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PVA-5GPU

Owner's Manual

Revision C

Precision Valve & Automation
6 Corporate Drive
Halfmoon, NY 12065

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1. Introduction

Before you operate this system, read the operation and setup manual. This will help you to become familiar with the product and ensure successful operation.

If any questions or problems arise, contact PVA's Technical Support department.

1.1 PVA Contact Information

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1.2 Document History

Revision	Revision Date	Reason for Changes
REV C	January 2025	Major System Changes
REV B	May 2014	Pail Support Base Updated
REV A	April 2014	Initial Release

Note: All photographs and CAD model representations in this document are a "general representation" of the system and its components. The actual appearance of the system and its components can differ based upon customer specific configuration.

1.3 Safety

Certain warning symbols are affixed to the machine and correspond to notations in this manual. Before operating the system, identify these warning labels and read the notices described below. Not all labels may be used on any specific system.

Always wear approved safety glasses when you operate or work near the workcell.

Before you operate the system, read and understand the manuals provided with the unit.

Never put hands or tools in areas with this symbol when the machine is in operation. A dangerous condition may exist.

Read and understand the manuals provided with the unit before any repairs or maintenance is done. Only a qualified individual should do service.

Use caution when there are pressurized vessels. Find and repair any leaks immediately. Always wear appropriate safety equipment when you work with pressurized vessels or vessels that contain chemicals

Shear hazard from moving parts. Avoid contact.

Do not remove protective guarding.

In situations where inattention could cause either personal injury or damage to equipment, a warning notice is used.

Do not smoke near the machine. Always have a fire extinguisher available for emergency use.

Before performing any repairs or maintenance to the system, turn off power and lock out the power disconnect switch.

Warning notices are used to emphasize that hazardous voltages, current, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use. Only qualified personnel should enter areas designated with this symbol.

Laser light source present. Do not stare directly into the beam. Do not use in the presence of highly reflective surfaces

Pinch hazard from moving parts. Avoid contact.

Hot surface. Avoid contact.

Warning, Ultraviolet (UV) light hazard. Do not look directly at the UV light source.

This product meets EU standards for health, safety, and environmental protection.

Warning, no open flames.

Electrostatic sensitive device warning. Observe precautions for handling.

1.4 Theory of Operation

The PVA-5GPU Hydraulic Extrusion Pump is a heavy-duty extrusion pump designed for extruding thermal interface materials (TIM) to a dispense head. The PVA-5GPU extrudes the material from a 5-gallon pail with a hydraulic ram cylinder. This has no internal moving parts and transfers the material without changes to the material properties and with virtually zero maintenance required.

1.5 Personal Protective Equipment

Operators must use eye protection at all times. Always wear gloves when handling materials and solvents. Refer to MSDS sheets on the material being dispensed for other precautions.

1.6 Waste Disposal

Dispose of all used parts and materials in accordance with local laws and regulations.

2. Pump Overview

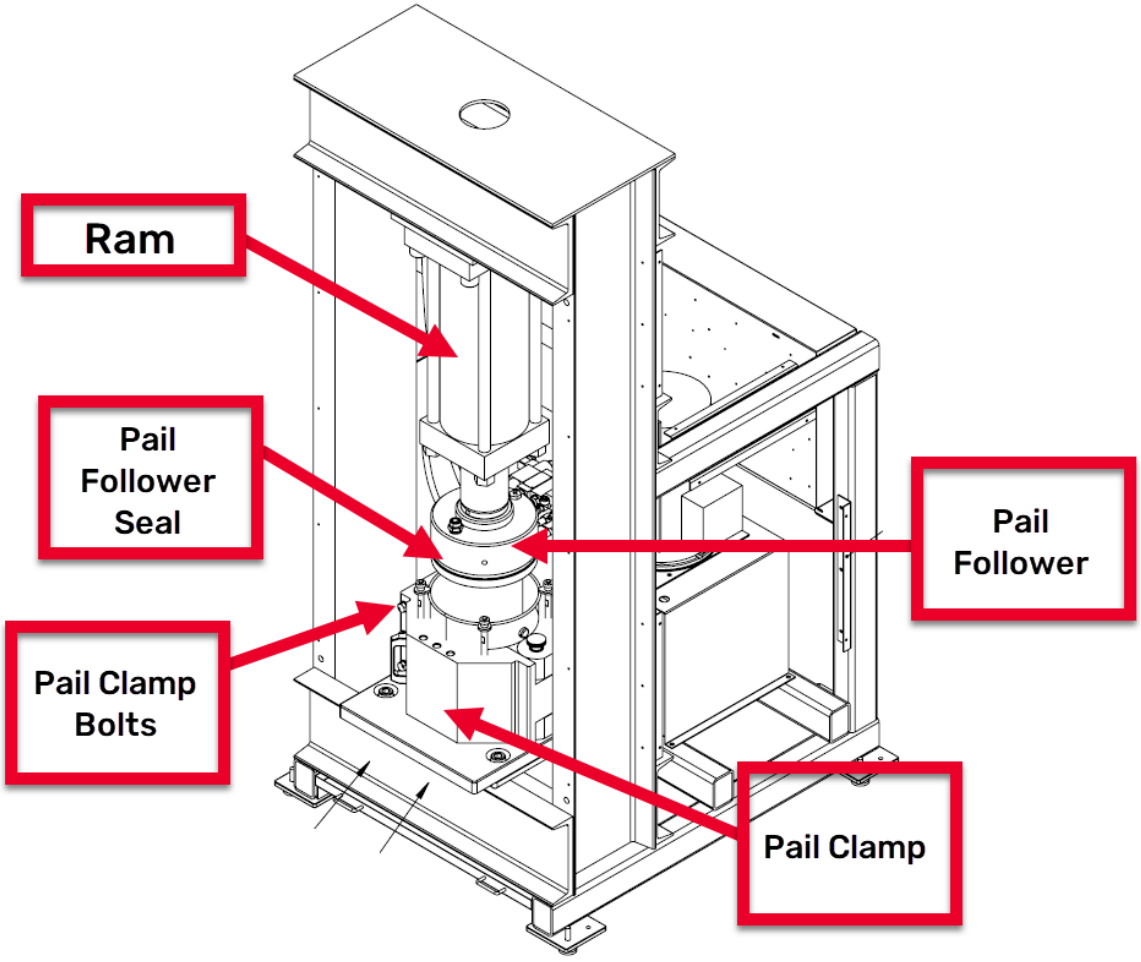


Figure 1: Pump Overview

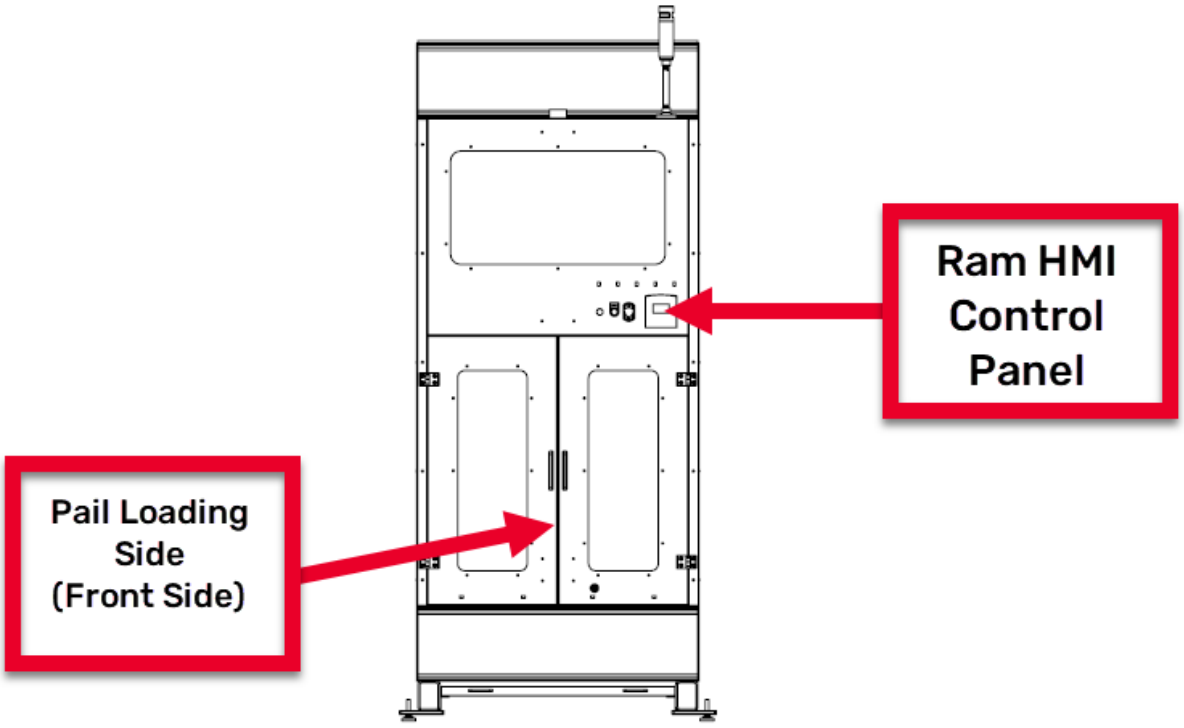


Figure 2: 5GPU Front Side

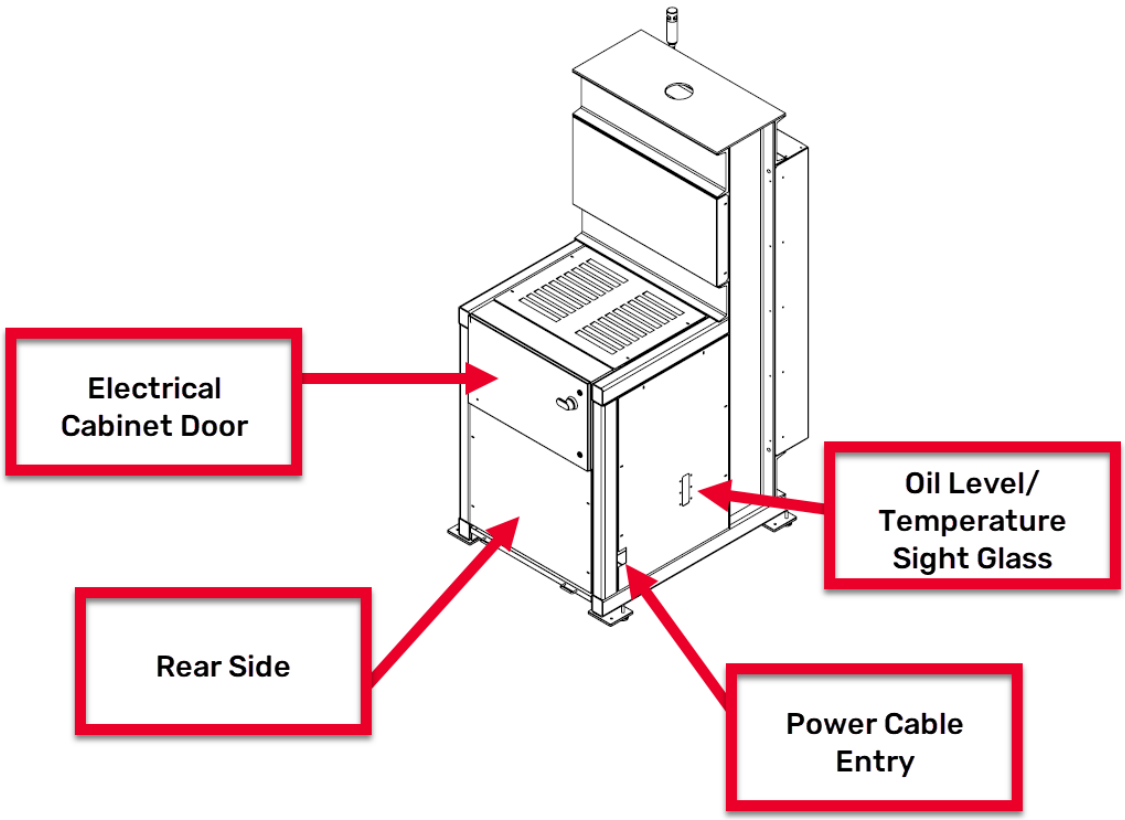


Figure 3: 5GPU Rear Side

3. HMI Overview

The HMI (human machine interface) is used to operate the system. The HMI has some buttons that are always used for the same functions and other buttons that change functions. The buttons that change functions are labeled on the display screen. The HMI is on the ram control panel.

Press the image on the touch screen or the function keys to make a selection.

The screen shown below is the home screen. You must go back to cycle stop to access all other options.

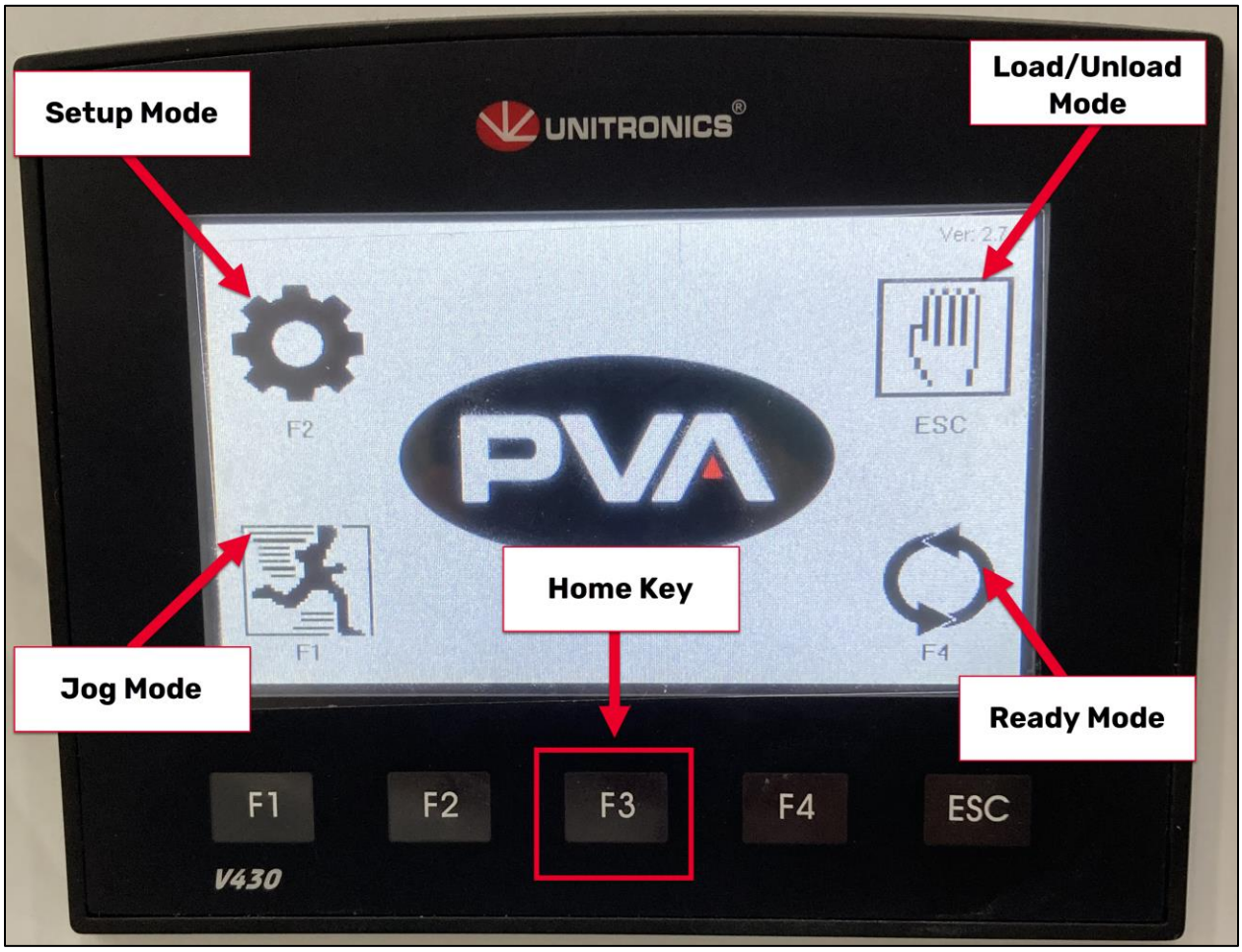


Figure 4: HMI Overview, Home Screen Shown

3.1 Ram Position and Pump Pressure Overview

Each mode will display two values: **Ram Position** and **Pump Pressure**. The pressure value displayed is hydraulic pressure. This operates at approximately a 2:1 ratio to fluid pressure. For example, if the hydraulic pressure displays 1,000 psi, the fluid pressure at the ram will be close to 500 psi.

3.2 Jog Mode Overview

Press the **F1** key to enter **Jog Mode**. In this screen, you can press and hold the **Up arrow key (F2)** to manually jog the ram up or press and hold the **Down arrow key (F4)** to jog the ram down.

Note: Press and hold the arrow keys for continuous movement of the ram and release the arrow key to stop movement.

3.3 Setup Mode Overview

Press the **F2** key to enter **Setup Mode**. In these screens, you can adjust Material Levels, Pressure Modes, and Pressure Settings. Press **ESC** to scroll through the setting screens.

3.4 Load/Unload Mode Overview

Press the **ESC** key to enter **Load/Unload Mode**. This mode can be used to automatically move the ram to the locations programmed in **Setup - Load/Unload**. Once a new pail is in place, press the Down arrow key (Load) to index the ram to the load position inside the pail. Once a pail is empty, press the Up arrow key (Unload) to move the ram up and out of the pail so it can be removed.

3.5 Ready Mode Overview

Press the **F4** key to enter **Ready Mode**. Once in Ready Mode the pump, will move the ram into the material and build the preset hydraulic pressure. After that pressure is reached, the system will activate the ready bit to the PLC and dispensing can start.

Note: This mode should be used for normal dispense operation.

3.6 Error Screens

There are several error screens that may be shown. All warning messages are displayed on the ready mode screen. Whenever a warning message is displayed, the amber light will blink on and off. If a user encounters an error, correct the problem. After the problem has been corrected, select **F3** to return to the home screen.

4.Operation

4.1 E-Stop

Figure 5: E-Stop Engaged

Figure 6: Disengage E-Stop

Figure 7: Power On

4.2 Remove the Pail

Warning: Doors must be always closed to operate the hydraulic ram. The hydraulic ram will not operate unless the doors are closed. DO NOT bypass the magnetic door interlocks or remove any guarding, the ram is under high pressure!

1. Select **ESC** from the home screen to enter **Load Unload Mode**.

Figure 8: Load Unload Mode

2. Select **F4** to unload. The ram should rise fully out of the pail.

Figure 9: Unload

3. The ram will stop automatically when it is fully raised. If necessary at any point, select **F4** again to stop the ram.

4. Open the lower door.

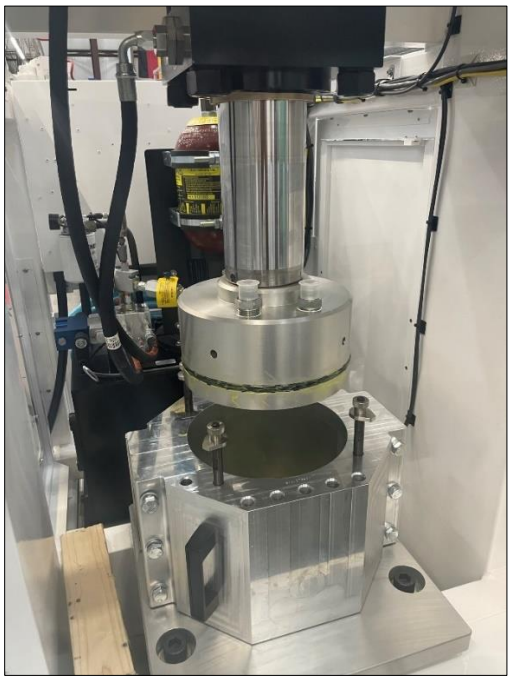
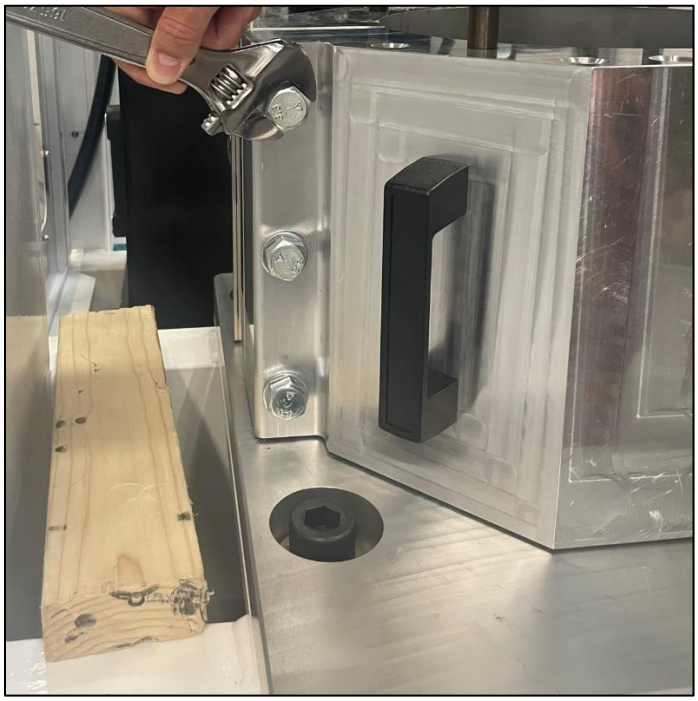


Figure 10: Doors Open, Ram Fully Retracted

5. Use a 15/16” socket to remove the three bolts on the left and right side of the pail clamp.



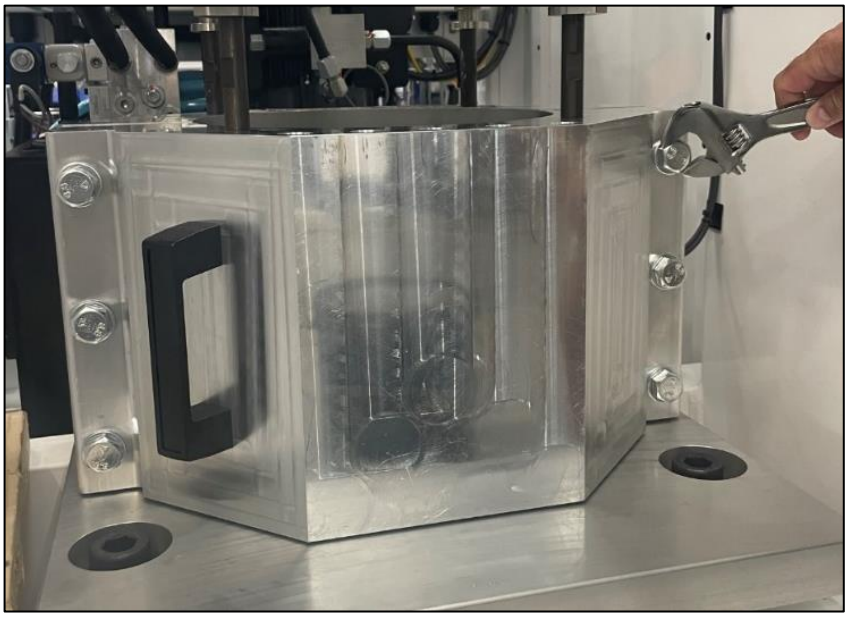


Figure 11: Remove the Pail Clamp Bolts

6. Open the pail clamp door.

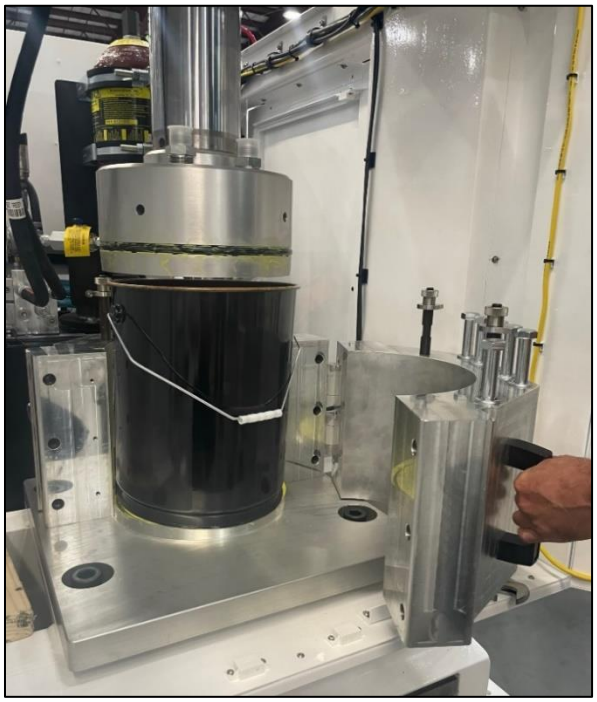


Figure 12: Open the Pail Clamp Door

7. Remove the pail from the clamp.

Figure 13: Remove the Pail

4.3 Remove the Pail Follower Seal

1. If the ram is not fully seated, use the **Unload** function on the HMI to raise the ram full out of the pail.
2. Use the pick to remove the pail follower seal. Be careful not to damage the pail follower seal.

Note: Be careful not to damage the follower plate side walls or seal grooves.

Figure 14: Pick

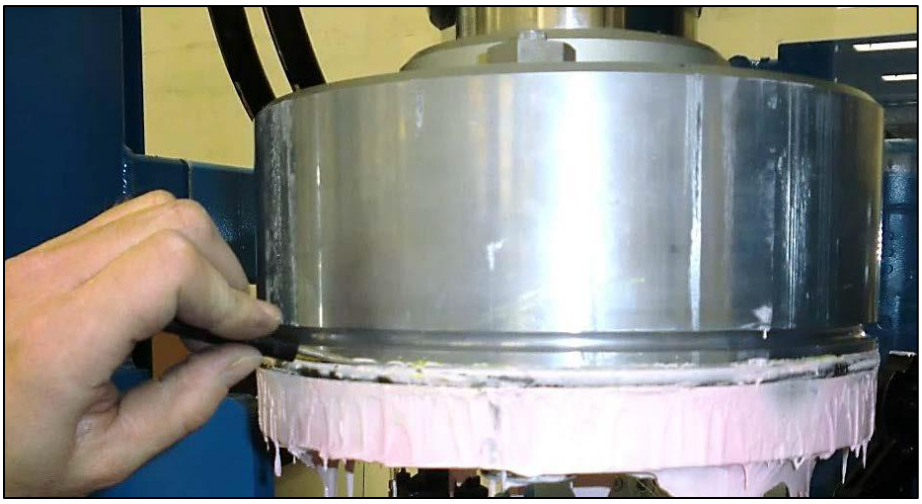


Figure 15: Use a Pick to Remove the Seal

4.4 Install the Pail Follower Seal

1. Clean the pail follower seal thoroughly using isopropyl alcohol and wipes.

Figure 16: Isopropyl Alcohol for Cleaning

2. Examine the pail follower seal for wear or damage and replace if necessary.
3. Clean the bottom groove of the ram thoroughly with cotton swabs and solvent.

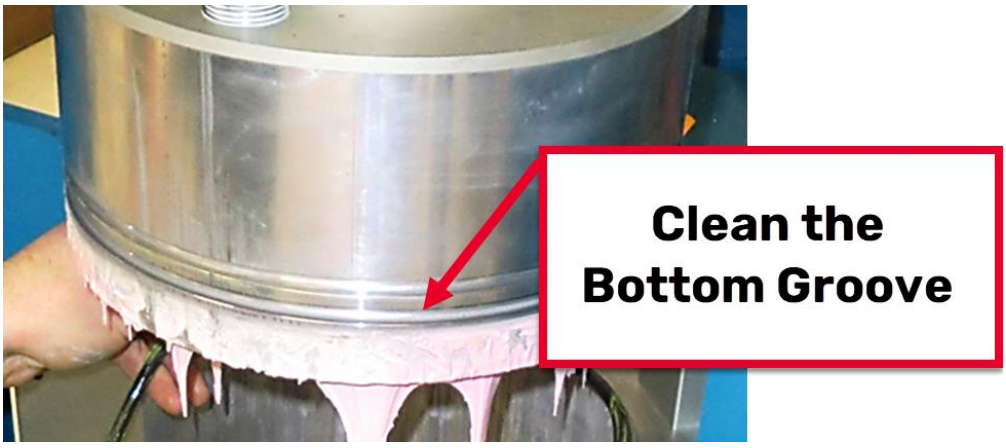


Figure 17: Clean the Lower Groove

4. Apply silicon grease to the pail follower seal.

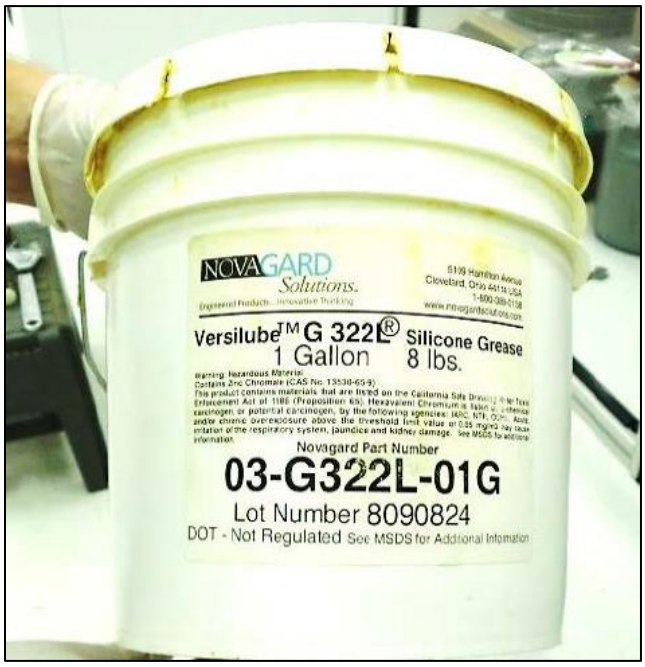


Figure 18: Silicon Grease for the Seal

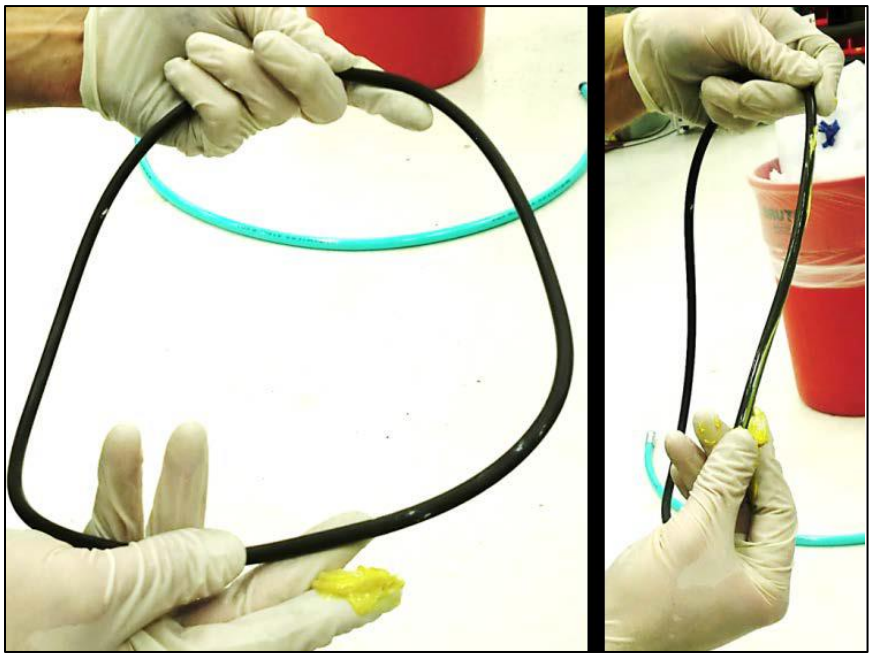


Figure 19: Applying Grease to the Seal

5. Put the pail follower seal in the bottom groove.

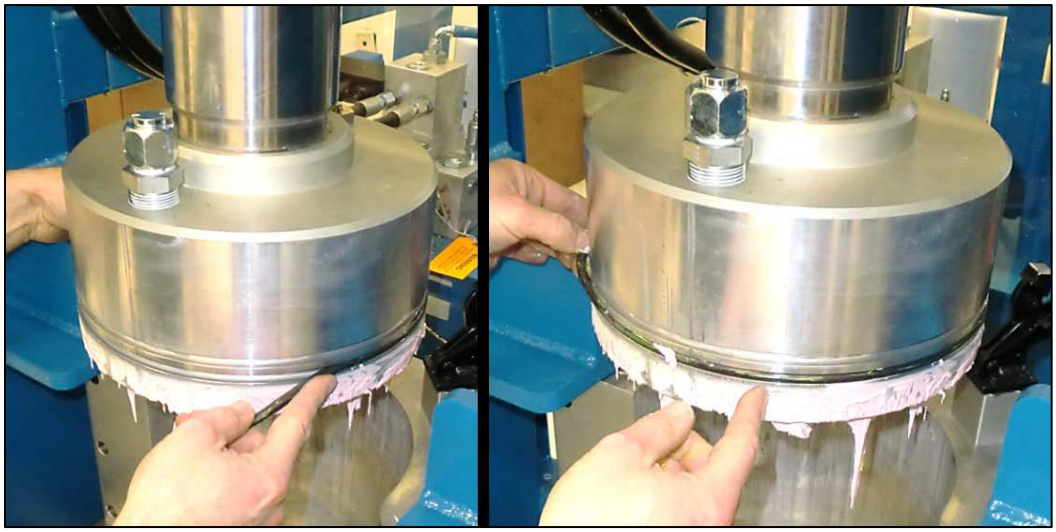


Figure 20: Installing the Pail Follower Seal

6. Ensure the pail follower seal is not twisted in the groove.

Figure 21: Pail Follower Seal Installed

4.5 Load a Pail

Warning: Doors must be closed at all times when operating the hydraulic ram. The hydraulic ram will not operate unless the doors are closed. Do not bypass the magnetic door interlocks or remove any guarding, the ram is under high pressure.

1. Ensure the ram is fully raised from the pail. Refer to Section 4.2 for more information.
2. Open the bottom door.
3. Use a 15/16" socket to remove the three bolts on the left and right sides of the pail clamp.
4. Open the pail clamp door.
5. Inspect the new pail for defects, dirt, or other contamination of any kind.
6. Ensure the pail support base is installed in the base of the machine.
7. Apply grease to the pail support base.

Figure 22: Apply Grease to the Pail Support Base

8. Use a cotton tipped applicator to ensure there is grease in the pail support groove.

Figure 23: Ensure There is Grease in the Pail Support Groove

Note: The pail will be very difficult to remove if you do not grease the pail support base every time a pail is installed.

9. Put the pail into the pail clamp. The bottom of the pail should fit perfectly into the pail support base. The base of the pail should sit flat on the base of the machine.

Figure 24: Putting the Pail in the Pail Clamp

10. Close the pail clamp door, ensuring that it closes completely.
11. Install and tighten the three bolts in the pail clamp.

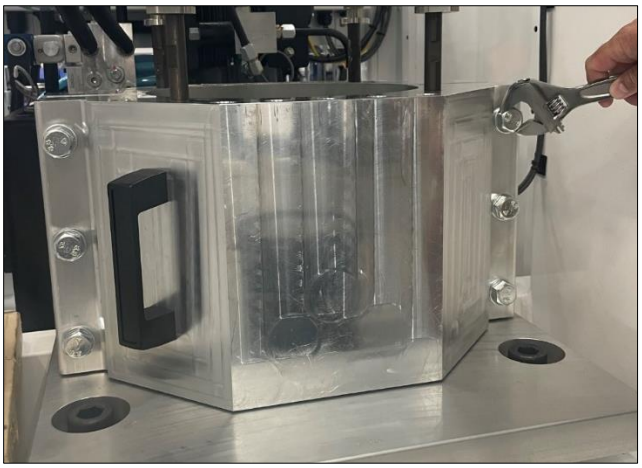


Figure 25: Install the Clamp Door

12. Engage the pail clamps to face inward so the clamps will engage the pail edge.

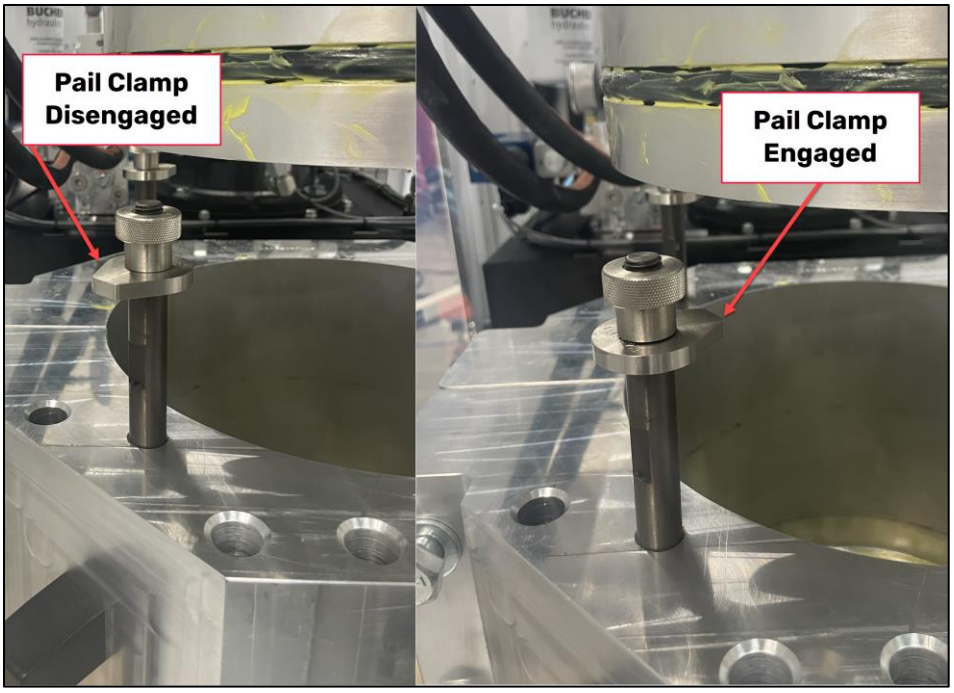


Figure 26: Engaging the Pail Clamps

13. From the Load/Unload screen on the HMI, select the Down arrow key to **Load**.

14. The ram should lower into the pail until it contacts the material and builds up to the process pressure setting. Refer to Section 5.3 to change the process pressure setting.

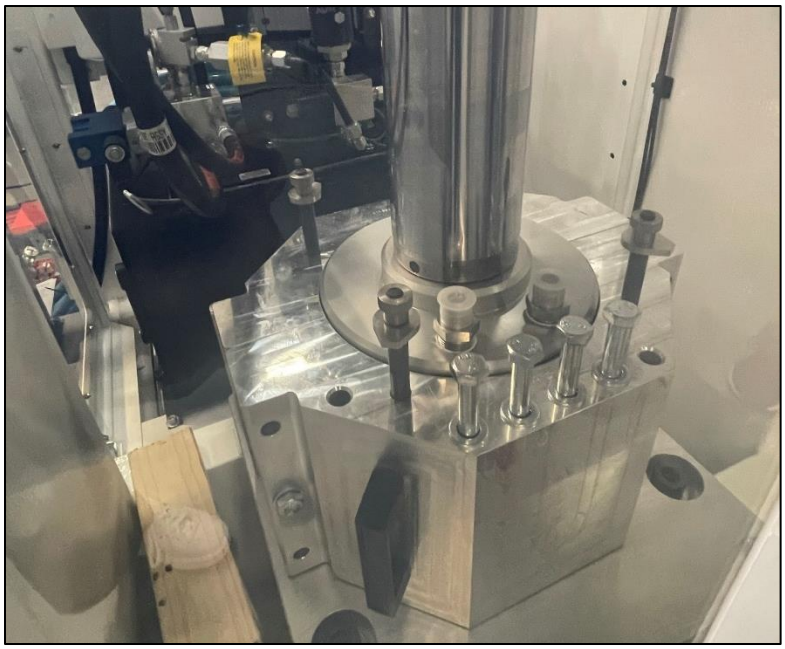


Figure 27: Lowering the Ram

15. Select the Down arrow again to stop the ram. The ram will stop automatically when it reaches the load position.

16. Select the **F3** button to go to the Home screen.

4.6 Ready Mode

1. Select the **F4** key to enter **Ready Mode**.
2. The pump will move the ram into the material and build the preset hydraulic pressure.
3. After that pressure is reached, the system will activate the ready bit to the PLC and dispensing can start.

Note: This mode should be used for normal dispense operation.

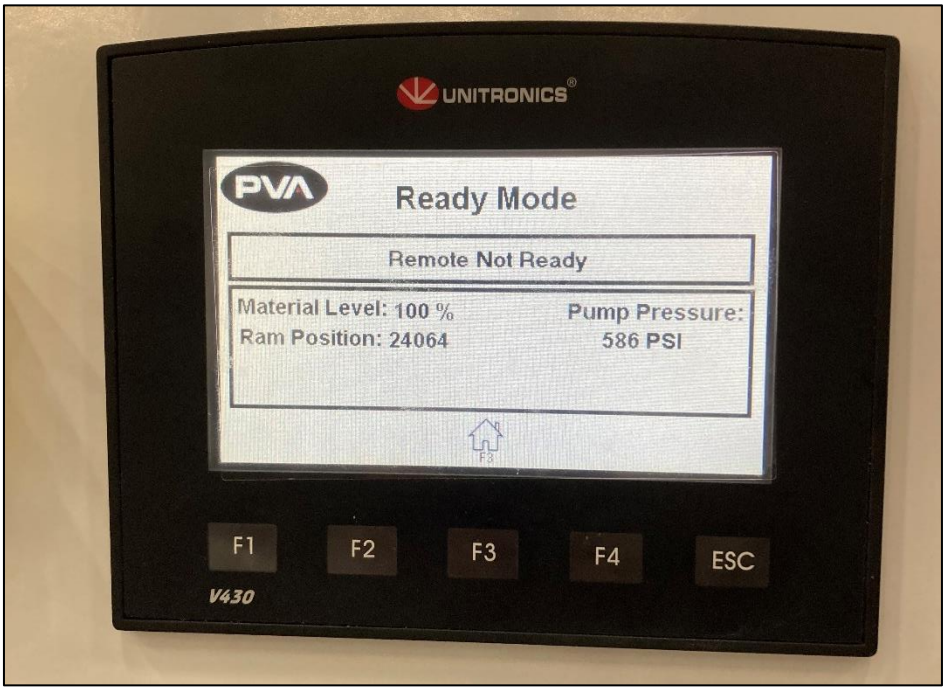


Figure 28: Ready Mode

4.7 Jog

The ram can be raised or lowered manually with the **Jog** function.

1. Select **F1** from the home screen to enter **Jog Mode**.

Figure 29: Jog Mode

2. Press and **F2** to **Jog Up** or **F4** to **Jog Down**.

Note: Press and hold the keys for continuous movement of the ram and release the key to stop movement.

Figure 30: Jogging the Ram Up or Down

5. Setup

Press the **F2** (gear key) to enter **Setup Mode**.

Note: Press the F1 key to scroll left or the ESC key to scroll right through the setup screens.

5.1 Setup - Material Levels

The Material Levels screen allows you to set the vertical position of the ram where the Empty Level and Low Level signals will activate an output through the I/O cable to a PLC.

Figure 31: Setup - Material Levels Screen

Note: The Low Level setting should be set at a higher valve and used as a warning. The Empty level should be set lower and used as a signal to stop dispensing.

1. To adjust either setting, press the percentage value marked in **blue**.

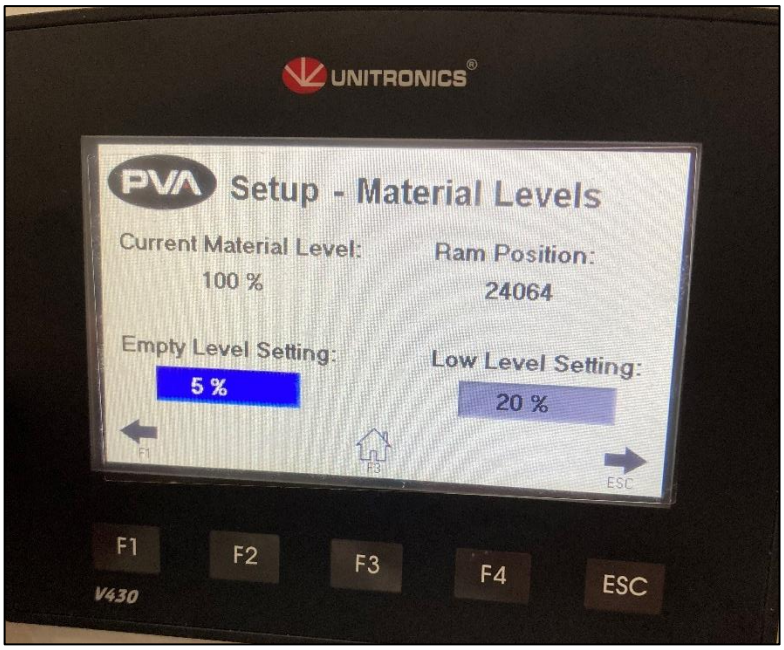


Figure 32: Adjust Empty Level Setting

2. Once in the value adjust screen, use the keypad to enter a new value.

Figure 33: Enter Value in Keypad

3. Press the Enter key in the lower right corner to save that value and return to the previous screen.

Note: The ESC key can be used to exit this screen without saving changes.

Figure 34: Enter Key on Keypad

5.2 Setup - Pressure Modes

1. Press the ESC key to scroll to the right and enter **Setup – Pressure Modes**.

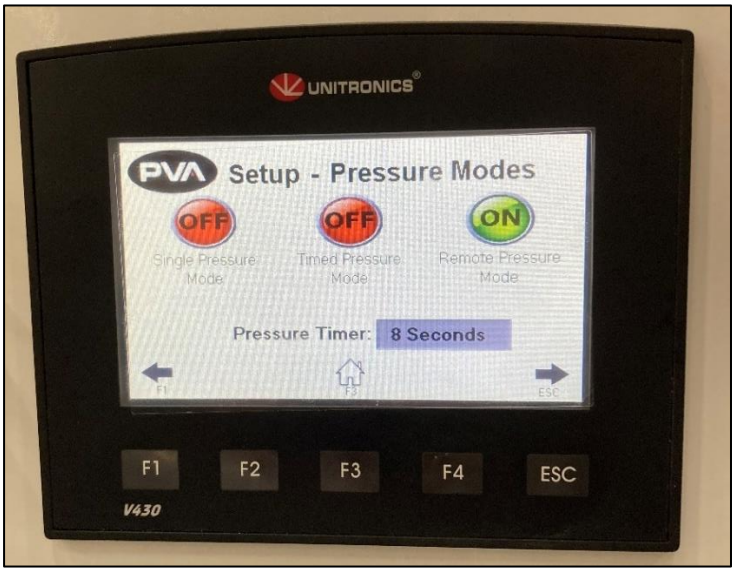


Figure 35: Setup - Pressure Modes Screen

2. Press the **Select Single Pressure Mode** button to switch it to the ON position. In this mode, the pump system will always operate at one constant pressure which will be entered as a value in the **Setup – Pressure Settings** screen as **Pressure 1**.

3. Press the **Timed Pressure Mode** button to switch it to the ON position. In this mode, the system can be automatically switched between the **Pressure 1** and **Pressure 2** values entered in the **Setup – Pressure Settings Screen**. Upon startup, the system will adjust to the **Pressure 1** value. A signal can then be sent from the PLC to start the timer shown on this screen and once that time is reached, the system will switch adjust to the value entered in the **Pressure 2** box. That signal from the PLC can be removed to allow the pump to adjust back to the **Pressure 1** value.

4. To adjust the time setting, press the timed value marked in **blue**.

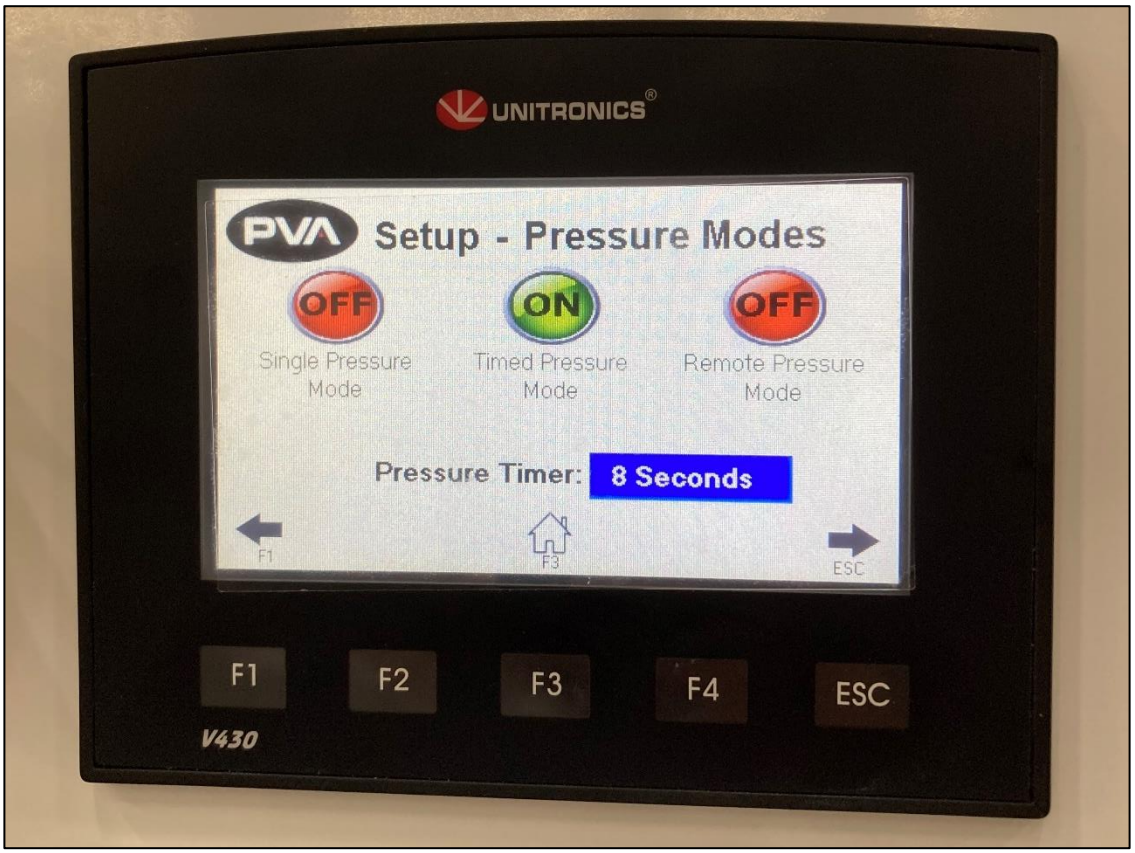


Figure 36: Adjust Time Setting

5. Once in the value adjust screen use the keypad to enter a new value then press the Enter key in the lower right corner to save that value and return to the previous screen.

Note: The ESC key can be used to exit this screen without saving changes.

Figure 37: Adjust Pressure Timer (Keypad)

6. Press the **Remote Pressure Mode** button to switch it to the ON position.

In this mode, the system can be automatically switched in real time between the **Pressure 1** and **Pressure 2** values entered in the **Setup – Pressure Settings Screen**. Upon startup, the system will adjust to the **Pressure 1** value.

A signal can then be sent from the PLC to switch to the value entered in the **Pressure 2** box. That signal from the PLC can be removed to allow the pump to adjust back to the **Pressure 1** value, in real time without time delays.

5.3 Setup – Pressure Settings

1. Press the ESC key to scroll to the right and enter **Setup – Pressure Settings** mode.

Figure 38: Setup - Pressure Settings Screen

2. In this screen you can adjust the values for **Pressure 1** and **Pressure 2**. To adjust the pressure settings, press either of the boxes with a PSI value.

3. Once in the value adjust screen, use the keypad to enter a new value then press the Enter key in the lower right corner to save that value and return to the previous screen.

Note: The ESC key can be used to exit this screen without saving changes.

5.4 Setup - Load/Unload

1. Press the ESC key to scroll to the right and enter the **Setup – Load/Unload** screen.

2. In this screen you can manually **Jog Up** the RAM up with the up arrow key (F2) or manually **Jog Down** with the down arrow key (F4).

Note: Press and hold the arrow keys for continuous movement of the RAM and release the arrow key to stop movement.

3. Once in the desired position, press the **Teach Load** arrow key to lock that location into memory for the position the ram should return to inside the pail once a new pail is loaded.

4. Press the **Teach Unload** arrow key to lock a location into position where the RAM height should be set to manual unload a pail. This location should be high enough above an empty pail to easily remove it.

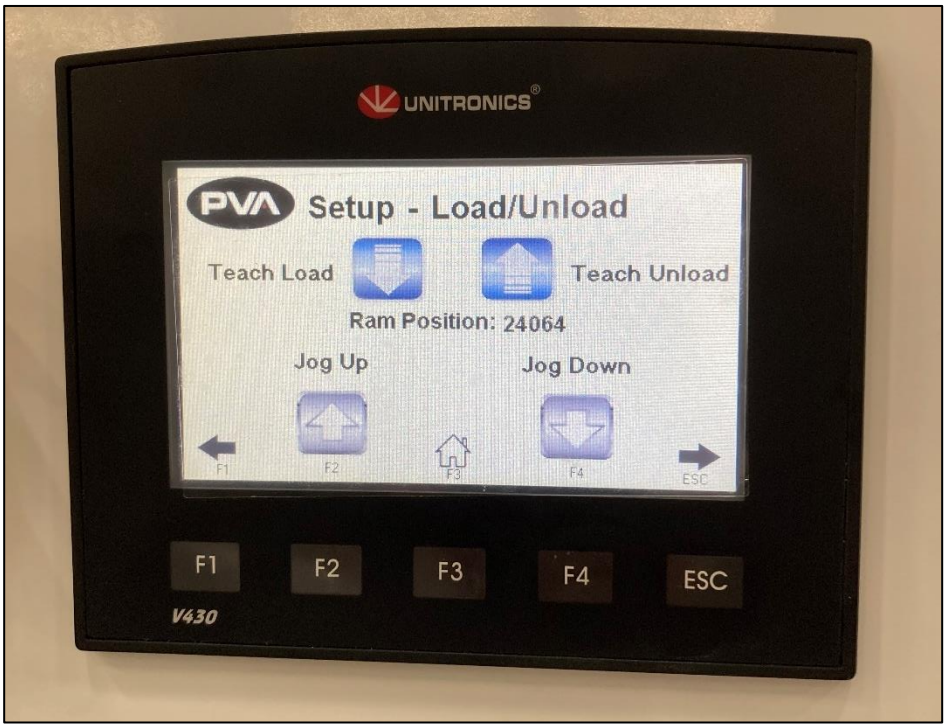


Figure 39: Teach Load/Unload

6. Maintenance Schedule

Refer to the manual for Eaton/Vickers Hydraulic Power Unit for more information on troubleshooting, spare parts, maintenance, and specifications.

Interval	Action
At each pail change	1. Examine the pail follower seal for wear or damage. Replace as necessary. 2. Clean the side of the pail follower and the pail follower seals before loading a new pail. 3. Grease the pail follower seal 4. Inspect the air bleed valve and repair, if necessary.
Daily	1. Examine the hydraulic fluid level and temperature on the hydraulic power unit. If necessary. Add hydraulic oil, as specified. 2. Examine hoses for signs of wear or kinks. 3. Examine the hydraulic power unit for excessive noise or vibration.
Annually or every 4,000 hours of operation	1. Clean the hydraulic power unit reservoir, suction strainer, and air vent filter. 2. Replace the oil filter. 3. Refer to the Eaton/Vickers Hydraulic power unit manual.

Figure 40: Maintenance Schedule

7. Spare Parts

Below is a listing of spare parts. Refer to the bill of materials and schematic for specific options on your pump. Contact PVA for more information on replacement parts or to place an order.

Description	Part Number	Notes
Pail Follower Seal	VLV-450V	
Pail Follower Seal Grease	Common silicon grease	
Hydraulic Oil	Mobil DTE25, ISO Grade 46, SAE20, non-detergent (or equivalent)	
Hydraulic Oil Filter	V0211B1r05	

Figure 41: Replacement Parts and Accessories

8. Technical Specifications

Item	Description
Material packaging	Five-gallon straight wall metal pail
Maximum fluid pressure	800 psi
Fluid outlet	1” NPT (F)
Wetted parts	Seals: Viton Ram: Aluminum and stainless steel

Figure 42: Technical Specifications

9. Drawings

9.1 PVA-5GPU Measurements

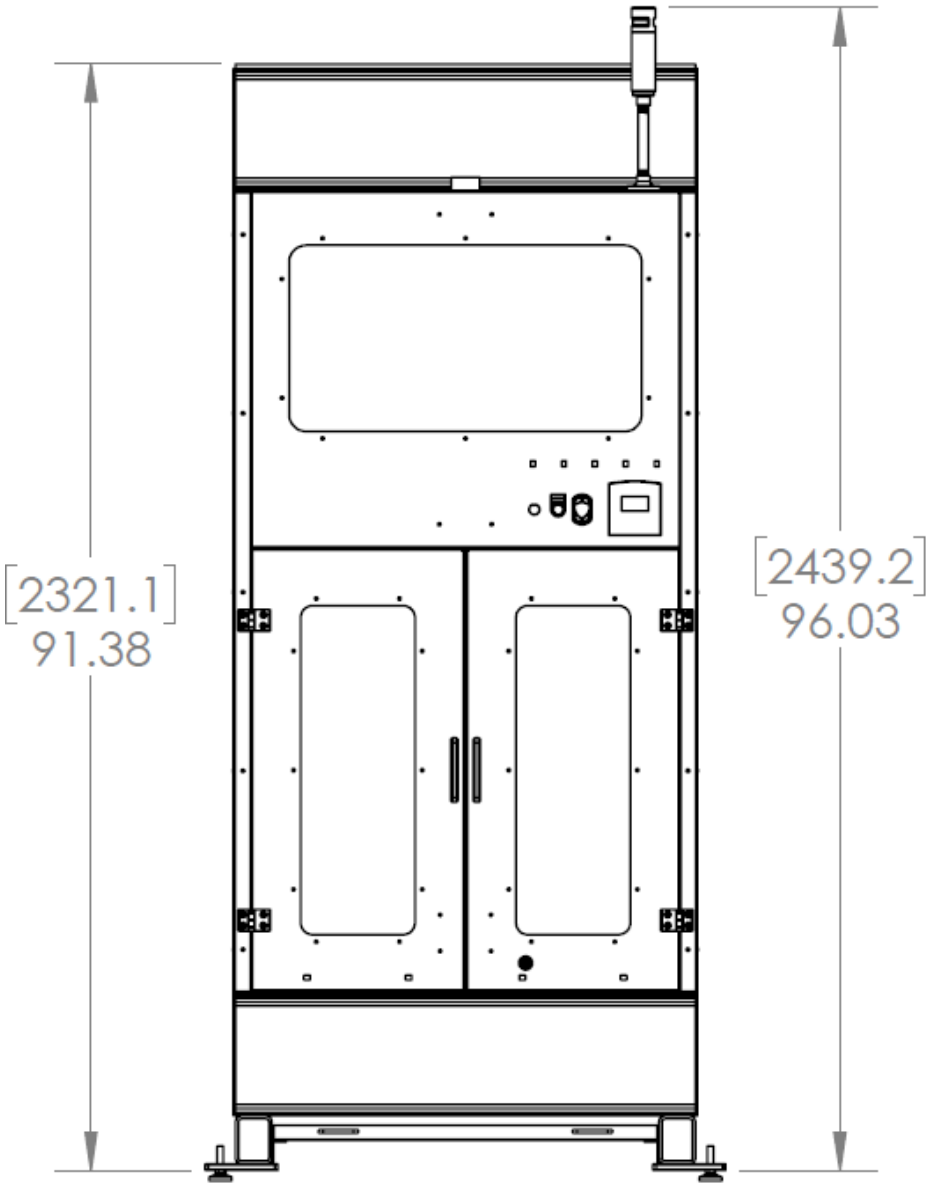


Figure 43: PVA-5GPU Measurements (Front)

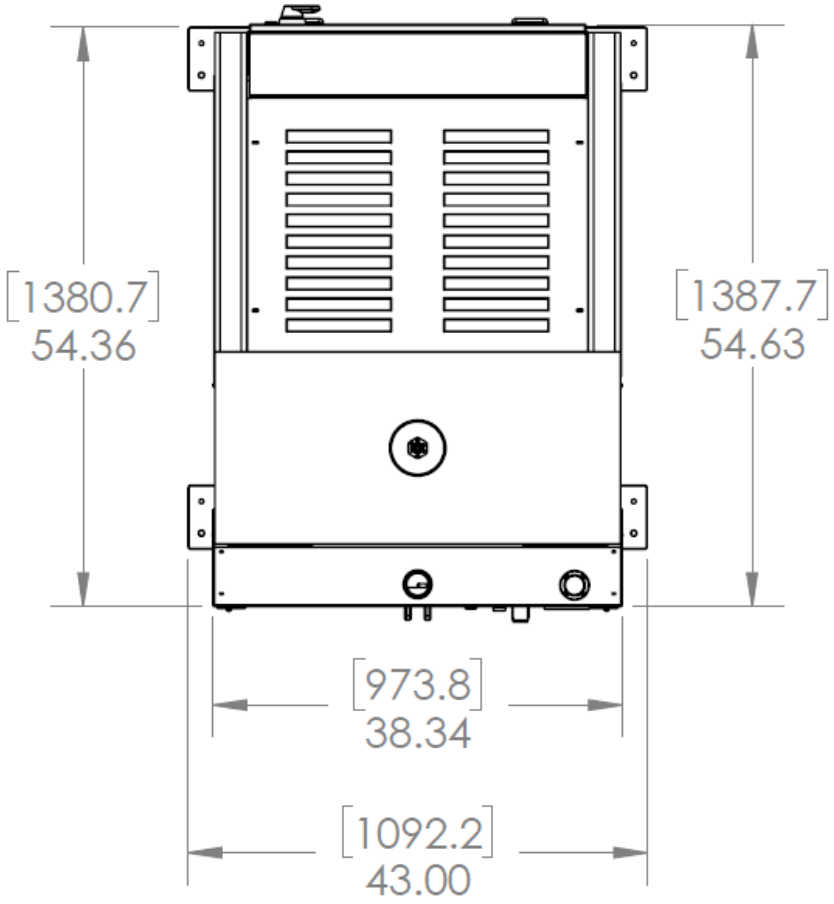


Figure 44: PVA-5GPU Measurements (Back)

9.2 Electrical Schematic

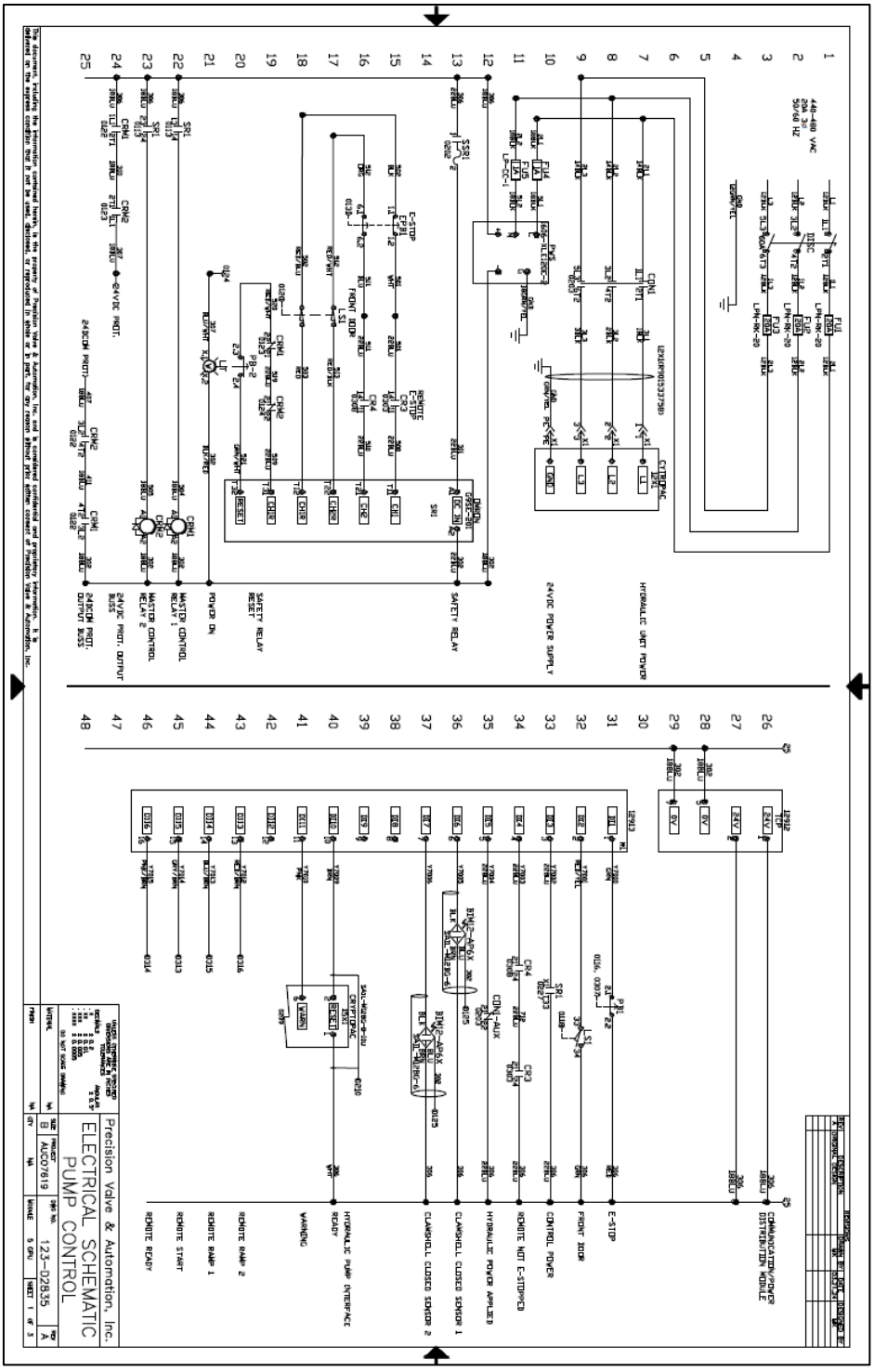


Figure 45: Electrical Schematic 1

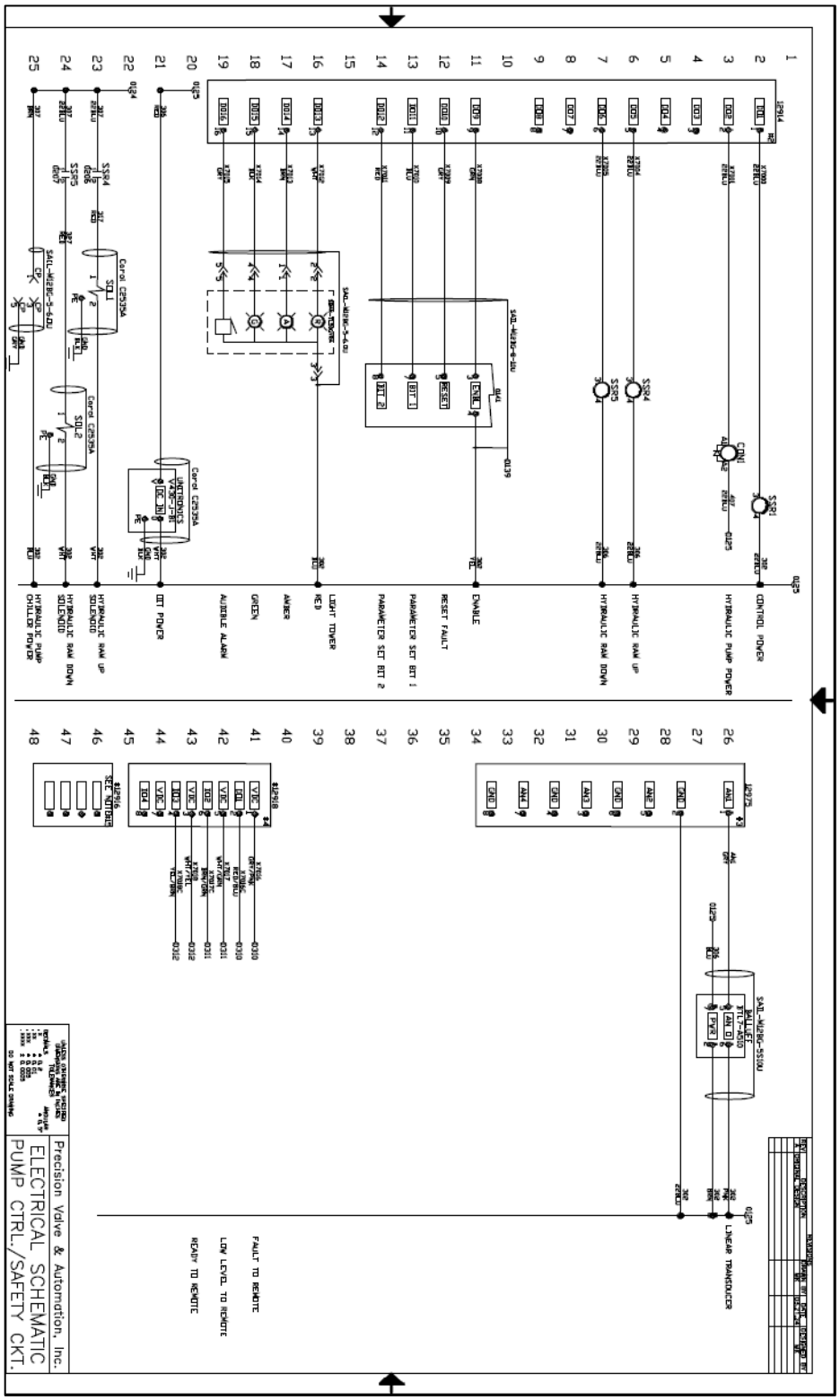


Figure 46: Electrical Schematic 2

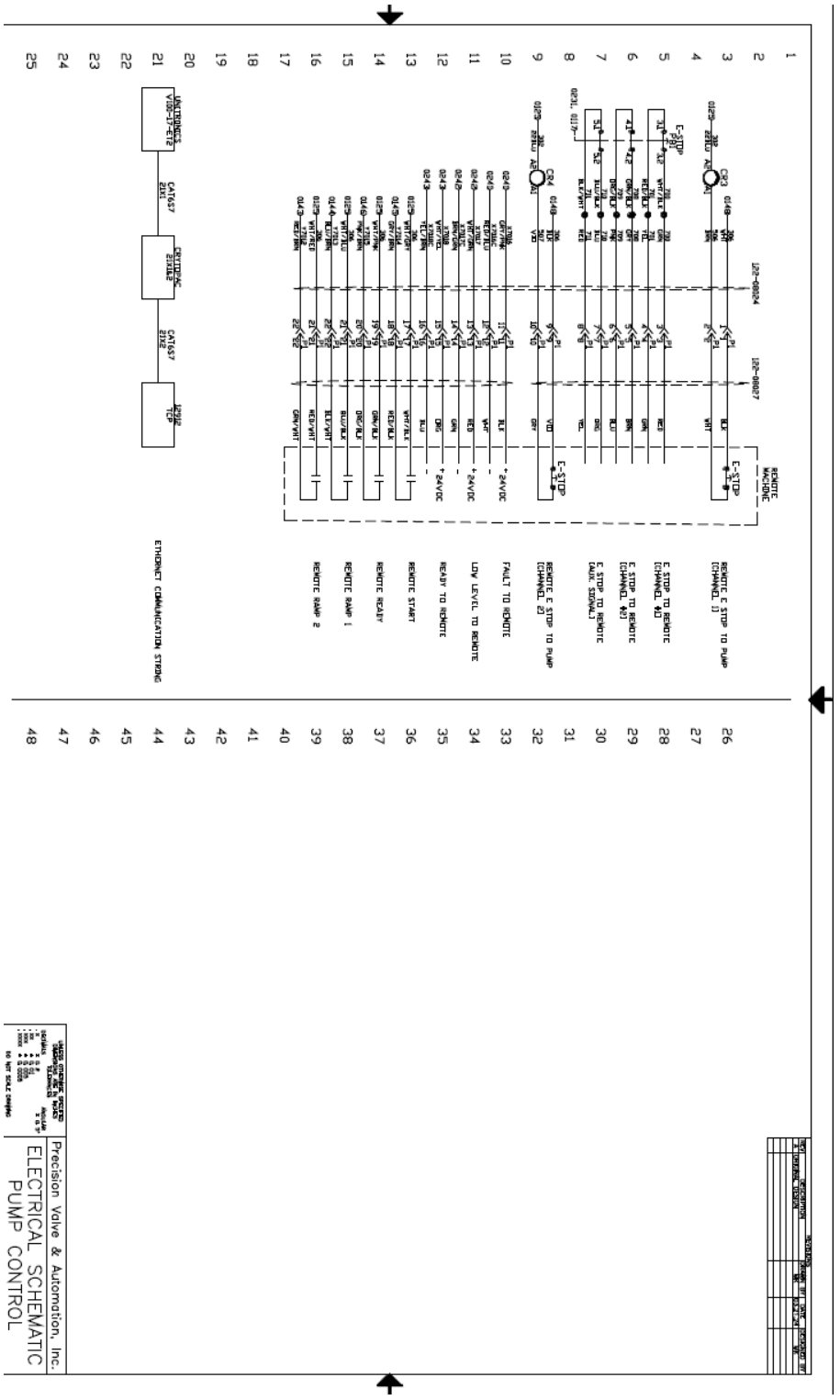


Figure 47: Electrical Schematic 3

9.3 IO Cable

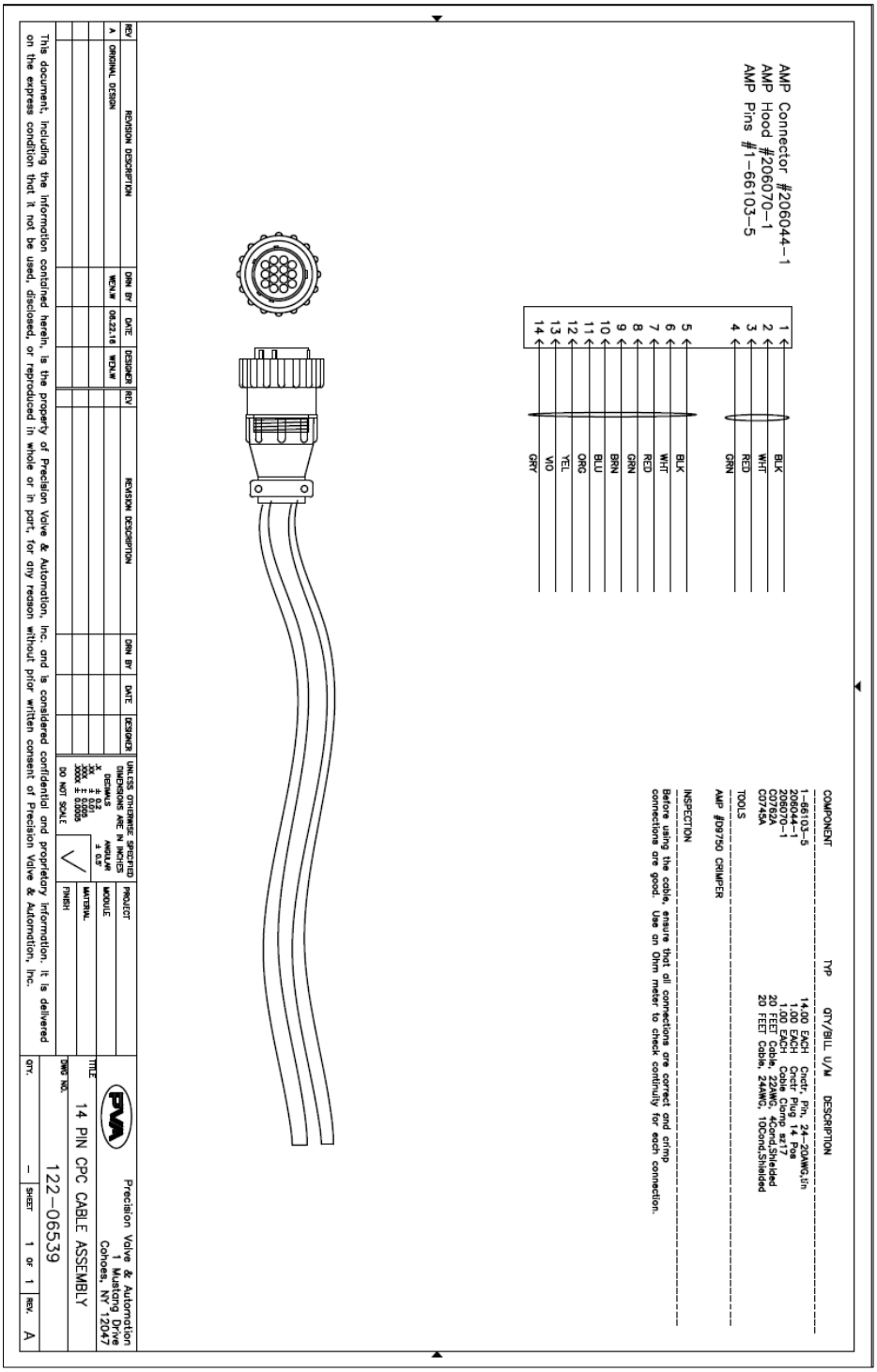


Figure 48: IO Cable

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11. Notes

12. Warranty

PVA Warranty Policy

PVA warrants the enclosed product against defects in material or workmanship on all components for one year from the date of shipment.

The warranty does not extend to components damaged due to misuse, negligence, or installation and operation that are not in accordance with the recommended factory instructions. Unauthorized repair or modification of the enclosed product, and/or the use of spare parts not directly obtained from PVA (or from factory authorized dealers) will void all warranties.

All PVA warranties extend only to the original purchaser. Third party warranty claims will not be honored at any time.

Prior to returning a product for a warranty claim, a return authorization must be obtained from PVA's Technical Support department. Authorization will be issued either via the telephone, facsimile, or in writing upon your request.

To qualify as a valid warranty claim, the defective product must be returned to the factory during the warranty period. Upon return, PVA will repair (or replace) all components found to be defective in material or workmanship.

(Retain this for your records)

Product Information:

PRODUCT: _____

SERIAL NUMBER: _____

DATE OF PURCHASE: _____