Operation

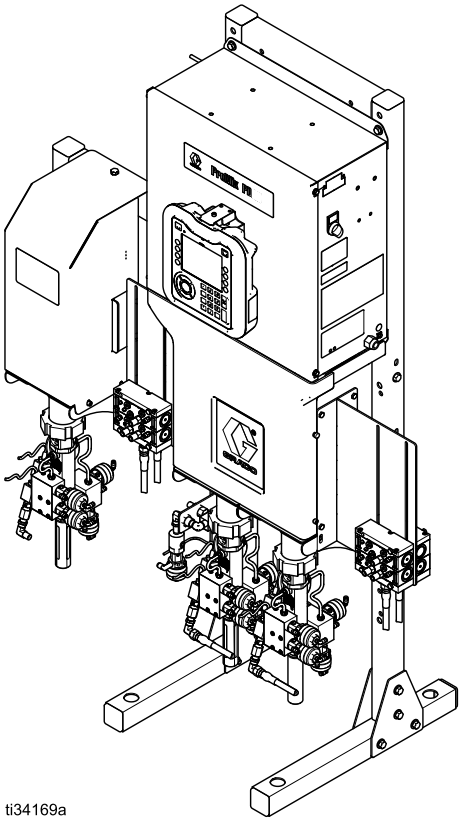
ProMix® PD3K+ Proportioner for Automatic Spray Applications

3A6287E
EN

Electronic positive displacement proportioner for up to 4-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 and Repair/Parts manuals. Save these instructions.

See page 3 for model part numbers and approvals information.



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Contents

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
332455	Color Change Kits, Instructions — Parts

Manual No.	Description
333282	Color Change and Remote Mix Manifold Kits, Instructions — Parts
332456	Pump Expansion Kits, Instructions — Parts
334183	Modbus TCP Gateway Module, Instructions — Parts
334494	ProMix PD2K CGM Installation Kits, Instructions — Parts

Models

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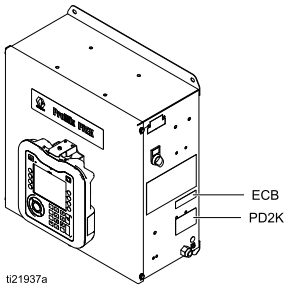
See Figs. 1–6 for component identification labels, including approval information and certification.

Part No.	Series	Maximum Air Working Pressure	Maximum Fluid Working Pressure	Location of ProMix PD and Electrical Control Box (ECB) Labels
AC0500	A	100 psi (0.7 MPa, 7.0 bar)	With low–pressure pumps: 300 psi (2.068 MPa, 20.68 bar)	
			With high–pressure pumps: 1500 psi (10.34 MPa, 103.4 bar)	
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)	

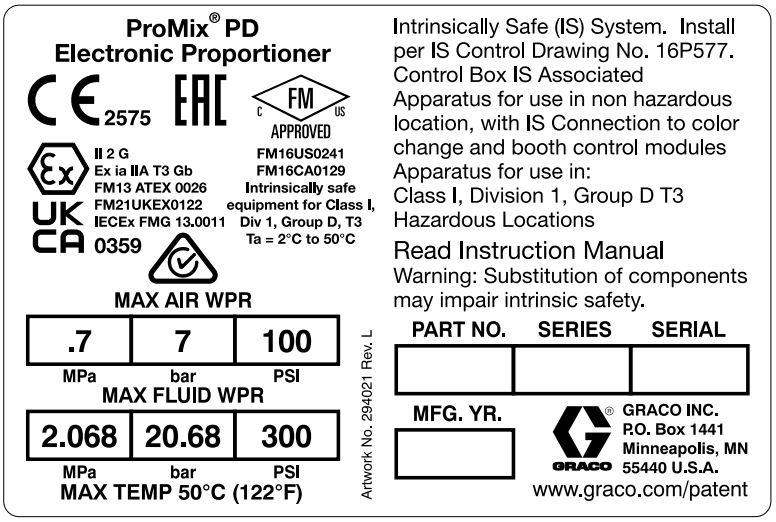


Figure 1 Model AC1000 Identification Label

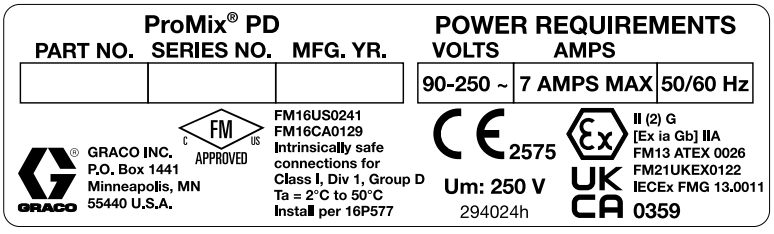


Figure 2 24M672 Control Box Identification Label

Continued on the next page.

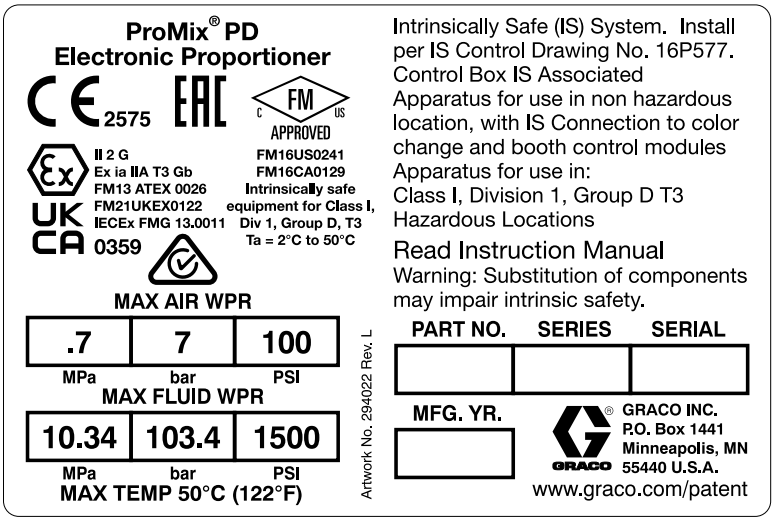


Figure 3 Model AC2000 Identification Label

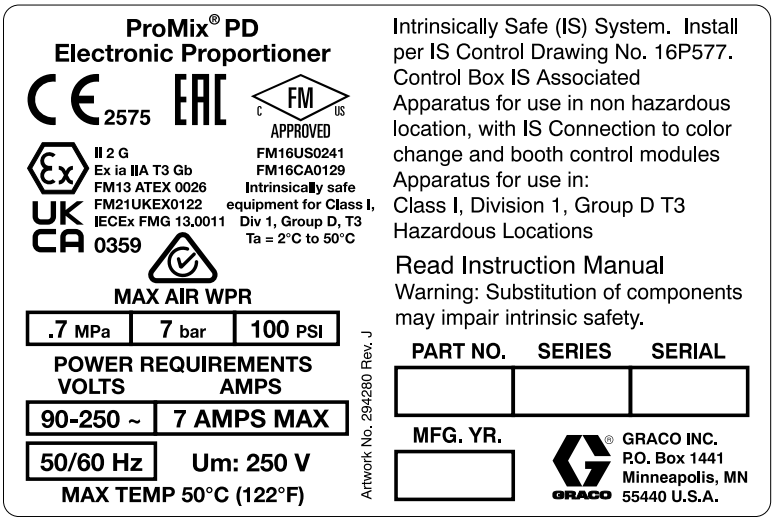


Figure 4 Model AC0500 Identification Label

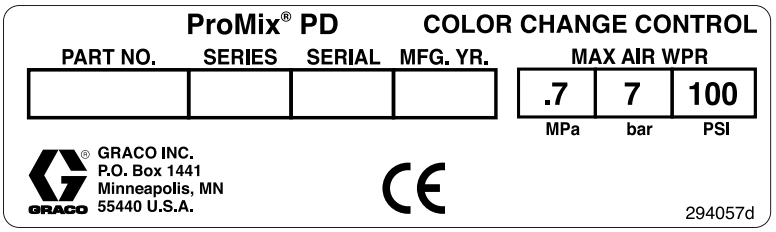


Figure 5 Non-Intrinsically Safe Color Change Control (Accessory) Identification Label

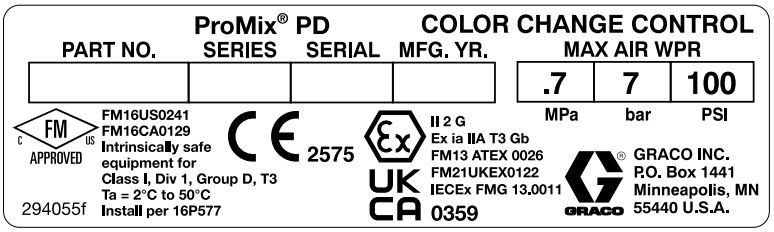


Figure 6 Intrinsically Safe Color Change Control (Accessory) Identification Label

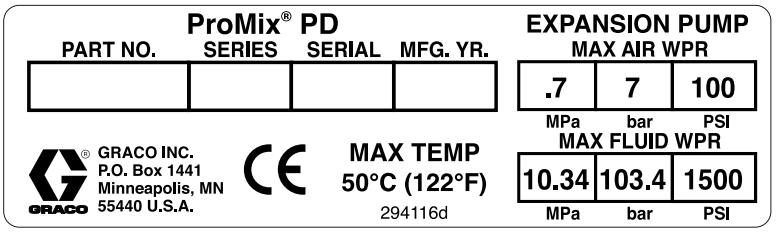


Figure 7 Pump Expansion Kit (Accessory) Identification Label

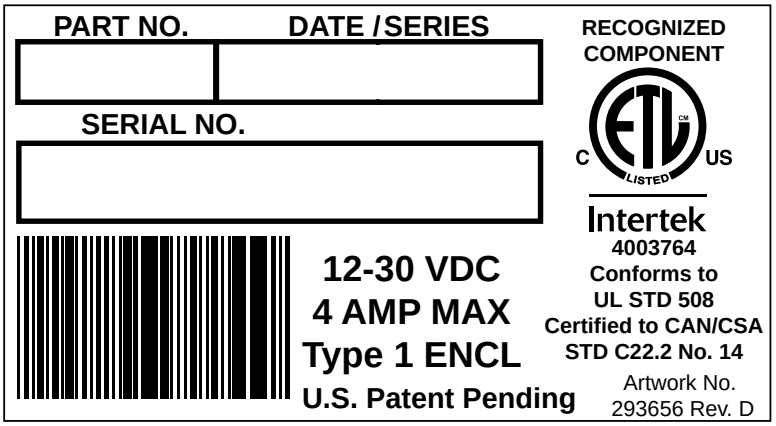


Figure 8 CGM Identification Label

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 symbols refer to procedure-specific risks. When these symbols appear in the body of this manual, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

WARNING




FIRE AND EXPLOSION HAZARD

Flammable fumes, such as solvent and paint fumes, in **work area** can ignite or explode. Paint or solvent through the equipment can cause static sparking. 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 sparking).
- Ground all equipment in the work area. See **Grounding** instructions
- Never spray or flush solvent at high pressure.
- 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.
- 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 Safety Data Sheets (SDSs) for handling instructions and to know the specific hazards of the fluids you are using, including the effects of long-term exposure.
- When spraying, servicing equipment, or when in the work area, always keep work area well-ventilated and always wear appropriate personal protective equipment. See Personal Protective Equipment warnings in this manual.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.

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

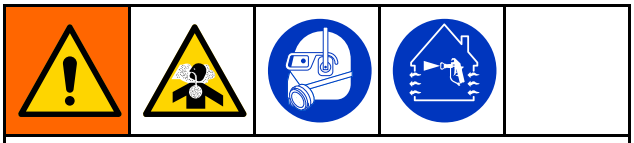
Misuse can cause death or serious injury.

- 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 Specifications** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Specifications** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheets (SDSs) 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 fluids that contain isocyanates creates potentially harmful mists, vapors, and atomized particulates

- Read and understand the fluid manufacturer's warnings and Safety Data Sheet (SDS) to know specific hazards and precautions related to isocyanates.
- Use of isocyanates involves potentially hazardous procedures. Do not spray with the equipment unless you are trained, qualified, and have read and understood the information in this manuals and in the fluid manufacturer's application instructions and SDS.
- Use of incorrectly maintained or mis-adjusted equipment may result in improperly cured material. Equipment must be carefully maintained and adjusted according to instructions in the manual.
- To prevent inhalation of isocyanate mists, vapors, and atomized particulates, everyone in the work area must wear appropriate respiratory protection. Always wear a properly fitting respirator, which may include a supplied-air respirator. Ventilate the work area according to instructions in the fluid manufacturer's SDS.
- Avoid all skin contact with iscocyanates. Everyone in the work area must wear chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority. Follow all fluid manufacturer recommendations, including those regarding handling of contaminated clothing. After spraying, wash hands and face before eating or drinking.

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.

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. 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.

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.

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 59, or Setup Mode Screens, page 67.

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.

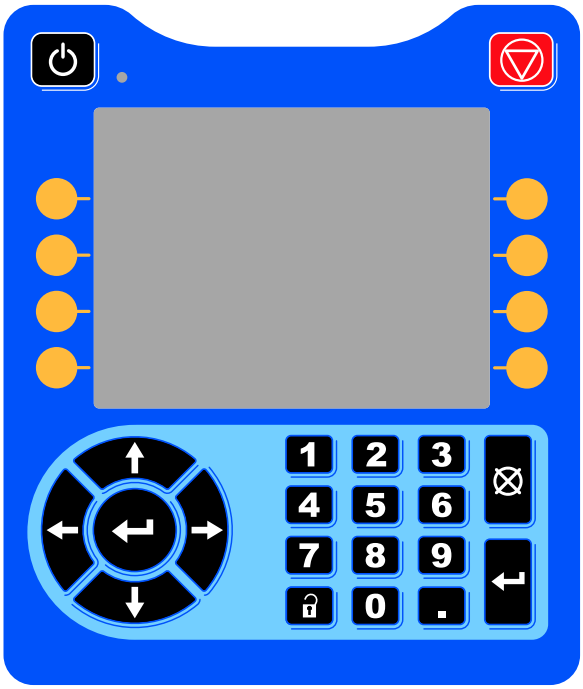


Figure 9 Advanced Display Module

USB Download Procedure

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

1. Enable USB downloads. See Advanced Screen 3, page 92.
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 DISPTEXT.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 PD3K+ 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.

NOTE: If the system configuration settings file was installed, it is recommended to remove the file from the UPLOAD folder on the USB flash drive. This will prevent inadvertently overwriting any future setup changes.

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	• *Left/Right Arrows:* Use to move from screen to screen. • *Up/Down Arrows:* 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 13.
 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.
 Solvent Purge	Press to engage solvent push sequence, when applicable.
 Pre-Fill Pump	Press to mark pump as filled. (Only for applicable pumps.)

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).
 Info	Press to get more information on active system error.
 Troubleshoot	Press to see troubleshooting information for system error.

Key	Function
 QR Code	Press to see QR Code for system error.
 Recipe Page	Press to access additional info for that recipe.

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	1:1 Target Ratio
Recipe Number	Flow Rate
Pressure	Volume
Material A	Material B
Material C	Material D
Material A+B+C	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 19, 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.”

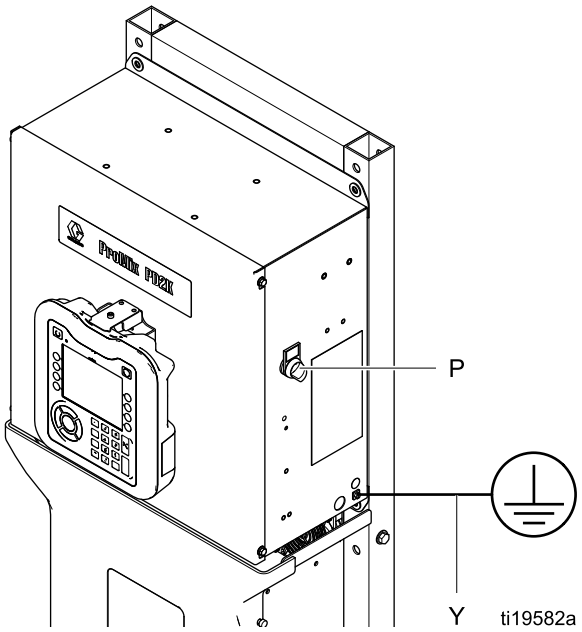


Figure 10 Power Switch

Initial System Setup

1. Change optional setup selections to desired parameters, as described in Setup Mode Screens, page 67.
2. Set recipe and flush information as described in Recipe Screen 1, page 76 and Flush Screen, page 79.

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.

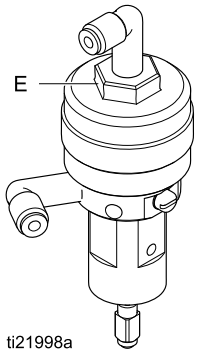


Figure 11 Valve Adjustment

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

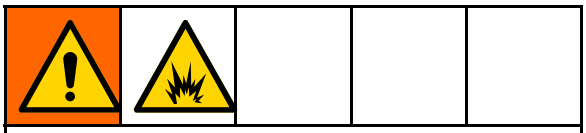
NOTE: The following procedure relieves all fluid and air pressure in the system. Use your control interface to issue the necessary commands to your system.

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. From Maintenance Screen 5 on the ADM, check the box in the field labeled Gun for the color or catalyst in the pump. Trigger the spray device to relieve pressure. Repeat for each pump in the system.
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.

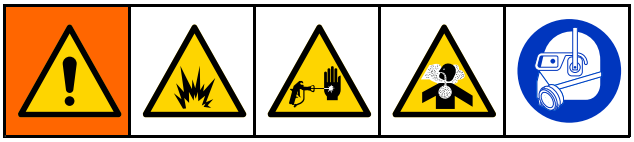
2. Trigger the gun to relieve pressure. From Maintenance Screen 5 on the ADM, check the box in the field labeled Gun for each color in the system, to manually open each color valve.
3. Set the system to Recipe 0 to flush the pumps and to purge to the spray device. Hold the gun trigger open after the solvent valve shuts off to relieve all pressure. When flushing is complete the system will go to Standby.
4. 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.
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.
6. Verify on the ADM Home Screen that neither pump is showing any pressure.

Operation Using Advanced Display Module (ADM)

Prime and Fill the System

NOTE: See Run Mode Screens, page 59, 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 22. 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 1, page 76, and the Flush Screen, page 79.
6. Enable the manual override on System Screen 4.
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, step 8 can be skipped..
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.

Pre-Fill the Pump

NOTE: This option is only available for pumps that have color change valves and only a single material.

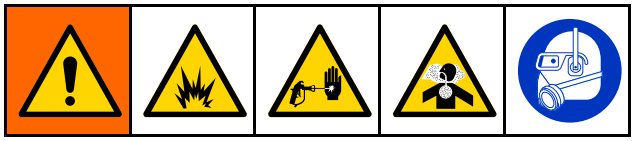
If a pump is filled with a material when the system is powered down, this will allow the user to change the pump's contents, without flushing the pump, the next time power is restored.

1. Enable the manual override on System Screen 4, page 72.
2. Go to the Fill Screen, page 63.
3. Press the Pre-Fill Pump key  . The pump will change from material 61 to the proper color or catalyst.

Spraying

To spray in a multiple color system, also see Multiple Color Systems, page 96.

NOTE: See Run Mode Screens, page 59, 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(s) and the mixed material hose volume(s). The mixed material hose volume is determined by the stage hose length and diameter entered in System Screen 4, page 72, and the remote-to-mix hose length and diameter entered in System Screen 5, page 73.
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, B, C, and D out of the spray device.
3. Turn on atomizing air to the spray device. Check the spray pattern as instructed in your spray device manual.

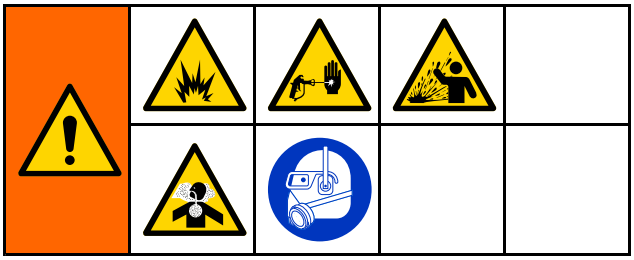
NOTICE

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 96.

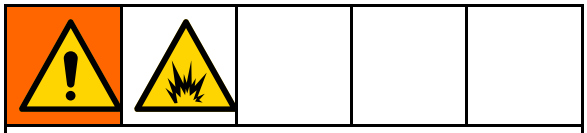
Flush Mixed Material



There are times when you only want to purge the remote mix manifold(s) 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(s), 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.



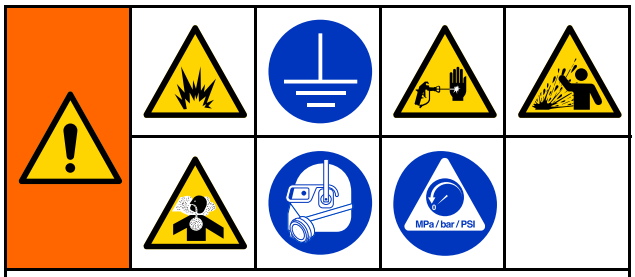
To reduce risk of fire and explosion, if using an electrostatic gun, shut off the electrostatics before flushing the gun.

3. Command the system to Purge. (See Purge Mode Sequence, page 39.) 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.
4. If the system is not completely clean, repeat Step 5.

   NOTE: For optimal efficiency, adjust purge sequence times so only one cycle is required.

NOTE: The remote mix manifold(s) 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 20.
2. Disconnect the component 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 4, page 72.
5. On the ADM, go to the Fill screen. Set the Material to Component A. Press  . 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 Material to Component B. Press  . The system will pump solvent through pump B all the way to the gun.
8. Relieve the pressure. See Pressure Relief Procedure, page 20

Color Change System

1. Relieve the pressure. See Pressure Relief Procedure, page 20.
2. Attach regulated solvent supply lines as follows:
   - **Mix of multiple and single component pumps:** On pumps that have color change, do not disconnect the component supply line from the inlet manifold of the pump. Instead connect a regulated solvent supply line to the designated solvent valve on the component valve manifold. On pumps that do not have color change, disconnect the supply line from the inlet manifold of the pump, and connect a regulated solvent supply line.
   - **Multiple components on all pumps:** Connect regulated solvent supply lines to the designated solvent valves on each of the component 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. Select Component A. Enter the component number in the box to the right.
5. Select the Flush Line box.
6. If the solvent is not already loaded, press the Prime softkey  . The system will prime solvent into the selected pump and out the outlet dump valve.
7. Press the Fill softkey  . The system will flush the selected Component line with the solvent until the user presses Stop  .
8. Hold a metal part of the gun firmly to a grounded metal pail. Trigger the gun until clean solvent dispenses.
9. Repeat for each component line.
10. Relieve the pressure. See Pressure Relief Procedure, page 20

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 20.
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 PD3K+ 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 PD3K+ can be driven by a discrete input *or* network communications. These options need to be configured at the ADM (see System Screen 6, page 73). 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 PD3K+ 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 PD3K+ does not supply power for Discrete I/O. A clear understanding of these inputs is necessary to properly integrate the ProMix PD3K+ 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 12 show where discrete I/O connections are made on the ProMix PD3K+.

Table 3 PD3K+ 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 PD3K+ 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 System Screen 6, page 73 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

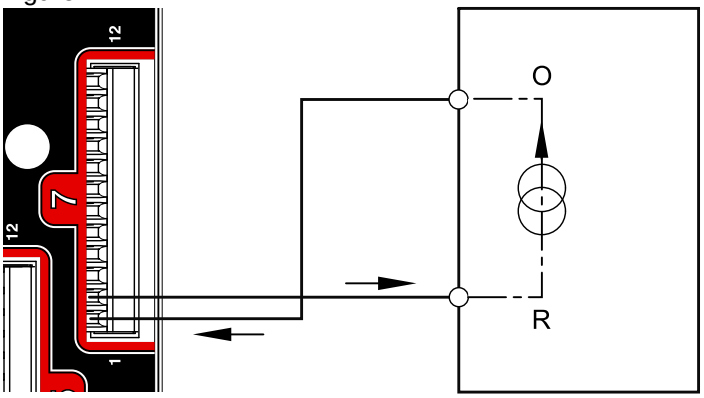
Flow Control Set Point: When enabled, this 4-20mA signal input is used to set and adjust the operating flow control set point. The ProMix PD3K+ scales the set point linearly from 0 to the Max Set Point setting (see System Screen 6, page 73). *Examples*,

- **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 System Screen 6, page 73 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

Figure 12



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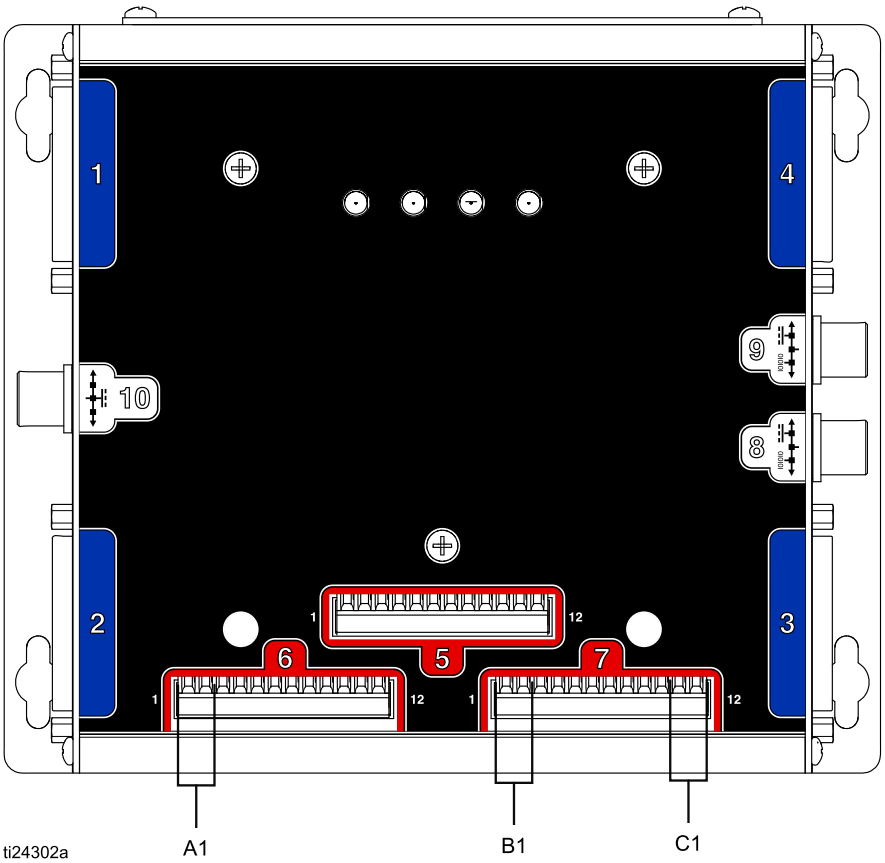
O = Output → EFCM pin 1
R = Return → EFCM pin 2

PD3K+ Discrete Input PLC (4–20 MA Signal)

Discrete I/O Connections on EFCM

Figure 13



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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 PD3K+ system and a selected fieldbus. This linkage provides the means for remote monitoring and control by external automation systems.

CGM Kits

The PD3K+ system does not come with a CGM. It must be purchased separately. The available CGM communication protocols are listed in the tables below.

NOTE: The CGM installation kit is also required for all protocols.

CGM Installation Kit Part No.	Field Bus	Manual
26C284	All	334494

CGM Part No.	Fieldbus	Manual
CGMDN0	DeviceNet	312864
CGMEP0	EtherNet/IP	312864
CGMPN0	PROFINET	312864
24W462	Modbus TCP	334183

Network Communication I/O Data Map

The PD3K+ has PLC Diagnostic Screens built into the software that assist in the system integration process. See Setup Mode Screens, page 67.

ProMix PD3K+ Network Outputs

The ProMix PD3K+ 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 31.

OUTPUT REGISTER 00: Current System Mode

The Current System Mode register contains a number that indicates the current operation mode of the PD3K+ 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: Purge C	The system is purging material C as part of a recipe change.
6	Recipe Change: Purge D	The system is purging material D as part of a recipe change.
7	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.
8	Mix Fill Stage 1	The system is mixing material at ratio through the first mix manifold of the fluid stream.
9	Mix Fill Stage 2	The system is mixing material at ratio through the second mix manifold of the fluid stream.
10	Mix Fill Stage 3	The system is mixing material at ratio through the third mix manifold of the fluid stream.
11	Mix	The system is currently mixing/spraying material.
12	Mix Idle	The system has paused mix operation due to the absence of a gun trigger signal.
13	Purge A	The system is purging material A while in Standby.
14	Purge B	The system is purging material B while in Standby.
15	Purge C	The system is purging material C while in Standby.
16	Purge D	The system is purging material D while in Standby.
17	Standby: Fill Ready	The system has a valid recipe loaded in the pumps, but not in the gun.
18	Standby: Mix Ready	The system has a valid recipe loaded out to the gun.
19	Standby: Mix Not Ready	The system requires that a recipe change operation be completed.
20	Standby: Alarm	The system has an active alarm.
21	Line Filling/Flushing	The system is filling/flushing a color change hose between the outlet valves and remote valves.
22	Pump Prime/Flush	The system is priming/flushing a pump.
23	Maintenance/Calibration	The system is currently in a maintenance or calibration mode.
24	Mix: Solvent Push	The system is currently mixing/spraying with solvent push engaged.

OUTPUT REGISTER 01: Event Flag

The Event Flag register indicates a system error has occurred that requires user acknowledgment. Only system errors of type Alarm or Deviation will require user acknowledgment.

- The value is 0 if there are no new system errors that require acknowledging.
- The value is 1 if there is at least one new system error that requires user acknowledgment.

A system error may be acknowledged at the system's ADM or remotely. See INPUT REGISTER 01: Clear Active Alarm/Deviation in ProMix PD3K+ Network Inputs, page 34.

OUTPUT REGISTER 02: Actual Mix Flow/Pressure

The Actual Mix Flow/Pressure register reports the instantaneous mixing flow rate in cc/min or mixing pressure in PSI. The value displayed will correlate to the Fluid Control setting, see System Screen 6, page 73. If Fluid Control is set to "Flow", this register will display flow rate, if set to "Pressure", this register will display pressure.

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

OUTPUT REGISTERS 03, 04, 05, and 06: Actual Mix Ratio Component A, B, C, and D

The Actual Mix Ratio Component register contains the instantaneous calculated ratio value of that particular component in the current recipe.

- The value reported is the ratio value multiplied by 1000, regardless of the selected ratio format.

Example: Value = 4000 >> Component has a proportional relationship of 4.000 as compared to the other components.

Example (percent ratio formats): Value = 30000 >> Component is 30.000% proportion of total mixed material.

- If a component is not included as part of a recipe, (ratio value of 0) this value will be 0.

These registers are valid only during a mix operation.

OUTPUT REGISTER 07, 08, 09: Actual Mix Potlife Remaining Stage 1, 2, and 3

The Actual Mix Potlife Remaining registers reports the current amount of time remaining in the potlife of the mixed components in seconds, for each stage of the fluid stream, individually.

NOTE: If the potlife time is disabled for any of the mix stages of the fluid stream, or at initial power up of the system, this value will be 0xFFFFFFFF.

OUTPUT REGISTER 10: Gun Trigger Input Status

The Gun Trigger Input Status register contains the status of the Gun Trigger Discrete Inputs for guns 1, 2, and 3, as applicable. The register is formatted as a bit vector with bits 0, 1, and 2 representing gun trigger inputs 1, 2, and 3, respectively.

- A bit value of 0 indicates the input is OPEN (gun not triggered).
- A bit value of 1 indicates the input is CLOSED (gun triggered).

Example: *A value of 3 (Bit 2 = 0, Bit 1 = 1, Bit 0 = 1) >> Gun 1 and 2 are triggered, but Gun 3 is not triggered.*

NOTE: If the system is not using multiple guns, this value will only change between 0 and 1.

This data register is valid only for systems configured to use discrete inputs for gun triggers. See Gun Trigger Signal on System Screen 6, page 73.

OUTPUT REGISTER 11: Active Gun

The Active Gun register indicates which gun is currently in use or was last in use.

NOTE: This register will always be equal to 1 if not using multiple guns

OUTPUT REGISTER 12: Job Number

The Job Number register will show the number of the current job.

OUTPUT REGISTER 13: Job Total Sprayed Volume

The Job Total Sprayed Volume reports the total volume of sprayed material during the current job in cc. The total is the sum of components A, B, C, and D.

OUTPUT REGISTER 14: Job Solvent Volume

The Job Solvent Volume reports the total solvent volume that has been dispensed during the current job, in cc.

OUTPUT REGISTER 15: 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 24.

OUTPUT REGISTER 16: Active Recipe Number

The Active Recipe Number register contains the number of the active recipe (1 – 40).

- 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 17: Active Recipe Material A

The Active Recipe Material A register contains the number of the component (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 18: Active Recipe Material B

The Active Recipe Material B data register contains the number of the component (31 – 38) 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 value is 0 for Component B.

OUTPUT REGISTER 19: Active Recipe Material C

The Active Recipe Material C register contains the number of the component (39 – 46) that is associated with the current recipe.

- The value is 0 if the system was flushed.
- The value is 61 if the current recipe is invalid or at initial startup.
- The value is 0 if the current recipe ratio value is 0 for component C.

OUTPUT REGISTER 20: Active Recipe Material D

The Active Recipe Material D register contains the number of the component (47 – 54) that is associated with the current recipe.

- The value is 0 if the system was flushed.
- The value is 61 if the current recipe is invalid or at initial startup.
- The value is 0 if the current recipe ratio value is 0 for component D.

OUTPUT REGISTER 21, 22, 23, and 24: Active Recipe Ratio Set Point

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

- The value reported is the ratio value multiplied by 1000, regardless of the selected ratio format.

Example: Value = 4000 >> Component has a proportional relationship of 4.000 as compared to the other components.

Example (percent ratio formats): Value = 30000 >> Component is 30.000% proportion of total mixed material.

- If a component is not included as part of a recipe, (ratio value of 0) this value will be 0.

OUTPUT REGISTERS 25, 26, 27, and 28: 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 06: Flush/Prime Pump Command in ProMix PD3K+ Network Inputs, page 34.

Table 4 Pump States for Output Registers 25–28

Number	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 29: Actual Pump 1 Flow Rate

OUTPUT REGISTER 30: Actual Pump 2 Flow Rate

OUTPUT REGISTER 31: Actual Pump 3 Flow Rate

OUTPUT REGISTER 32: Actual Pump 4 Flow Rate

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

OUTPUT REGISTER 33: Actual Pump 1 Fluid Pressure

OUTPUT REGISTER 34: Actual Pump 2 Fluid Pressure

OUTPUT REGISTER 35: Actual Pump 3 Fluid Pressure

OUTPUT REGISTER 36: Actual Pump 4 Fluid Pressure

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

OUTPUT REGISTERS 37 – 45: DCS Command Structure

See Dynamic Command Description, page 47.

Network Output Data Map (Read Only)

Network Output ID	Modbus Register	Parameter Name	Data Type	Units	Range
0000	41000	Current System Mode	uint32	NONE	1 = Pump Off 2 = Color Change 3 = Color Change: Purge A 4 = Color Change: Purge B 5 = Color Change: Purge C 6 = Color Change: Purge D 7 = Color Change: Fill 8 = Mix Fill: Stage 1 9 = Mix Fill: Stage 2 10 = Mix Fill: Stage 3 11 = Mix 12 = Mix Idle 13 = Purge A 14 = Purge B 15 = Purge C 16 = Purge D 17 = Standby: Mix Fill Ready 18 = Standby: Mix Ready 19 = Standby: Mix Not Ready 20 = Standby: Alarm 21 = Line Filling/Flushing 22 = Pump Prime/Flush 23 = Maintenance/Calibration 24 = Mix: Solvent Push
0001	41002	Event Flag	uint32	NONE	0 = No Events 1 = New Event
0002	41004	Actual Mix Flow/Pressure	uint32	cc/min or PSI	1 - 3000
0003	41006	Actual Mix Ratio Component A	uint32	NONE	0 - 100000
0004	41008	Actual Mix Ratio Component B	uint32	NONE	0 - 100000

Network Output ID	Modbus Register	Parameter Name	Data Type	Units	Range
0005	41010	Actual Mix Ratio Component C	uint32	NONE	0 - 100000
0006	41012	Actual Mix Ratio Component D	uint32	NONE	0 - 100000
0007	41014	Actual Mix Potlife Remaining Stage 1	uint32	sec	0 – 59940
0008	41016	Actual Mix Potlife Remaining Stage 2	uint32	sec	0 – 59940
0009	41018	Actual Mix Potlife Remaining Stage 3	uint32	sec	0 – 59940
0010	41020	Gun Trigger Input Status	uint32	NONE	0 := Gun not triggered 1 := Gun triggered
0011	41022	Active Gun	uint32	NONE	1 - 3
0012	41024	Job Number	uint32	NONE	0 - 9999
0013	41026	Job Total Sprayed Volume	uint32	cc	0 - 999999999
0014	41028	Job Solvent Volume	uint32	cc	0 - 999999999
0015	41030	Safety Interlock Input Status	uint32	NONE	0 := Open 1:= Closed
0016	41032	Active Recipe Number	uint32	NONE	0 - 40, 61
0017	41034	Active Recipe Material A	uint32	NONE	0, 1 - 30, 61
0018	41036	Active Recipe Material B	uint32	NONE	0, 31 - 38, 61
0019	41038	Active Recipe Material C	uint32	NONE	0, 39 - 46, 61
0020	41040	Active Recipe Material D	uint32	NONE	0, 47 - 54, 61
0021	41042	Active Recipe Ratio Set Point Component A	uint32	NONE	0 - 100000
0022	41044	Active Recipe Ratio Set Point Component B	uint32	NONE	0 - 100000
0023	41046	Active Recipe Ratio Set Point Component C	uint32	NONE	0 - 100000
0024	41048	Active Recipe Ratio Set Point Component D	uint32	NONE	0 - 100000
0025	41050	Pump 1 Status	uint32	NONE	0 = Off 1 = Standby 2 = Busy 3 = Flushing 4 = Priming

Network Output ID	Modbus Register	Parameter Name	Data Type	Units	Range
0026	41052	Pump 2 Status	uint32	NONE	0 = Off 1 = Standby 2 = Busy 3 = Flushing 4 = Priming
0027	41054	Pump 3 Status	uint32	NONE	0 = Off 1 = Standby 2 = Busy 3 = Flushing 4 = Priming
0028	41056	Pump 4 Status	uint32	NONE	0 = Off 1 = Standby 2 = Busy 3 = Flushing 4 = Priming
0029	41058	Actual Pump 1 Flow Rate	uint32	cc/min	0 - 1000
0030	41060	Actual Pump 2 Flow Rate	uint32	cc/min	0 - 1000
0031	41062	Actual Pump 3 Flow Rate	uint32	cc/min	0 - 1000
0032	41064	Actual Pump 4 Flow Rate	uint32	cc/min	0 - 1000
0033	41066	Actual Pump 1 Fluid Pressure	uint32	PSI	0 - 1500
0034	41068	Actual Pump 2 Fluid Pressure	uint32	PSI	0 - 1500
0035	41070	Actual Pump 3 Fluid Pressure	uint32	PSI	0 - 1500
0036	41072	Actual Pump 4 Fluid Pressure	uint32	PSI	0 - 1500
0037	42000	Command Return 0	uint32	N/A	N/A
0038	42002	Command Return 1	uint32	N/A	N/A
0039	42004	Command Return 2	uint32	N/A	N/A
0040	42006	Command Return 3	uint32	N/A	N/A
0041	42008	Command Return 4	uint32	N/A	N/A
0042	42010	Command Return 5	uint32	N/A	N/A
0043	42012	Command Return 6	uint32	N/A	N/A
0044	42014	Command Return 7	uint32	N/A	N/A
0045	42016	Command Acknowledge	uint32	NONE	0 := NOP 1 = BUSY 2 = ACK 3 = NAK 4 = ERR

ProMix PD3K+ Network Inputs

The ProMix PD3K+ 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 PD3K+. 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 PD3K+ 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 PD3K+ system to initiate a particular operation. Some operation modes may be initiated only under certain conditions (see Figures 5 – 9 for details).

Input Value	Operation Mode	Description
0	No OP	The system takes no action.
1	Power Pumps	The system powers on or powers off the pumps.
2	Remote Stop	The system stops all current operations and turns off power to the pumps.
3	Recipe Change	The system initiates a recipe change. (See also Register 2.)
4	Mix Fill	The system fills the mix manifold(s) and gun with material at ratio for a valid recipe.
5	Mix	The system initiates a mix/spray cycle.
6	Purge A	The system purges only Material A out through the gun.
7	Purge B	The system purges only Material B out through the gun.
8	Purge C	The system purges only Material C out through the gun.
9	Purge D	The system purges only Material D out through the gun.
10	Standby	The system puts all active pumps into Standby mode.
11	Recipe Purge	The system automatically determines the purge sequence required based on the loaded recipe.
12	Solvent Purge	The system initiates the solvent push sequence while mixing/spraying.

INPUT REGISTER 01: Clear Active Alarm/Deviation

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 97 for more information on clearing alarms.)

NOTE: This register is not polled by the ProMix PD3K+. 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 02: 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 40 can be written to this register. However, a recipe must be enabled via the ADM before it can be loaded. See Recipe Screen 1, page 76.

NOTE: Writing to this register does not trigger a recipe change. *See Color Change Sequence, page 43.*

INPUT REGISTER 03: Mix Control Set Point

The Mix Control Set Point register is used to set and adjust the mixing fluid control set point. 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 2000 cc/min for a 3K recipe, and between 5 and 1600 for a 2K recipe. See Fluid Control on System Screen 6, page 73.
- 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 6, page 73.

NOTE: The Flow Control must be configured to 'Network' via System Screen 6 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 24.

INPUT REGISTER 04: Mix Fill Set Point

The Mix Fill Set Point register is used to set an alternate control set point for filling the mix portions of the fluid hoses faster. The same ranges apply as INPUT REGISTER 03.

INPUT REGISTER 05: 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 06 below) to independently prime or flush an inactive pump.

- Write a value between 1 and 10 if flushing a pump.
- Write a value between 1 and 30 if priming a pump with Component A.
- Write a value between 31 and 38 if priming a pump with Component B.
- Write a value between 39 and 46 if priming a pump with Component C.
- Write a value between 47 and 54 if priming a pump with Component D.

NOTE: It is important that the user know which material is assigned to each pump. An invalid selection will be ignored by the ProMix PD3K+.

Input Value	Operation Mode	Description
0	No OP	The system takes no action.
1	Flush Pump 1	Flush Pump 1 using selected sequence.
2	Prime Pump 1	Prime Pump 1 using selected material.
3	Flush Pump 2	Flush Pump 2 using selected sequence.
4	Prime Pump 2	Prime Pump 2 using selected material.
5	Flush Pump 3	Flush Pump 3 using selected sequence.
6	Prime Pump 3	Prime Pump 3 using selected material.
7	Flush Pump 4	Flush Pump 4 using selected sequence.
8	Prime Pump 4	Prime Pump 4 using selected material.
9	Fill Line	Run selected material from the pump and out the gun.
10	Flush Line	Run solvent through hoses for selected material from the pump and out the gun.
11	Stop Line Fill/Flush	Stop Line Fill/Flush command.

INPUT REGISTER 06: 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 05) 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 25 – 28).

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.

This register can also be used to fill or flush a specific material hose.

INPUT REGISTER 07: Job Complete

The Job Complete register is used to log the current job remotely. Write a '1' to the register to command the ProMix PD3K+ to flag a job complete.

(See Usage Screen, page 65 for more information on Job Logs and Job Complete.)

NOTE: This register is not polled by the ProMix PD3K+. 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.*

* It is recommended to wait at least 500 msec for the PD3K+ to process before resetting to '0'.

INPUT REGISTER 08: Gun Trigger State

The Gun Trigger State register is used to signal the ProMix PD3K+ when an 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.

The register is formatted as a bit vector with bits 0, 1, and 2 representing gun trigger inputs 1, 2, and 3, respectively.

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 bit 0, 1, or 2 to signal gun 1, 2, or 3 is triggered, respectively.
- Write a value of '0' to bit 0, 1, or 2 to signal gun 1, 2, or 3 is NOT triggered, respectively.

NOTE: This register is used only if the Gun Trigger is set to 'Network' via System Screen 6 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 24.

NOTE: Because timing is so critical for flow control, Graco recommends that users provide a discrete input to minimize latency effects.

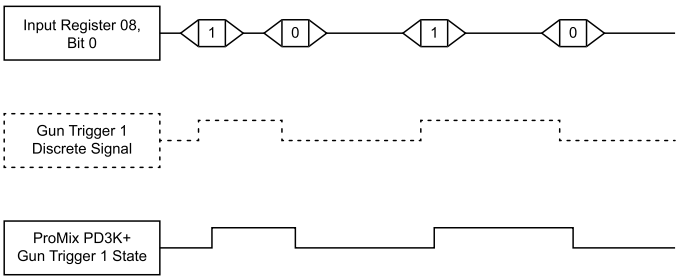


Figure 14 Gun Trigger Timing (Network and Discrete Signals Shown

INPUT REGISTER 9: Set Active Gun

The Set Active Gun register allows for remotely changing between guns for purging or spraying.

NOTE: If the system is not configured for more than 1 gun, this register is ignored.

INPUT REGISTERS 10 – 17: DCS Command Structure

See Dynamic Command Description, page 47.

Network Input Data Map (Write/Read)

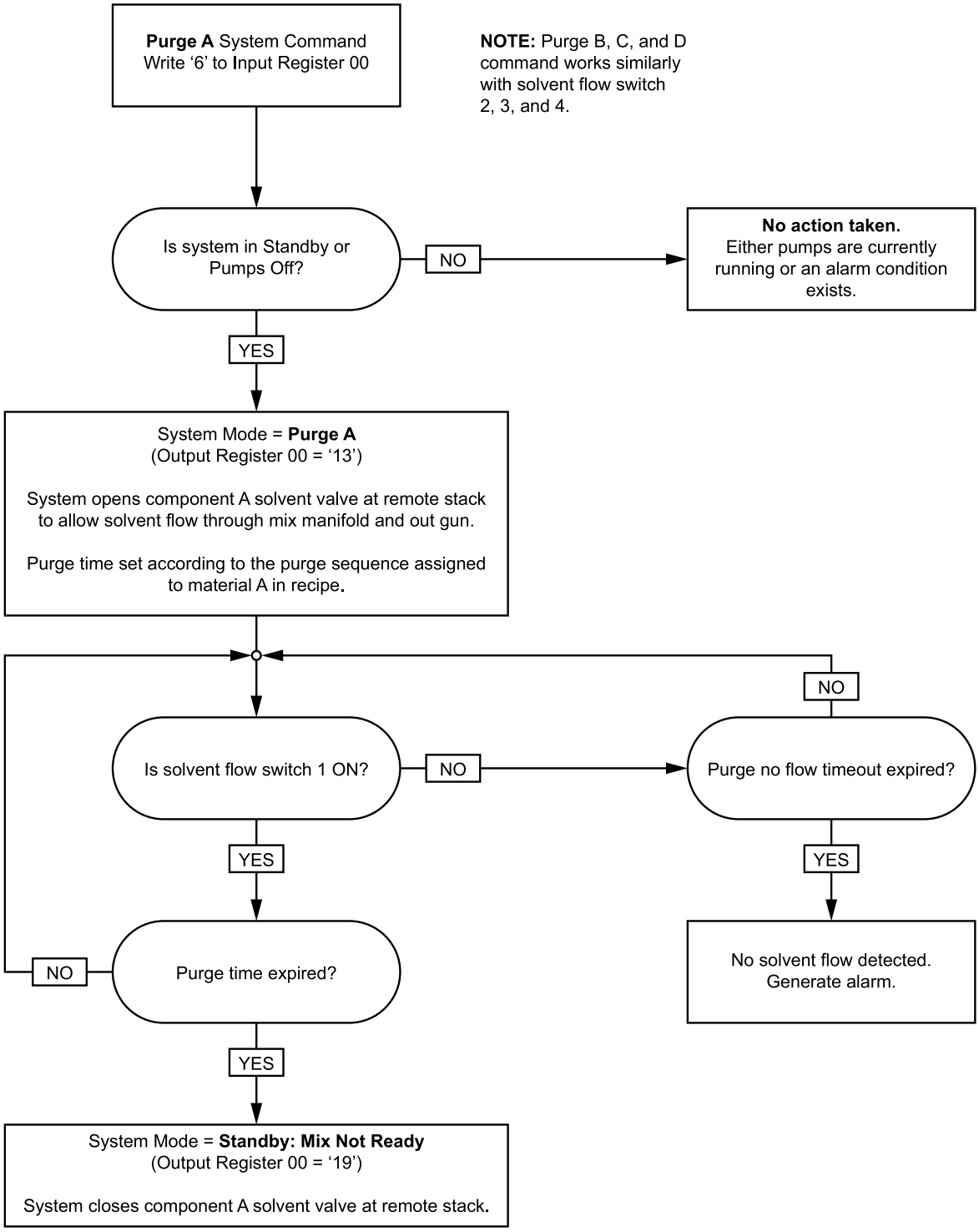
Network Input ID	Modbus Register	Parameter Name	Data Type	Units	Range
0000	41100	System Mode Command	uint32	NONE	0 = No OP 1 = Power Pumps 2 = Remote Stop 3 = Recipe Change 4 = Mix Fill 5 = Mix 6 = Purge A 7 = Purge B 8 = Purge C 9 = Purge D 10 = Standby 11 = Recipe Purge 12 = Solvent Push
0001	41102	Clear Active Alarm/Deviation	uint32	NONE	1 = Clear Active Alarm/Deviation
0002	41104	Goto Recipe Number	uint32	NONE	0, 1 - 40
0003	41106	Mix Control Set Point	uint32	cc/min or PSI	1 - 2000
0004	41108	Mix Fill Set Point	uint32	cc/min or PSI	1 - 2000
0005	41110	Pump Flush Sequence #/Prime Material #	uint32	NONE	1 - 10, 1 - 54
0006	41112	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 9 = Fill Line 10 = Flush Line 11 = Stop Line Fill/Flush
0007	41114	Job Complete	uint32	NONE	1 := Trigger job complete
0008	41116	Gun Trigger State	uint32	NONE	0 = Gun not triggered 1 = Gun triggered
0009	41118	Set Active Gun	uint32	NONE	1 - 3

Network Input ID	Modbus Register	Parameter Name	Data Type	Units	Range
0010	42100	Command Argument 0	uint32	NONE	N/A
0011	42102	Command Argument 1	uint32	NONE	N/A
0012	42104	Command Argument 2	uint32	NONE	N/A
0013	42106	Command Argument 3	uint32	NONE	N/A
0014	42108	Command Argument 4	uint32	NONE	N/A
0015	42110	Command Argument 5	uint32	NONE	N/A
0016	42112	Command Argument 6	uint32	NONE	N/A
0017	42114	Command ID	uint32	NONE	See Command Table

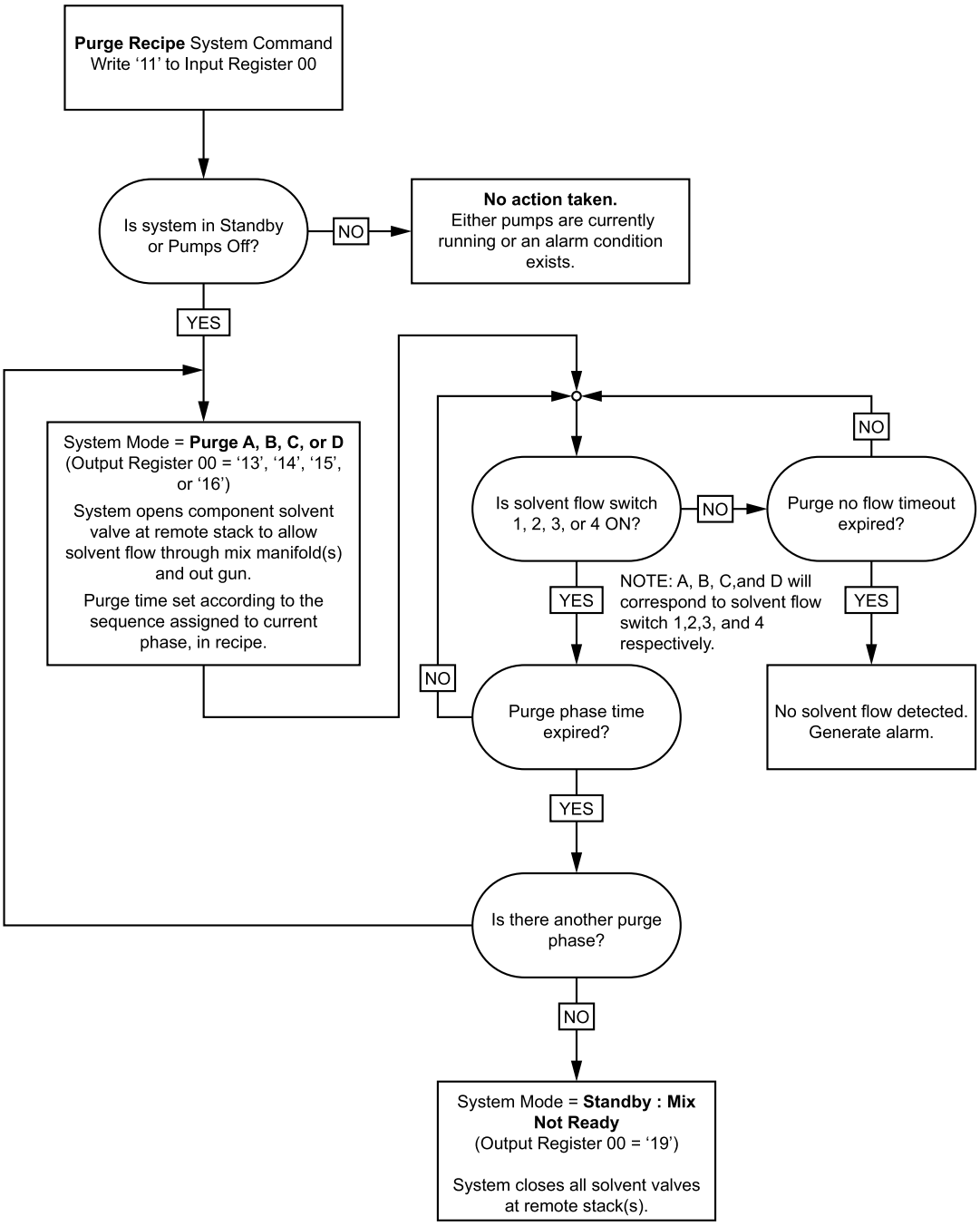
DCS Register

Operation Flow Charts

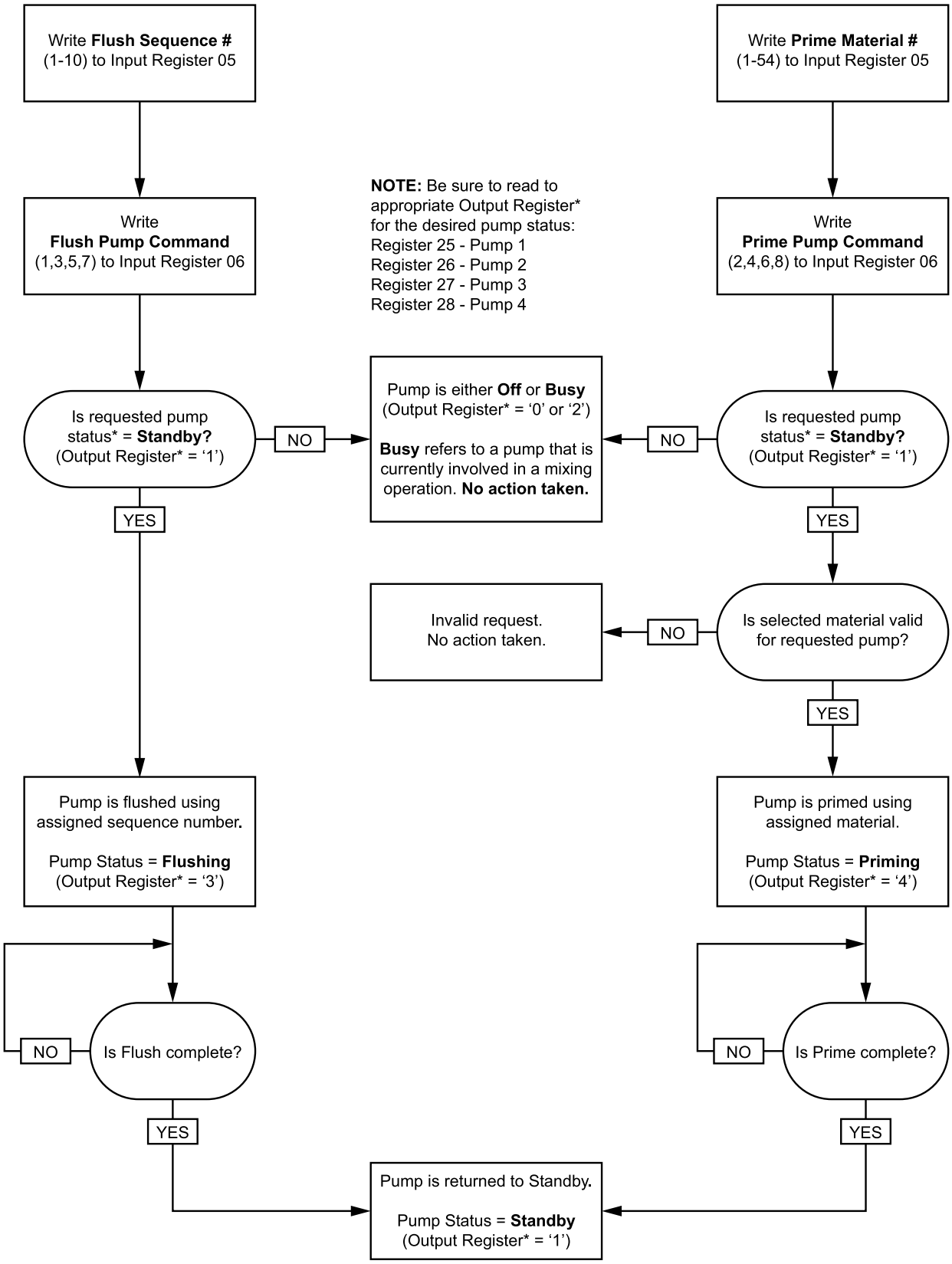
Purge Mode Sequence



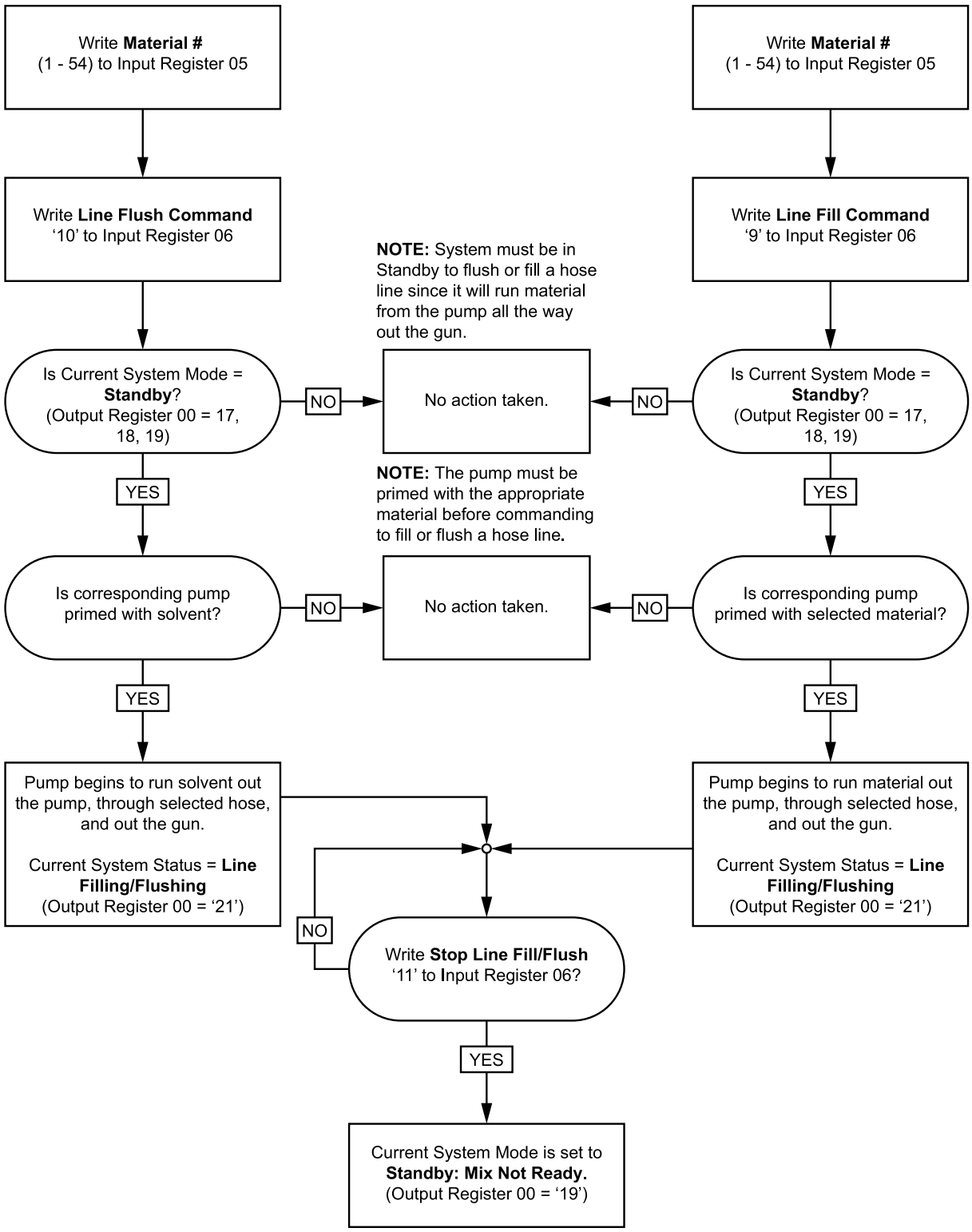
Purge Recipe Sequence



Inactive Pump Flush and Prime Sequences

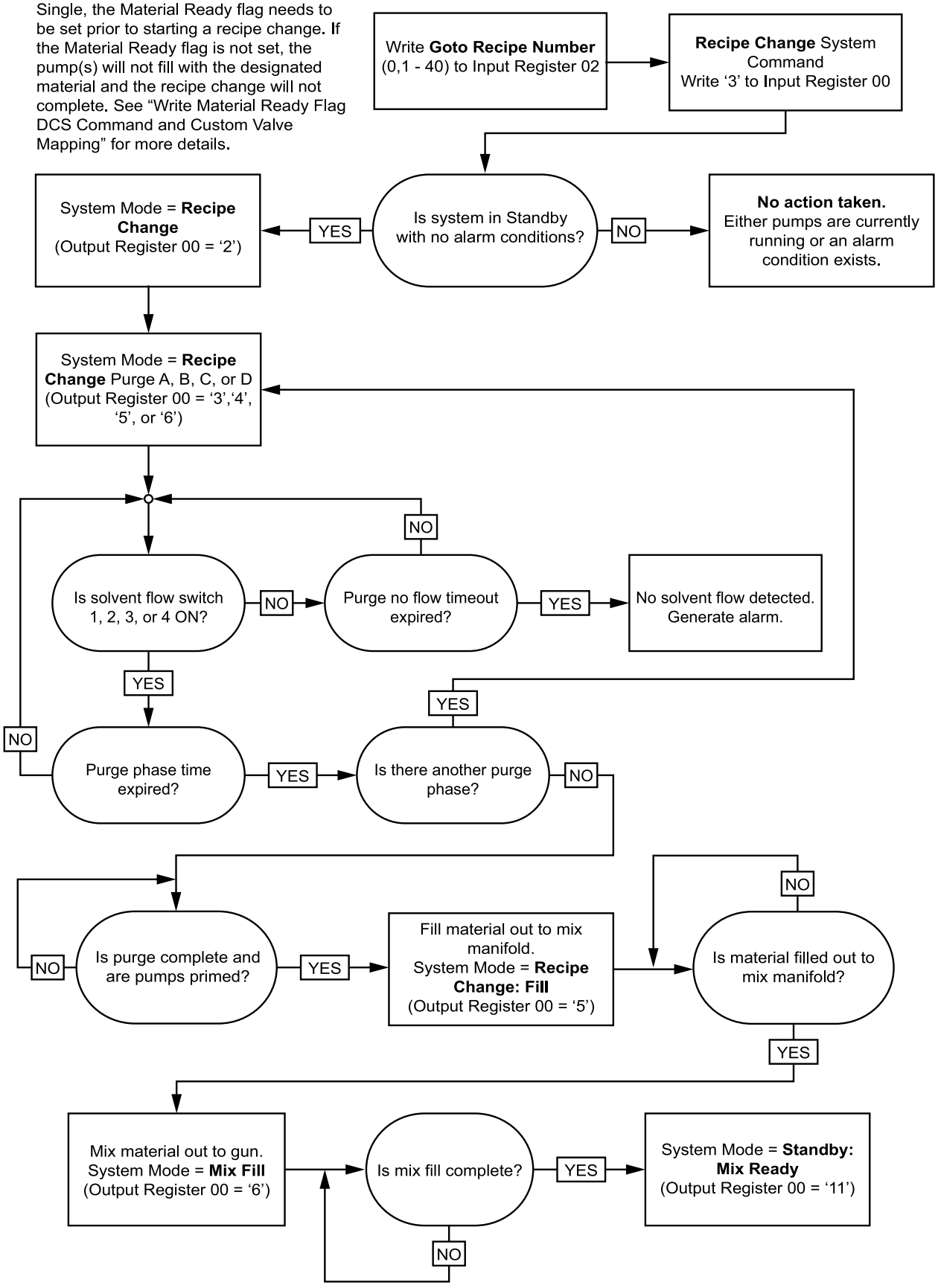


Line Fill and Flush Sequences

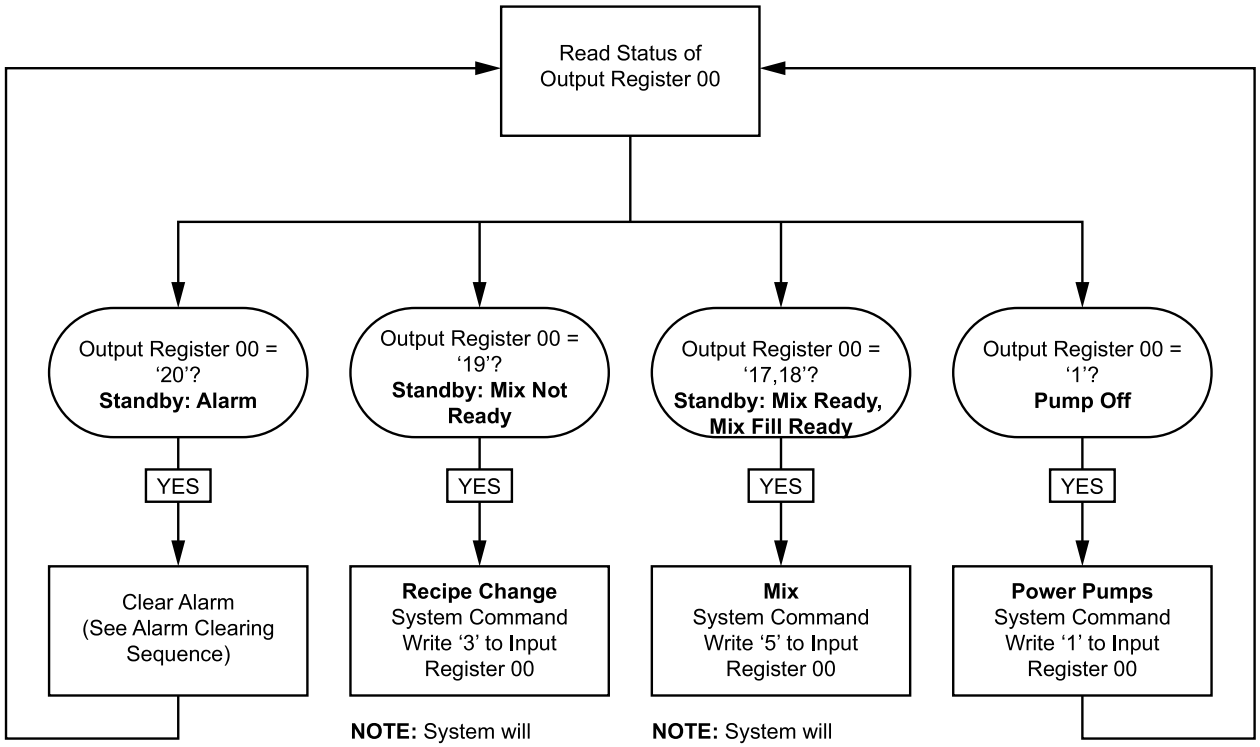


Color Change Sequence

NOTE: If the Inlet stack is set to Single, the Material Ready flag needs to be set prior to starting a recipe change. If the Material Ready flag is not set, the pump(s) will not fill with the designated material and the recipe change will not complete. See "Write Material Ready Flag DCS Command and Custom Valve Mapping" for more details.



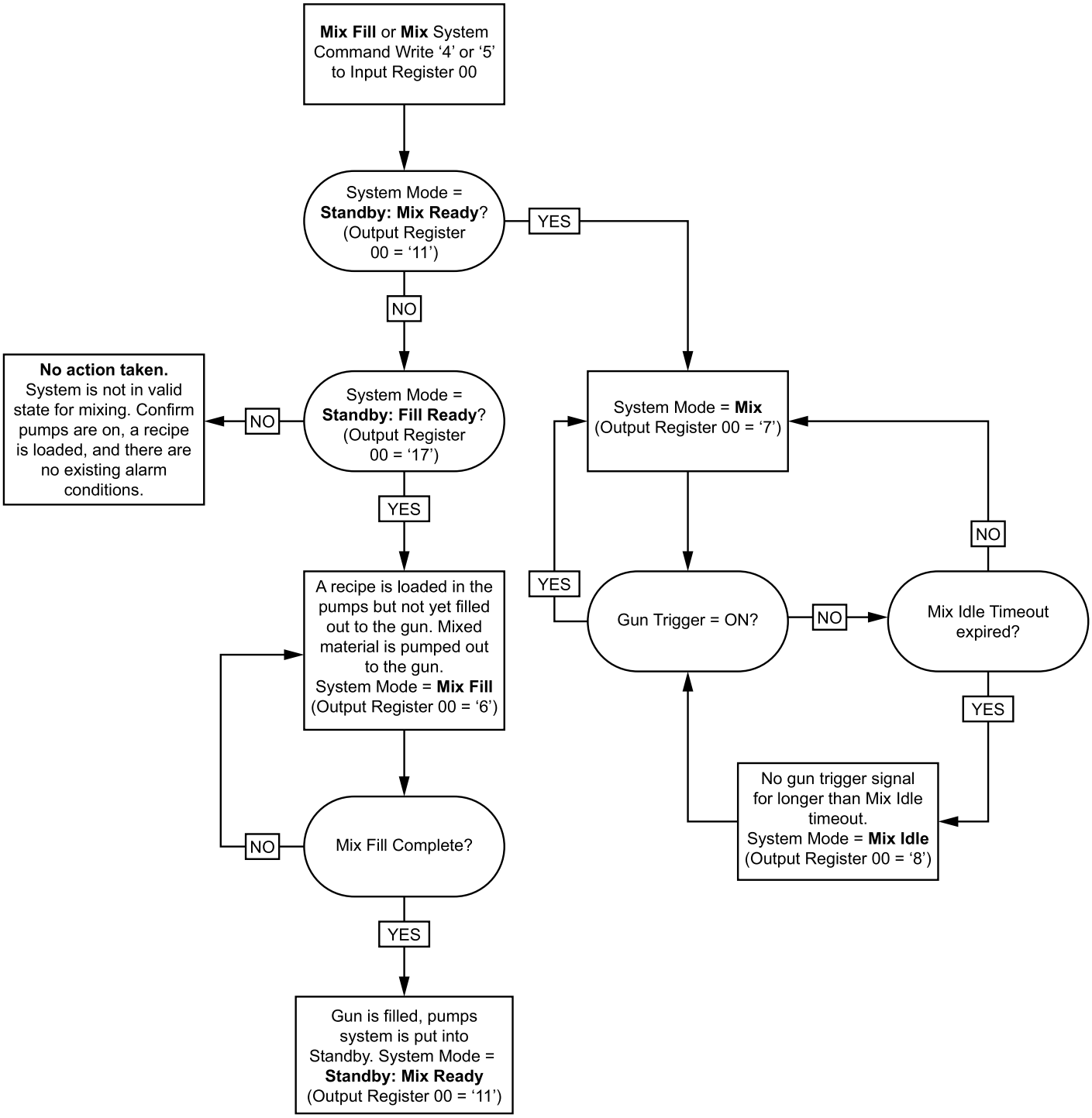
Recipe Change Alarm Recovery Sequences



NOTE: System will automatically run through necessary recipe change steps based on it's current state. If **Goto Recipe Number** has not changed, it does not have to be rewritten here.

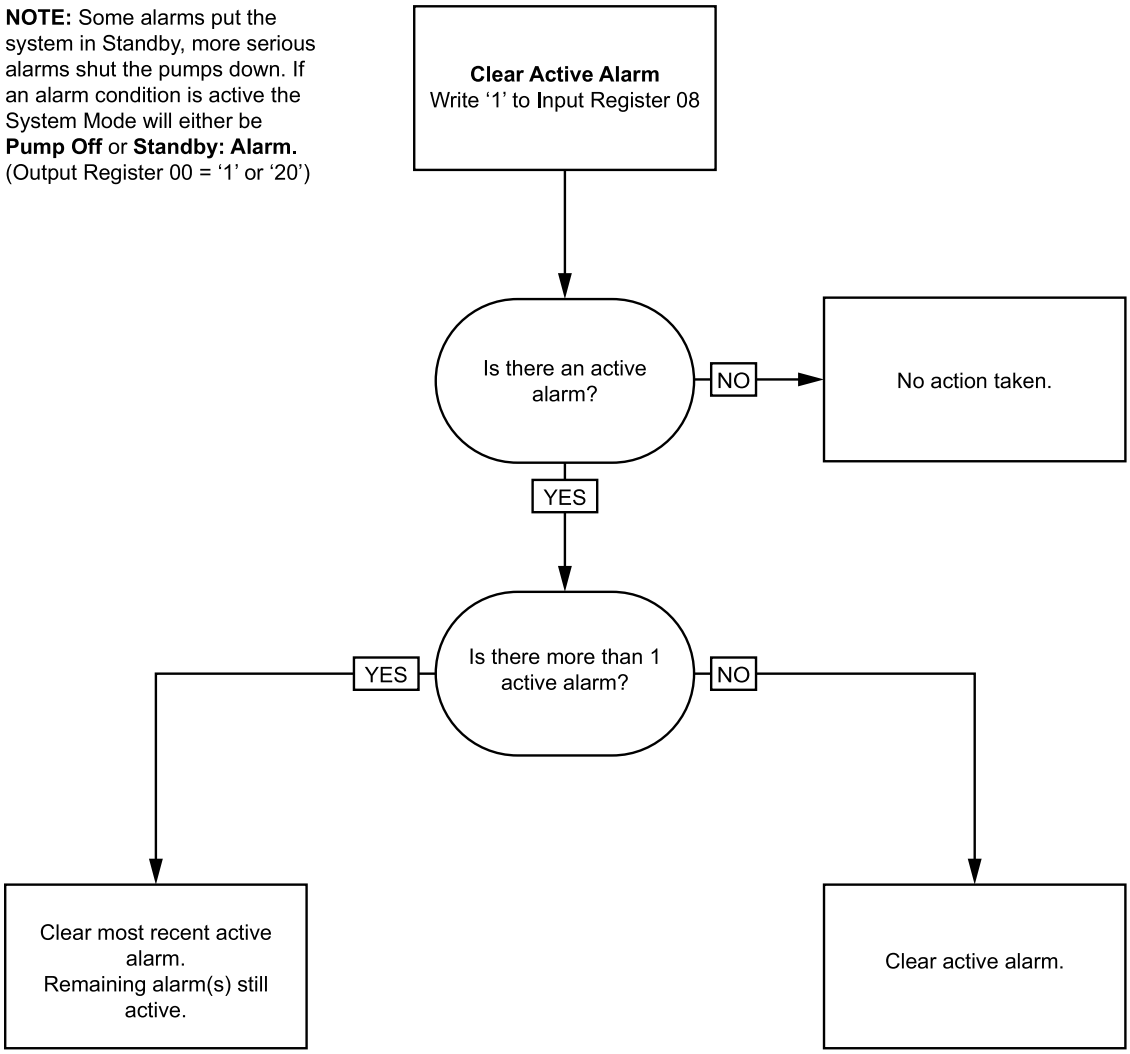
NOTE: System will automatically perform Mix Fill if it needs to be completed before transitioning directly into Mix mode.

Mixing Sequence



Alarm Clearing Sequence

NOTE: Some alarms put the system in Standby, more serious alarms shut the pumps down. If an alarm condition is active the System Mode will either be **Pump Off** or **Standby: Alarm.** (Output Register 00 = ‘1’ or ‘20’)



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 37 and Network Output Data Map (Read Only), page 31.

Use the following sequence for the DCS.

1. Write the appropriate command arguments to INPUT REGISTERS 10 – 16. 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 17.
3. The ProMix PD3K+ will respond to a valid command by writing a 2 (Acknowledge) to OUTPUT REGISTER 45.
4. The ProMix PD3K+ will write appropriate return values to OUTPUT REGISTERS 37 – 44.

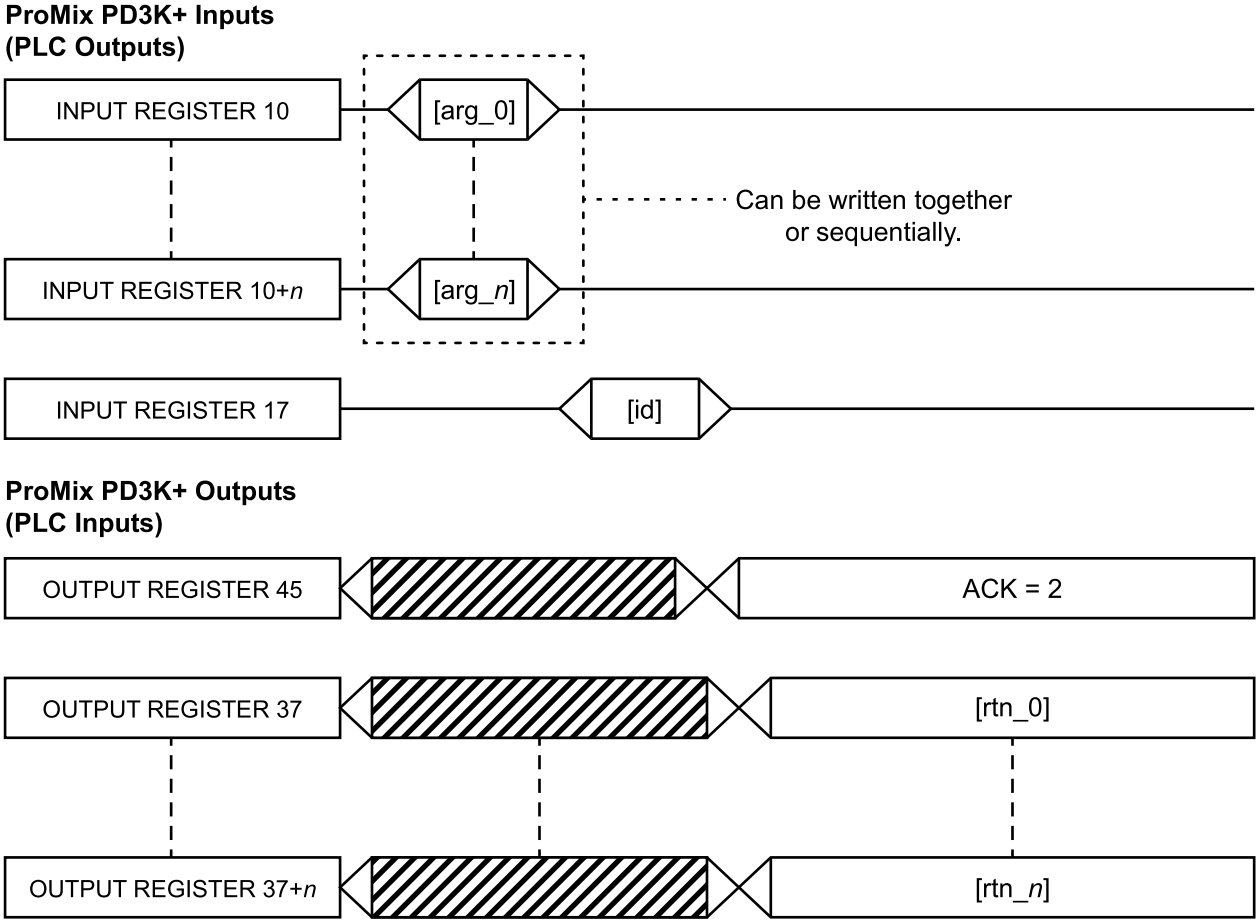


Figure 15 Dynamic Command Structure Timing

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 Fluid Control Mode
4	Write Material Ready Flag
10	Read User ID
11	Read Recipe
12	Read Fluid Control Mode
13	Read Job Info
14	Read Alarm Info
15	Read Event Info
16	Read Gun Potlife Time
18	Read Pump Material
19	Read Gun Contents
22	Read Grand Totals

Write User ID

The Write User ID command allows users to assign a User ID to a Job Log. See Usage Screen, page 65, 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 PD3K+.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Write User ID	uint32	NONE	1	0 - 19
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 component selections of a recipe remotely. See Recipe Screen 1, page 76, 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 Component A = 2, Component B = 1, Component C = 2.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Write Recipe	uint32	NONE	2	0 - 19
Argument 0	Recipe Number	uint32	NONE	6	0 - 40
Argument 1	Component A	uint32	NONE	2	0 – 30
Argument 2	Component B	uint32	NONE	31	0, 31 – 38
Argument 3	Component C	uint32	NONE	40	0, 39 - 46
Argument 4	Component D	uint32	NONE	N/A	0, 47 - 54
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Recipe Number	uint32	NONE	6	0 - 40
Return 1	Component A	uint32	NONE	2	0 – 30
Return 2	Component B	uint32	NONE	31	0, 31 – 38
Return 3	Component C	uint32	NONE	40	0, 39 - 46
Return 4	Component D	uint32	NONE	N/A	0, 47 - 54
Return 5	Recipe Gun Assignment*	uint32	NONE	1	1 - 3

* Only used when Multiple Guns is enabled.

Write Fluid Control Mode

The Write Fluid Control Mode command allows users to remotely change Fluid Control between ‘Flow’ and ‘Pressure’. See System Screen 6, page 73, 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	3	0 - 19
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

Write Material Ready Flag

The Write Material Ready Flag command is used to signal to the PD3K+ that the upstream material management has the appropriate component loaded at the inlet valve stack(s) of the pump(s) prior to a recipe change. This flag is only used when multiple materials for a pump are fed to the PD3K+ via a single valve at the inlet valve stack (i.e. a piggable system). See Custom Valve Mapping, page 84 for more info on Single inlet valve stacks.

NOTE: This flag should be cleared prior to or during a material change operation upstream of the inlet valve stack to avoid having the wrong material being fed into the pump during a recipe change.

Example: Setting the Material Ready Flag for Pump 1.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Write Material Ready Flag	uint32	NONE	6	0 - 19
Argument 0	Material Ready Status	uint32	NONE	1	0 := Not Ready/No OP 1 := Material Ready
Argument 1	Pump Number	uint32	NONE	1	1 - 4
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Mix Fill Set Point	uint32	NONE	1	0 := Not Ready/No OP 1 := Material Ready
Return 1	Pump Number	uint32	NONE	1	1 - 4

Read User ID

The Read User ID command reads back the current User ID. See Usage Screen, page 65, 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 - 19
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 component selections 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 Component A = 3, Component B = 2 (32), Component C = 1 (39).

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read Recipe	uint32	NONE	11	0 - 19
Argument 0	Recipe #	uint32	NONE	5	0 - 40
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Recipe #	uint32	NONE	5	0 - 40
Return 1	Component A	uint32	NONE	3	0 - 30, 61
Return 2	Component B	uint32	NONE	32	0, 31 - 38, 61
Return 3	Component C	uint32	NONE	39	0, 39 - 46, 61
Return 4	Component D	uint32	NONE	N/A	0, 47 - 54, 61
Return 5	Recipe Gun Assignment	uint32	NONE	1	1 - 3

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	12	0 - 19
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 65, 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	13	0 - 19
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 - 40, 61
Return 4	Total Sprayed 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 PD3K+. 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 97, 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	14	0 - 19
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 PD3K+. 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	15	0 - 19
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

Read Gun Potlife Time

The Read Gun Potlife Time command returns the remaining potlife time, in seconds, for a selected gun if it is currently loaded and mixed. This command is particularly useful if Multiple Guns is enabled. See Appendix B: Multiple Guns, page 118 .

NOTE: This command will return 0xFFFFFFFF if there is no potlife time associated with the recipe or the timer has not started.

Example: Read Gun 1 potlife time remaining that is currently “12 minutes” for Stage 1 and “15 minutes” for Stage 2.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read Gun Potlife Time	uint32	NONE	16	0 - 19
Argument 0	Gun Number	uint32	NONE	1	1 - 3
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Gun Number	uint32	NONE	1	1 - 3
Return 1	Potlfe Time Remaining Stage 1	uint32	sec	720	0 - 60000
Return 2	Potlfe Time Remaining Stage 2	uint32	sec	900	0 - 60000
Return 3	Potlfe Time Remaining Stage 3	uint32	sec	0xFFFFFFFF	0 - 60000

Read Pump Material

The Read Pump Material command returns the material number of the color or catalyst that is currently loaded in a user-specified pump.

NOTE: This command will return ‘0’ if the pump is filled with solvent, or ‘61’ if the material is unknown.

Example: Read what material is loaded in pump 1, which is currently color 2.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read Pump Material	uint32	NONE	18	0 - 19
Argument 0	Pump Number	uint32	NONE	1	1 - 4
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Pump Number	uint32	NONE	1	1 - 4
Return 1	Material Number	uint32	NONE	2	0 - 54, 61

Read Gun Contents

The Read Gun Contents command returns the recipe number of the mixed material that is currently loaded in a user-specified gun. This command is used if Multiple Guns are enabled. See Appendix B: Multiple Guns, page 118 .

NOTE: This command will return ‘0’ if the gun is filled with solvent, or ‘61’ if the material is unknown.

Example: Read what material is loaded in gun 1, which is currently recipe 2.

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read Gun Contents	uint32	NONE	19	0 - 19
Argument 0	Gun Number	uint32	NONE	1	1 - 3
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 - 4
Return 0	Gun Number	uint32	NONE	1	1 - 3
Return 1	Recipe Number	uint32	NONE	2	0 - 40, 61

Read Grand Totals

The Read Grand Totals command allows remote access to the material grand total volume data. No arguments are necessary for this command.

Example: Read current Grand Total usage data. A = 132 gal, B = 128 gal, , C = 24 gal, D = 0 gal, A+B+C+D = 320 gal, Solvent = 11 gal

DCS Register	Parameter Description	Data Type	Units	Value	Range
DCS Command	Read Grand Totals	uint32	NONE	22	0 – 22
Acknowledge	Command Acknowledged	uint32	NONE	2 = ACK	0 – 4
Return 0	Grand Total A Material	uint32	Gallons	132	0 – 4,294,967,295
Return 1	Grand Total B Material	uint32	Gallons	128	0 – 4,294,967,295
Return 2	Grand Total C Material	uint32	Gallons	42	0 – 4,294,967,295
Return 3	Grand Total D Material	uint32	Gallons	0	0 – 4,294,967,295
Return 4	Grand Total A+B+C+D	uint32	Gallons	320	0 – 4,294,967,295
Return 5	Grand Total Solvent	uint32	Gallons	11	0 – 4,294,967,295

PLC Diagnostic Screens

These screens may be used to verify PLC communications by providing a real-time status of all Network Inputs and Outputs.

PLC Diagnostic Screens 1–5

These screens show all PD3K+ Network Outputs with their associated register ID, Modbus TCP address, current value, and any relevant state information.

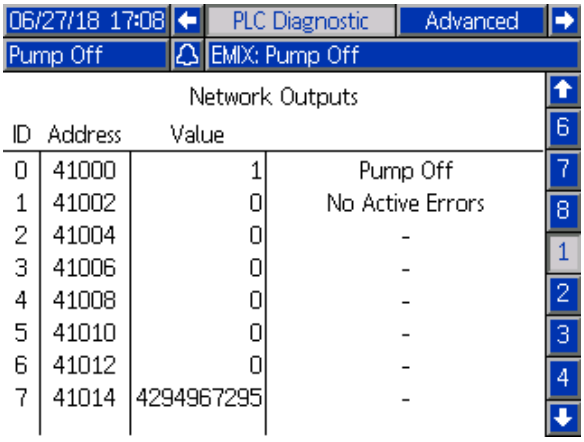


Figure 16 PLC Diagnostic Screen 1

PLC Diagnostic Screens 6–7

These screens show all PD3K+ Network Inputs with their associated register ID, Modbus TCP address, last value written, and any relevant state information.

NOTE: If a Network Input has not been written, it will show a value of 4294967295 (0xFFFFFFFF) and state as invalid.

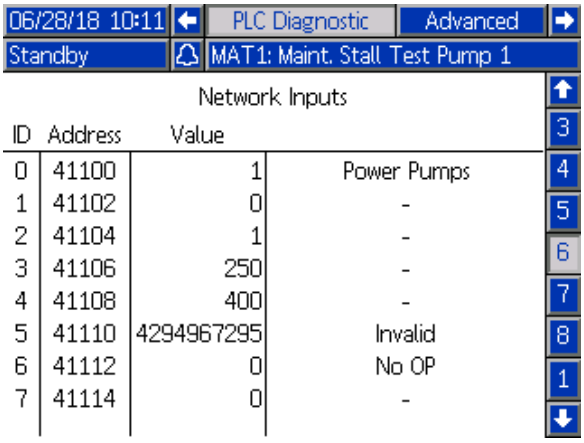


Figure 17 PLC Diagnostic Screen 6

PLC Diagnostic Screens 8

This screen encapsulates all the registers used in the Dynamic Command Structure. Arguments and Command registers are shown on the left. Acknowledge and Return registers are shown on the right. When a valid DCS command is sent, the Return registers will display the appropriate data on the right side of the screen. This can be used to test and verify DCS commands with the PLC.

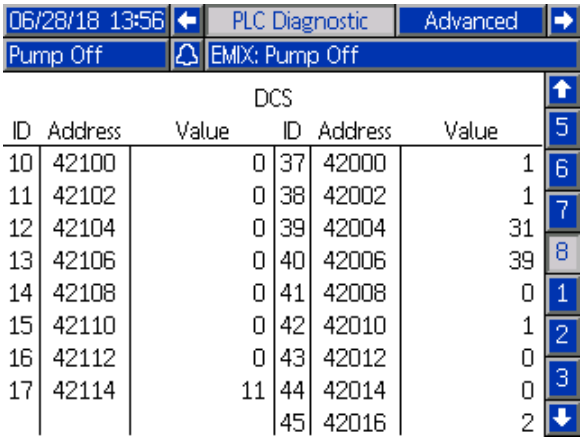


Figure 18 PLC Diagnostic Screen 8

Flow Control System

Overview

Flow control is an optional feature that precisely regulates the flow of material to an automatic spay device, to help ensure adequate coverage and avoid sags or runs in the finish coat. The ProMix PD3K+ 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 6, page 73, 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 PD3K+ 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 PD3K+ 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 19 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.

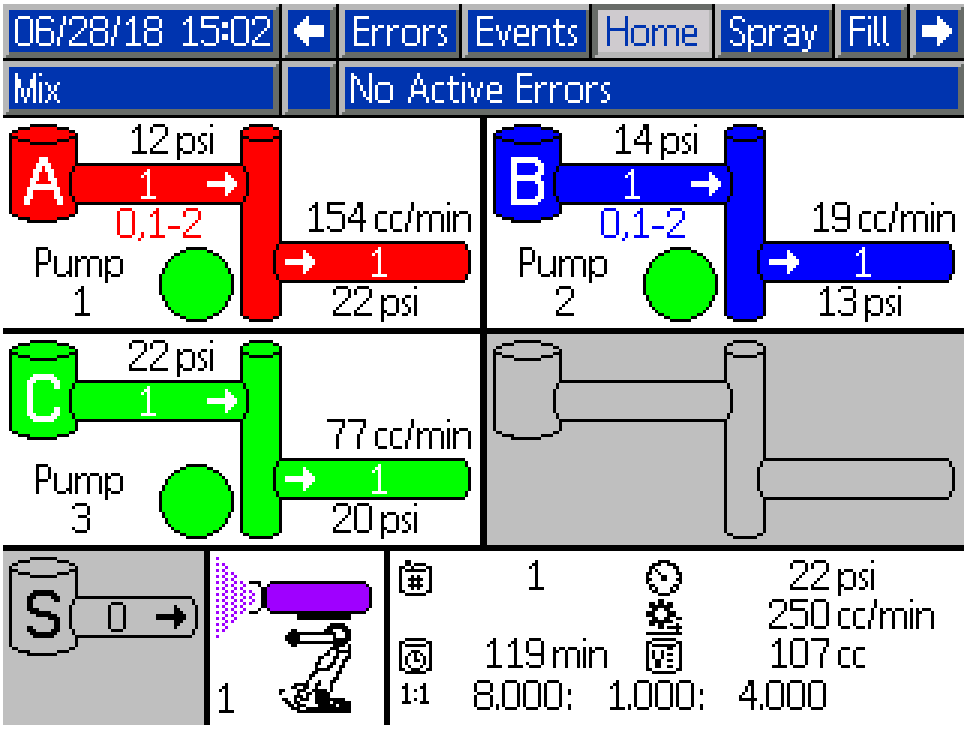
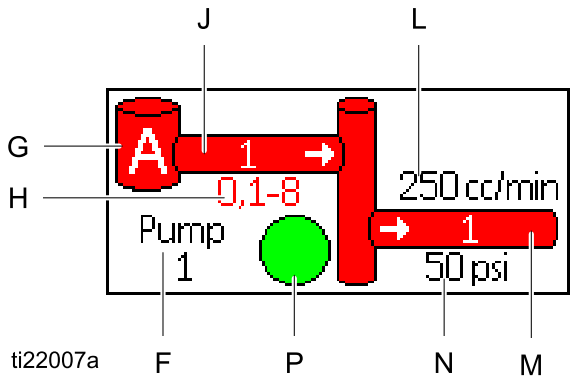
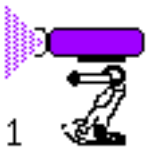
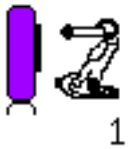
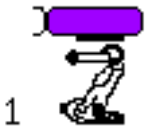
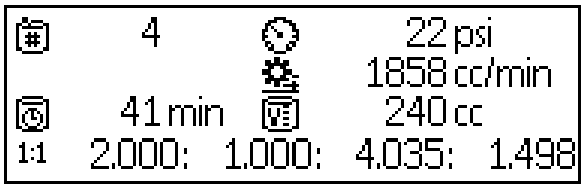


Figure 20 Home Screen, in Mix Mode with Diagnostics On

Home Screen Key

Key	Description	Details	
A	Date and Time	See Advanced Screen 1, page 91, 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 6, page 73. • Potlife (see Potlife Screen, page 64) • Usage (see Usage Screen, page 65) • Jobs (see Jobs Screen, page 66) • Errors (see Errors Screen, page 66) • Events (see Events Screen, page 66)	
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.	
E	Pump Animation and Diagnostic Information		
F	Pump Number (1–4)		
G	Material (A, B, C, or D)		
H	Available Components		
J	Pump Inlet Component		
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.	

<table>
<tr><th>Key</th><th>Description</th><th>Details</th></tr>
<tr><td>T</td><td>Spray Device Animation</td><td>Shows mixed material in the spray device and displays active recipe at the spray device. Gun animation changes to show:

NOTE: If the fluid stream has more than one mix manifold (maximum three), during Mix Fill, the stage numbers will be shown underneath the gun icon, and the current stage being filled will be highlighted.
• 
(Mix Fill)
• 
(Mix With Gun Triggered)
• 
(Recipe Standby)
• 
(Purge)
• 
(Solvent Standby)
• 
(Mix With Gun Not Triggered)</td></tr>
<tr><td>U</td><td>Active Recipe ()</td><td rowspan="6">  </td></tr>
<tr><td>V</td><td>Current Ratio (1:1)</td></tr>
<tr><td>W</td><td>Potlife Time Remaining ()</td></tr>
<tr><td>X</td><td>Total Volume for the Current Job ()</td></tr>
<tr><td>Y</td><td>Current Flow Rate ()</td></tr>
<tr><td>Z</td><td>Current Pressure ()</td></tr>
</table>

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 6, page 73. 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 6, page 73) 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.

When the system is configured for solvent push, the purge soft key changes to the solvent push soft key while in Mix mode.

Press to initiate solvent push.

NOTE: The Target Ratio and Actual Ratio will show the selected ratio format, and on the line below, each of the component ratio values. The ratio format is selectable for each recipe. (See Recipe Screen 1, page 76.)

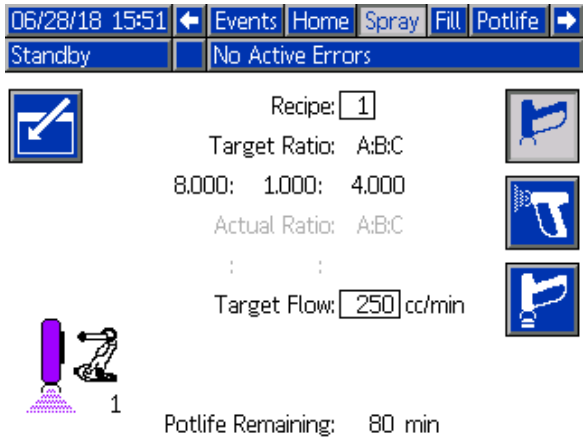


Figure 21 Spray Screen, in Standby Mode

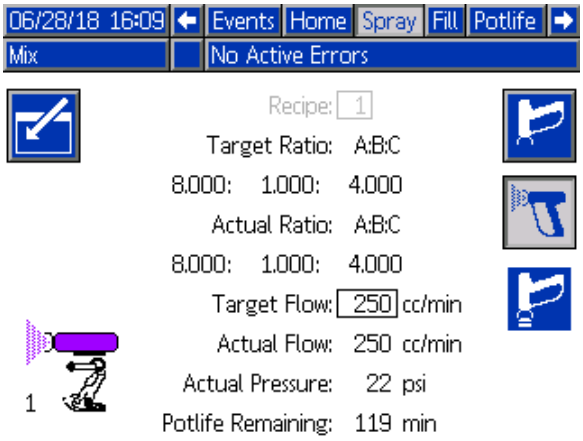


Figure 22 Spray Screen, in Mix Mode

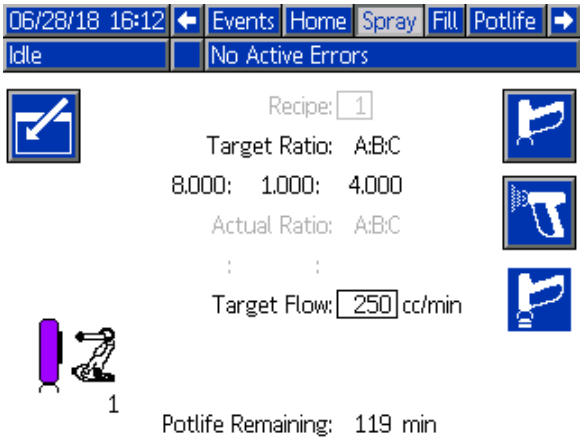


Figure 23 Spray Screen, in Idle Mode

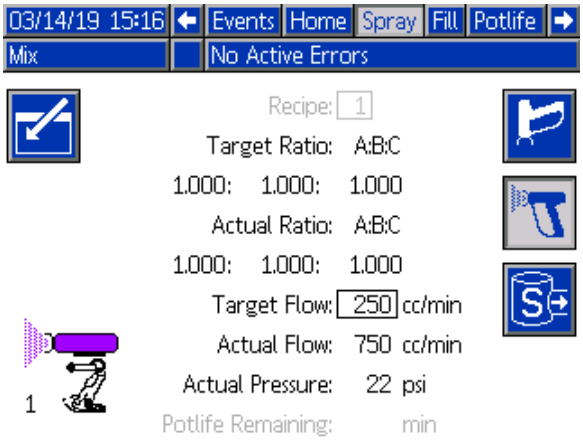


Figure 24 Spray Screen, in Mix Mode, Solvent Push Enabled

Fill Screen

NOTE: This screen is visible only if manual override is enabled on System Screen 6, page 73.

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

- Material. Select Component A, B, C, or D. 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 21.

1. Press the Edit softkey to open the screen for editing.
2. Select Component (A).
3. If the selected material is not already loaded, press the Prime softkey. The system will prime Component (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 Component (A) lines until the user presses Stop. Trigger the gun into a waste container.
5. Repeat for all components.

Pre-Fill Pump

The pump pre-fill option is available for pumps that have color change, but only a single material (A, B, C, or D). The pre-fill option may be used for pumps that remain filled with material when the system was powered down.

Press the Pre-Fill softkey to “prime” the pump without flushing or expelling any material unnecessarily.

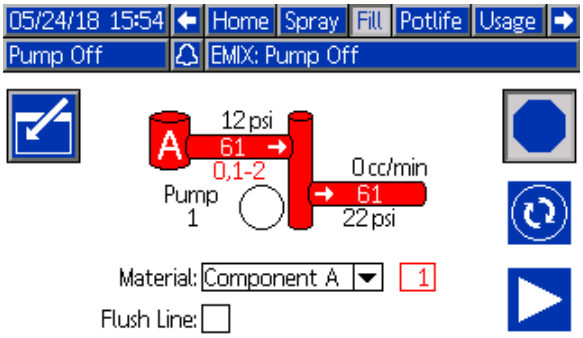


Figure 25 Fill Screen, Component (A) Selected

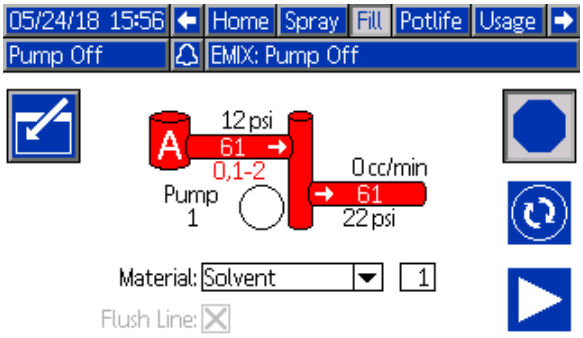


Figure 26 Fill Screen, Solvent Selected

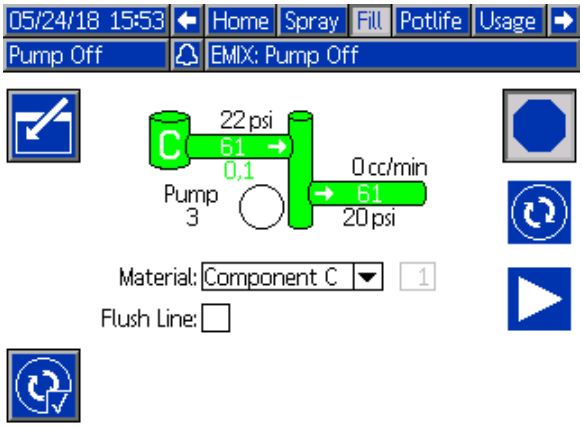


Figure 27 Fill Screen, Pre-Fill Pump Option

Potlife Screen

The Potlife screen displays the current remaining potlife time of any mixed materials in the system. Each mixing stage (if more than one) will be shown with the recipe number that is currently loaded and the remaining potlife. If there is no potlife timer for a recipe or individual stage, the time field will be blank.

NOTE: For systems with multiple guns, all guns and stages will be shown on the screen. The current active gun will be highlighted.

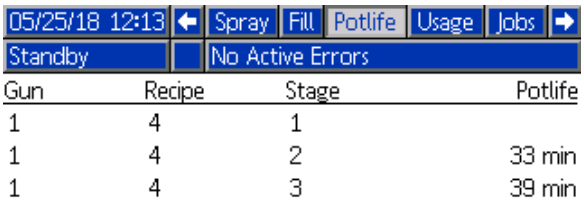


Figure 28 Potlife Screen

Usage Screen

The first two Usage screens display the current job usage and grand total usage of component A, B, C, D, A+B+C(+D), and solvent (S). Edits may be made only if manual override is enabled on System Screen 6, page 73. The third Usage screen displays the total volume pumped for all available materials.

NOTE: Only the individual components that have been enabled will be displayed.

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 66, to review past jobs.
4. Press the Edit softkey to close the screen.

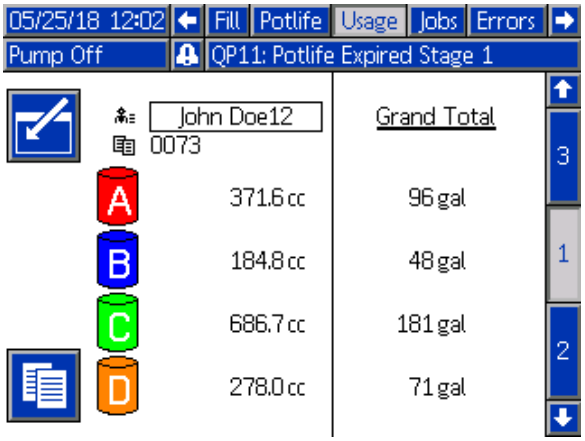


Figure 29 Usage Screen 1

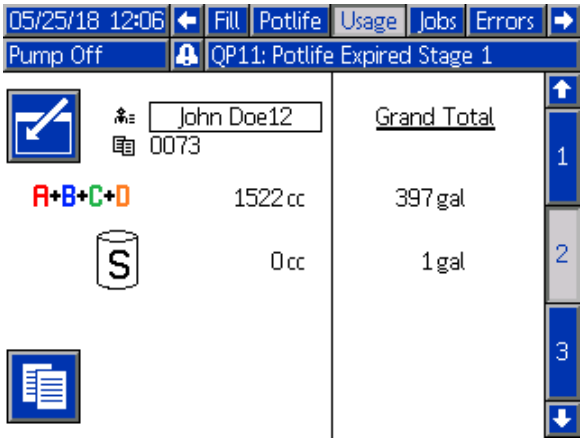


Figure 30 Usage Screen 2

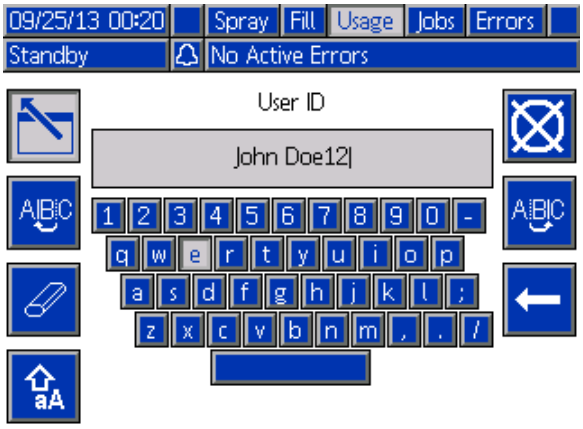


Figure 31 User ID Keyboard Screen

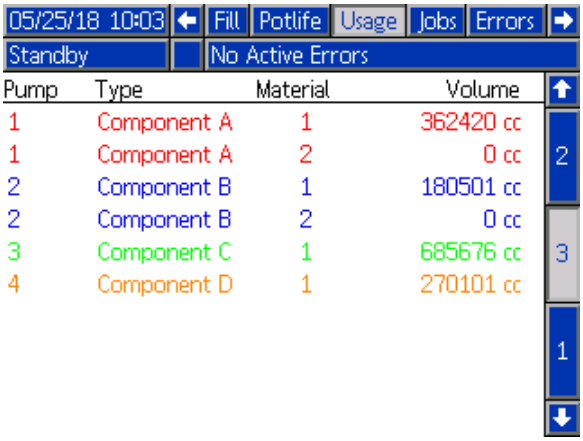


Figure 32 Usage Log

Jobs Screen

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

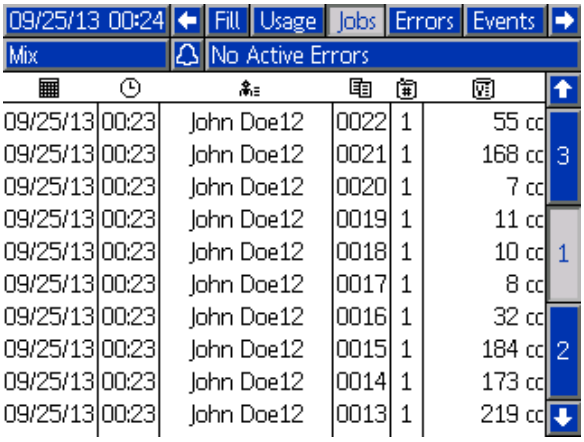


Figure 33 Jobs Screen

Errors Screen

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

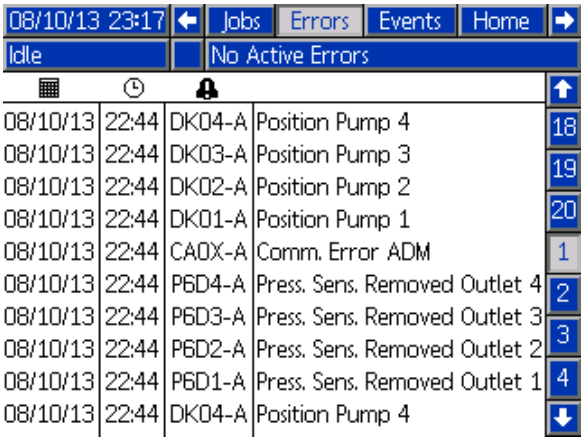


Figure 34 Errors Screen

Additional information is available for system errors to assist with troubleshooting. To access this information for a system error that has occurred, first press  to enter edit mode; the first error will be highlighted. Using the Up and Down arrow keys, navigate to the desired error code, press  again (see System Errors, page 97, for more information on the troubleshooting information screens).

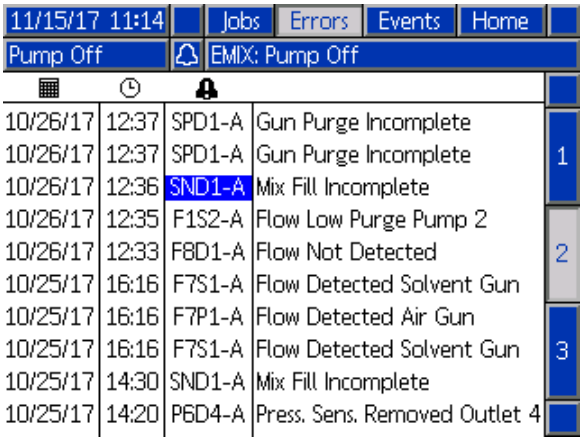


Figure 35 Errors Screen, Edit Mode

Events Screen

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

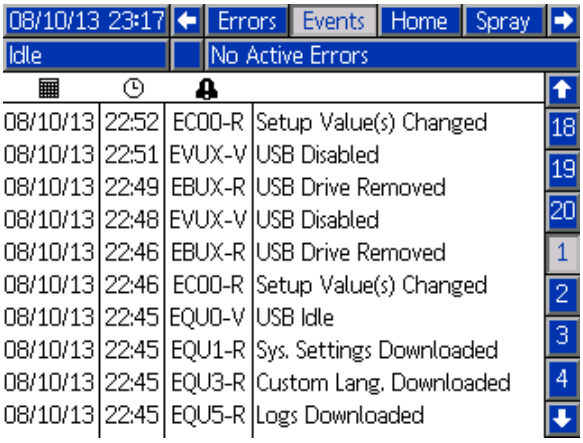


Figure 36 Events Screen

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 67.

Password Screen

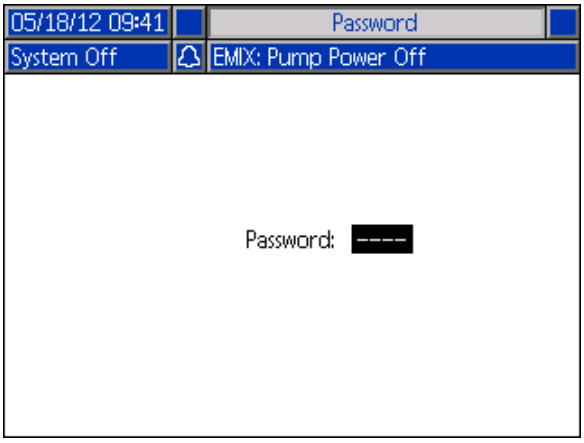


Figure 37 Password Screen

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 91.

System Screen 1

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

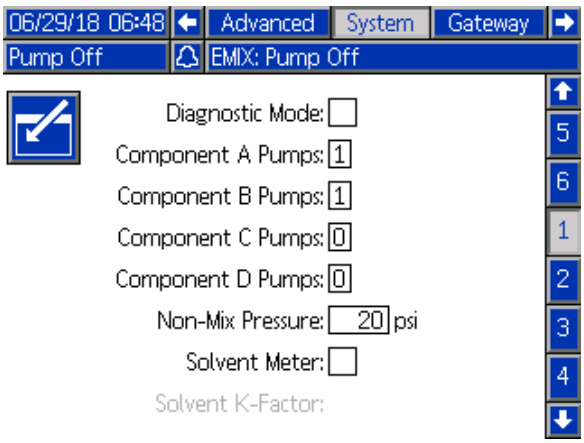


Figure 38 System Screen 1, During Standby

Diagnostic Mode

Select this box to display flow rate and pressure for each pump on the Home Screen, page 59.

Component A Pumps

Enter the number of Component A pumps in your system.

Component B Pumps

Enter the number of Component B pumps in your system.

Component C Pumps

Enter the number of Component C pumps in your system.

Component D Pumps

Enter the number of Component D pumps in your system.

NOTE: A maximum of four total pumps may be connected. If there is no Component D Pump, then a second Component A, B, or C pump may be enabled.

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.

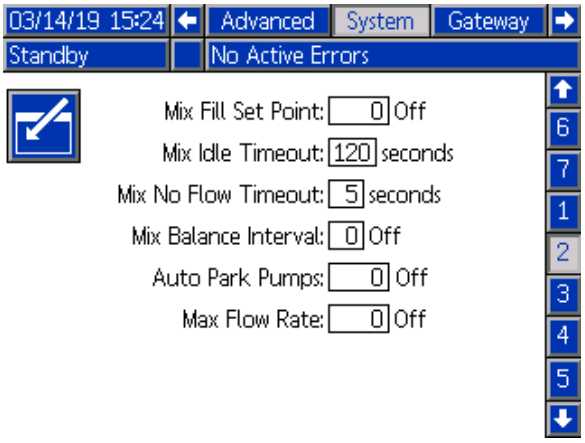


Figure 39 System Screen 2, in Standby Mode

Mix Fill Set Point

Set a higher flow rate or pressure for use while mix filling to decrease the time needed to fill the hose and spray device. Once the spray device is filled, the system will use the target set point as set by the PLC.

The default value is ‘0’. When set to ‘0’, the system ignores the Mix Fill Set Point and instead uses the target set point as set by the PLC.

The value will be a flow rate if Fluid Control is set to ‘Flow’, or a pressure if Fluid control is set to ‘Pressure’.

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 24.

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 24.

Mix Balance Interval

When transitioning from Standby mode to Mix mode, fluid viscosities and high ratios may affect how quickly fluid dynamics balance, which may result in nuisance Exceed Max Flow or Differential Pressure mixing alarms.

The Mix Balance Interval set point may be used to enable a brief period at the start of a mix cycle for fluids to balance before generating any mixing alarms.

NOTE: The Mix Balance Interval timer only runs while the gun is triggered. Setting this time to zero turns the timer off.

Auto Park Pumps

Parking the pumps will help prevent material from hardening on the pump rods. The Auto Park Pumps timer will automatically park all pumps and turn off pump power. The default value of 0 minutes turns off this feature.

NOTE: The timer only runs while the system is in Standby and all guns are purged to prevent volumes from going off ratio.

Max Flow Rate

The Max Flow Rate setting allows you to limit the total flow rate while in Mix mode. Normally, while controlling to the target pressure set point, flow rates may fluctuate slightly due to a number of variations, including ambient conditions or user adjustment of the applicator tip. The Max Flow Rate may be used to ensure a more consistent application of material, and could result in material savings.

The default setting is 0. When set to 0, the system does not limit the flow rate beyond what the pumps are capable of delivering.

NOTE: The Max Flow Rate is a global set point that applies to all recipes in the same way.

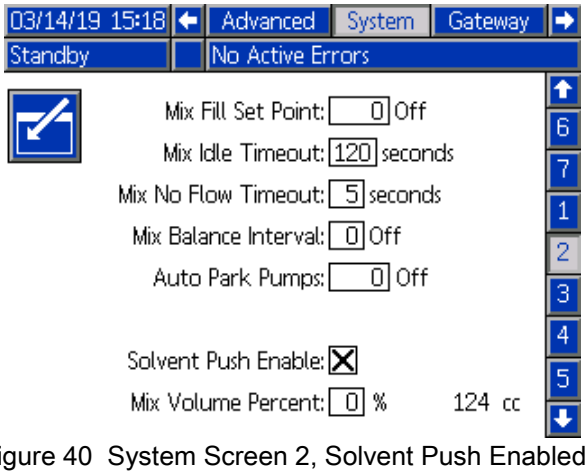


Figure 40 System Screen 2, Solvent Push Enabled

Solvent Push Enable

Enable the Solvent Push option for the end of a mix/spray cycle. When enabled, the system may be commanded to end a mix/spray cycle with solvent push using the soft key on the ADM Spray Screen or using a PLC command. For more details, see Solvent Push, page 69.

NOTE: The solvent push feature is only available for Flow Mode fluid control systems with single outlet color change valve configurations (see Custom Valve Mapping, page 84). The check box is only visible if the system is configured in this way.

Solvent Push

Certain fluid stream configurations can benefit from switching from resin to solvent before concluding a mixing/spray cycle. The solvent is dispensed directly behind the resin material and is used to push the resin material (and, as a result, the mixed material) down the fluid path and to the spray device. The dispensed solvent comes at a cost savings over the resin material and also provides a head start on the flushing of the pump and fluid lines before the next color change.

The solvent push feature is available as an option for certain system configurations. See Custom Valve Mapping, page 84.

- The **Fluid Control** must be set to **Flow Mode** (see System Screen 7, page 74).
- The resin pump must use the **Custom Valve Mapping** option of **Single Outlet Color Change**.
- This configuration usually does not use a remote color change stack, so the **Remote Color Change** must be set to **Disabled**.

The following figure shows a typical MISO (multiple color in, single color out) configuration.

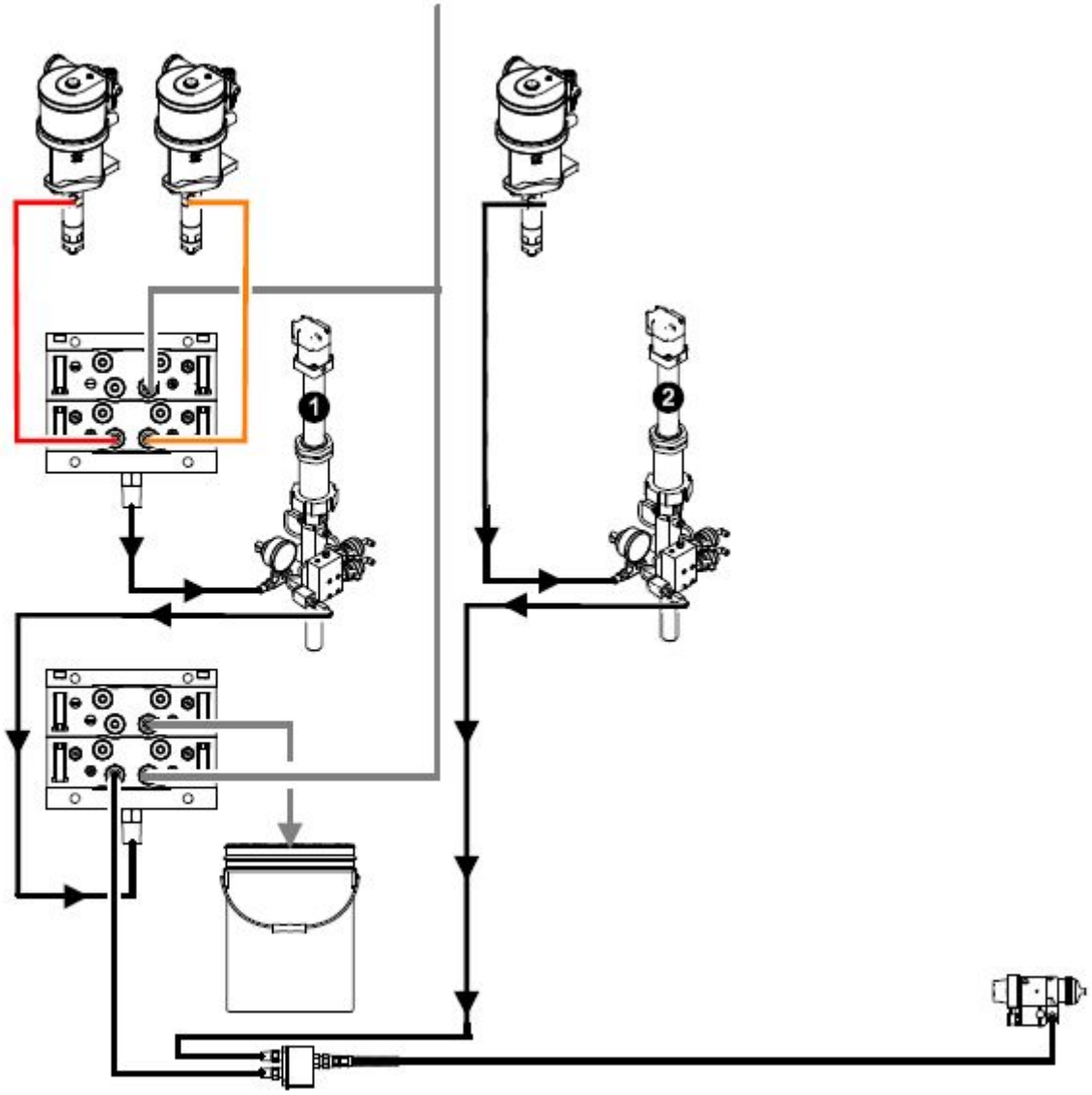
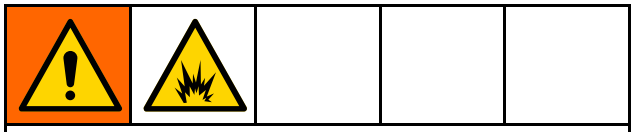


Figure 41 MISO Fluid Stream Configuration (for Solvent Push)

Mix Volume Percent

If needed, solvent may be pushed past the mix manifold and into the mix hose, or manifolds and hoses if multiple stages. To prevent atomizing solvent, it may only be dispensed to a percent of the total mix hose volume. The default value is 0%, which will not dispense solvent beyond the mix manifold that introduces the resin. The mix hose volume is set by the **Stage # Hose Length** and **Stage # Hose Diameter** fields. See System Screen 5, page 73.

The displayed volume shows the total amount of solvent to be dispensed during the solvent push sequence. This volume includes, at minimum, the total fluid stream volume from the inlet color stack to the mix manifold. Additionally, this volume will include a percentage of the total mix hose volume, if set to greater than 0%.



If using an electrostatic gun, to reduce the risk of fire and explosion, confirm the mix hose parameters are accurately represented in the settings.

The solvent push sequence is initiated using a soft key on the Spray Screen (see Spray Screen, page 62) or a PLC command (see ProMix PD3K+ Network Inputs, page 34).

Timing is critical to avoid having the solvent push sequence end before the last part has been finished. The system will go into Standby and must complete a recipe change before it can mix again.

System Screen 3

System screen 3 sets the following system operating parameters.

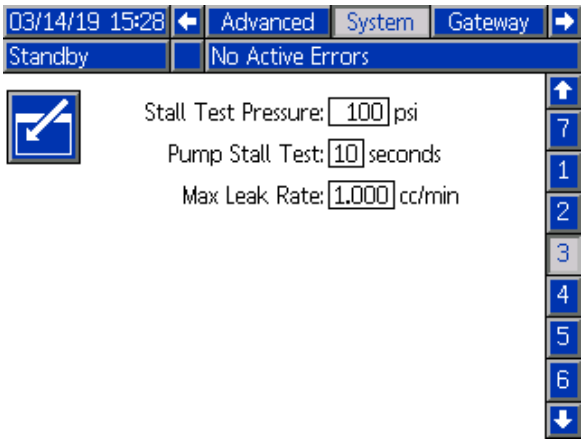


Figure 42 System Screen 3

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.

NOTE: If the material supply pressure at the pump inlet is greater than 90% of the Stall Test Pressure, the system will generate an alarm and will not complete the stall test. See Calibrate Screen 1, page 87.

Pump Stall Test

Set the duration for the pump stall test. See Calibrate Screen 1, page 87.

Maximum Leak Rate

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

System Screen 4

System screen 4 sets the following system operating parameters.

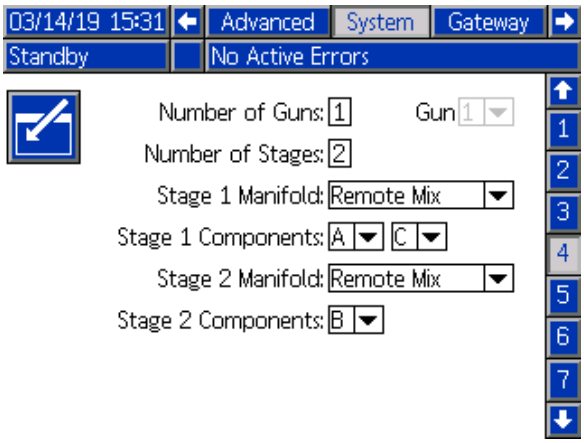


Figure 43 System Screen 4

NOTE: If the fluid stream configuration has any invalid entries the fields will indicate that by being highlighted red, and the system will prevent the user from loading recipes or mixing with that fluid stream.

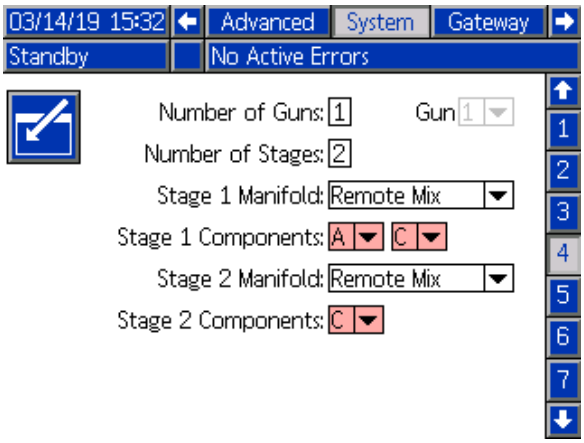


Figure 44 System Screen 4, Invalid Configuration

Number of Guns

Enter the number of separate fluid streams if more than a single spray device is required (with a maximum of three). See Appendix B: Multiple Guns, page 118.

Gun

Select which fluid stream/gun to which the content of the page applies. Each gun must be set up individually.

NOTE: The **Gun** selection field becomes enabled when the **Number of Guns** field is set to a value that is greater than 1.

Number of Stages

Enter the number of mixing stages that are required for the fluid stream.

Stage # Manifold

Select the type of manifold used at each mixing point of the fluid stream. The options are Remote Mix, Three Port, Mix at Belt, and None.

- Remote Mix is a two-inlet port manifold.
- Three Port is a three-inlet port manifold.

  NOTE: Confirm the material chemistries will support three-in-one mixing before choosing this manifold.
- Mix-at-Belt is a two-inlet port manifold with handle manipulation for spraying/flushing.

  NOTE: The mix-at-belt manifold can only be selected as the manifold for the last stage of the fluid stream because it requires manual manipulation. If selected as any other stage, the manifold selections will be shown as invalid.

  NOTE: The mix-at-belt manifold cannot be selected for use with a 4K recipes.
- None may be chosen for a 1K fluid stream.

  NOTE: None may only be selected when the number of stages is 1.

Stage # Components

Select the components that are mixed at each mixing stage of a fluid stream.

NOTE: Each system component can only be used once in the fluid stream. If a component is used more than once, the component selections will be shown as invalid.

System Screen 5

System screen 5 sets the following system operating parameters.

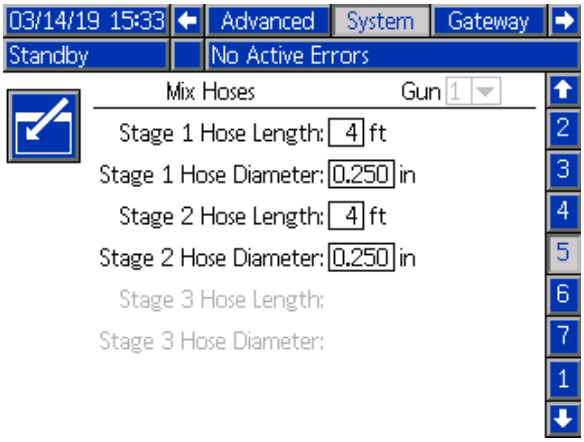


Figure 45 System Screen 5

Stage # Hose length and Diameter

Enter the length and diameter of each mixing hose in the fluid stream. The system will automatically enable the appropriate number of stages and hoses based on the configuration entered on System Screen 4.

Gun

Select which fluid stream/gun to which the content of the page applies. Each gun must be set up individually.

NOTE: The **Gun** selection field becomes enabled when the **Number of Guns** field is set to a value that is greater than 1 on System Screen 4, page 72.

System Screen 6

System screen 6 sets the following system operating parameters.

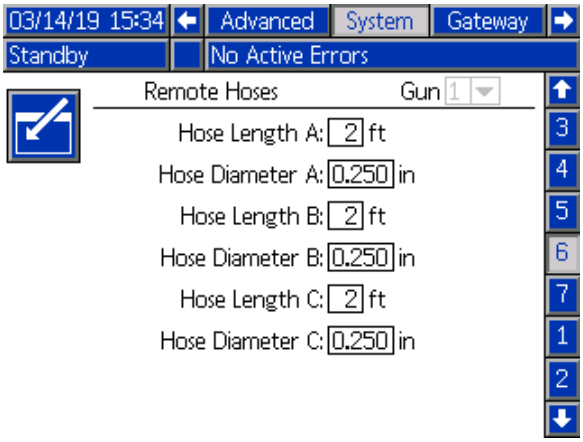


Figure 46 System Screen 6

Hose Length and Diameter

Enter the length and diameter of the hose from the remote color stack to the mix manifold, for each component in the fluid stream.

NOTE: The **Gun** selection field becomes enabled when the **Number of Guns** field is set to a value that is greater than 1 on System Screen 4, page 72.

Gun

Select which fluid stream/gun to which the content of the page applies. Each gun must be set up individually.

NOTE: The **Gun** selection field becomes enabled when the **Number of Guns** field is set to a value that is greater than 1 on System Screen 4, page 72.

System Screen 7

System screen 7 sets the following system operating parameters.

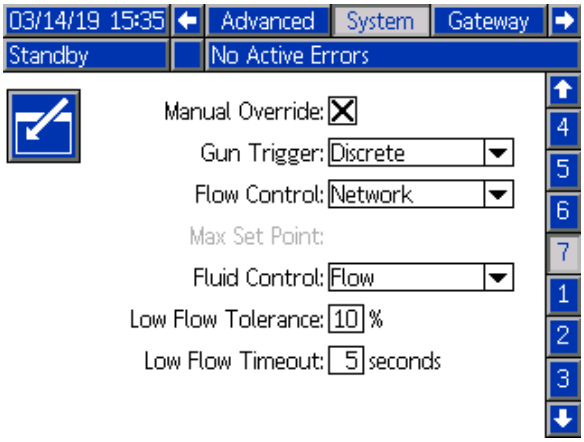


Figure 47 System Screen 7

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.
- Recipe — flow rate or pressure is set according to user-entered value on each recipe screen.

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.

Low Flow Tolerance

This field is active if Fluid Control is set to ‘Flow’. 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.

Gateway Screen

System screen 4 sets the following system operating parameters.

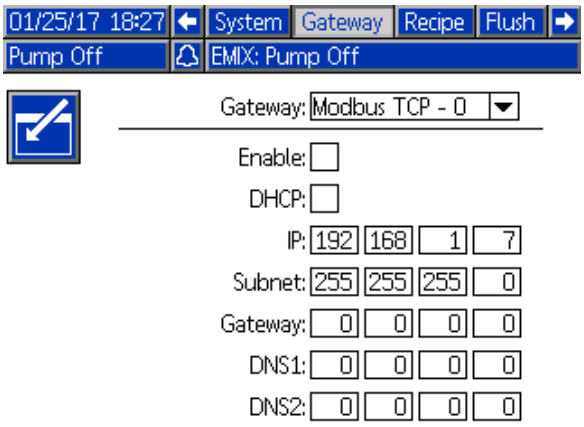


Figure 48 Gateway Screen

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.

Recipe Screen 1

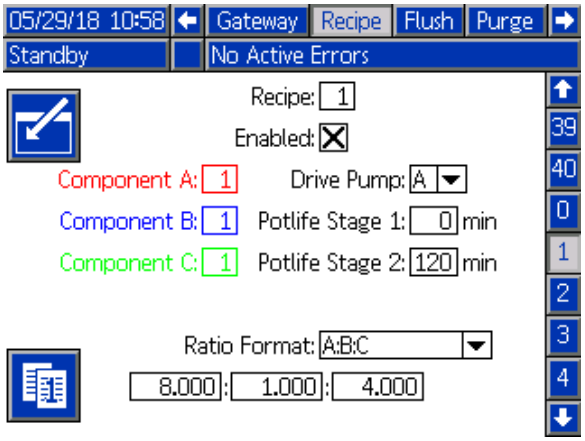


Figure 49 Valid Recipe Screen 1

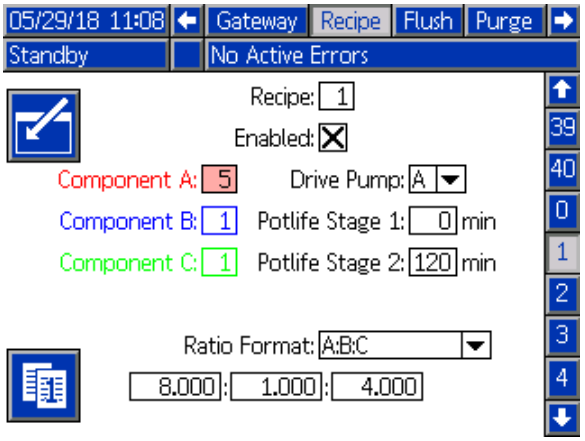


Figure 50 Invalid Recipe Screen

Recipe

Enter the desired recipe number (1-40).

Recipe 0

Use Recipe 0 to flush the system.

- **If a recipe (1–40) 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.

Component A Valve

Enter the desired Component A 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 in the Invalid Recipe Screen example.

Component B, C, or D Valve

Enter the desired component valve number (1-8).

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.

Drive Pump

Select the component pump that will be driving to target pressure. Most often this will be the Component A pump because it will have relatively high viscosity and volume compared to the other mixing components.

Potlife Time

Enter the potlife time (0 to 999 minutes) for all or any of the individual mixing stages of the fluid stream. Entering 0 disables this function for that particular mixing stage.

NOTE: The system will automatically detect which fluid stream is used based on component selection and will enable the appropriate potlife stage fields based on the fluid stream configuration settings entered on System Screen 3, page 71.

Ratio Format

Select the ratio format that most closely matches what is shown on the material data sheets. Multiple formats are available to simplify entering the ratio values. The ratio value fields will automatically update when the format is changed.

Values for the ratio fields can be set from 0.01- 100, and percent values from 0.1% - 100.0%. A value of 0 indicates that the component is not part of the recipe and it will be hidden from the recipe screens. It is extremely important to consider hose sizing and fluid dynamics when implementing wide ratios (50:1 – 100:1) and a relationship between any two components should never exceed 100:1.

NOTE: The minimum flow requirement for any single component in a recipe is 1 cc/min.

NOTE: For ratio formats in percent, the sum of the component percentages should always equal exactly 100%.

NOTE: For 1K or 2K recipes, it is recommended to use ratio format A:B:C and set the ratio values of unused components to zero.

Recipe Screen 2

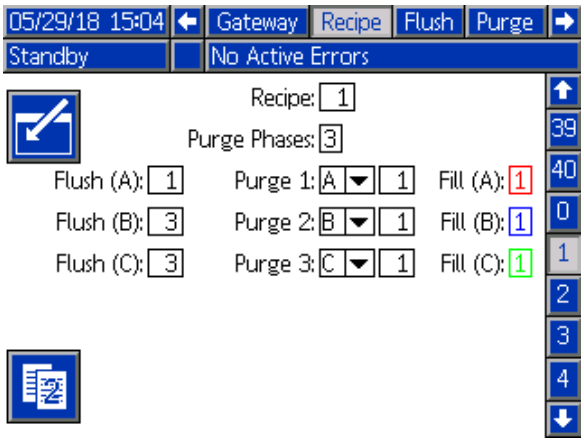


Figure 51 Valid Recipe Screen 2

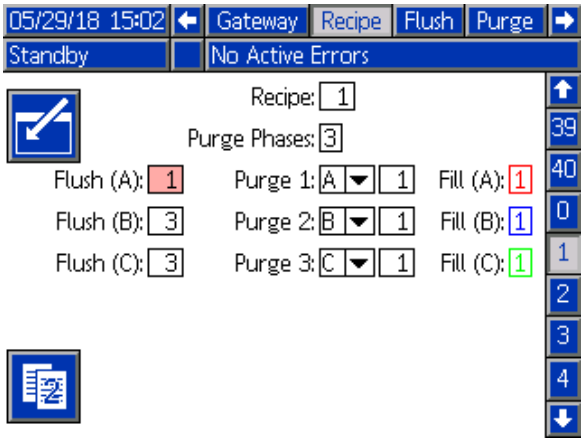


Figure 52 Invalid Recipe Screen 2

Flush Sequence

Enter the desired flush sequence (1-10). For hard to flush colors, select a longer sequence. The flush sequence applies only to cleaning of the pumps. Each component pump used in the recipe that has color change may have a unique flush sequence assigned. (see Flush Screen, page 79)

Purge Phases

Select the number of segments (0-6) for flushing of the mixed material out the gun. Each segment will flush out a particular component's fluid hoses from the remote color change valves out the gun.

NOTE: To skip purging all together, set the number of purge phases to 0.

Purge Sequence

For each phase of the total purge cycle, select the component that will be flushed and the desired purge sequence (1-10). The purge sequence applies only to cleaning out the mixed material hoses and remote hoses feeding mix manifolds. (See Purge Screen, page 80.)

Fill Sequence

Enter the order of filling of the remote hoses up to the mix manifold(s) with material. Setting the same number indicates filling in parallel. Unless there are materials that are incompatible and need to be filled in sequence, it is recommended to leave these values at 1 for each component.

Recipe Screen 3

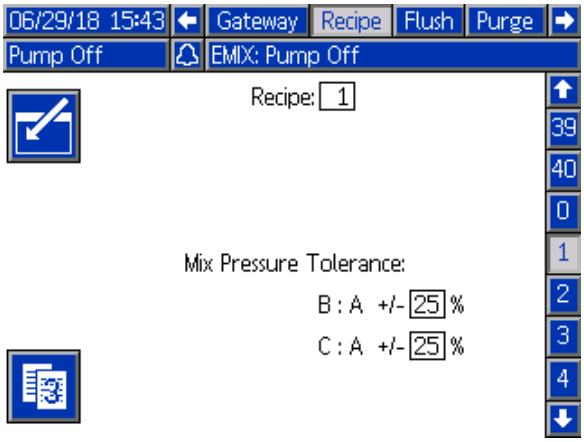


Figure 53 Recipe Screen 3

Mix Pressure Tolerance

The pressure of one component must be within a percentage of the pressure of the driving component during spray or mix. Set the desired Mix Pressure Tolerance in these fields for the relationship between each component and the drive component. The component relationship labels are determined based on the components used with the recipe and the Drive Pump set on Recipe Screen 1. The labels indicate the reference (drive component) on the right of the colon. The default set point value is 25%. See Differential Pressure and the Mix Pressure Tolerance Set Point, page 78 .

Differential Pressure and the Mix Pressure Tolerance Set Point

A primary means of maintaining ratio assurance for the ProMix PD3K+ system is through monitoring of the differential pressure between the drive component-pump and the other component-pump outlets. Ideally, these pressures would be identical, but factors such as line sizing, viscosity, and mix ratio lead to some variation. Understanding where your system typically operates is imperative when setting up an effective differential pressure check that notifies the user of potential mix ratio inaccuracies while avoiding nuisance alarms.

It is recommended that, once the system is fully installed and ready to use, the user load a recipe and then spray the mixed material. While spraying, note the outlet pressures of all component pumps (per the ADM's main screen or the PLC) and spray long enough to ensure the pressures have stabilized to a nominal value. The difference between the outlet pressures of the drive pump and other component pumps is an established baseline for the Mix Pressure Tolerance set point.

The Mix Pressure Tolerance set point allows the other component pump outlet pressure to vary a specified percentage away from the drive pump outlet (spray) pressure. For example: In the following figure, if the spray pressure (A-side pump outlet pressure) is 100 psi, and the Mix Pressure Tolerance is set to 25%, the B-side outlet pressure is allowed to float between 75 and 125 psi (100 psi ± 25%) without generating an alarm.

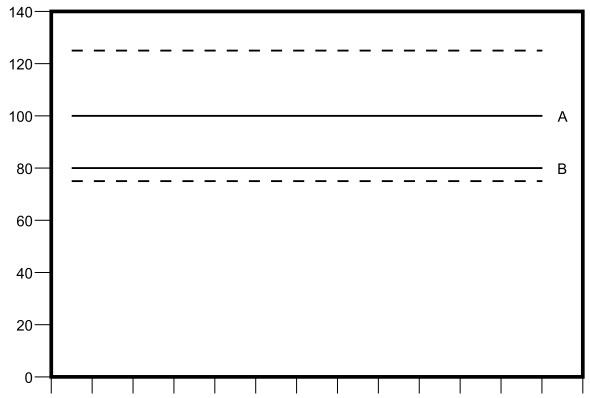


Figure 54 The acceptable B-side pump outlet pressure range for a system with a target spray pressure (A) of 100 psi and a Mix Pressure Tolerance of 25%.

It is recommended that you keep the Mix Pressure Tolerance set point as low as possible to alert the user of anything affecting the mix ratio accuracy. However, if your system is generating several differential pressure alarms, or will be mixing a wide variety of materials at different mix ratios, you may need to increase the Mix Pressure Tolerance.

Flush Screen

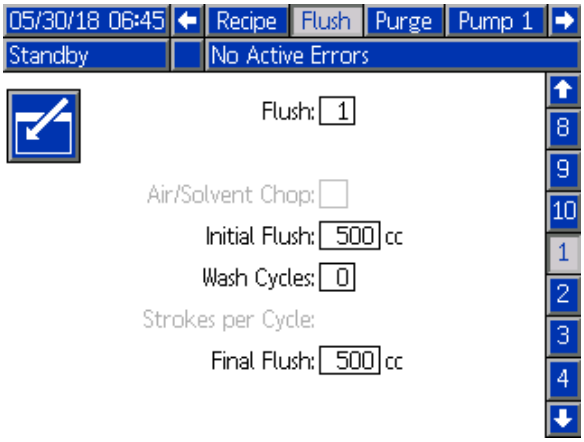


Figure 55 Flush Screen

Flush Number

Enter the desired flush sequence (1-10). For hard to flush colors, select a longer sequence. 1 is the default, and should be designated for the longest, most thorough flush duration.

Air/Solvent Chop

Enable air/solvent chop for flushing of the pump.

An air/solvent chop may be utilized in place of the standard wash cycles to provide a more abrasive clean, especially effective for flushing metallic materials.

NOTE: This feature is only available for pumps that have an air inlet valve enabled (See Pump Screen - Advanced Configuration, page 84). Air/solvent chop requires additional hardware for the air purge valve (See manual 333282 for kit numbers and installation).

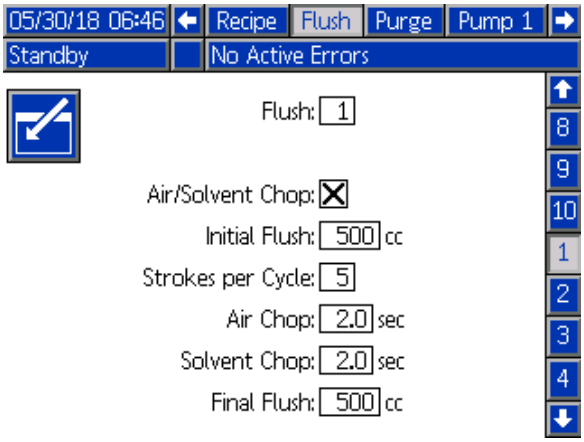


Figure 56 Flush Screen with Chop

Initial Flush

Enter the initial 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.

NOTE: If Air/Solvent Chop is enabled, this setting dictates the length of the chop cycle. Each stroke runs about 2 seconds long, so determine your total length of air/solvent chop time and divide by 2 seconds to determine an appropriate number of strokes.

Final Flush

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

Air Chop

Set the air chop duty cycle for the chop phase.

Solvent Chop

Set the solvent chop duty cycle for the chop phase.

Purge Screen

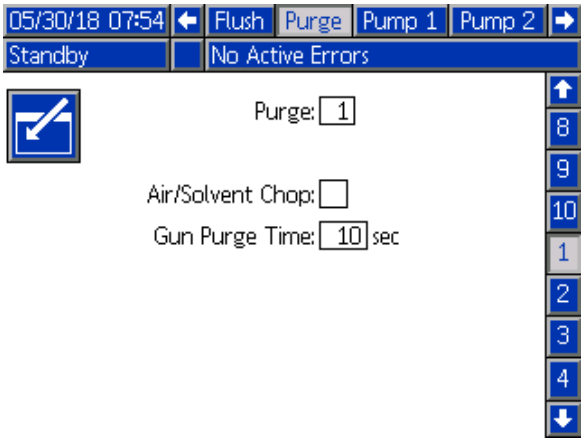


Figure 57 Purge Screen

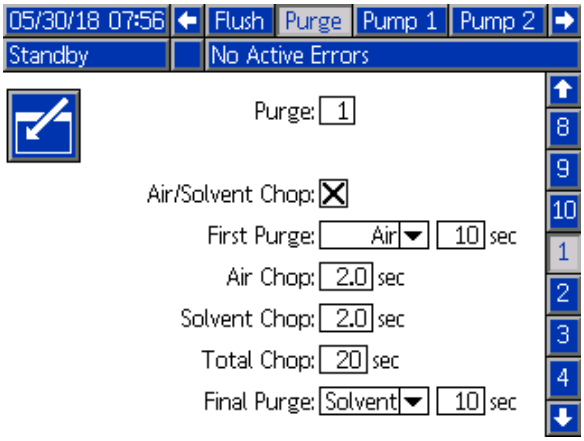


Figure 58 Purge Screen with Chop

Purge Number

Enter the desired purge sequence (1-10). For hard to flush materials, select a longer sequence. 1 is the default, and should be designated for the longest, most thorough flush duration.

Gun Purge Time

Enter the gun purge time (0 to 999 seconds).

Air/Solvent Chop

Air/Solvent Chop replaces the standard Gun Purge Time parameter on the Purge screen. Instead the purge is split into three phases: First Purge, Chop, and Final Purge. The Chop Phase will always start with Air and each phase has multiple configuration parameters.

First Purge

Select the material to be either Air or Solvent and the length of time for the first purge phase, which dispenses only the material selected.

Air Chop

Set the air chop duty cycle for the chop phase.

Solvent Chop

Set the solvent chop duty cycle for the chop phase.

Total Chop

Set the length of time for the chop phase. The system will switch between air and solvent pulses according to the duty cycles set for the length of the Total Chop time.

Final Purge

Select the material to be either Air or Solvent and the length of time for the final purge phase, which dispenses only the material selected.

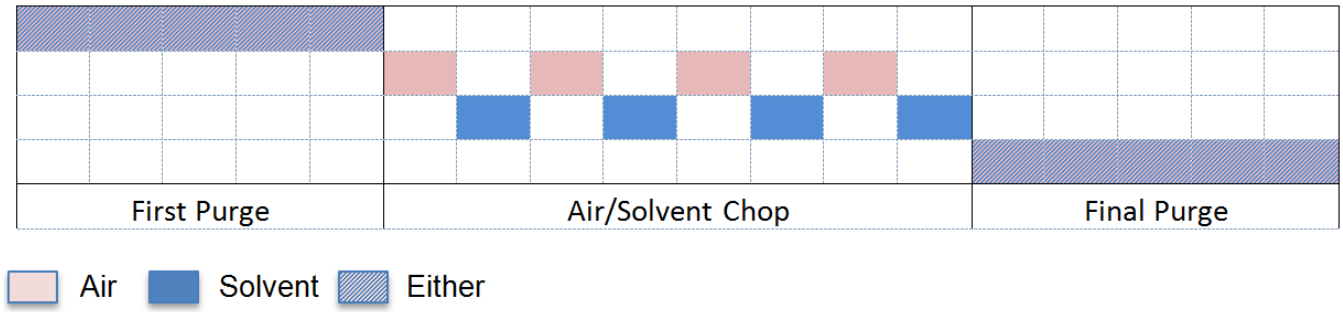


Figure 59 Air/Solvent Chop Timing Diagram

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 four or more 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.

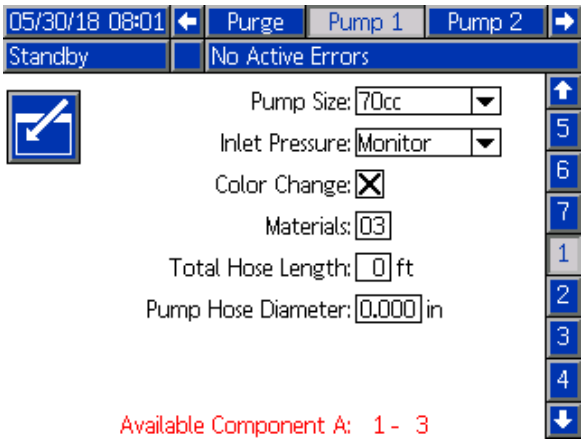


Figure 60 Pump Screen 1

Pump Size

Select 35cc or 70cc, as appropriate.

Inlet Pressure

Select one of the following:

- Disabled
- Monitor, to track inlet pressure (requires inlet pressure transducer)

Select Color Change

Select this box if your system uses color change.

Materials

Enter the number of materials used in your system.

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 Components

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

Pump Screen 2

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

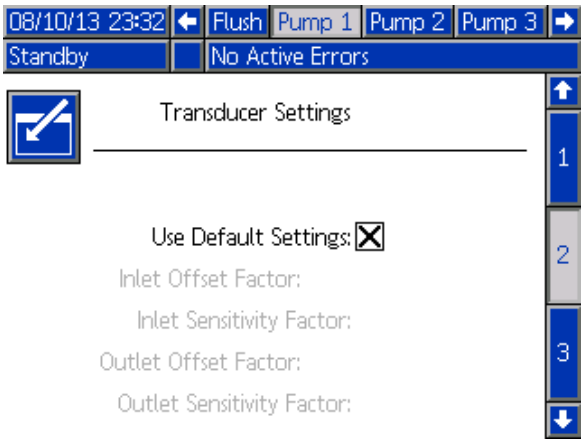


Figure 61 Pump Screen 2, Default Settings Enabled

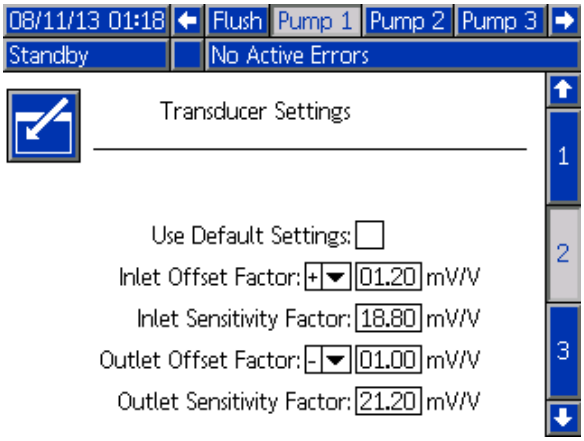


Figure 62 Pump Screen 2, Default Settings Disabled

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 81, 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 81, 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.

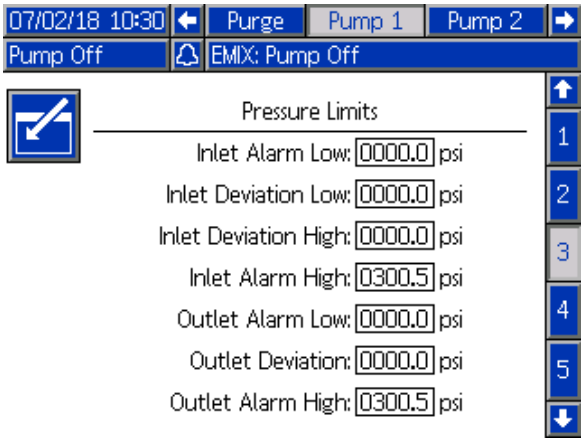


Figure 63 Pump Screen 3

Pressure Alarm and Deviation Limits

Inlet fields are only active if **Inlet Pressure** in Pump Screen 1, page 81, 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.

NOTE: Outlet Alarm Low is only enabled for systems using Flow Control.

Pump Screen - Material Assignment

For systems using Multiple Guns, see Appendix B: Multiple Guns, page 118, for more detail.

Custom Valve Mapping

For the PD3K+, every color change solenoid may be assigned to any unique, valid control module location.

Pump Screen - Advanced Configuration

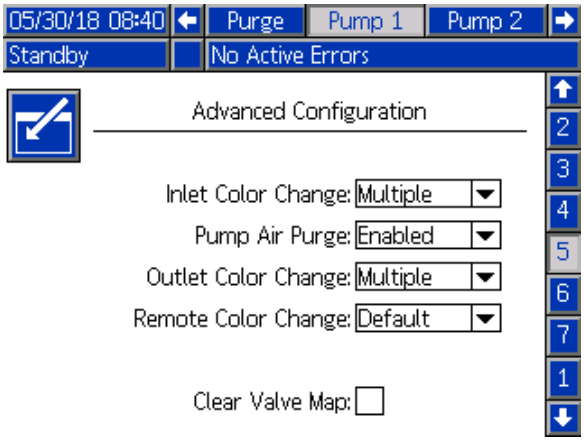


Figure 64 Pump Screen, Advanced Configuration

Inlet Color Change

Select Multiple if each individual material has its own valve on the inlet color stack for a particular pump. Select Single if there is more than one material using a single valve on the inlet color stack (i.e., a piggable system). This option is only available for pumps that have more than one color change material.

NOTE: For systems that select Single, it is expected the user knows when a particular material is plumbed and filled to the inlet stack before performing a color change. The PD3K+ system does not know what material is connected up stream of the inlet valve stack.

Pump Air Purge

Select Enable to add an air purge valve to the pump inlet stack to allow for an air/solvent chop flush of the pump out the dump valve. Select Disable if no air purge valve will be used for the pump. See Pump Air/Solvent Chop on Flush Screen, page 79, for further detail.

Outlet Color Change

Select Multiple if each individual material has its own valve on the outlet color stack for a particular pump. Select Single if there is more than one material using a single hose connected to the outlet color stack. This option is only available for pumps that have more than one color change material.

NOTE: If Single is selected, the hose connected to the outlet stack will need to be purged before completing a color change.

Remote Color Change

Select Multiple if each individual material has its own valve on the remote color stack for a particular pump. Select Single if there is more than one material using a single hose connected to the remote color stack. Select Disable if there are no remote color change valves (only solvent and air purge) for the pump. Single is only available for pumps that have more than one color change material.

NOTE: Unless Disabled is selected, this must match the selection for Outlet Color Change.

NOTE: If Single is selected, the hose connected between the outlet stack and remote stack will need to be purged before completing a color change.

Clear Valve Map

Check this box to clear all valve assignments. The user will be prompted to confirm the choice. This will erase any valve assignments permanently, including any that were automatically set based on the static mapping.

Pump Screen - Valve Assignment

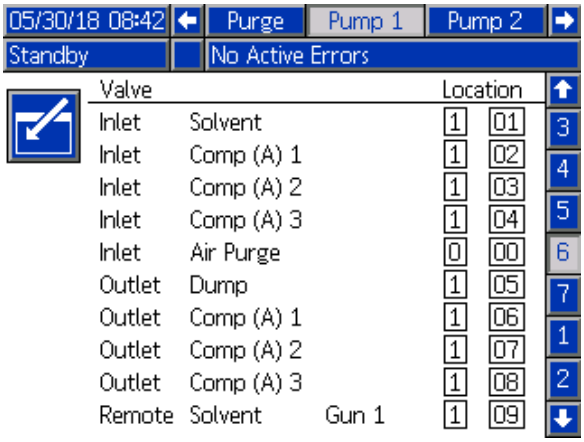


Figure 65 Pump Screen, Valve Assignment

This screen allows the user to assign each individual color change valve solenoid in the system to a unique location. The list of valves will automatically populate based on the settings that apply to the pump. A description of the valve includes what stack it belongs to, the material identification, and a specific gun or pump designator, if that applies.

NOTE: Some remote stack valves may be shared by more than one pump. They will show up on the valve list for all pumps to which they apply.

All color change valves require a valid location be assigned for the system to be able to operate properly. There are two columns that determine the solenoid location. The left column is the color change module number. This number must be between 1 and 8 and should reflect the dip switch settings on one of the color change boards (see manual 332455 for more details on dip switch settings). The second column is the solenoid location, and this number must be between 1 and 18. The following figure shows the solenoid location enumeration.

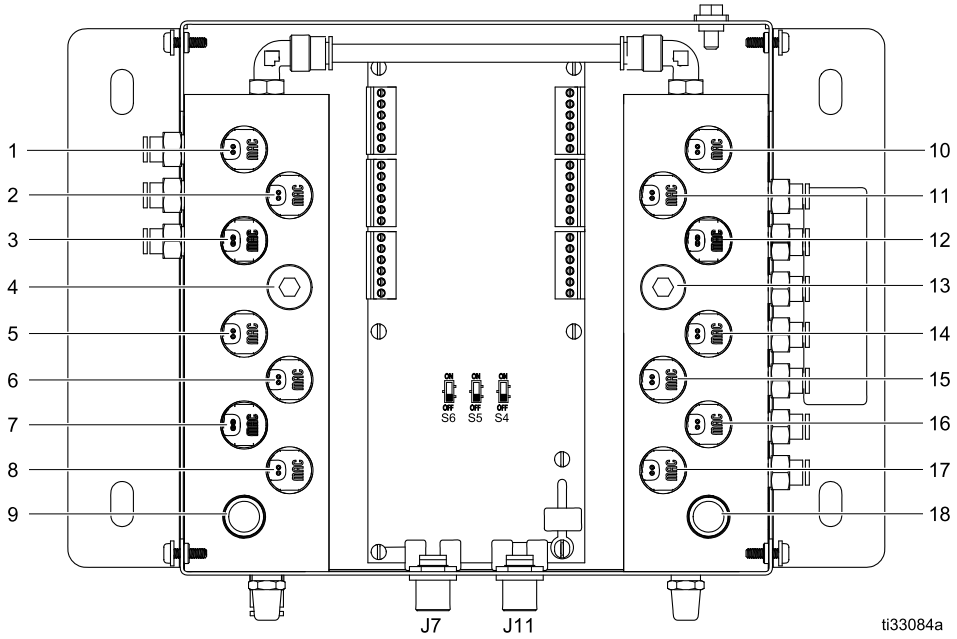


Figure 66 Solenoid Location Enumeration

If more than one valve is assigned a valid solenoid location, all instances of that location will be highlighted in red, and are considered invalid.

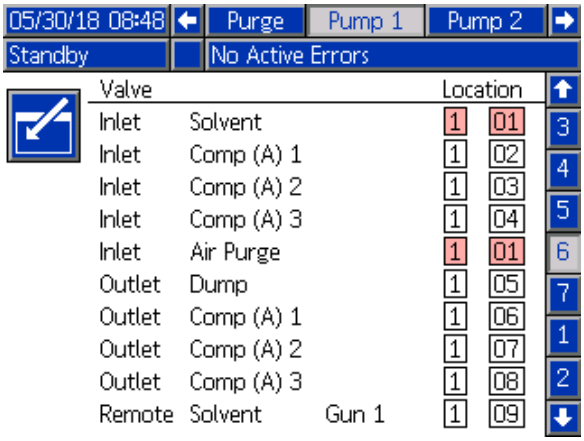


Figure 67 Pump Screen, Valve Assignment with duplicates

A value of 0 for the control module, or 00 for the solenoid, indicates no previous location assignment and both are also invalid assignments.

If a valve location is considered invalid, any operation that uses that valve will be prevented from running. This is easily identified on the Recipe screens. If any of the material's valves are considered invalid, that material will be highlighted red. If any of the valves used in the flush or purge procedure are considered invalid, the flush or purge sequence will be highlighted red.

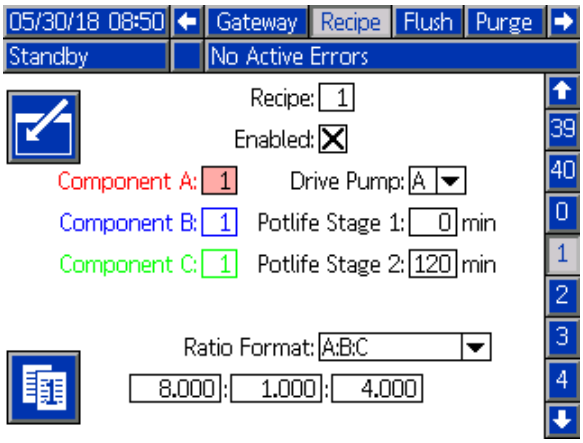


Figure 68 Recipe Screen with invalid component valve location

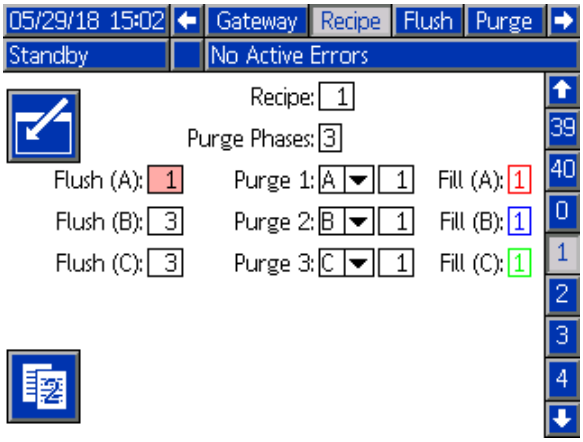


Figure 69 Recipe Screen 2 Invalid

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 a component (not solvent) before doing the stall test. See System Screen 2, page 68, to set test parameters. See Pump Pressure Check, page 94, for complete test instructions.

To initiate the test, press the Pressure Check button for the desired pump. The system will first check the inlet pressure due to the material supply pressure. If this pressure is greater than 90% of the Stall Test Pressure, the system will generate an alarm and halt the stall test. 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.

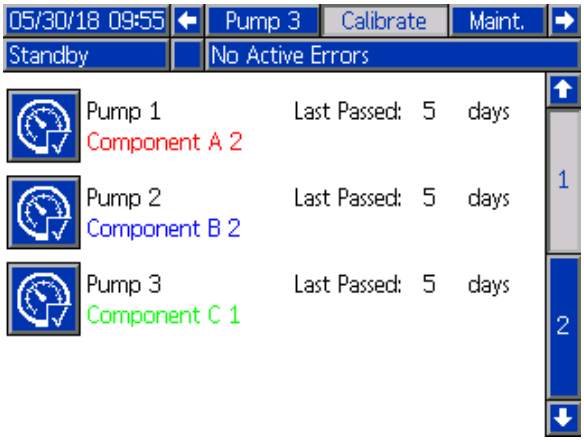


Figure 70 Calibrate Screen 1

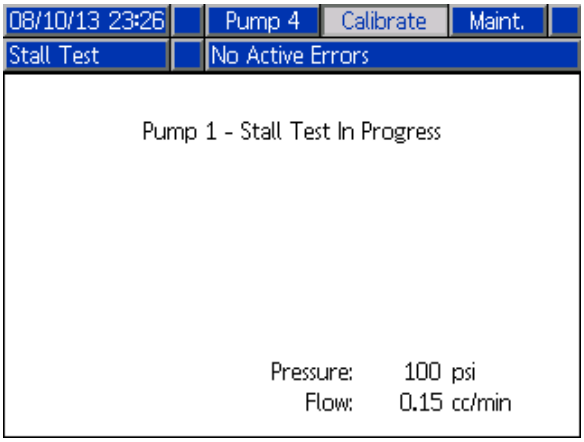


Figure 71 Stall Test Screen

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 a compound (not solvent) before doing the Volume Check. See Pump Volume Check, page 95, 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.

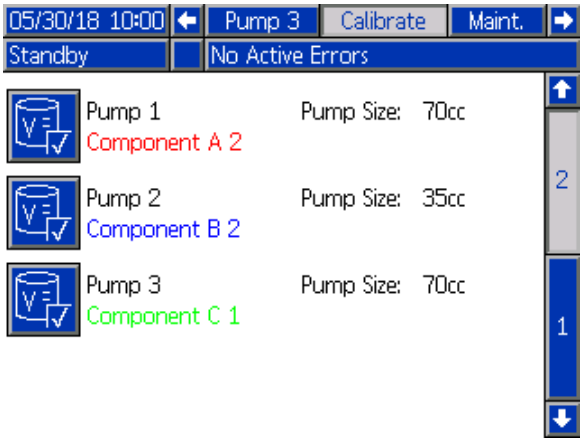


Figure 72 Calibrate Screen 2

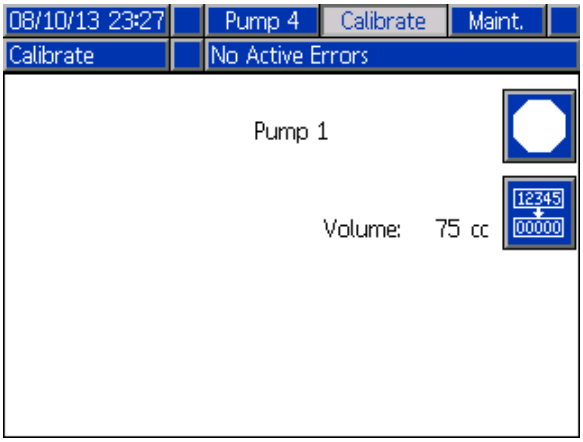


Figure 73 Volume Check Screen

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 95, 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.

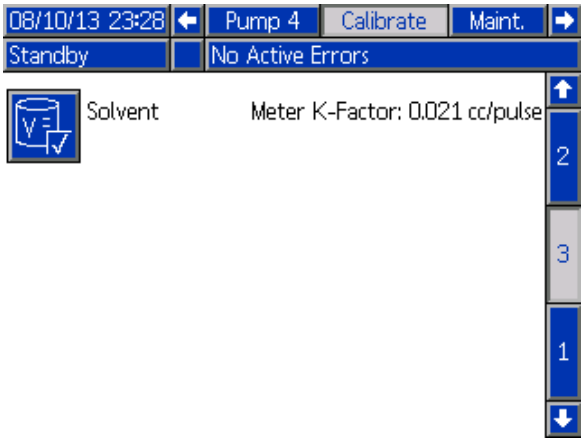


Figure 74 Calibrate Screen 3

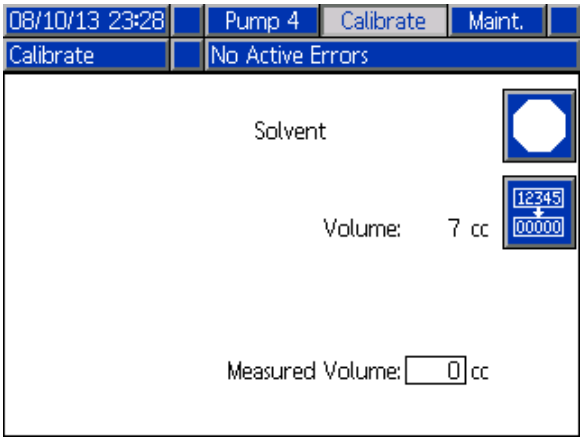


Figure 75 Enter Measured Volume of Solvent

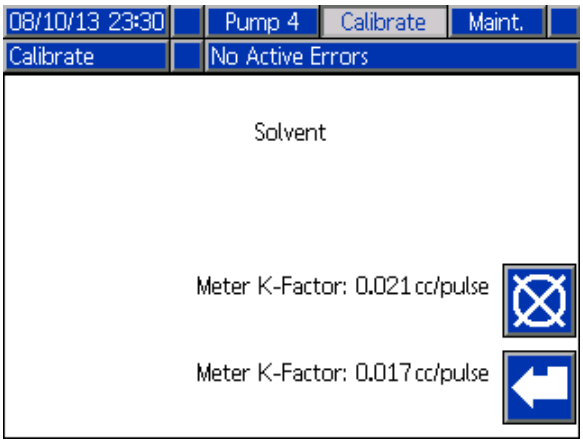


Figure 76 Accept Calibration

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.

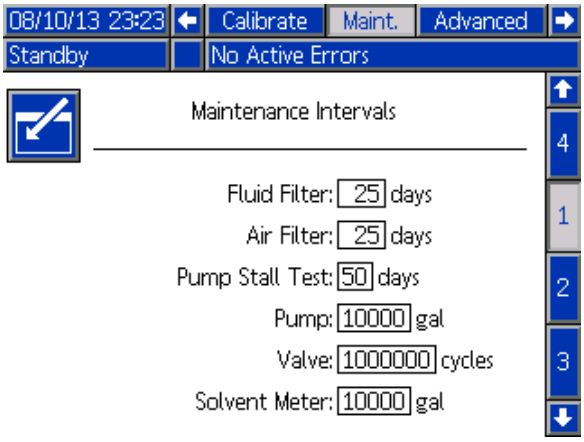


Figure 77 Maintenance Screen 1, Interval Settings

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.

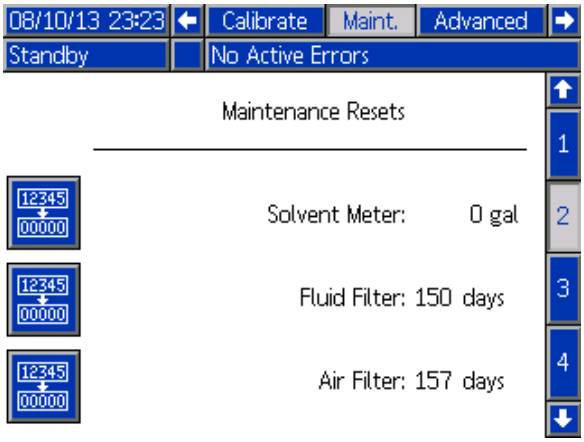


Figure 78 Maintenance Screen 2, Current Status

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.

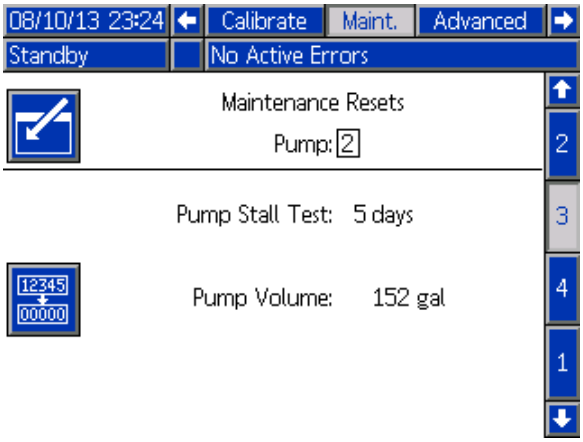


Figure 79 Maintenance Screen 3, Current Pump Status

Maintenance Screen 4

Maintenance screen 4 is used to manually relieve pump outlet pressure, or to configure automatic pressure relief.

NOTE: Pump outlet pressure relief is only available for pumps that have a dump valve (color change outlet valves).

To manually relieve pump outlet pressure, change the number to the desired pump and press the Relief softkey  .

To set the system to automatically relieve pump outlet pressure, check the Autodump box and set the Pressure Limit. All applicable pumps, while in Standby, will briefly open the dump valves to relieve outlet pressure when the reading climbs above the set Pressure Limit. The system will attempt up to three times if the pressure does not drop below the set limit.

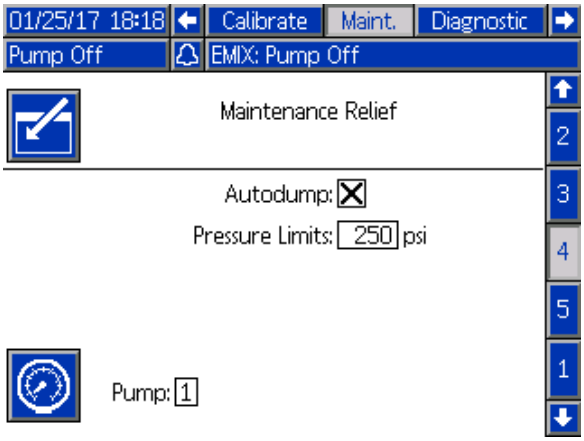


Figure 80 Maintenance Screen 4, Manual Pump Relief

Maintenance Screen 5

Maintenance screen 5 displays cycle counts for a selected component, 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. Leaving this screen will close all manually-driven valves.

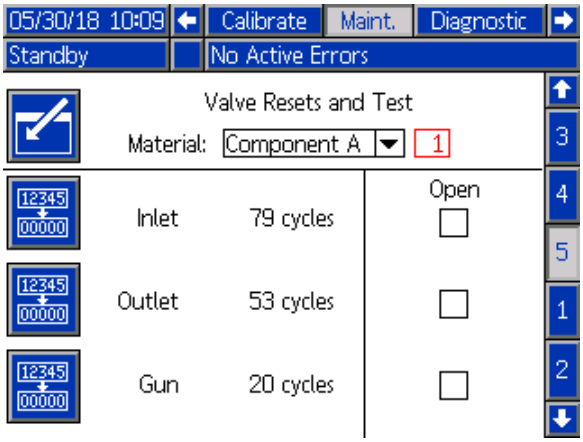


Figure 81 Maintenance Screen 5, Component Valve Resets

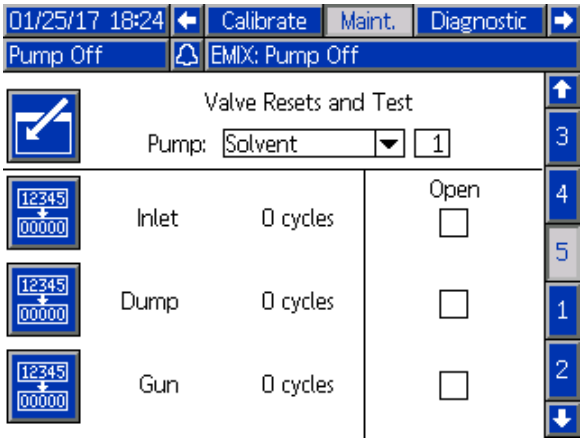


Figure 82 Maintenance Screen 5, Solvent Valve Resets

NOTE: 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.

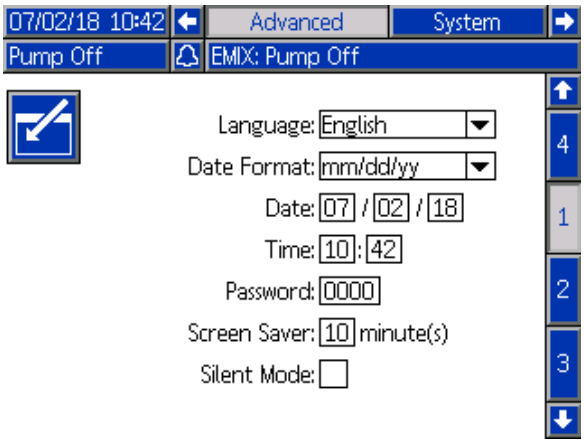


Figure 83 Advanced Screen 1

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).

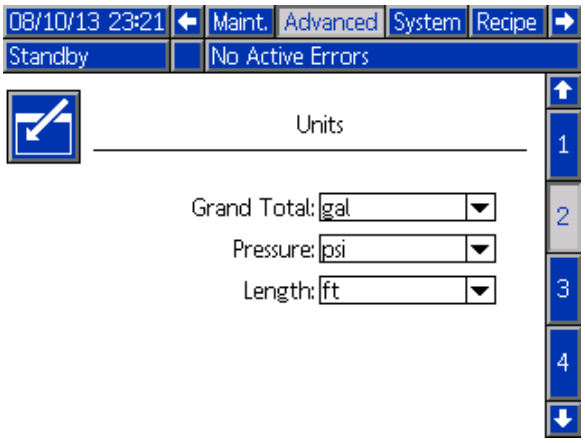


Figure 84 Advanced Screen 2

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.

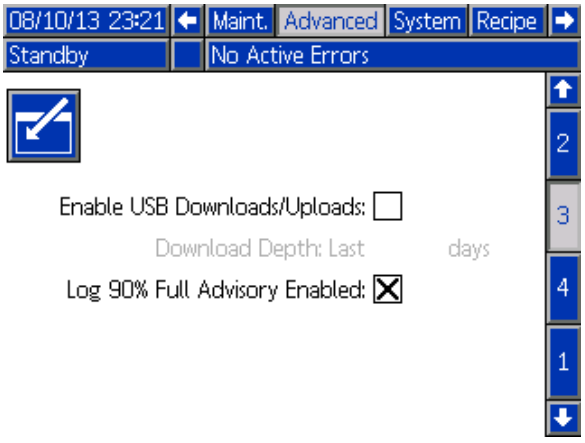


Figure 85 Advanced Screen 3

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 screen can not be edited.

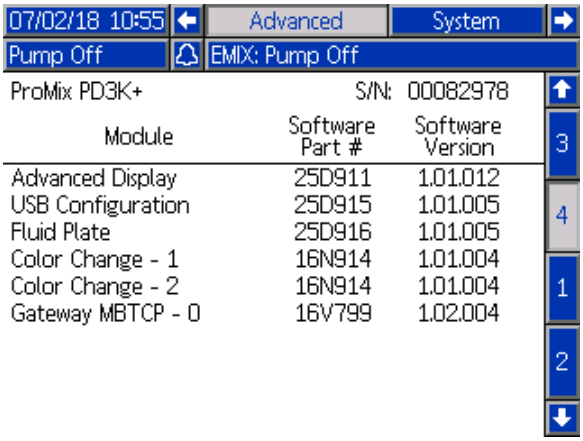


Figure 86 Advanced Screen 4

Diagnostic Screens

Diagnostic Screen 1

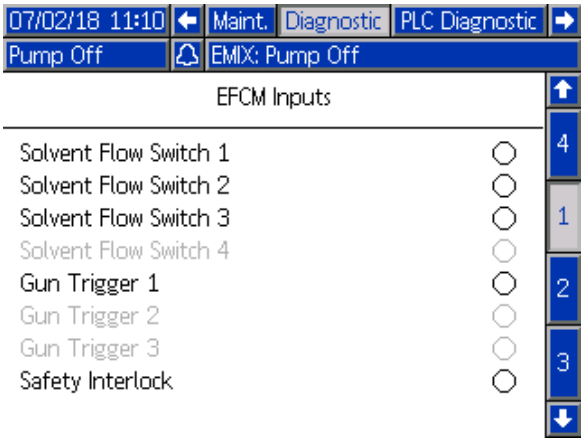


Figure 87 Diagnostic Screen 1

Use this screen to test and verify proper wiring for all inputs to the EFCM. (See installation manual for details.) The screen shows all available inputs to the EFCM, but only highlights those that are relevant to the system configuration. All inputs are normally open. When the input sees a switch closure the status indicator on the screen will turn green.

Diagnostic Screen 2

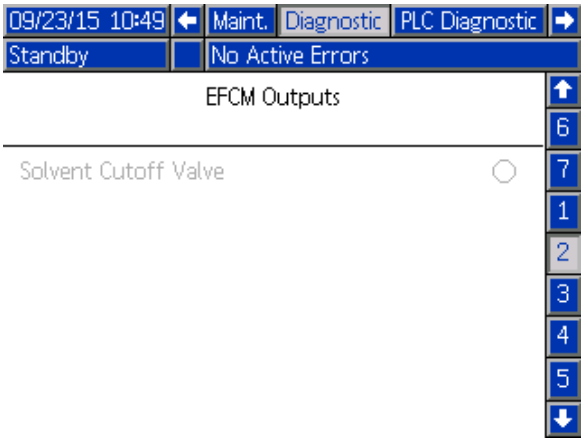


Figure 88 Diagnostic Screen 2

This screen can be used to determine whether any of the EFCM outputs are currently on or off. The screen shows all available outputs from the EFCM, but only highlights those that are relevant to the system configuration. The status indicator next to each output indicates the output is ON when it is green.

Diagnostic Screens 3–10

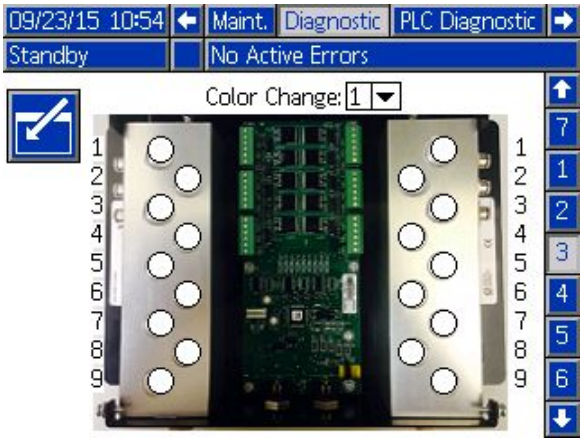


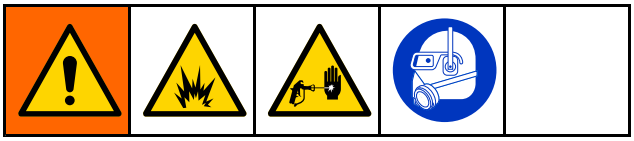
Figure 89 Diagnostic Screen 3–10

Diagnostic screens 3–10 are only available for color change modules that are currently connected to the PD3K+ system. These screens provide real time status of the color change valve outputs by changing the status indicator from white to green when the system energizes that solenoid. The user may scroll through the boards with the up and down arrows, or jump directly to a specific color change module by selecting it from the drop-down box.

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.

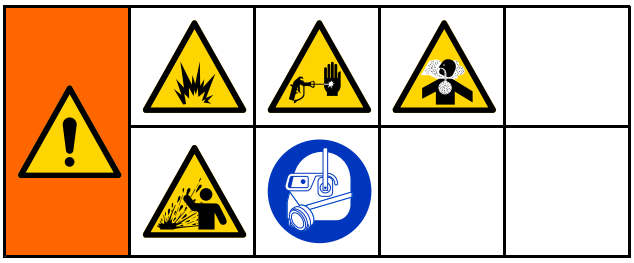
During each pressure test, the dose valve will close during an up stroke and a down stroke (in either order). This test is to verify that the valves are seating properly and not leaking. If leaking occurs, the system will alarm after the test for that particular pump direction.

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

1. The pump and lines must be primed with a component (not solvent) before doing the Pressure Check. See Operation Using Advanced Display Module (ADM), page 21.
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 87.
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



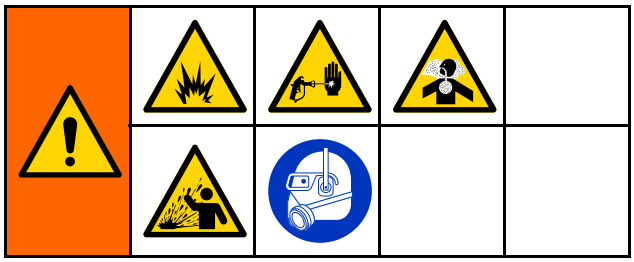
1. The pump and lines must be primed with a component (not solvent) before doing the Volume Check. See Operation Using Advanced Display Module (ADM), page 21.
2. If the display is on a Run Mode screen, press  to access setup screens.
3. Scroll to Calibrate in the menu bar.
4. Scroll to Calibrate Screen 2, page 87.
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



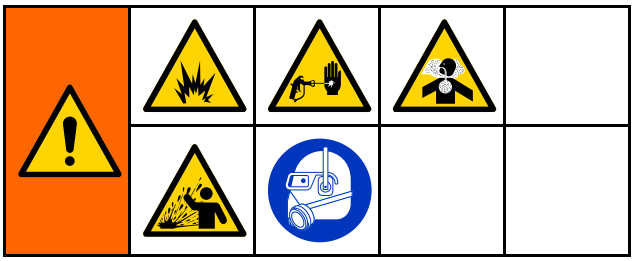
1. The meter and lines must be primed with solvent before doing the calibration. See Operation Using Advanced Display Module (ADM), page 21.
2. If the display is on a Run Mode screen, press  to access setup screens.
3. Scroll to Calibrate in the menu bar.
4. Scroll to Calibrate Screen 3, page 88.
5. 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.

Multiple Color Systems

1. Command the system to Standby.
2. Enable manual override on System Screen 4, page 72.
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 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 1, page 76.
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..

Color Change Does Not Initiate

When selecting a new recipe via a PLC or from the Spray Screen, if a color change sequence does not start, there are a number of things to check that prevent a color change from starting:

1. Are there any active alarms? See System Errors, page 97.
2. Is the recipe enabled? See Recipe Screen 1, page 76.
3. Are the recipe parameters valid? See Recipe Screen 1, page 76, Recipe Screen 2, page 77, and ., page 78
4. Is the fluid stream configuration valid? See System Screen 3, page 71.

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. The four-digit error code will be followed by '-V'.

A **Deviation** records an error in the system but does not shut down the equipment. The deviation must be acknowledged by the user. The four-digit error code will be followed by '-D'.

If an **Alarm** occurs, operation stops. The four-digit error code will be followed by '-A'.

If any of the system error types occur:

- Alarm buzzer sounds (unless in silent mode).
- Alarm popup screen shows the active alarm code (see Error Codes, page 99).
- Status bar on the Advanced Display Module shows the active alarm code.
- Alarm is saved in the date/time stamped log.

A **Record** saves relevant system events in the background. These are informational only and can be reviewed on the Events screen, which displays the 200 most recent events, with date, time, and description.

On-Screen Help

When a system alarm occurs, a help screen is available to provide timely and relevant troubleshooting information for the user. On the alarm popup screen, press  to access the help screens. The help screens may also be accessed at any time by going to the Errors Screen and selecting an alarm in the log (see Errors Screen, page 66).

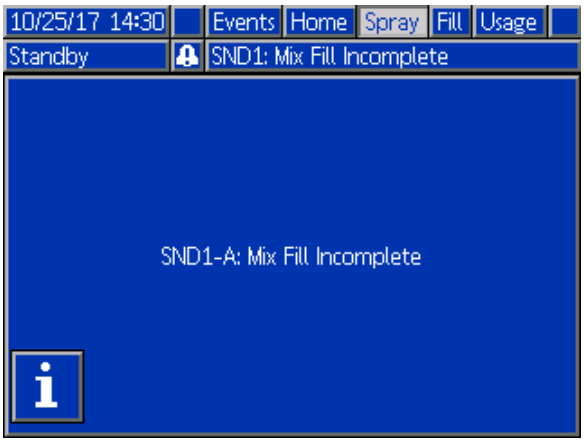


Figure 90 Alarm Popup Screen

All alarms have a QR code screen. A mobile device with internet access and a QR reader may use the QR code to access additional information on a webpage hosted by help.graco.com.

Figure 91 Error QR Code Screen

A number of the alarms that are most likely to be encountered during typical operation have detailed troubleshooting information screens. The troubleshooting screens will replace the QR code screen, though the QR code may still be accessed by pressing  .

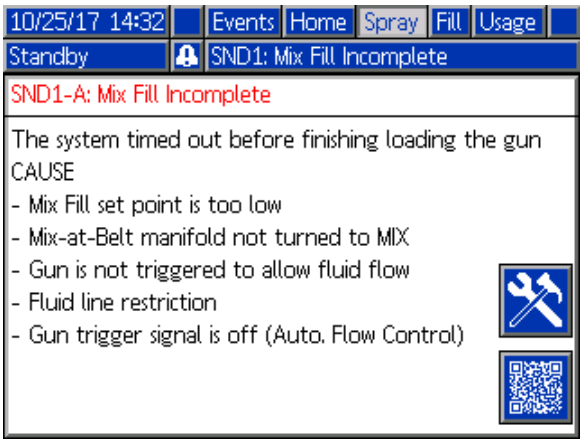


Figure 92 Error Troubleshooting Screen

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 66, 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 PD3K+ Network Inputs, page 34.

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 66, to view the last 200 errors, with date, time, and description.

Purge Errors

Code	Type	Description	Problem	Cause	Solution
ETE0	Record	Purge Not Complete	The system was unable to complete a purge sequence.	An indication that the system either could not complete or was interrupted before completing a gun purge.	No action required.
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.
F7S2	Alarm	Flow Detected Solvent Mix	The solvent flow switches indicate that both are flowing solvent at the same time.	One or both solvent flow switches are stuck in flow position.	Clean or replace the switch(es).
				There is a leak through one or both of the solvent cutoff valves.	Check for leaks and repair valve(s).
QP1#	Alarm then Deviation	Potlife Expired Stage 1 - Gun #	Potlife time has expired before the system has moved the required amount of material (potlife volume) through the stage 1 mixed material line.	Purge process was not completed.	Make sure purge process is allowed to complete.
				Solvent supply shut off or empty.	Verify solvent supply is available and on, supply valves are open.
QP2#	Alarm then Deviation	Potlife Expired Stage 2 - Gun #	Potlife time has expired before the system has moved the required amount of material (potlife volume) through the stage 2 mixed material line.	Purge process was not completed.	Make sure purge process is allowed to complete.
				Solvent supply shut off or empty.	Verify solvent supply is available and on, supply valves are open.
QP3#	Alarm then Deviation	Potlife Expired Stage 3 - Gun #	Potlife time has expired before the system has moved the required amount of material (potlife volume) through the stage 3 mixed material line.	Purge process was not completed.	Make sure purge process is allowed to complete.
				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.
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.

Code	Type	Description	Problem	Cause	Solution
DKD#	Alarm	Position Failed Pump #	Pump was unable to reach its drive position.	Not enough air is supplied to the dosing valves.	Ensure that at least 85 PSI is being supplied to the dosing valves.
				The pressure at the pump outlet is too high.	Check for an obstruction downstream of the pump that would increase pressure. Ensure the feed pressure is within 1/2 - 1/3 of the target pressure.
DKF#	Alarm	Position Overspeed Pump #	Pump moved beyond its drive position.	The pump was knocked out of position.	There is not fluid pressure at the outlet of the pump. Run the pump at a lower pressure to fill the lines. Check that the feed pressure is not more than 1/2 – 1/3 greater than the target pressure.
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.
EP0X	Record	Auto Park Complete	Record of pumps auto park complete.	An indication on the display that the system parked the pump automatically.	No action required.
ETD#	Record	Autodump Pump # Complete	Record of pump # pressure automatic pressure relief complete.	An indication on the display that the system automatically opened the dump valve to relieve pressure.	No action required.
F1A#	Alarm	Flow Low Dispense Pump #	The pump was unable to maintain its target flow rate.	There is a restriction in the hose or gun that is preventing the pump from dispensing at its target rate.	Check that the gun is triggered ad for restrictions in the hose.

Code	Type	Description	Problem	Cause	Solution
F1D#	Alarm	Flow Low Mix Pump #	The pump was unable to maintain it's target flow rate.	There is a restriction in the hose or gun that is preventing the pump from dispensing at it's target rate.	Check that the gun is triggered and for restrictions in the hose.
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.

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
P1D#	Alarm	Presure Low Oultet Pump #	The outlet pressure on pump # is less than the user-entered alarm limit. *This alarm is only enabled with Flow Control.	There is no fluid pressure or pump is cavitating.	Check supply for pump #, increase supply pressure.
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.
P4P#	Alarm	Pressure High Supply Pump #	The supply pump fluid pressure for pump # is greater than 90% of the user-entered Stall Test Pressure.	The supply pump pressure is too high.	Check supply for pump #, decrease supply 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.
P6F#	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.
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.
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.

Code	Type	Description	Problem	Cause	Solution
QAB1	Alarm	Differential Pressure A Over B	Differential pressure is low between driving component and second component. This alarm is active only during Mix mode.	There is a leak on the second component side.	Check the system for internal and external leaks on all manifolds and plumbing for the second component.
QAC1		Differential Pressure A Over C		The second component side pump is cavitating.	Check paint supply on the second component side, increase paint supply pressure.
QAD1		Differential Pressure A Over D			
QBA2	Alarm	Differential Pressure B Over A	Differential pressure is high between driving component and second component. This alarm is active only during Mix mode.	There is a leak on the driving component side.	Check the system for internal and external leaks on all manifolds and plumbing for the driving component.
QCA2		Differential Pressure C Over A		The driving component side pump is cavitating.	Check paint supply on the driving component side, increase paint supply pressure.
QDA2		Differential Pressure D Over A			
QBA1	Alarm	Differential Pressure B Over A	Differential pressure is low between driving component and second component. This alarm is active only during Mix mode.	There is a leak on the second component side.	Check the system for internal and external leaks on all manifolds and plumbing for the second component.
QBC1		Differential Pressure B Over C		The second component side pump is cavitating.	Check paint supply on the second component side, increase paint supply pressure.
QBD1		Differential Pressure B Over D			
QAB2	Alarm	Differential Pressure A Over B	Differential pressure is high between driving component and second component. This alarm is active only during Mix mode.	There is a leak on the driving component side.	Check the system for internal and external leaks on all manifolds and plumbing for the driving component.
QCB2		Differential Pressure C Over B		The driving component side pump is cavitating.	Check paint supply on the driving component side, increase paint supply pressure.
QDB2		Differential Pressure D Over B			
QCA1	Alarm	Differential Pressure C Over A	Differential pressure is low between driving component and second component. This alarm is active only during Mix mode.	There is a leak on the second component side.	Check the system for internal and external leaks on all manifolds and plumbing for the second component.
QCB1		Differential Pressure C Over B		The second component side pump is cavitating.	Check paint supply on the second component side, increase paint supply pressure.
QCD1		Differential Pressure C Over D			
QAC2	Alarm	Differential Pressure A Over C	Differential pressure is high between driving component and second component. This alarm is active only during Mix mode.	There is a leak on the driving component side.	Check the system for internal and external leaks on all manifolds and plumbing for the driving component.
QBC2		Differential Pressure B Over C		The driving component side pump is cavitating.	Check paint supply on the driving component side, increase paint supply pressure.
QDC2		Differential Pressure D Over C			

Code	Type	Description	Problem	Cause	Solution
QDA1	Alarm	Differential Pressure D Over A	Differential pressure is low between driving component and second component. This alarm is active only during Mix mode.	There is a leak on the second component side.	Check the system for internal and external leaks on all manifolds and plumbing for the second component.
QDB1		Differential Pressure D Over B			
QDC1		Differential Pressure D Over C		The second component side pump is cavitating.	Check paint supply on the second component side, increase paint supply pressure.
QAD2	Alarm	Differential Pressure A Over D	Differential pressure is high between driving component and second component. This alarm is active only during Mix mode.	There is a leak on the driving component side.	Check the system for internal and external leaks on all manifolds and plumbing for the driving component.
QBD2		Differential Pressure B Over D			
QCD2		Differential Pressure C Over D		The driving component side pump is cavitating.	Check paint supply on the driving component 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
EBIX	Record	Pumps Off Button Pressed	Record of a pump power off button press.	Indicates pump power key o ADM pressed to power down pumps.	n/a
EBCX	Record	Pumps Off PLC Command	Record of a pump power off PLC command.	Indicates a system command to power off pumps was sent by the PLC.	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
WSN0	Alarm	Config Error Valve Map	The system requires more color change valves than may be supplied (8x18 = 144)	The settings entered for the system requires too many color change valves.	Change the system settings to reduce the total number of valves to 144 or less.

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.
CAGX	Alarm	Comm. Error Gateway	System does not detect a CGM that was registered as being connected at power up.		
CAG#	Alarm	Comm. Error Modbus Gateway	System does not detect a Modbus CGM that was registered as being connected at power up.	The Modbus CGM address dial was changed while the system was powered up.	Unplug the Modbus CGM from the CAN network and re-plug it back in so that it re-registers with the new address.
				The Modbus CGM is not connected/failed.	Check that the Modbus CGM is properly connected to the CAN network and it's LEDs indicate it is powered.
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.
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
B9C0	Advisory	Volume Rollover C Current	Batch counter for material C rolled over.	The totalizer has reached maximum capable value and started over at zero.	n/a
B9CX	Advisory	Volume Rollover C Lifetime	Grand total counter for material C rolled over.	The totalizer has reached maximum capable value and started over at zero.	n/a
B9D0	Advisory	Volume Rollover D Current	Batch counter for material D rolled over.	The totalizer has reached maximum capable value and started over at zero.	n/a
B9DX	Advisory	Volume Rollover D Lifetime	Grand total counter for material D rolled over.	The totalizer has reached maximum capable value and started over at zero.	n/a
B9P#	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.
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.
ME#1	Advisory	Maint. Valve CC Module #, Valve 1	Maintenance is due on color change valve 1 of color change module #.
ME#2	Advisory	Maint. Valve CC Module #, Valve 2	Maintenance is due on color change valve 2 of color change module #.
ME#3	Advisory	Maint. Valve CC Module #, Valve 3	Maintenance is due on color change valve 3 of color change module #.
ME#4	Advisory	Maint. Valve CC Module #, Valve 4	Maintenance is due on color change valve 4 of color change module #.
ME#5	Advisory	Maint. Valve CC Module #, Valve 5	Maintenance is due on color change valve 5 of color change module #.
ME#6	Advisory	Maint. Valve CC Module #, Valve 6	Maintenance is due on color change valve 6 of color change module #.
ME#7	Advisory	Maint. Valve CC Module #, Valve 7	Maintenance is due on color change valve 7 of color change module #.
ME#8	Advisory	Maint. Valve CC Module #, Valve 8	Maintenance is due on color change valve 8 of color change module #.
ME#9	Advisory	Maint. Valve CC Module #, Valve 9	Maintenance is due on color change valve 9 of color change module #.
ME#A	Advisory	Maint. Valve CC Module #, Valve 10	Maintenance is due on color change valve 10 of color change module #.
ME#B	Advisory	Maint. Valve CC Module #, Valve 11	Maintenance is due on color change valve 11 of color change module #.
ME#C	Advisory	Maint. Valve CC Module #, Valve 12	Maintenance is due on color change valve 12 of color change module #.
ME#D	Advisory	Maint. Valve CC Module #, Valve 13	Maintenance is due on color change valve 13 of color change module #.
ME#E	Advisory	Maint. Valve CC Module #, Valve 14	Maintenance is due on color change valve 14 of color change module #.
ME#F	Advisory	Maint. Valve CC Module #, Valve 15	Maintenance is due on color change valve 15 of color change module #.
ME#G	Advisory	Maint. Valve CC Module #, Valve 16	Maintenance is due on color change valve 16 of color change module #.
ME#H	Advisory	Maint. Valve CC Module #, Valve 17	Maintenance is due on color change valve 17 of color change module #.
ME#J	Advisory	Maint. Valve CC Module #, Valve 18	Maintenance is due on color change valve 18 of color change module #.

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.

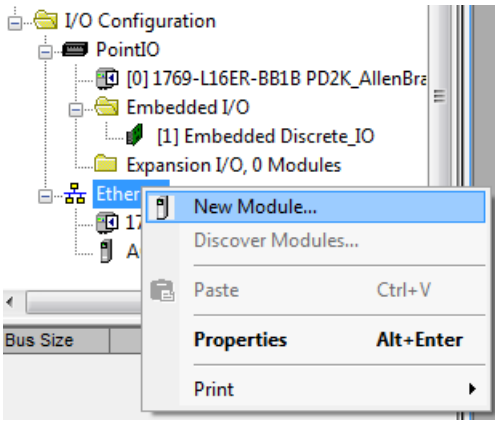
Appendix A: Integration with Allen Bradley PLC

This appendix outlines how to integrate a ProMix PD3K+ with an Allen Bradley Studio 5000 Programmable Logic Controller (PLC).

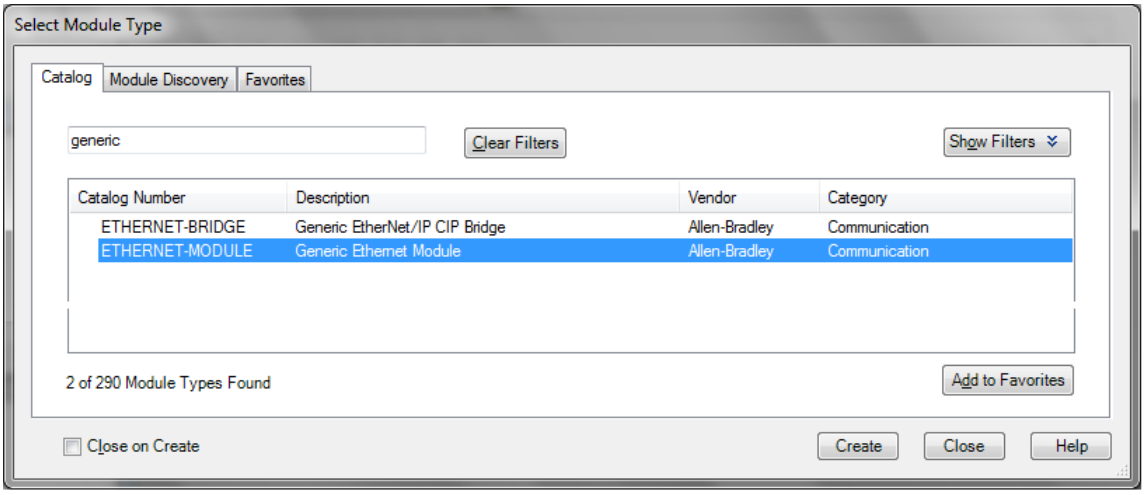
To integrate, the ProMix PD3K+ must have the Ethernet/IP protocol for PLC CGM (Graco Part number CGMEPO) installed prior to performing this procedure.

In the PLC software, perform the following steps:

1. Add the new Ethernet module.



2. The **Select Module Type** screen opens.

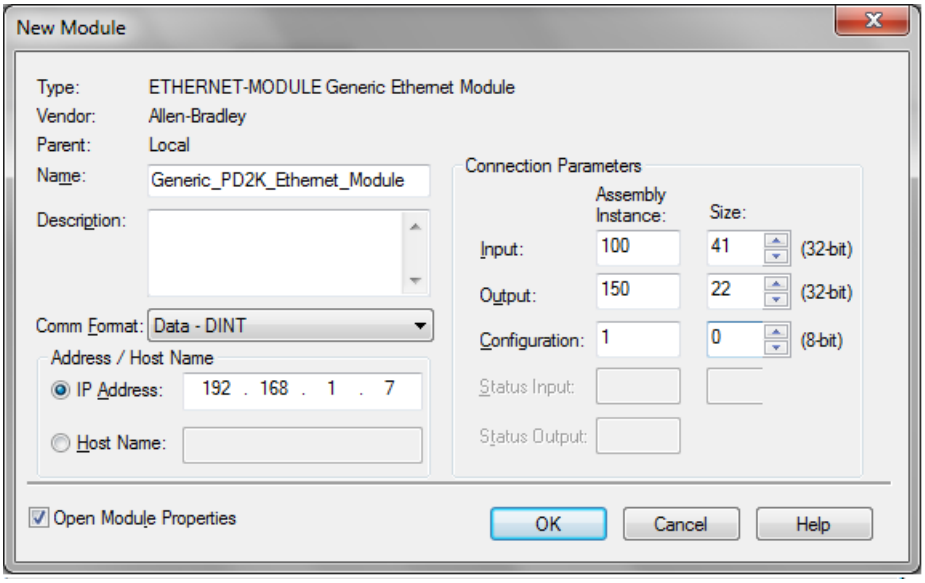


   a. In the search field, type “generic” .
   b. Select ETHERNET-MODULE Generic Ethernet Module.

      NOTE: Do not select the Close on Create checkbox.

   c. Click the Create button.

3. The **New Module** screen opens.



Configure the module by defining the fields as follows:

NOTE: The Open Module Properties checkbox must remain selected so that the configuration can be completed after completing this screen.

a. Name (required): Enter a name for the module (select a name that will have meaning for you when viewed on the Ethernet directory shown by the figure in step 1).

b. Description (optional): Use any description desired.

c. IP Address (required): Enter the static IP address of the Graco EtherNet/IP CGM installed in the ProMix PD3K+.

d. Input: Assembly Instance (required): Enter “100”, which is a device-specific parameter for the Graco EtherNet/IP CGM.

e. Input: Size (required): Enter “41”, which is the number of 32–bit registers that are allocated for input variables in the Graco EtheNet/IP CGM.

f. Output: Assembly Instance (required): Enter “150”, which is the device-specific parameter for the Graco EtherNet/IP CGM.

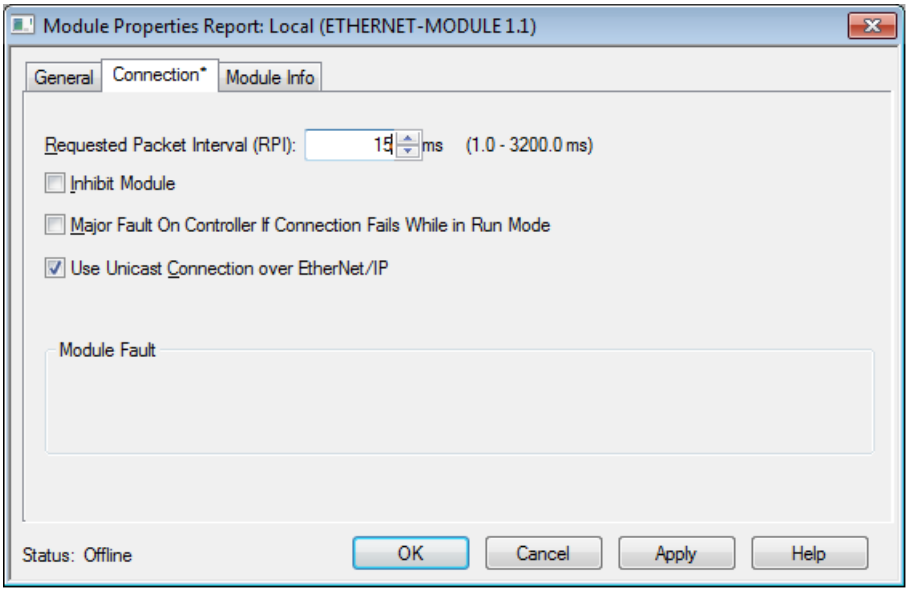
g. Output: Size (required): Enter “22”, which is the number of 32–bit registers that are allocated for output variables in the Graco EtheNet/IP CGM.

h. Configuration: Assembly Instance (required): Enter “1”.

i. Configuration: Size (required): Enter “0”.

j. Click the OK button. The **Module Properties Report** window will be displayed.

4. On the Connection tab:



NOTE: An asterisk appears after the tab heading if unsaved changes are present. Click the Apply button to save changes without exiting this screen.

a. Enter a Requested Packet Interval (RPI) value.

   NOTE: Graco recommends a value of 50 ms or greater.

b. If desired, select the available checkboxes.

c. Click the OK button to save all changes and exit this screen.

Table 6 Potential Configuration Problems

Error	Description
Connection Request Error — Invalid Input Application Path	This error, which also triggers an I/O Fault on the PLC, is caused by an invalid number being entered for the **Input: Assembly Instance** parameter. The correct value for this parameter is “100”.
Connection Request Error — Invalid Output Application Path	This error, which also triggers an I/O Fault on the PLC, is caused by an invalid number being entered for the **Output: Assembly Instance** parameter. The correct value for this parameter is “150”.
Connection Request Error — Invalid Input Size	This error, which also triggers an I/O Fault on the PLC, is caused by an invalid number being entered for the **Input: Size** parameter. The correct value for this parameter is “41”.
Connection Request Error — Invalid Output Size	This error, which also triggers an I/O Fault on the PLC, is caused by an invalid number being entered for the **Output: Size** parameter. The correct value for this parameter is “22”.
Module Configuration Rejected — Format Error	This error, which also triggers an I/O Fault on the PLC, is caused by an invalid number being entered for the **Configuration: Size** parameter. Because there are no configuration registers associated with the module, the correct value for this parameter is “0”.

Appendix B: Multiple Guns

A ProMix PD3K+ Automatic system normally operates with a single spray device, but may be configured to used multiple (up to three maximum) spray devices. Having multiple spray devices has the advantage of very fast color changes; the system could have a recipe loaded in each spray device and could then switch between them almost instantly. The PD3K+ will also track potlife time for multiple mixed recipes.

The Multiple Guns operation mode may be enabled on System Screen 3 by changing the Number of Guns to greater than 1.

Each component in the system must be assigned to a single spray device. Assignment of the component to a spray device is done on the Pump Screen 4 by entering the spray device number next to the component number.

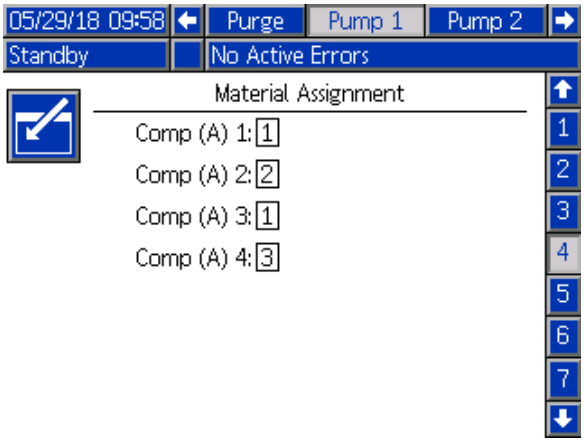


Figure 93 Pump Screen 4 – Material Assignment

Components B, C, or D may be assigned to a single spray device, shared among multiple spray devices (common), or a mix of both. Only one component per pump may be configured as Common, and because each assignment requires a remote valve, the total number (including each common assignment) cannot exceed eight. To configure a component as common to multiple spray devices, check the **Common** box and select all appropriate spray devices.

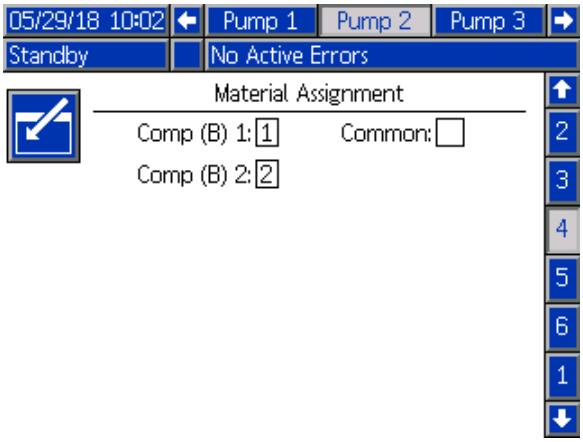


Figure 94 Pump Screen 4 Component B

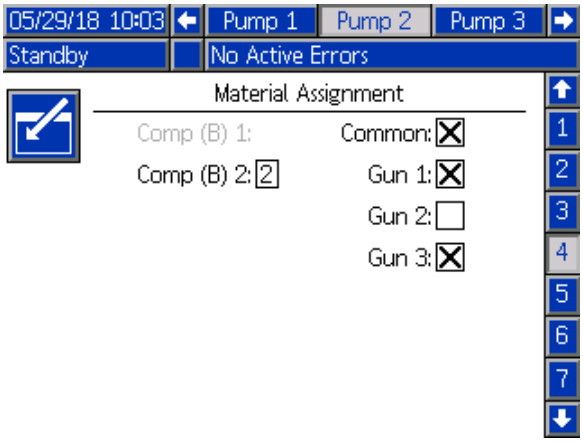


Figure 95 Pump Screen 4 Component B Common

Recipes can only be set up to use components that are assigned to the same spray device. If the spray device assignments do not match, the recipe will be invalidated and disabled. See Recipe Screen 1, page 76 for more information on invalid recipes.

Spray Screen

The Spray screen provides the same information and operating capabilities as with a single spray device (see Spray Screen, page 62). In addition, the Spray screen shows the contents of each spray device, and allows the user to switch control among the spray devices. (The active spray device is that which is, or was, most recently spraying or loading mixed material, and is highlighted on the left side of the screen.) If manual override is enabled, and the system is in Standby, the user may select **Gun** and enter the number to be the active spray device. This provides the ability to purge a spray device that is currently inactive but loaded with mixed material that has an expired potlife.

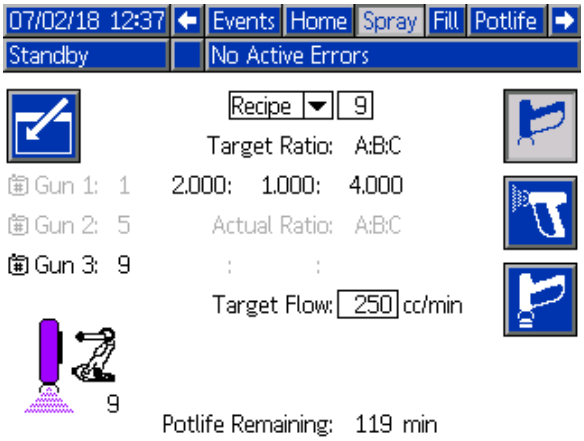


Figure 96 Spray Screen

Fill Screen

The Fill screen operates the same as with a single spray device (see Fill Screen, page 63).

NOTE: When filling a line, it is important to know and trigger the appropriate spray device to which the material is assigned to avoid over-pressuring the system.

When filling a line with a component that is common, the user will also need to select one of the spray devices. The system will open the appropriate valves and fill material out the selected spray device.

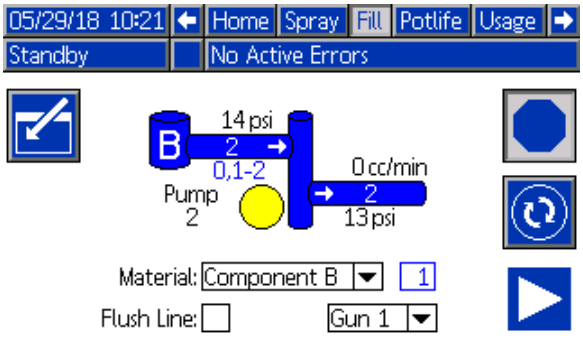


Figure 97 Fill Screen Common Component B

Maintenance Screen 5

Color change valves may be manually overridden from Maintenance Screen 5 the same as with a single spray device (see Maintenance Screen 5, page 90).

For a component configured as common, the user will have to identify which remote valve to cycle by selecting the appropriate gun.

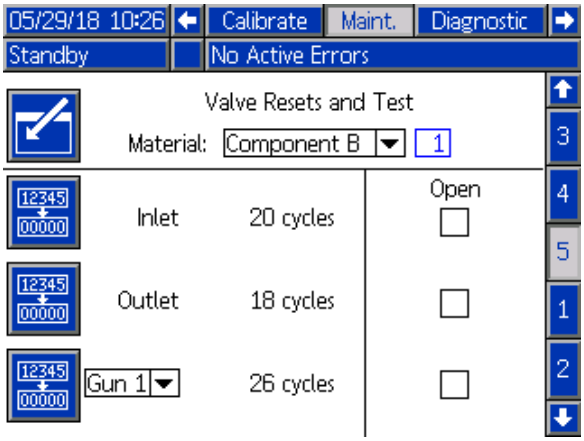


Figure 98 Maintenance Screen 5 Common Component B

Because each spray device has its own unique remote solvent valves, when overriding a remote solvent valve the user will similarly have to identify the appropriated spray device.

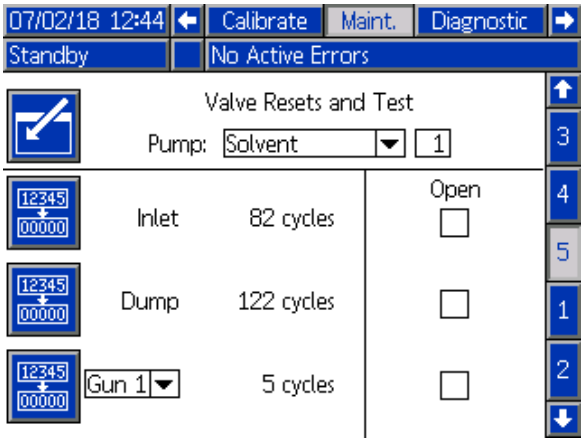


Figure 99 Maintenance Screen 5 Solvent

Operation With a PLC

All spray devices defined for the system are required to have provided for them a unique gun trigger signal. The following table shows where discrete I/O connections are made for the three available gun trigger inputs on the EFCM.

I/O Description	EFCM Connector	Pins	Type
Gun Trigger Input 1	6	1, 2	Normally Open Contact
Gun Trigger Input 2	6	3, 4	Normally Open Contact
Gun Trigger Input 3	6	5, 6	Normally Open Contact

If the Gun Trigger is configured to ‘Network’, Input Register 8 is used. Review Discrete I/O, page 24 and ProMix PD3K+ Network Inputs, page 34.

Output Register 11 is used to indicate which gun is currently the ‘active’ spray device.

When command a line fill/flush for a common catalyst from the PLC using Input Registers 05 and 06, the appropriate spray device must be identified and triggered to avoid over-pressurizing the system. To accomplish this, the common components have a special material number designation. If filling with a common component on pump 2, instead of using material 31 the user will enter 41, 42, and 43 for spray device 1, 2, and 3, respectively. See ProMix PD3K+ Network Inputs, page 34, and Line Fill and Flush Sequences, page 42, for details.

If one of the inactive spray devices is loaded with material and the potlife expires, it may be desired to purge the material immediately, but not change over materials in the pumps. The user may change active guns by writing the desired spray device number to Input Register 09.

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 — 100:1, ±1%	
Fluids handled:	one or two component: • solvent and waterborne paints • polyurethanes • epoxies • moisture sensitive isocyanates	
Viscosity range of fluid:	20–5000 centipoise	
Fluid filtration (user-supplied):	100 mesh minimum	
Maximum fluid flow:	1600 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	

California Proposition 65

CALIFORNIA RESIDENTS

⚠ **WARNING:** Cancer and reproductive harm — www.P65warnings.ca.gov.

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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.

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Original Instructions. This manual contains English. MM 332564

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