five buttons labeled 1, 2, 3, 4, and 5, with button 5 currently highlighted.

Figure 32 System Screen 5

Fluid Control

Select the desired operating mode (pressure or flow), using the pull-down menu.

- In **Pressure Mode**, the motor will adjust the pump speed to maintain the fluid pressure set by an external control device.
- In **Flow Mode**, the motor will maintain a constant speed to maintain the target flow rate set by an external control device.

Manual Override

Check this box to give users system control at the ADM. Leave the box unchecked if all system settings

are controlled through a PC, PLC, or other networked device.

Gun Trigger Signal

Select the format of the signal indicating whether the spray device is triggered.

- Discrete — the signal is sent via a direct, hard-wired connection
- Network — the signal is sent via a PC, PLC, or other networked device.

Flow Control (Setpoint Signal)

Select the format of the signal that indicates system flow rate or pressure.

- Discrete — the signal is sent via a direct, hard-wired connection. This selection will make the Max Rate field active.
- Network — the signal is sent via a PC, PLC, or other networked device.

Stepup Gain and Stepdown Gain

These fields are active only for systems set to flow control on System Screen 5. Enter a value from 1 to 100 to optimize system response time to a change in fluid flow setpoint. Use the Stepup Gain field for increases in fluid flow setpoint. Use the Stepdown Gain field for decreases in fluid flow setpoint.

Recipe Screen

Figure 33 Valid Recipe Screen

Recipe

Enter the desired recipe number (1-60).

Recipe 0

Use Recipe 0 to flush the system.

- **If a recipe (1–60) is loaded:** Select Recipe 0 to flush the previously active pumps and purge the gun.
- **If Recipe 0 or 61 is loaded:** Select Recipe 0 to flush all pumps and purge the gun.

Enabled

Selecting “Enabled” makes the selected recipe accessible from the Spray screen on the ADM or to the PLC.

Note: Recipe 0 is always enabled.

Color (A) Valve

Enter the desired color valve number (1-30).

NOTE: If you enter a number which is not valid in your system configuration, the field will be highlighted and the recipe becomes invalid. For example, if your configuration has 8 color valves and you enter 30, the field will appear as shown below.

Figure 34 Invalid Recipe Screen

Catalyst (B) Valve

Enter the desired catalyst valve number (1-4).

NOTE: If you enter a number which is not valid in your system configuration, the field will be highlighted and the recipe is invalid. For example, if your configuration has 1 catalyst valve and you enter 4, the field will be highlighted and the recipe is invalid.

Flush Sequence

Enter the desired flush sequence (1-5) for the color (A) valve and the catalyst (B) valve. The gun purge time for each material depends on the flush sequence assigned to each. See [Flush Screen, page 73](#). If materials A and B require different purge times, assign separate flush sequences. Set the necessary gun purge time for each. For hard to flush colors, select a longer sequence. 1 is the default, and should be designated for the longest, most thorough flush duration.

Mix Ratio

Enter the desired mix ratio (0 to 50.0):1.

Potlife Time

Enter the potlife time (0 to 999 minutes). Entering 0 disables this function.

Flush Screen

Figure 35 Flush Screen

Flush Number

Enter the desired flush sequence (1-5). For hard to flush colors, select a longer sequence. 1 is the default, and should be designated for the longest, most thorough flush duration.

Gun Purge Time

Enter the spray device purge time (0 to 999 seconds).

Initial Flush

Enter the initial flush volume (0 to 9999 cc).

Final Flush

Enter the final flush volume (0 to 9999 cc).

Wash Cycles

A Wash Cycle activates the pump with the valves closed, to use pumping motion to thoroughly clean the pump. Enter the desired number of wash cycles (0 to 99). Entering a number will make the Strokes per Cycle field active.

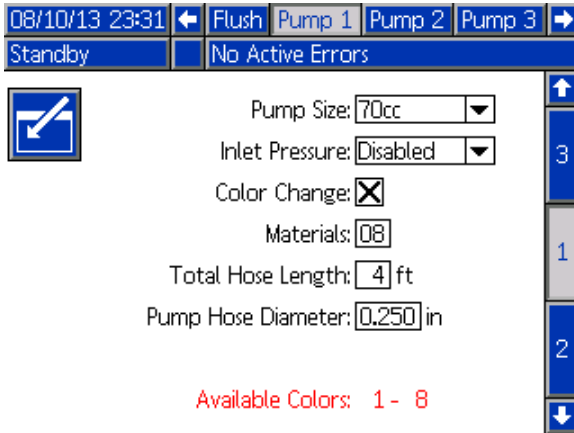
Strokes per Wash Cycle

Enter the desired pump strokes per wash cycle (0 to 99). Default is 1.

Pump Screen 1

NOTE: Your system may include 2, 3, or 4 pumps. Information for each pump is accessible under a separate tab in the menu bar at the top of the screen. Select the tab for the desired pump. Each pump has three screens. Only the screens for Pump 1 are shown here, but the same fields appear on all.

Pump screen 1 includes the following fields which define the pump.



The screenshot shows the Pump Screen 1 interface. At the top, there is a menu bar with tabs for '08/10/13 23:31', 'Flush', 'Pump 1' (selected), 'Pump 2', and 'Pump 3'. Below the menu bar, there is a status bar showing 'Standby' and 'No Active Errors'. The main area contains several configuration fields: 'Pump Size' set to '70cc', 'Inlet Pressure' set to 'Disabled', 'Color Change' checked with an 'X', 'Materials' set to '08', 'Total Hose Length' set to '4 ft', and 'Pump Hose Diameter' set to '0.250 in'. On the right side, there is a vertical navigation bar with buttons for '3', '1' (selected), and '2'. At the bottom, it says 'Available Colors: 1 - 8'.

Figure 36 Pump Screen 1

Pump Size

Select 35cc or 70cc, as appropriate.

Inlet Pressure

Select one of the following:

- Disabled
- Monitor, to track inlet pressure

Select Color Change

Select this box if your system uses color change.

Materials

Enter the number of materials used in your system. Each color change module controls 8 colors.

Hose Length

Compute the length of the hoses from the supply stack to the pump and from the pump to the outlet stack. Enter the total length.

Hose Diameter

Enter the diameter of the supply and output hoses.

Available Colors

The module displays the number of colors available in your system. This field is not editable.

Pump Screen 2

Pump screen 2 sets the pressure transducer settings for the pump.

Figure 37 Pump Screen 2, Default Settings Enabled

Figure 38 Pump Screen 2, Default Settings Disabled

Default Settings Selected

When the “Use Default Settings” box is selected, default settings are used for the calibration values, and the fields are grayed out.

Default Settings Not Selected

When the “Use Default Settings” box is not selected, the following calibration values must be entered. Invalid values will be over-ridden and the system will automatically select the default settings.

- **Inlet Offset Factor:** This field is only used if **Inlet Pressure** in [Pump Screen 1, page 74](#) is set to Monitor; it is grayed out if set to Disabled. The valid range is -01.20 to +01.20 mV/V.
- **Inlet Sensitivity Factor:** This field is only used if **Inlet Pressure** in [Pump Screen 1, page 74](#) is set to Monitor; it is grayed out if set to Disabled. The valid range is 18.80 to 21.20 mV/V.
- **Outlet Offset Factor:** The valid range is -01.20 to +01.20 mV/V.
- **Outlet Sensitivity Factor:** The valid range is 18.80 to 21.20 mV/V.

Pump Screen 3

Pump screen 3 sets the pressure alarm limits for the pump.

When **Inlet Pressure** in [Pump Screen 1, page 74](#) is set to Disabled, the inlet limit fields are grayed out and only the outlet limit fields are active. See [Pressure Alarm and Deviation Limits, page 76](#).

Figure 39 Pump Screen 3, Pressure Monitoring Disabled

When **Inlet Pressure** in [Pump Screen 1, page 74](#) is set to Monitor, all fields are active. See [Pressure Alarm and Deviation Limits, page 76](#).

Figure 40 Pump Screen 3, Pressure Monitoring Enabled

Pressure Alarm and Deviation Limits

Inlet fields are only active if **Inlet Pressure** in [Pump Screen 1, page 74](#) is set to Monitor; they are grayed out if set to Disabled. Outlet fields are active at all times.

- Alarm and Deviation ranges are 0-300 psi for low pressure systems, and 0-1500 psi for high pressure systems.
- Setting to 0 will disable the alarm. The Inlet Alarm High and Outlet Alarm High **cannot** be disabled.
- Alarms and Deviations will display when the inlet or outlet pressure drops below the low limit or exceeds the high limit.

Calibration Screens

Calibrate Screen 1

Calibrate Screen 1 initiates a pump pressure check (stall test) for the selected pump. During the test, the Stall Test screen will appear.

The pump and lines must be primed with color or catalyst before doing the stall test. See [System Screen 2, page 68](#) to set test parameters. See [Pump Pressure Check, page 84](#) for complete test instructions.

To initiate the test, press the Pressure Check  button for the desired pump. The pump will build pressure in the line to a minimum of the Stall Test Pressure. The pump will then move to the center stroke position and stall test the upstroke, followed by the downstroke.

NOTE: The Last Passed log can only be reset by successfully completing the test.

The screen displays the number of days since the last stall test was passed for each pump.



Figure 41 Calibrate Screen 1

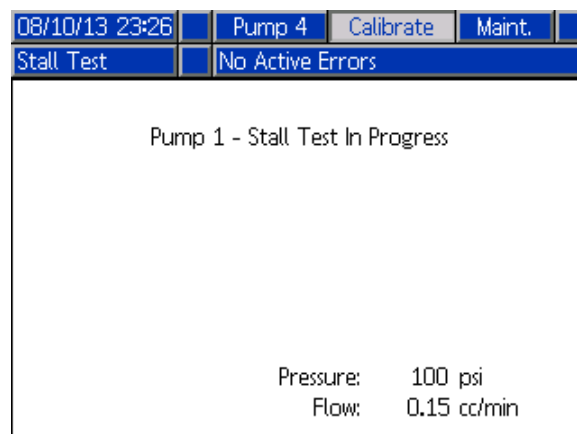


Figure 42 Stall Test Screen

Calibrate Screen 2

Calibrate Screen 2 initiates a volume test for the selected pump. During the test, the Volume Check screen will appear.

The pump and lines must be primed with color or catalyst before doing the Volume Check. See [Pump Volume Check, page 85](#) for complete test instructions.

To initiate the test, press the Volume Check  button for the desired pump.

The screen displays the volume dispensed. Press  to end the test.

Press and hold the Reset button  for 1-2 seconds to reset the volume counter.



Figure 43 Calibrate Screen 2

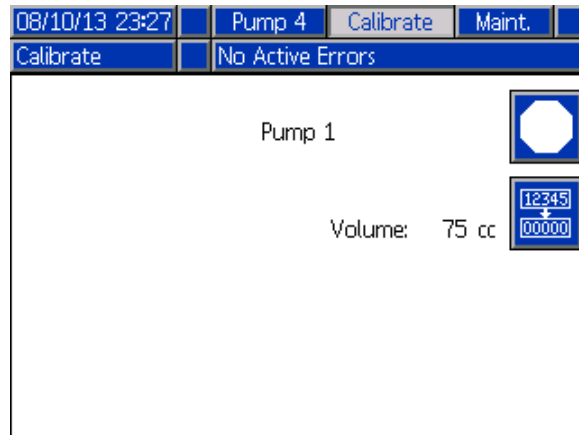


Figure 44 Volume Check Screen

Calibrate Screen 3

Calibrate Screen 3 initiates a calibration of an accessory solvent meter. During the test, the Volume Verification screen will appear.

The meter and lines must be primed with solvent before doing the calibration. See [Solvent Meter Calibration, page 86](#) for complete instructions.

To initiate the calibration, press the Volume Check



button.

The screen displays the volume dispensed. Enter the amount of solvent dispensed in the Measured



Volume field, or press to end the test.

After the Measured Volume is entered, the Accept



Calibration window will appear. Press to accept



the calibration. Press to cancel the calibration and retain the previous K-factor.



Press and hold the Reset button for 1-2 seconds to reset the volume counter.

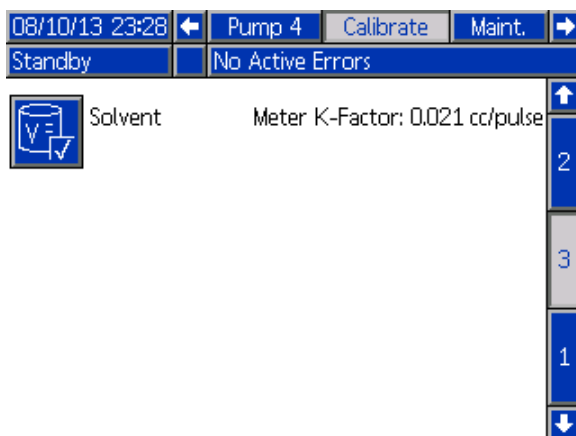


Figure 45 Calibrate Screen 3

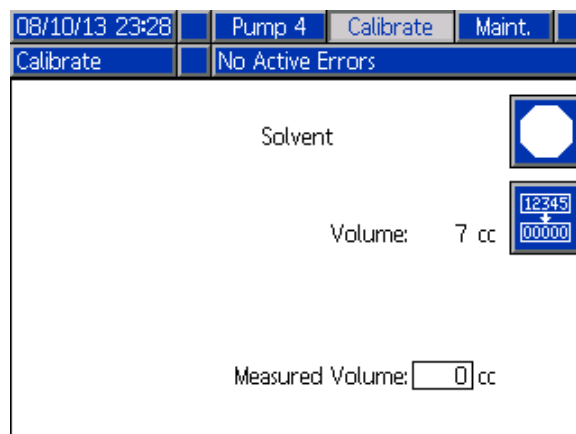


Figure 46 Enter Measured Volume of Solvent

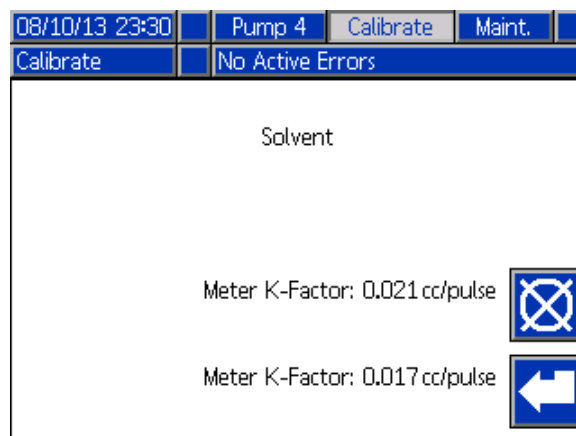


Figure 47 Accept Calibration

Maintenance Screens

Maintenance Screen 1

Use this screen to set maintenance intervals. Set to 0 to disable the alarm.

NOTE: The Pump Stall Test cannot be disabled. You must enter a value other than 0.

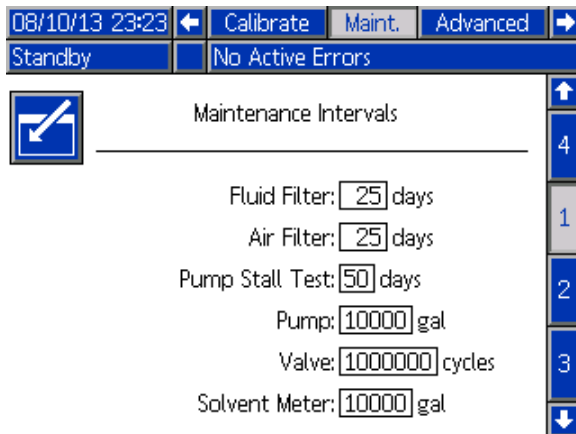


Figure 48 Maintenance Screen 1, Interval Settings

Maintenance Screen 2

Maintenance screen 2 shows the current interval status of the solvent meter, fluid filter, and air filter.

Press and hold the Reset button  for 1-2 seconds to clear the alarm and reset the counter.

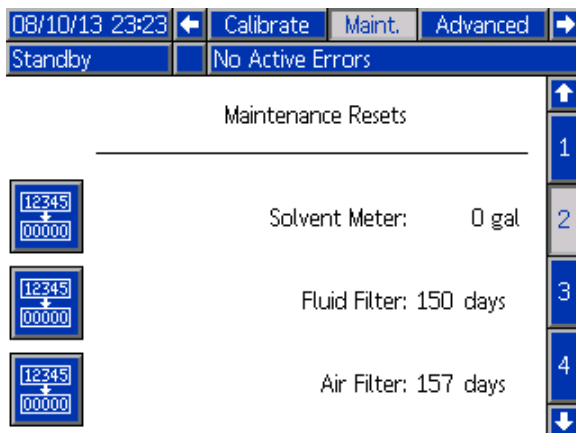


Figure 49 Maintenance Screen 2, Current Status

Maintenance Screen 3

Maintenance screen 3 shows the current interval status of the pump maintenance tests.

Press and hold the Reset button  for 1-2 seconds to clear the alarm and reset the counter.

NOTE: The Pump Stall Test can only be reset by successfully completing the test.

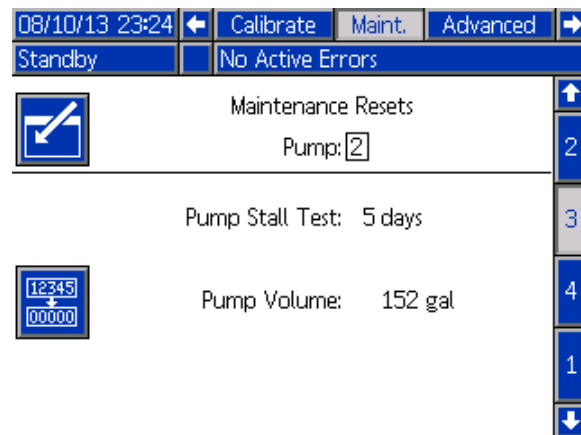


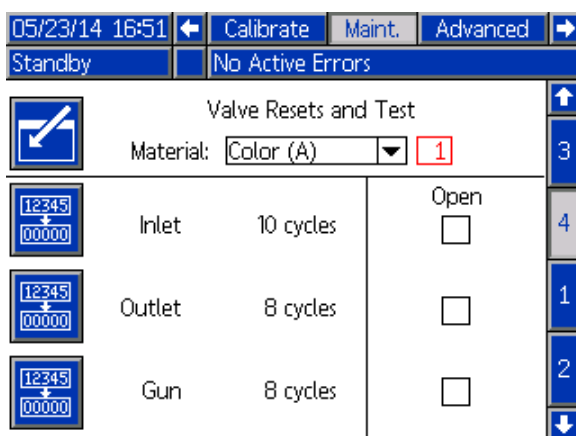
Figure 50 Maintenance Screen 3, Current Pump Status

Maintenance Screen 4

Maintenance screen 4 displays cycle counts for a selected color, catalyst, or solvent valve.

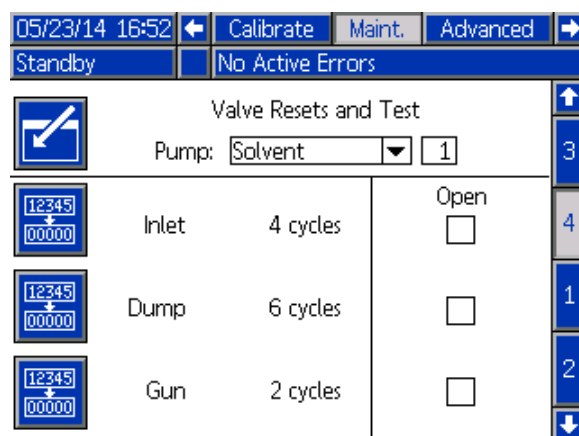
Press and hold the Reset button  for 1-2 seconds to reset the counter.

If the system is in Standby, valves can be opened or closed by selecting or deselecting the box for the corresponding valve.



Valve Resets and Test			
Material:		Color (A)	1
	Inlet	10 cycles	Open ☐
	Outlet	8 cycles	☐
	Gun	8 cycles	☐

Figure 51 Maintenance Screen 4, Color Valve Resets



Valve Resets and Test			
Pump:		Solvent	1
	Inlet	4 cycles	Open ☐
	Dump	6 cycles	☐
	Gun	2 cycles	☐

Figure 52 Maintenance Screen 4, Solvent Valve Resets

NOTE: In Fig. 48, the number to the right of “Solvent” is the pump number, not the material number.

Advanced Screen 1

Advanced screen 1 sets the following display parameters.

Figure 53 Advanced Screen 1

Language

Defines the language of the screen text. Select:

- English (default)
- Spanish
- French
- German
- Japanese
- Chinese
- Korean
- Dutch
- Italian
- Portuguese

- Swedish
- Russian

Date Format

Select mm/dd/yy, dd/mm/yy, or yy/mm/dd.

Date

Enter the date, using the format selected. Use two digits for the month, day, and year.

Time

Enter current time in hours (24 hour clock) and minutes. Seconds are not adjustable.

Password

The password is only used to enter Setup mode. The default is 0000, which means no password is required to enter Setup. If a password is desired, enter a number from 0001 to 9999.

NOTE: Be sure to write down the password and keep it in a secure location.

Screen Saver

Select the desired screen timeout in minutes (00-99). 5 is the default. Select zero (0) to disable the screen saver.

Silent Mode

Select Silent Mode to disable the alarm buzzer and audible feedback.

Advanced Screen 2

Advanced screen 2 sets display units (US or metric).

08/10/13 23:21 ← Maint. Advanced System Recipe →

Standby No Active Errors

Units

Grand Total: gal

Pressure: psi

Length: ft

1 2 3 4

Figure 54 Advanced Screen 2

Display Units

Select the desired display units:

- Grand Total Volume (US gallon or liter)
- Pressure (psi, bar, or MPa)
- Length (ft or m)

Advanced Screen 3

Advanced screen 3 enables USB downloads and uploads.

08/10/13 23:21 ← Maint. Advanced System Recipe →

Standby No Active Errors

Enable USB Downloads/Uploads: ☐

Download Depth: Last days

Log 90% Full Advisory Enabled: ☒

1 2 3 4

Figure 55 Advanced Screen 3

Enable USB Downloads/Uploads

Select this box to enable USB downloads and uploads. Enabling USB activates the Download Depth field.

Download Depth

Enter the number of days for which you want to retrieve data. For example, to retrieve data for the previous week, enter 7.

Log 90% Full Advisory Enabled

This selection is enabled by default. When enabled, the system will issue an advisory if the memory log has reached 90% of capacity. Perform a download to avoid loss of data.

Advanced Screen 4

Advanced screen 4 displays the software part numbers and versions for the system components. This is not an editable screen.

Module	Software Part #	Software Version
Advanced Display	16K567	0.07.013
USB Configuration	16K464	0.03.002
Fluid Plate	16K460	0.08.001
Booth Control	16N913	0.02.003
Color Change - 1	16N914	0.01.009
Color Change - 2	16N914	0.01.007
Color Change - 5	16N914	0.01.009

12/18/01 18:47 ← Pump 2 Advanced Recipe Flush →

Standby No Active Errors

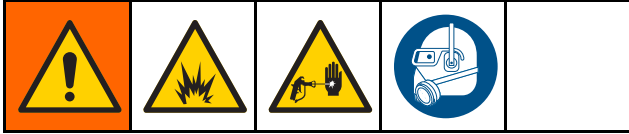
1 2 3 4

Figure 56 Advanced Screen 4

Calibration Checks

Pump Pressure Check

NOTE: Enter the transducer calibration data before doing the pressure check.



Perform the pressure check:

- The first time the system is operated.
- Whenever new materials are used in the system, especially if the materials have viscosities that differ significantly.
- At least once per month as part of regular maintenance.
- Whenever a pump is serviced or replaced.

During each pressure test, the dose valve will close during an up stroke and a down stroke (in either order). This test is to verify that the valves are seating properly and not leaking. If leaking occurs, the system will alarm after the test for that particular pump direction.

NOTE: Do not trigger the spray device during the pressure check.

1. The pump and lines must be primed with color or catalyst before doing the Pressure Check. See [Prime and Fill the System, page 20](#).
2. If the display is on a Run Mode screen, press  to access setup screens.
3. Scroll to Calibrate to display [Calibrate Screen 1, page 77](#).
4. Press the Pressure Check  button for the desired pump. The pump will build pressure in the line to a minimum of the Stall Test Pressure. The pump will then move to the center stroke position and stall test the upstroke, followed by the downstroke.
5. The pressure and flow that the unit measured are displayed on the screen. Compare with the maximum leak rate entered on [System Screen 2, page 68](#). If the values are substantially different, repeat the test.

NOTE: The stall test pressure set point is a minimum. The system may stall at a higher pressure depending on hose lengths and fluid composition.

Pump Volume Check



1. The pump and lines must be primed with color or catalyst before doing the Volume Check. See [Prime and Fill the System, page 20](#).
2. If the display is on a Run Mode screen, press  to access setup screens.
3. Scroll to Calibrate in the menu bar.
4. Scroll to [Calibrate Screen 2, page 78](#).
5. Press the soft key  for the pump you want to check.

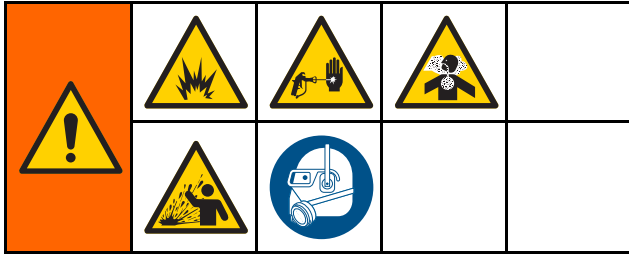
NOTE: For maximum accuracy, use a gravimetric (mass) method to determine the actual volumes dispensed. Verify that the fluid line is filled and at the proper pressure before checking. Air in the line or pressure that is too high may cause incorrect values.

6. Press the Reset key . The volume counter will reset to 0.
7. Trigger the gun into a graduated cylinder. Dispense a minimum of 500cc of material.
8. The volume that the unit measured displays on the screen.
9. Compare the amount on the screen to the amount in the graduated cylinder.

NOTE: If the value is substantially different, repeat the test. If the dispensed volume and measured volume still do not match, check that the A and B pump positions are not reversed.

NOTE: Stop triggering the gun and press  to cancel the test.

Solvent Meter Calibration



1. The meter and lines must be primed with solvent before doing the calibration. See [Prime and Fill the System, page 20](#).
2. If the display is on a Run Mode screen, press  to access setup screens.
3. Scroll to Calibrate in the menu bar.
4. Scroll to [Calibrate Screen 3, page 79](#).
5. Press the soft key  to initiate the calibration.

NOTE: For maximum accuracy, use a gravimetric (mass) method to determine the actual volumes dispensed.

NOTE: Verify that the fluid line is filled and at the proper pressure before calibrating. Air in the line or pressure that is too high may cause incorrect calibration values.

6. Trigger the gun into a graduated cylinder. Dispense a minimum of 500cc of material.
7. The volume that the unit measured displays on the screen.
8. Compare the amount on the screen to the amount in the graduated cylinder.

NOTE: If the value is substantially different, repeat the calibration process.

9. Enter the amount of solvent dispensed in the Measured Volume field on the screen.
10. After the measured volume is entered, the controller calculates the new solvent meter K-factor and displays it on the screen. The standard meter K-factor is 0.021 cc/pulse.

11. Press  to accept the calibration. Press  to cancel the calibration and retain the previous K-factor.

Color Change



Color Change Module Kits are available as an accessory. See manual 333282 for complete information.

Single Color Systems

1. Follow the procedure under [Flush the System, page 23](#).
2. Load the new color. See [Prime and Fill the System, page 20](#).
3. Command the system to Mix to start spraying.

Multiple Color Systems

1. Command the system to Standby.
2. Enable manual override on [System Screen 5, page 71](#).
3. Select the new recipe on the [Spray Screen, page 62](#). This will change colors in the pump and initiate a gun purge.
4. The system will purge material B then material A out of the gun. Each material will purge for the amount of time designated by the Flush Sequence selected for each material on the [Recipe Screen, page 72](#).
5. Wait for the color change to complete. The system automatically goes from Color Change to Mix Fill and the remote mix manifold automatically selects the correct color.
6. Trigger the gun to complete the Mix Fill.
NOTE: There is a 10 second delay without flow before the system will fault.
7. Wait for the system to complete the Mix Fill operation. Command the system to Mix and begin spraying..

System Errors

System errors alert you of a problem and help prevent off-ratio spraying. There are three types: Advisory, Deviation, and Alarm.

An **Advisory** records an event in the system, and will clear itself after 60 seconds.

A **Deviation** records an error in the system but does not shut down the equipment. The deviation must be acknowledged by the user.

If an **Alarm** occurs, operation stops.

If any of the three types occur:

- Alarm buzzer sounds (unless in silent mode).
- Alarm popup screen shows the active alarm code (see [Error Codes, page 89](#)).
- Status bar on the Advanced Display Module shows the active alarm code.
- Alarm is saved in the date/time stamped log.

To Clear Error and Restart

NOTE: When a deviation or alarm occurs, be sure to determine the error code before resetting it. If you forget which code occurred, go to the [Errors Screen, page 65](#), to view the last 200 errors, with date and time stamps.

If an alarm has occurred, correct the cause before resuming operation.

To acknowledge a deviation or clear an alarm, press



on the Advanced Display Module. Users also may acknowledge and clear errors via a network device. [INPUT REGISTER 08: Clear Active Alarm in ProMix PD2K Network Inputs, page 36](#).

Gun Trigger Input Function

The Gun Trigger Input signals the controller when the gun is triggered. The gun icon on the Advanced Display Module shows spray when the Gun Trigger Input is activated.

If a pump fails, pure resin or catalyst could spray indefinitely if the unit does not detect the condition and intervene, which is why the Gun Trigger Input is so important.

If the unit detects through the Gun Trigger Input signal that the gun is triggered, yet one or both of the pumps are not running, a Flow Not Detected Alarm (F8D1) occurs after 10 seconds (default) and the system goes into Standby.

Error Codes

NOTE: When an error occurs be sure to determine the code before resetting it. If you forget which code occurred, use the [Errors Screen, page 65](#) to view the last 200 errors, with date, time, and description.

Purge Errors

Code	Type	Description	Problem	Cause	Solution
F7P1	Alarm	Air Flow Switch On	The air flow switch is indicating unexpected atomizing air flow.	Air flow switch is stuck in flow position.	Clean or replace switch.
				Leak downstream in air line or fitting.	Check for leaks and tighten fittings.
				Air supply pressure fluctuation.	Eliminate pressure fluctuations.
SPD1	Alarm	Gun Purge Incomplete	The system timed out without reaching the user-specified volume of solvent for a purge.	Solvent flow switch not working.	Replace switch.
				Solvent flow is too low to actuate the solvent switch.	Increase solvent pressure to drive a high purge flow rate
				Gun is not triggered.	Operator must continue flushing for configured time, until the booth control indicates purge is completed.
				Mix manifold was not set to flush position, blocking solvent flow to the spray gun.	Set manifold to flush position.

Mix Errors

Code	Type	Description	Problem	Cause	Solution
F7S1	Alarm	Flow Detected Solvent Gun	The solvent flow switch is indicating unexpected solvent flow.	Solvent flow switch is stuck in flow position.	Clean or replace switch.
				There is a leak through the solvent cutoff valve.	Check for leaks and repair valve.
QPD1	Alarm, then Deviation	Potlife Expired	Potlife time has expired before the system has moved the required amount of material (potlife volume) through the mixed material line.	Purge process was not completed.	Make sure purge process is completed.
				Solvent supply shut off or empty.	Verify solvent supply is available and on, supply valves are open.
SND1	Alarm	Mix Fill Incomplete	The system timed out before the mix fill cycle loaded the gun with mixed material.	Mix manifold not set to spray position.	Set manifold to spray.
				Spray gun was not triggered.	Allow flow through gun during fill process until the fill complete LED stops flashing.
				Restrictions in mixer, manifold, or spray gun.	Fix restrictions.

Pumping Errors

NOTE: In some error codes listed below, a # symbol is shown as the last digit. This symbol represents the applicable component number, which can vary. The unit's display will show the applicable number as the last digit in the code. For example, the F1S# code listed in this table will be displayed as F1S1 if the affected component is pump 1, F1S2 for pump 2, and so on.

Code	Type	Description	Problem	Cause	Solution
DA0#	Alarm	Exceeded Maximum Flow Pump #	Pump was driven to its maximum allowed speed.	System has a leak or open valve that is allowing unrestricted flow.	Inspect system for leaks.
				Pump is cavitating, cycling without restriction.	Verify that the pump is being supplied with material.
				Viscosity of material is too thin for nozzle size.	Reduce nozzle size to create more restriction. Reduce paint pressure to lower the flow rate.
				System pressure or Flow Setpoint is too high (causing the pump to work too hard).	Reduce the pressure or the Flow Setpoint.
DE0#	Alarm	Leak Detected Pump #	This is a manual stall test failure when the pump cannot build pressure to the target "Stall Test Pressure." Will fault after 30 seconds.	No material in the pump or line.	Make sure the pump and down stream color line are loaded with material.
				Leak in the system.	Determine if leak is external or internal by visually inspecting the system for fluid leakage. Fix all loose or worn hoses, fittings, and seals. Inspect all valve seats and needles for wear, and replace worn piston or throat seals.
DF0#	Alarm	No Stall Up Pump #	Pump failed the stall test; did not stall on the upstroke.	Valve failure, seal failure, worn rod or cylinder.	Replace inlet and outlet valve and seal for up stroke. Replace piston and throat seals. Replace rod and cylinder as necessary.
DG0#	Alarm	No Stall Down Pump #	Pump failed the stall test; did not stall on the downstroke.	Valve failure, seal failure, worn rod or cylinder.	Replace inlet and outlet valve and seal for down stroke. Replace piston and throat seals. Replace rod and cylinder as necessary.

Code	Type	Description	Problem	Cause	Solution
DH0#	Alarm	No Stall Pump #	Pump failed the stall test; did not stall on either the upstroke or the downstroke.	Valve failure, seal failure, worn rod or cylinder.	Replace inlet and outlet valve and seal for up and down strokes. Replace piston and throat seals. Replace rod and cylinder as necessary.
DK0#	Alarm	Position Pump #	Pump was detected to be out of position.		Re-enable pump power to reset pump. Make sure inlet supply pressure is not too high.
EBH#	Record	Home Complete Pump #	Record of pump homing is complete.	An indication on the display that the pump completed the home function	No action required.
EF0#	Alarm	Timeout Startup Pump #	Pump tried but was not able to move to the home position within a specified amount of time.	Pump dose valves did not actuate.	Verify air pressure to solenoid valves. Verify the valves are actuating.
				Motor could not drive pumps and linear actuator.	Verify motor is driving the pump.
				Pump stroke length is shortened by mechanical system tolerance.	Verify correct assembly of linear actuator and pump piston rods. See pump manual.
EF1#	Alarm	Timeout Shutdown Pump #	Pump tried but was not able to move to the park position within a specified amount of time.	Pump dose valves did not actuate.	Visually inspect valves to ensure they are operating properly; verify they have air pressure above 85 psi (0.6 MPa, 6.0 bar).
				Pump is filled with thick paint and could not drive piston to end of stroke. Motor or drive is worn or damaged.	Observe motor and drive assembly to verify that the motor is generating force.

System Errors

Code	Type	Description	Problem	Cause	Solution
F1F#	Alarm	Flow Low Fill Pump #	There has been no flow or low flow during a pump fill operation.	There is a restriction on the outlet side of the pump or color stack.	Make sure there are no restrictions in the color stack and that the dump valve is actuating.
				Thick viscosity paint requires more pressure to pump.	Increase non-mix pressure if necessary to create flow during the fill function.
				The pumps do not have to move for the system to build enough pressure to meet the setpoint.	Increase non-mix pressure if necessary to create flow during the fill function.
F1S#	Alarm	Flow Low Purge Pump #	There has been no flow or low flow during a pump purge operation.	Restriction in the outlet side of the pump or color stack resulting in the solvent flow being too low.	Make sure there are no restrictions in the system. Increase non-mix pressure if necessary to create flow during the purge function.
F7D#	Alarm	Flow Detected Pump #	The pump flow exceeded 20 cc/min flow coming into Idle mode.	There is a leak in the system or the gun was open when the system went into Idle mode.	Verify there are no leaks in the system. Make sure the air flow switch is actuating properly. Do not trigger the gun without atomizing air.
F8D1	Alarm	Flow Not Detected	No flow while mixing.	Restriction in the outlet side of the pump or color stack.	Make sure there are no restrictions in the system.
F9D#	Alarm	Flow Unstable Pump #	The pump flow rate did not stabilize while entering Idle mode.	Potential leak in the system.	Check the system for leaks and run manual stall test.
SAD1	Alarm	Atomizing Solvent	Air flow switch is active while solvent, diluted material, or an unknown material is in the gun.	Atomizing air supply was not shut off before purging or filling spray gun.	Make sure atomizing air is shut off before purging or filling the spray gun. Use an AA cutoff valve on the atomizing air supply.

Pressure Errors

NOTE: In some error codes listed below, a # symbol is shown as the last digit. This symbol represents the applicable component number, which can vary. The unit's display will show the applicable number as the last digit in the code. For example, the P6F# code listed in this table will be displayed as P6F1 if the affected component is pump 1, P6F2 for pump 2, and so on.

Code	Type	Description	Problem	Cause	Solution
F6F#	Alarm	Press. Sens. Removed Inlet #	No inlet pressure transducer is detected when the system is expecting one.	Disconnected transducer.	Verify transducer is connected properly. Replace if reconnecting does not eliminate the alarm.
P1F#	Alarm	Pressure Low Inlet Pump #	The inlet pressure on pump # is less than the user-entered alarm limit.		Increase inlet pressure.
P2F#	Deviation	Pressure Low Inlet Pump #	The inlet pressure on pump # is less than the user-entered deviation limit.		Increase inlet pressure.
P3D#	Deviation	Pressure High Outlet Pump #	The outlet pressure on pump # is greater than the user entered deviation limit.		Relieve system pressure.
P3F#	Deviation	Pressure High Inlet Pump #	The inlet pressure on pump # is greater than the user-entered deviation limit.		Decrease inlet pressure.
P4D#	Alarm	Pressure High Outlet Pump #	The outlet pressure on pump # is greater than the user entered alarm limit.		Relieve system pressure.
P4F#	Alarm	Pressure High Inlet Pump #	The inlet pressure on pump # is greater than the user-entered alarm limit.		Decrease inlet pressure.
P6D#	Alarm	Press. Sens. Removed Outlet #	No outlet pressure transducer is detected when the system is expecting one.	Disconnected transducer.	Verify transducer is connected properly. Replace if reconnecting does not eliminate the alarm.
P9D#	Alarm	Press. Sens. Failed Outlet #	Outlet pressure transducer has failed.	Outlet pressure transducer has failed or the pressure is above the readable range.	Relieve system pressure. Verify connections, or replace if reconnecting does not eliminate the alarm.

System Errors

Code	Type	Description	Problem	Cause	Solution
P9F#	Alarm	Press. Sens. Failed Inlet #	Inlet pressure transducer has failed.	Inlet pressure transducer has failed or the pressure is above the readable range.	Relieve system pressure. Verify connections, or replace if reconnecting does not eliminate the alarm.
QADX	Alarm	Differential Pressure A Over B	Low differential pressure. This alarm is active only during Mix mode.	There is a leak on the B side.	Check the system for internal and external leaks on all catalyst manifolds and plumbing.
				The B side pump is cavitating.	Check paint supply on the B side, increase paint supply pressure.
QBDX	Alarm	Differential Pressure B Over A	High differential pressure. This alarm is active only during Mix mode.	There is a leak on the A side.	Check the system for internal and external leaks on all color manifolds and plumbing.
				The A side pump is cavitating.	Check paint supply on the A side, increase paint supply pressure.

System Errors

Code	Type	Description	Problem	Cause	Solution
EB00	Record	Stop Button Pressed	Record of a stop button press.	Indicates system stop key on ADM was pressed.	n/a
EC00	Record	Setup Value(s) Changed	Record of changing setup variables.	Indicates date and time when setup values were changed.	n/a
EL00	Record	System Power On	Record of power cycle (ON).	Indicates date and time when system was started.	n/a
EM00	Record	System Power Off	Record of power cycle (OFF).	Indicates date and time when system was turned off.	n/a
EMIX	Advisory	Pump Off	The pumps are not powered and are unable to move.	Pump power was turned off or an error occurred.	Start pumps by pressing pump start key on Advanced Display module.
ES00	Advisory	Factory Defaults	Record of defaults being loaded.		n/a

Communication Errors

NOTE: In some error codes listed below, a # symbol is shown as the last digit. This symbol represents the applicable component number, which can vary. The unit's display will show the applicable number as the last digit in the code. For example, the CAC# code listed in this table will be displayed as CAC1 if the affected component is color change board 1, CAC2 for board 2, and so on.

Code	Type	Description	Problem	Cause	Solution
CA0X	Alarm	Comm. Error ADM	System does not detect the Advanced Display Module (ADM).	This communication error indicates that the Network has lost communication with the Advanced Display Module.	Check CAN cable connecting ADM to the EFCM.
CAC#	Alarm	Comm. Error Color Change #	System does not detect the Color Change Module #.	This communication error indicates that the network has lost communication with the Color Change Module #.	Check CAN cable connections to the Color Change Module # and any interconnected modules.
CADX	Alarm	Comm. Error Fluid Module	System does not see the Enhanced Fluid Control Module (EFCM).	This communication error indicates that the Network has lost communication with the EFCM.	Check CAN cables connecting ADM to the EFCM. Replace Cable or EFCM as necessary.

System Errors

Code	Type	Description	Problem	Cause	Solution
CAGX	Alarm	Comm. Error Gateway	System does not detect a CGM that was registered as being connected at power up.		
CDC#	Alarm	Duplicate Color Change #	System detects two or more identical Color Change Modules.	More than one Color Change Module with the same address is connected in the system .	Check the system and remove the extra color change module.
CDDX	Alarm	Duplicate Fluid Module	System sees two or more identical Enhanced Fluid Control Modules (EFCM).	More than one EFCM is connected in the system.	Check the system and remove the extra EFCM.

USB Errors

Code	Type	Description	Problem	Cause	Solution
EAUX	Advisory	USB Busy	USB drive is inserted, download is in progress.	Indicates USB port is uploading or downloading data.	Wait for USB Idle.
EBUX	Record	USB Drive Removed	USB drive was removed while downloading or uploading.	Downloading/uploading data on USB was interrupted by the USB device being removed.	Replace the USB device and begin process again.
EQU0	Advisory	USB Idle	USB download completed, drive may be removed.	Data transfer is completed to the USB device.	Remove USB device from ADM.
EQU1	Record	USB Sys. Settings Downloaded	Settings were downloaded to USB drive.	User installed USB device in ADM USB port.	n/a
EQU2	Record	USB Sys. Settings Uploaded	Settings were uploaded from USB drive.	User installed USB device in ADM USB port.	n/a
EQU3	Record	USB Custom Lang. Downloaded	Custom language was downloaded to USB drive.	User installed USB device in ADM USB port.	n/a
EQU4	Record	USB Custom Lang. Uploaded	Custom language was uploaded from USB drive.	User installed USB device in ADM USB port.	n/a
EQU5	Record	USB Logs Downloaded	Data logs were downloaded to USB drive.	User installed USB device in ADM USB port.	n/a
EVUX	Advisory	USB Disabled	USB drive has been inserted, downloading is disabled.	Configuration of system is blocking data transfer.	Change configuration to enable USB download function.
MMUX	Advisory	Maint. USB Logs Full	USB memory is more than 90% full.	Configuration parameter on system is enabled to generate this advisory.	Complete download to ensure no data is lost.
WSUX	Advisory	USB Config. Err.	USB configuration file does not match expected; checked on startup.	A software update was not completed successfully.	Reinstall software.

System Errors

Code	Type	Description	Problem	Cause	Solution
WXUD	Advisory	USB Download Err.	An error occurred while downloading to the USB drive.	User installed incompatible USB device in ADM USB port.	Repeat process with compatible USB device.
WXUU	Advisory	USB Upload Err.	An error occurred while uploading from the USB drive.	User installed incompatible USB device in ADM USB port.	Repeat process with compatible USB device.

Miscellaneous Errors

NOTE: In some error codes listed below, a # symbol is shown as the last digit. This symbol represents the applicable component number, which can vary. The unit's display will show the applicable number as the last digit in the code. For example, the B9D# code listed in this table will be displayed as B9D1 if the affected component is pump 1, B9D2 for pump 2, and so on.

Code	Type	Description	Problem	Cause	Solution
B9A0	Advisory	Volume Rollover A Current	Batch counter for material A rolled over.	The totalizer has reached maximum capable value and started over at zero.	n/a
B9AX	Advisory	Volume Rollover A Lifetime	Grand total counter for material A rolled over.	The totalizer has reached maximum capable value and started over at zero.	n/a
B9B0	Advisory	Volume Rollover B Current	Batch counter for material B rolled over.	The totalizer has reached maximum capable value and started over at zero.	n/a
B9BX	Advisory	Volume Rollover B Lifetime	Grand total counter for material B rolled over.	The totalizer has reached maximum capable value and started over at zero.	n/a
B9D#	Advisory	Volume Rollover Pump #	Grand total counter for pump # rolled over.	The totalizer has reached maximum capable value and started over at zero.	n/a
B9S0	Advisory	Volume Rollover Solvent Current	Batch counter for solvent rolled over.	The totalizer has reached maximum capable value and started over at zero.	n/a
B9SX	Advisory	Volume Rollover Solvent Lifetime	Grand total counter for solvent rolled over.	The totalizer has reached maximum capable value and started over at zero.	n/a
WX00	Alarm	Software Errors	An unexpected software error has occurred.		Call Graco technical support.

Calibration Errors

NOTE: In some error codes listed below, a # symbol is shown as the last digit. This symbol represents the applicable component number, which can vary. The unit's display will show the applicable number as the last digit in the code. For example, the ENT# code listed in this table will be displayed as ENT1 if the affected component is pump 1, ENT2 for pump 2, and so on.

Code	Type	Name	Description
END#	Record	Calibration Pump #	A calibration test was run on the pump.
ENS0	Record	Calibration Solvent Meter	A calibration test was run on the solvent meter.
ENT#	Record	Calibration Stall Test Pump #	A stall test was completed successfully on pump #.

Maintenance Errors

NOTE: In some error codes listed below, a # symbol is shown as the last digit. This symbol represents the applicable component number, which can vary. For example, the MAD# code listed in this table will be displayed as MAD1 if the affected component is pump 1, MAD2 for pump 2, and so on.

Because some components are assigned a 2-digit number, the last digit of the code is displayed as an alphanumeric character. The second table below correlates the alphanumeric digit to its component number. For example, code MEDZ represents outlet valve 30.

Code	Type	Name	Description
MAD#	Advisory	Maint. Outlet Pump #	Maintenance is due on pump.
MAT#	Advisory	Maint. Stall Test Pump #	Maintenance stall test is due on pump.
MEB#	Advisory	Maint. Valve Catalyst (B) #	Maintenance is due on catalyst valve.
MED#	Advisory	Maint. Valve Outlet #	Maintenance is due on outlet valve.
MEF#	Advisory	Maint. Valve Inlet #	Maintenance is due on inlet valve.
MEG#	Advisory	Maint. Valve Gun #	Maintenance is due on gun valve.
MES#	Advisory	Maint. Valve Solvent #	Maintenance is due on solvent valve.
MFF#	Advisory	Maint. Meter Flow #	Maintenance is due on flow meter.
MFS0	Advisory	Maint. Meter Solvent	Maintenance stall test is due on solvent meter.
MGH0	Advisory	Maint. Filter Fluid	Maintenance is due on fluid filter.
MGP0	Advisory	Maint. Filter Air	Maintenance is due on air filter.

Alphanumeric Last Digits

Alphanumeric Digit	Component 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
D	13
E	14
F	15

Alphanumeric Digit	Component Number
G	16
H	17
J	18
K	19
L	20
M	21
N	22
P	23
R	24
T	25
U	26
V	27
W	28
Y	29
Z	30

Maintenance

Preventive Maintenance Schedule

The operating conditions of your particular system determine how often maintenance is required. Establish a preventive maintenance schedule by recording when and what kind of maintenance is needed, and then determine a regular schedule for checking your system.

Flushing

- Flush before changing fluids, before fluid can dry in the equipment, at the end of the day, before storing, and before repairing equipment.

- Flush at the lowest pressure possible. Check connectors for leaks and tighten as necessary.
- Flush with a fluid that is compatible with the fluid being dispensed and the equipment wetted parts.

Cleaning the ADM

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

Technical Data

Positive Displacement Proportioner	U.S.	Metric
Maximum fluid working pressure:		
AC1000 Air Spray Systems	300 psi	2.1 MPa, 21 bar
AC2000 Air-Assisted Spray Systems	1500 psi	10.5 MPa, 105 bar
Maximum working air pressure:	100 psi	0.7 MPa, 7.0 bar
Air supply:	85–100 psi	0.6–0.7 MPa, 6.0–7.0 bar)
Air filter inlet size:	3/8 npt(f)	
Air filtration for air logic (user-supplied):	5 micron (minimum) filtration required; clean and dry air	
Air filtration for atomizing air (user-supplied):	30 micron (minimum) filtration required; clean and dry air	
Mixing ratio range:	0.1:1 — 50:1, $\pm 1\%$	
Fluids handled:	one or two component: • solvent and waterborne paints • polyurethanes • epoxies • acid catalyzed varnishes • moisture sensitive isocyanates	
Viscosity range of fluid:	20–5000 centipoise	
Fluid filtration (user-supplied):	100 mesh minimum	
Maximum fluid flow:	800 cc/minute (depending on material viscosity)	
Fluid outlet size:	1/4 npt(m)	
External power supply requirements:	90 - 250 Vac, 50/60 Hz, 7 amps maximum draw 15 amp maximum circuit breaker required 8 to 14 AWG power supply wire gauge	
Operating temperature range:	36 to 122°F	2 to 50°C
Storage temperature range:	—4 to 158°F	—20 to 70°C
Weight (approximate):	195 lb	88 kg
Sound data:	Less than 75 dB(A)	
Wetted parts:	17–4PH, 303, 304 SST, Tungsten carbide (with nickel binder), perfluoroelastomer; PTFE, PPS, UHMWPE	

Graco Standard Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

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In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

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Graco Information

For the latest information about Graco products, visit www.graco.com.

To place an order, contact your Graco Distributor or call to identify the nearest distributor.

Phone: 612-623-6921 **or Toll Free:** 1-800-328-0211 **Fax:** 612-378-3505

All written and visual data contained in this document reflects the latest product information available at the time of publication.

Graco reserves the right to make changes at any time without notice.

For patent information, see www.graco.com/patents.

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Graco Headquarters: Minneapolis

International Offices: Belgium, China, Japan, Korea

GRACO INC. AND SUBSIDIARIES • P.O. BOX 1441 • MINNEAPOLIS MN 55440-1441 • USA

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