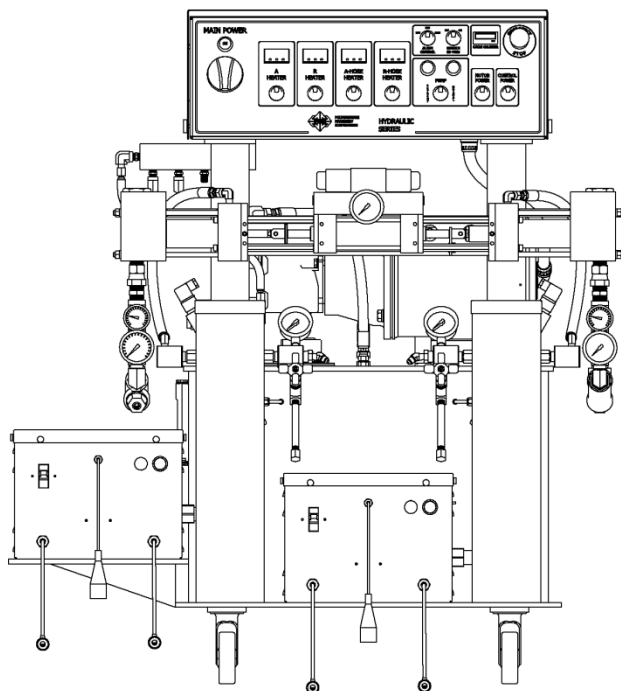




**POLYURETHANE  
MACHINERY  
CORPORATION**



# *Custom* **PH-40-SUB Proportioner**

**Hydraulic, Heated, Plural Component  
Proportioner**

**For spraying Polyurethane Foam and  
Coatings**

**For Professional Use Only**

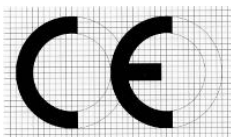
**Not approved for use in explosive  
atmosphere locations**

## **Service Manual**

**Ref. # MN-04024**

**Revision 1.0**

**September 15, 2016**



## **Polyurethane Machinery Corp.**

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**Before installing the PH Series Proportioner and start-up, carefully read all the technical and safety documentation included in this manual. Pay special attention to the information in order to know and understand the operation and the conditions of use of the PH Series Proportioner. All of the information is aimed at improving user safety and avoiding possible breakdowns from the incorrect use of the PH Series Proportioner.**

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## **WARRANTY**

Polyurethane Machinery Corporation (hereinafter “PMC”) provides this **LIMITED WARRANTY** (hereinafter “Warranty”) to the original purchaser (hereinafter “Customer”) covering this equipment and the original PMC manufactured accessories delivered with the equipment (hereinafter “Product”) against defects in material or workmanship of the Product (hereinafter “Defect” or “Defective”) for a period of one (1) year from the date of first purchase as shown on the original PMC invoice (hereinafter “Warranty Period”).

If during the Warranty Period under normal use, the Product is suspected by Customer to be Defective in material or workmanship, it is Customer’s responsibility to contact PMC and return the Product to PMC as directed by PMC, freight prepaid. If PMC determines that the Product is Defective and that such Defect is covered by this Warranty, PMC will credit Customer for the reasonable freight charges incurred by Customer in returning the Defective Product to PMC, and PMC (or its authorized agent) will, at PMC’s option, repair or replace the Product, subject to the following:

Original Invoice: The original invoice must be kept as proof of the date of first sale and the Product serial number. The Warranty does not cover any Product if the Original Invoice appears to have been modified or altered, or when the serial number on the Product appears to have been altered or defaced.

Product Maintenance: It is the Customer’s responsibility to maintain the Product properly. See your maintenance schedule and owner’s manual for details. The Warranty does not cover an improperly maintained Product.

Non-PMC Components and Accessories: Non-PMC manufactured components and accessories that are used in the operation of the Product are not covered by this Warranty. Such components and accessories shall be subject to the warranty offered to the Customer, if any, by the original manufacturer of such component or accessory.

Other Warranty Exclusions: The Warranty does not cover any Product that PMC determines has been damaged or fails to operate properly due to misuse, negligence, abuse, carelessness, neglect, or accident. By way of example only, this includes:

- Normal wear and tear.
- Improper or unauthorized installation, repair, alteration, adjustment or modification of the product.
- Use of heating devices, pumping equipment, dispensers, or other parts or accessories with the product that have not been approved or manufactured by PMC.
- Failure to follow the operating instructions and recommendations provided by PMC.
- Cosmetic damage.
- Fire, flood, “acts of God,” or other contingencies beyond the control of PMC.

**THE WARRANTY DESCRIBED HEREIN IS THE EXCLUSIVE REMEDY FOR THE CUSTOMER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, AND THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ALL OTHER WARRANTIES ARE HEREBY DISCLAIMED. TO THE FULLEST EXTENT PERMITTED BY LAW, PMC SHALL NOT BE RESPONSIBLE, WHETHER BASED IN CONTRACT, TORT (INCLUDING, WITHOUT LIMITATION, NEGLIGENCE), WARRANTY OR ANY OTHER LEGAL OR EQUITABLE GROUNDS, FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, LOST PROFITS, SPECIAL, PUNITIVE OR EXEMPLARY DAMAGES, WHETHER TO PERSON OR PROPERTY, ARISING FROM OR RELATING TO THE PRODUCT, EVEN IF PMC HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH LOSSES OR DAMAGES.**

Non-Warranty Service by PMC: If PMC determines that the suspected Defect of the Product is not covered by this Warranty, disposition of the Product will be made pursuant to the terms and conditions of PMC's written estimate on a time and materials basis.

Continuing Warranty for Products Repaired or Replaced under Warranty: Following the repair or replacement of a Product covered by this Warranty, such Product will continue to be subject to the original Warranty for the remainder of original Warranty Period or for three (3) months from the repair or replacement date, whichever is longer.

No Rights Implied: Nothing in the sale, lease or rental of any Product by PMC shall be construed to grant any right, interest or license in or under any patent, trademark, copyright, trade secret or other proprietary right or material owned by anyone; nor does PMC encourage the infringement of same.

Exclusive Warranty: This writing is the final, complete, and exclusive expression of the Warranty covering the Product. Any statements made by PMC, its employees or agents that differ from the terms of this Warranty shall have no effect. It is expressly understood that Customer's acceptance of this Warranty, by performance or otherwise, is upon and subject solely to the terms and conditions hereof, and any additional or different terms and conditions proposed or expressed by Customer or anyone, whether in writing or otherwise, are null and void unless specifically agreed to in writing by an Officer of PMC.

## **SAFETY AND HANDLING**

This chapter contains important information on the safety, handling, and use of your *Custom* PH Series Proportioner.



Before installing the PH Series Proportioner and start-up, carefully read all the technical and safety documentation included in this manual. Pay special attention to the information in order to know and understand the operation and the conditions of use of the PH Series Proportioner. All of the information is aimed at improving user safety and avoiding possible breakdowns from the incorrect use of the PH Series Proportioner.

***WARNING!*** Presents information to alert of a situation that might cause serious injuries if the instructions are not followed.

***CAUTION!*** Presents information that indicates how to avoid damage to the equipment or how to avoid a situation that could cause minor injuries.

***NOTE!*** Is relevant information of a procedure being carried out.

Careful study of this manual will enable the operator to know the characteristics of the PH Series Proportioner and the operating procedures. By following the instructions and recommendations contained herein, you will reduce the potential risk of accidents in the installation, use or maintenance of the PH Series Proportioner; you will provide a better opportunity for incident-free operation for a longer time, greater output and the possibility of detecting and resolving problems quickly and simply.

Keep this Operations Manual for future consultation of useful information at all times. If you lose this manual, ask for a new copy from your PMC Distributor or go online and visit our web site at [www.polymac-usa.com](http://www.polymac-usa.com).

The *Custom* PH Series Proportioner has been designed and built for the application of polyurea chemical systems, polyurethane foam chemical systems, and some two-component epoxy systems.

***WARNING! The design and configuration of the PH Series Proportioner does not allow its use in potentially explosive atmospheres, or the pressure and temperature limits described in the technical specifications of this manual to be exceeded.***

Always use liquids and solvents that are compatible with the unit. If in doubt, consult your PMC Distributor.

When working with the PH Series Proportioner, it is recommended that the operator wear suitable clothing and elements of personal protection, including, without limitation, gloves, protective goggles, safety footwear, and face masks. Use breathing equipment when working with the PH Series Proportioner in enclosed spaces or in areas with insufficient ventilation. The introduction and follow-up of safety measures must not be limited to those described in this manual. Before starting up the PH Series Proportioner, a comprehensive analysis must be made of the risks derived from the products to be dispensed, the type of application, and the working environment.



To prevent possible injury caused by incorrect handling of the raw materials and solvents used in the process, carefully read the Material Safety Data Sheet (MSDS) provided by your supplier.

Deal with the waste caused according to current regulations.



To avoid damage caused by the impact of pressurized fluids, do not open any connection or perform maintenance work on components subject to pressure until the pressure has been completely eliminated.



Use suitable protection when operating, maintaining or being present in the area where the equipment is functioning. This includes, but is not limited to, the use of protective goggles, gloves, shoes and safety clothing and breathing equipment.



The equipment includes components that reach high temperatures and can cause burns. Hot parts of the equipment must not be handled or touched until they have cooled completely.



To prevent serious injury through crushing or amputation, do not work with the equipment without the safety guards installed on the moving parts. Make sure that all the safety guards are correctly reinstalled at the end of the repair or maintenance work of the equipment.

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## **CHARACTERISTICS**

The *Custom* PH Series Proportioner has been designed and built for the application of polyurea chemical systems, polyurethane foam chemical systems, and some specific two-component epoxy systems.

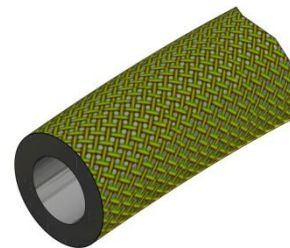
### **Principle Heating System**

The Proportioners consist of two (2) independent Material Heaters without internal seals. Each heater has six (6) Heating Elements rated at 1,500 watts each, giving the Proportioner a total heat of 18,000 watts and the necessary control and safety components for their precise operation. The Material Heater design allows a temperature differential ( $\Delta T$ ) of 90°F (32°C) and material application temperatures of up to 190°F (88°C) under normal ambient temperatures.

### **Hose Heating System**

The system is designed with two (2) 3 KVA Isolation Transformers that enable effective independent “A” and “R” hose heating of up to a total hose length of 310 feet (94 meters). The system includes an innovative hose heating concept in which the continuous braid tinned-copper jacket is distributed evenly around the circumference of the hose providing a uniform heating watt density and precise control of the material application temperature. This hose heating element design is extremely resistant to fatigue failure.

100% circumferential coverage produces the most uniform distribution of heat available.



### **Double Acting Opposed Piston Metering Pumps**

The opposed double acting Pump Line is driven by a dual rod Hydraulic Cylinder. The in-line pump system with opposed piston pumps provides a constant volume and guarantees uniform pressures in both directions of pump movement. Different sized pumps allow for various volumetric ratios to be achieved (1:5 to 1:1 to 5:1) between the chemical components used in the process.



## **TECHNICAL SPECIFICATIONS**

### **Electrical**

**Main Voltage:** \_\_\_\_\_ **3 x 480 VAC, 50/60Hz**  
**Electrical Consumption:** (2 x 9kW Heaters) \_\_\_\_\_ **61 A @ 3 x 480V**  
**Material Heater Power:** (2 x 9 kW) \_\_\_\_\_ **18 kW**  
**Hose Transformer Power:** \_\_\_\_\_ **2 x 3 KVA**  
**Electrical Motor Power:** \_\_\_\_\_ **5 HP**  
**Frequency:** \_\_\_\_\_ **50/60 Hz**

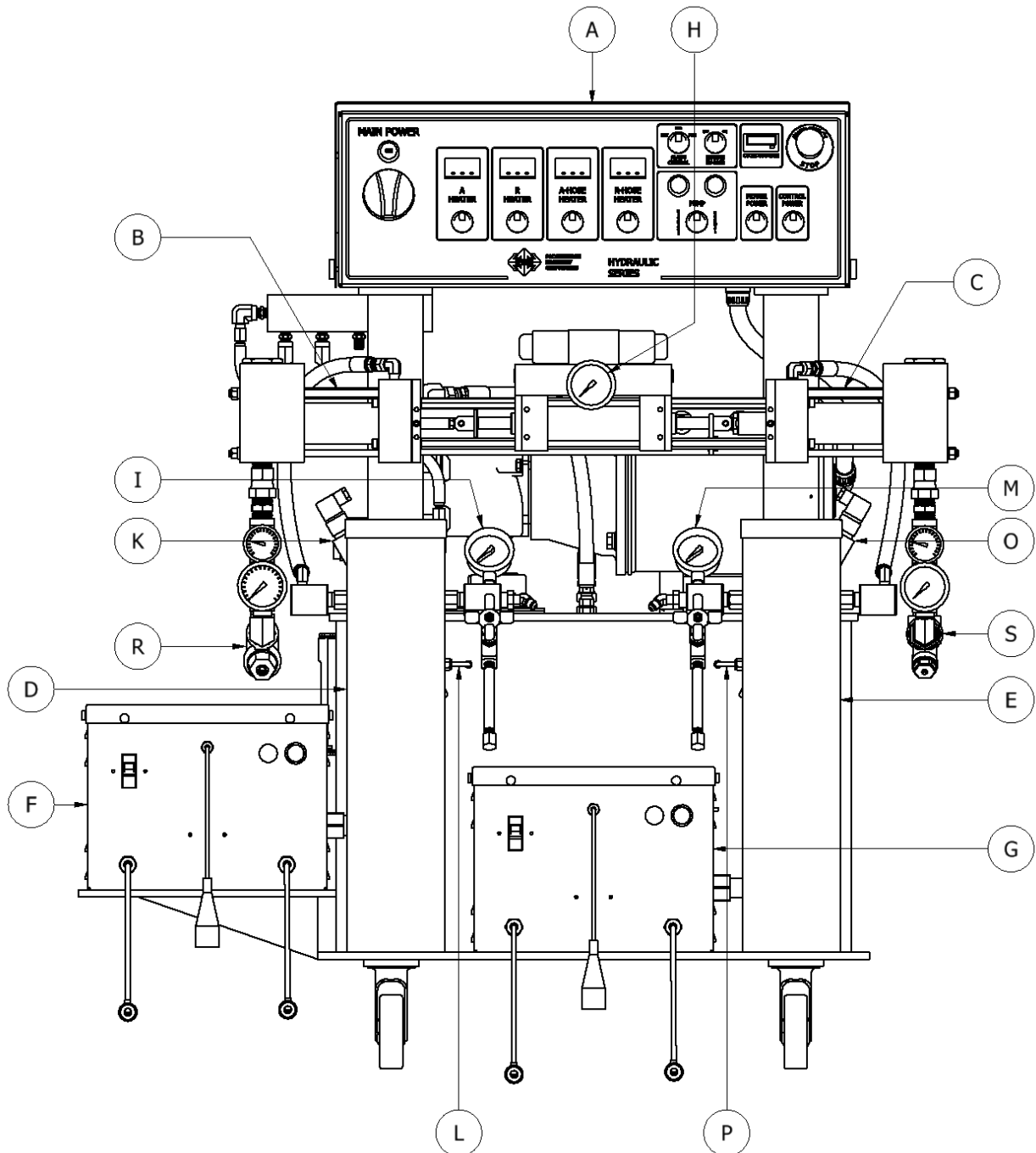


***CAUTION! Inside the console is a Terminal Strip for connecting the main power (wire not supplied) to the PH Series Proportioner. This electrical connection must be made only by a qualified electrician.***

### **Mechanical**

**Maximum working pressure:** \_\_\_\_\_ **3,000 psi**  
**Maximum production:** \_\_\_\_\_ **18 lbs/min**  
**Maximum hose length:** \_\_\_\_\_ **310 ft**  
**Approximate weight (Hydraulic Tank empty):** \_\_\_\_\_ **620 lbs**  
**Approximate weight (Hydraulic Tank full @ 20 gal):** \_\_\_\_\_ **780 lbs**  
**Dimensions:** \_\_\_\_\_ **45in W x 26in D x 45in H**

## DESCRIPTION



***CUSTOM PH-SERIES  
PROPORTIONER***

- A. Control Panel**  
Controls and regulates the operation of the PH Series Proportioner.
- B. Isocyanate (Iso, A) Metering Pump**  
Meters the Isocyanate material.
- C. Polyol (Poly, R) Metering Pump**  
Meters the Polyol material.
- D. Isocyanate (Iso, A) Heater**  
Heats the incoming Isocyanate to a temperature set by the operator.
- E. Polyol (Poly, R) Heater**  
Heats the incoming Polyol to a temperature set by the operator.
- F. Hose Heating Transformer Isocyanate (Iso, A)**  
Supplies the required voltage for the “A” side material Heated Hoses.
- G. Hose Heating Transformer Polyol (Poly, R)**  
Supplies the required voltage for the “R” side material Heated Hoses.
- H. Hydraulic Pressure Gauge**  
Indicates the pressure in the Hydraulic Drive System.
- I. Isocyanate (Iso, A) Pressure Gauge**  
Indicates the pressure in the Isocyanate system.
- J. Isocyanate (Iso, A) Safety High Pressure Switch**  
Disables the pump circuit in the event of excessive pressure in the Isocyanate system (not shown)
- K. Isocyanate (Iso, A) Safety Low Pressure Switch**  
Disables the pump circuit in the event of low pressure in the Isocyanate system
- L. Isocyanate (Iso, A) Thermocouple**  
Provides temperature information of the Isocyanate to its Temperature Controller.
- M. Polyol (Poly, R) Pressure Gauge**  
Indicates the pressure in the Polyol system.
- N. Polyol (Poly, R) Safety High Pressure Switch**  
Disables the pump circuit in the event of excessive pressure in the Polyol system (not shown).
- O. Polyol (Poly, R) Safety Low Pressure Switch**  
Disables the pump circuit in the event of low pressure in the Polyol system.
- P. Polyol (Poly, R) Thermocouple**  
Provides temperature information of the Polyol to its Temperature Controller.

**Q. Hydraulic Pressure Control**

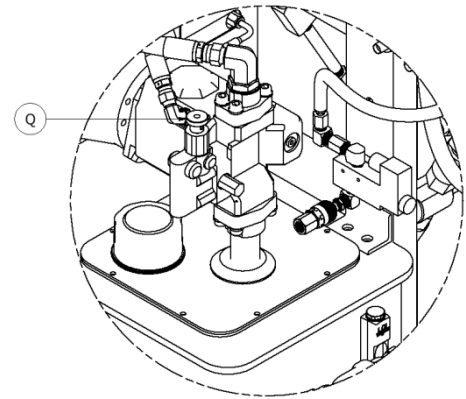
Allows the pressure of the hydraulic system to be increased or decreased. Turn clockwise to increase the pressure and counterclockwise to decrease. To regulate the pressure of the hydraulic system, the NORMAL or RETRACT Pump Switch position must be selected.

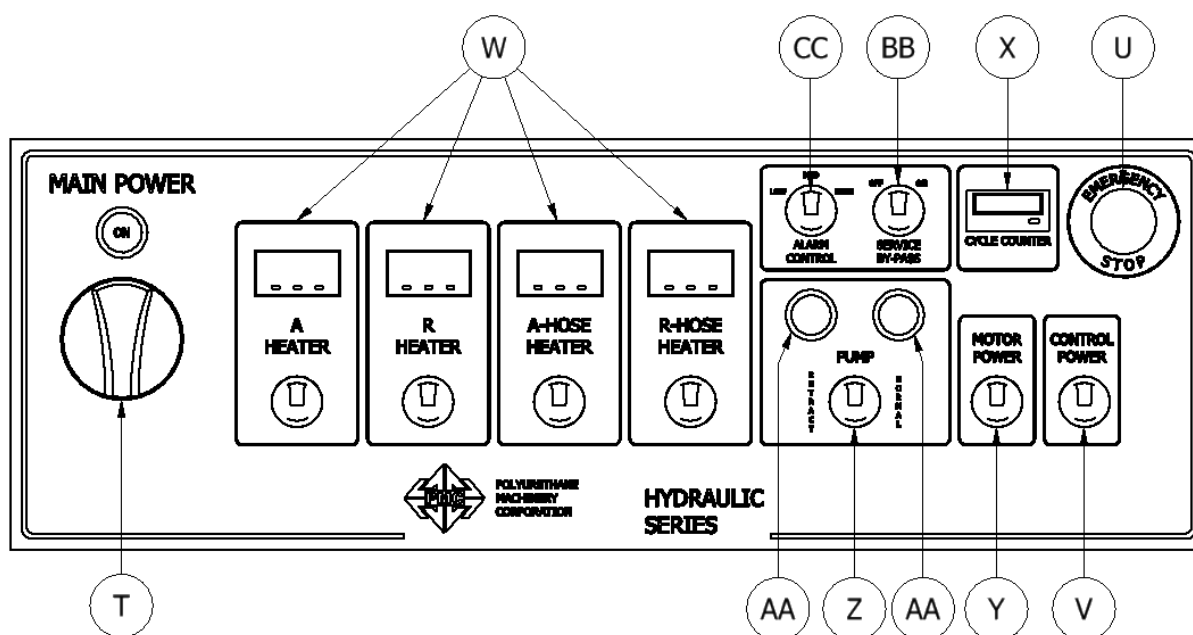
**R. Isocyanate (Iso, A) Inlet Material Strainer**

Screens (60 mesh) material from bulk supply.

**S. Polyol (Poly, R) Inlet Material Strainer**

Screens (60 mesh) material from bulk supply.





**CLASSIS PH-SERIES  
CONTROL PANEL**

- T. Main Power** - Turns ON and OFF main power to the control panel. It must be turned ON for any operation to be performed with the unit. When turned ON, the green pilot light will be lit.
- U. Emergency Stop** - Interrupts the PH Series control power circuit to stop all motion and heating.
- V. Control Power** - Turns ON and OFF the control power to the complete electrical circuit including Heaters and Hose Heater.
- W. Heater Temperature Controllers** - Turns ON and OFF power to the specific Heaters and Hoses. See page 20 for detailed Temperature Controller instructions.

**NOTE!** The switches listed as Heater and Hose turns ON and OFF power to the specific Heaters and Hoses. The Temperature controllers set the specific temperature settings for the Heaters and Hoses. See page 20 for detailed Temperature Controller instructions.

**NOTE!** The Hose Heater Controllers automatically controls the individual Hose Heaters only when using the TSU (Temperature Sensing Unit).

- X. Cycle Counter** – Indicates the number of pump cycles to calculate material usage.
- Y. Motor Switch** - Turns ON and OFF the Electric/Hydraulic Motor. When turned ON the switch will be lit. In the event of an overload of the Motor, pilot light will turn OFF and Motor will stop.
- Z. Pump Switch**
  - Off** - Removes power from the pump circuit. The directional indicator lights will not be lit.
  - Normal** - Activates the normal operation of the machine. When the switch is ON, the directional light corresponding to the stroke direction will light.
  - Retract** - Sets the Piston Rod of the Iso (A) metering pump to the retract position and prevents the crystallization of Iso (A) on the Piston Rod. Turn the switch to RETRACT position every time the unit is stopped by the operator (see Shut-Down, page 23).
- AA. Direction Indicator Light** - Indicates the direction of movement of the Metering Pumps. If excessive pressure occurs in the system, the pump circuit will be disabled and the directional lights will be OFF.
- BB. Low Pressure By-pass Switch**
  - Used to service or start up the machine when the chemical pressures are lower than the low pressure set point (400 PSI)
- CC. Alarm Volume Switch**
  - Allows the operator to set the decibel level of the alarm system (3 positions).

## **INSTALLATION**

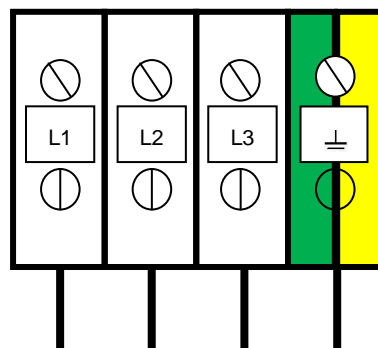
***WARNING!*** Use suitable protection and follow the recommendations in the Safety Information enclosed and provided by material suppliers when installing or working with the Proportioner.



***CAUTION!*** Inside the console is a Terminal Strip for connecting the main power (wire not supplied) to the PH Series Proportioner. This electrical connection must be made only by a qualified electrician.

***CAUTION!*** Make sure the power cable is disconnected from the main power source before connecting to the Terminal Strip in the Console.

***NOTE!*** To ensure the PH Series Proportioner works correctly, the electrical supply must meet the specifications indicated on the Serial Number Placard affixed to the Electrical Console.



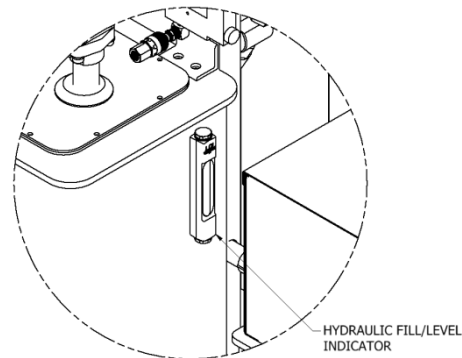
3 phase x 460 Volt

Follow the recommended procedure in the indicated order to install the Proportioner:

1. Insert the main power cable by passing it through the strain relief at the bottom of the Electrical Console and connect as shown in the above diagram.
2. Fill the Hydraulic Reservoir with 20 gallons (76 Liters) of approved hydraulic fluid. See page 46 for specifications.

**NOTE!** Do not fill the tank to maximum capacity; use the Visual Level Indicator on the tank to make sure the amount of hydraulic fluid is not more than 20 gallons (76 liters) or 80% of the tank max capacity.

3. Check the level of the hydraulic fluid in the Hydraulic Pump Case: Disconnect the Hydraulic Hose from the 90° fitting and remove the Fitting from Hydraulic Case. Add fluid as required to the top of threaded hole. Reattach Fitting and Hydraulic Hose.



**NOTE!** Ensure that the Emergency Stop is not engaged.

4. Check the Electric Motor to ensure rotation is **clockwise** when viewing the end of the Electric Motor. A counter clockwise rotation indicates two of the incoming power leads need to be reversed. Recheck rotation before proceeding with Installation.

**CAUTION!** Ensure Main Power Switch is OFF and incoming power is locked OFF before reversing power leads.



## Heated Hose Installation

**CAUTION!** *The material delivery Heated Hoses are color coded Red and Blue allowing the user to recognize them. The Red corresponds to the Isocyanate (Iso, A) and the Blue to the Polyol (Poly, R). To avoid connection errors the Coupling Connections of the Iso (A) and Poly (R) Heated Hoses are also different sizes, which makes it difficult to swap connections.*

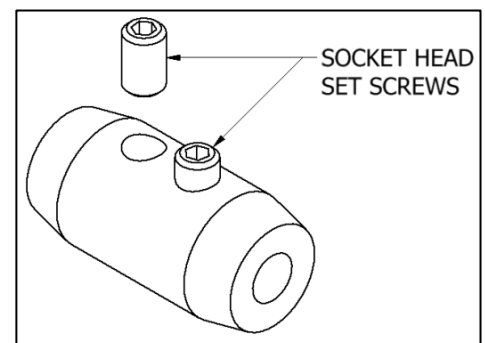
**NOTE!** *The material delivery Heated Hoses are capped at the ends to prevent absorbing moisture. Do not remove caps until the Heated Hoses are going to be installed on the Proportioner.*

1. Lay out all the Heated Hose assemblies end to end aligning the Iso “A” (red) and Poly “R” (blue) and connect the respective Coupling Connections using the appropriate sized open-end wrench after ensuring Heated Hose assemblies lay flat.

**CAUTION!** *Take care to not cross-thread or over-tighten the Coupling Connections. Thread seal tape or compound is not required for this tapered seat Coupling Connections.*

2. Connect the material Heated Hoses to the outlets of the respective Heaters i.e. Iso (A) Heated Hose to the Iso (A) Heater and the Poly (R) Heated Hose to the Poly (R) Heater ensuring Heated Hose assemblies lay flat.
3. Connect Air Hose Coupling Connections.
4. Connect the RED Heated Hose power wires to the “Fast-Lock” Connector (Part # KT-00029A) coming from the “A” Hose Heat Transformer and the BLUE heated hose power wires to the “Fast Lock” Connectors coming from the “R” Heated Hose Transformer as follows:

- a. Loosen the Socket Head Set Screw to allow insertion of the Heated Hose electrical wire Terminal.
- b. Insert the Terminal into the “Fast-Lock” Connector Body.
- c. Securely tighten the Socket Head Set Screw.
- d. Install electrical tape around Connector Body.



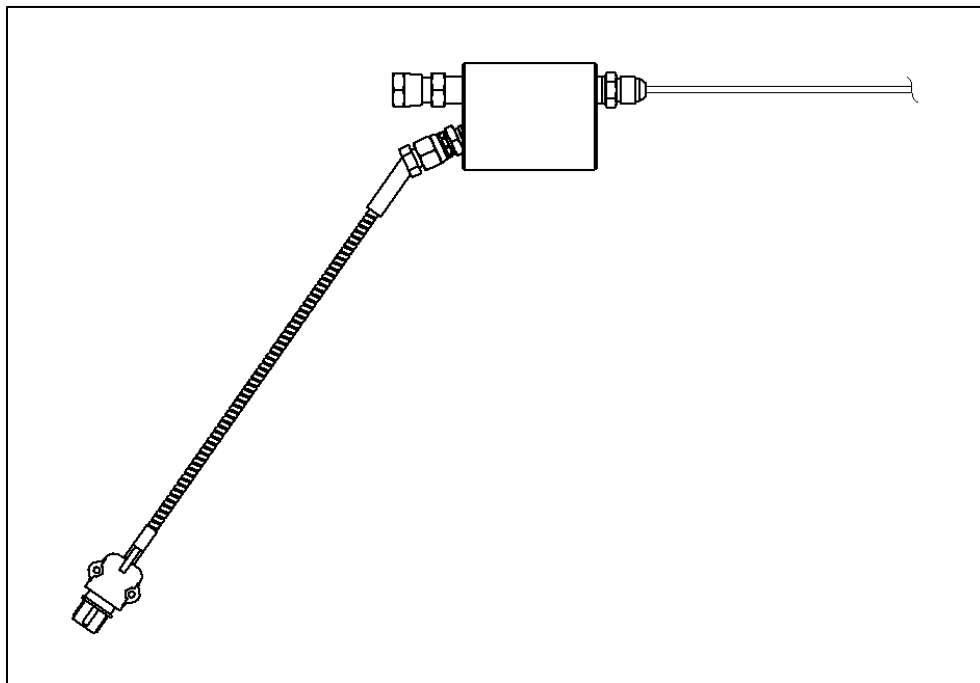
**NOTE!** *A good practice is to add some dielectric grease (Permatex 67VR or equivalent) to the outside of the Terminal prior to insertion.*

5. Repeat the above steps to connect the “Fast-Lock” Connectors that you will find on all Heated Hose power wire.

**CAUTION!** *Ensure the proper mechanical and electrical connections of the Heated Hoses are made to avoid possible material leakage and Hose heat problems.*

6. It is recommended the two TSU's be installed between the last section of Heated Hose and the Gun Whip. Carefully straighten the sensing wire, inserting it in the Iso (A) Heated Hose and tighten fluid fittings with appropriate sized open-end wrenches.

**CAUTION!** *To protect the TSU sensor, pay special attention not to kink or excessively bend the Heated Hoses. Do not coil the Heated Hoses with a diameter of less than 4 feet (1.22 meters).*



*Temperature Sensing Unit  
(TSU) Part # EL-51A-4  
Replacement Sensor Part # EL-51A-2*

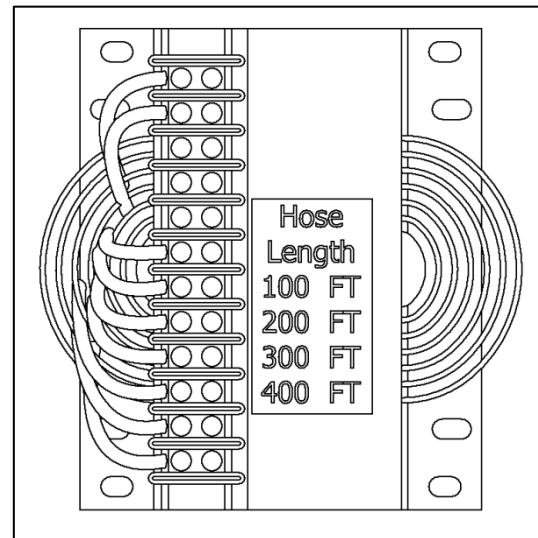
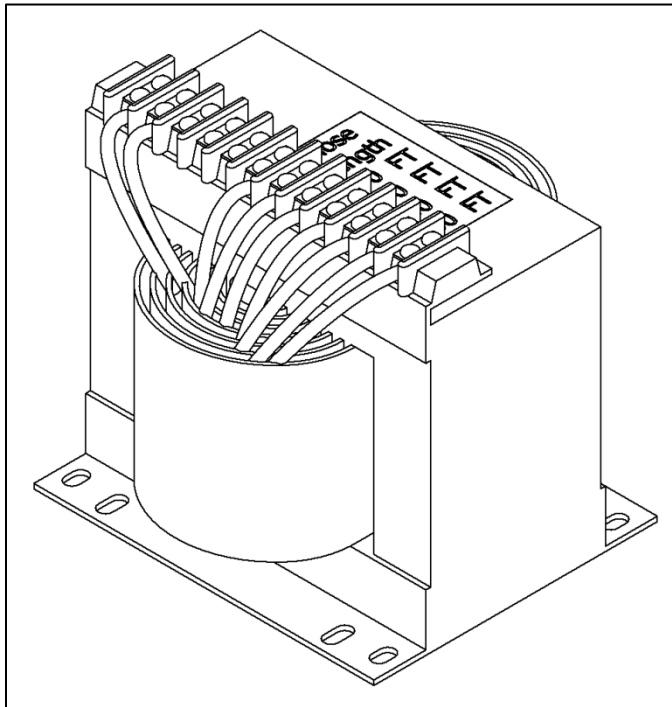
**CAUTION!** *Connecting the TSU between the first and second section of Heated Hose results in the TSU sensing the material temperature exiting the Heater and not the inside of the Heated Hose near the Spray Gun.*

## Transformer Settings

The Hose Heat Transformer offers the ability of connecting to different output voltages depending on the total length of the Heated Hose in use, maximizing the heating ability of the Heated Hose. The factory setting is 18 volts for use with 100 feet (18 Meters) of Heated Hose. Before starting the Proportioner, ensure the setting matches the Heated Hose length installed. If Heated Hose sections are added or removed, the Tap setting must be changed to a setting which will limit the maximum amperage in the Heated Hose to 52 amps. The suggested tap settings are tabled below<sup>2</sup>:

### RECOMMENDED TAP SETTINGS

Tap	Feet
60V	400
45V	300
30V	200
18V	100



7. Ensure the Manual Valves are CLOSED and connect the Coupling Block to the Heated Gun Whip.

**CAUTION!** Excessive force closing or opening the Manual Valves may result in damage to the Manual Valves and/or Coupling Block.

8. Connect the Transfer Pump/Heated Hose Assemblies air supply and air dryer systems as required. Review the Installation Instructions for each to ensure proper set-up and operation.

9. Install the 2:1 transfer pump into the ISO “A” Chemical container and the 5:1 Transfer Pump into the Poly “R” chemical container as follows:

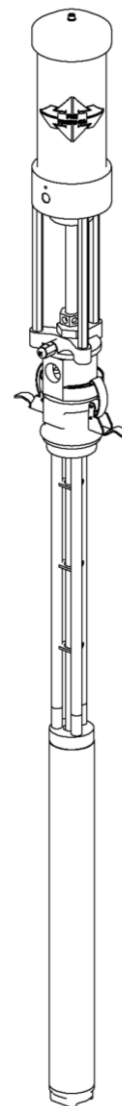
***WARNING! If Transfer Pumps have been previously used, pay special attention to connect each Pump to “its” specific material. Inadvertently changing the Transfer Pumps will cause a chemical reaction rendering them useless.***

***NOTE!*** Placing tape of the same color as of the Material Delivery Hoses (red for the Iso (A), blue for the Poly (R)) on each Transfer Pump would be a good method for minimizing errors in connection.

- a. Make sure that the Inlet Valves on the Proportioner are closed.
- b. Connect one end of the Polyol (R) Material Delivery Hose (1” thread) to the Proportioner Polyol (R) Inlet Valve and the other end to the Polyol (R) Transfer Pump.
- c. Connect one end of the Iso (A) Material Delivery Hose (½” thread) to the Proportioner Iso (A) Inlet Valve and the other end to the Iso Transfer Pump.
- d. Connect the air hose to the Transfer Pumps after ensuring each Transfer Pump Shut-Off Valve is CLOSED.
- e. Connect the air line to the mounted solenoid located on the machine’s left upright.

***NOTE!*** To avoid errors in connection, the Coupling connections of the Iso (A) and Poly (R) Material Delivery Hoses are different sizes, making it difficult to swap connections.

- f. Ground the Transfer Pump as recommend by the material supplier. The movement of product inside the Hoses can cause static electricity and produce electrical discharges.



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## **PROPORTIONER PURGING**

***WARNING! Use suitable Personal Protection Equipment (PPE) and follow the recommendations in the Safety Information provided by product suppliers when installing or working with the unit.***

***WARNING! Do not turn the Temperature Controllers ON until the Proportioner Purging procedure is complete and the Primary Heaters and Heated Hoses are filled with material.***

***NOTE!*** Before using the Proportioner it is necessary to purge the entire system, including Heated Hoses of mineral oil and air left over from Quality Control testing. The following procedure is also followed to purge air entrapped by running out of material in the supply Drum/Reservoirs resulting in a significant material pressure imbalance as indicated by the Pressure Gauges and sprayed material.

1. Ensure the following before proceeding:
  - a. Air supply to Transfer Pumps is 90 - 110 psi (6-8 Bar).
  - b. Proportioner Inlet Valves are CLOSED.
  - c. All connections are tight.
  - d. Material should be stored to the material suppliers' recommended temperatures.
2. Install Calibration tool Part # TL-06 to the Gun Coupling Block.
3. Slowly OPEN the Iso (A) Transfer Pump Air Shut-Off Valve allowing Pump to cycle slowly as it fills the Material Delivery Hose to the Proportioner. Check for leaks.
4. Slowly OPEN Proportioner Poly "R" Inlet Valve allowing Transfer Pump to move material through the system. Slowly OPEN Proportioner Iso "A" Inlet Valve allowing Transfer Pump to move material through the system.
5. Turn Hydraulic Pressure Control full COUNTERCLOCKWISE.
6. Hold the low pressure by-pass switch in the on position.
7. Turn on Main Power.
8. Turn on Control Power.

9. Open each manual valve into the respective container using the attached calibration tool.
10. Turn on Motor Power.
11. Set Pump Switch to NORMAL. The machine will start cycling.
12. When all spitting of air stops and all traces of mineral oil have disappeared, set pump switch to the OFF position.
13. CLOSE Iso "A" and Poly "R" Coupling Block Manual Valves.
14. Remove Calibration tool.
15. Clean material from Calibration tool and surface of Coupling Block.
16. OPEN Poly (R) Coupling Block Manual Valve over a waste container.
17. Slowly OPEN Proportioner Poly (R) Inlet Valve allowing the Transfer Pump to move material through the system. When all air spitting stops and all traces of mineral oil have disappeared, CLOSE Poly (R) Coupling Block Manual Valve. Clean Coupling Block.
18. Repeat steps 2 to 4 for Iso (A) side.

***CAUTION! Properly dispose of all waste chemicals in accordance with all applicable local, state and federal codes.***

19. Check all TSU's and hose connections for leaks.
20. Bundle all Heated Hose Connections ensuring no TSU Cable or Air Hose kinks. Wrap with electrical tap to securely hold all components in place and minimize places for bundle to snag onto job site protrusions.

## **DIGITAL TEMPERATURE CONTROLLER**

The PH Series has four Digital Temperature Controllers to manage the temperatures for the Primary Heaters (Iso (A), Poly (R)) and the “A” and “R” Heated Hoses. The Hose Heater Controllers are programmed different from the Iso (A) and Poly (R) Primary Heater Controllers and therefore not interchangeable with them.

***WARNING! Do not turn the Temperature Controllers ON until the Proportioner Purging procedure is complete and the Primary Heaters and Heated Hoses are filled with material.***



1. Ensure Main Power is ON, Control Power is ON, and controller's display light is lit. The **actual material temperature** should display.
2. Press and hold the \* button. The units (°F) and then the **set-point temperature** will display.
3. To change the set-point temperature, continue holding the \* and press the ↑ or ↓ buttons to increase or decrease the set-point temperature to the desired value as determined by the material supplier or application conditions.

***WARNING! The Controllers are factory programmed and are not field re-programmable. If a problem is encountered, contact your PMC Distributor. Do not attempt to change any of the programmed parameters. Do not substitute a Controller from an alternate supplier as its use may result in equipment damage and/or bodily injury.***

***NOTE!*** When lit, the square in the upper left indicates power is being sent to the designated heating system. The light will continue to cycle on and off indicating the Controller is working according to the internal settings. It is common for the A-Side material to overshoot more than the R-Side material during the initial warm-up. Allow the temperature inside the heater to cool to an acceptable level before operating the equipment. Once the temperature has reached the set-point, it should remain relatively constant unless the system is subject to large and sudden disturbances.



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## **START-UP**

**NOTE!** *Follow the recommended procedures in the order shown.*

**CAUTION!** *The Start-up procedures assume that all of steps in Proportioner purging have been performed and no problems found.*

1. Check the hydraulic fluid level and service as required.
2. Make sure the materials have been stored at the manufacturer's recommended temperature. Ask your material supplier for information (Material Data Sheet) on the minimum storage temperature.
3. Connect air supply to the two Transfer Pumps and ensure Air Valves are in the full OPEN position. OPEN both Proportioner Material Inlet Ball Valves.
4. Check the condition of the desiccant in the air dryer, replace if needed.

**CAUTION!** *Remove all Heated Hose sections from coiled storage and lay flat to eliminate heat build-up and possible Heated Hose failure.*

5. Turn ON Main Power.
6. Turn ON Control Power.
7. Turn ON "A" and "R" Hose Heaters and confirm material set-point temperature as recommended by the material supplier or application conditions.

**CAUTION!** *To avoid excessive pressure in the Proportioner, wait for the Hose Heater to reach its set-point temperature before continuing.*

8. Turn ON each Primary Heater and confirm material set-point temperature as required by the material supplier or application conditions has been reached.
9. Turn ON Motor Power.
10. Set Pump Switch to NORMAL. One of the Directional Indicator Lights will light indicating Metering Pump direction and the Metering Pump Shafts will begin to move.

**NOTE!** *The Material Pressure Gauges should be approximately equal and remain constant throughout the Metering Pump cycle. If not, refer to Trouble Shooting section.*

**NOTE!** *Directional Indicator Lights must indicate Metering Pump direction when Pump Switch is in the NORMAL position. If not, refer to Trouble Shooting section.*



11. Using the Hydraulic Pressure Control, adjust to the required stall pressure<sup>1</sup> and check each Material Pressure Gauge.
12. Release low pressure By-Pass switch to the OFF position.
13. Proceed with Installation and Start-up of the Spray Gun as per the Gun manual.

<sup>1</sup> Stall pressure: When materials are at recommended application temperature and Metering Pumps are pressurized but not moving. This pressure is normally 100 – 200 psi (7-14 Bar) greater than the developed spray pressure as recommended by the material supplier.

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## **SHUT-DOWN**

### **Short Term**

Follow the procedure below for temporary shut-downs, such as **lunch breaks**:

1. Set Pump Switch to OFF position.
2. Turn each Heater OFF. Hose Heater should remain ON. Never leave Proportioner ON if unattended.
3. CLOSE Spray Gun Manual Valves.
4. Flush the gun as required.

***CAUTION! Excessive force opening or closing the Manual Valves may result in damage to the Manual Valves and/or Coupling Block.***

### **Long Term**

Follow the procedure below for shut-downs when work is **stopped for the day**:

1. Set the Pump Switch to RETRACT.
2. Hold the low pressure By-Pass switch in the ON position.
3. Spray off the application surface until Material Pressure Gauges readings begin to fall.

***CAUTION! To avoid possible Proportioning Pump Seal seepage and moisture vapor drive into the Heated Hoses, the system pressure should not be reduced to zero. It is recommended to lower the system pressure to a minimum of 400 psi (27 Bar).***

4. CLOSE the Spray Gun Coupling Block Manual Valves.

***CAUTION! Excessive force opening or closing the Manual Valves may result in damage to the Manual Valves and/or Coupling Block.***

5. Turn OFF Motor Power.
6. Turn OFF the A and R Heaters and “A” and “R” Hose Heaters.
7. Turn OFF the Control Power and the Main Power.
8. Insert grease into the “A” pump grease fitting.
9. Disconnect the air supply to the two Transfer Pumps, CLOSE the Proportioner Material Inlet Valves, and flush the gun.

## **TROUBLESHOOTING**

The PH Series Proportioner has been designed and built to withstand severe working conditions with a high degree of reliability, provided that it is used in a suitable application by a properly trained operator. This chapter contains information on possible faults that may interrupt the operation of the PH Series Proportioner. The information provided will serve as a guideline to detect and resolve problems. In any case, feel free to contact your authorized PMC Distributor, where a qualified technician will advise you.

***CAUTION! All repairs performed by unqualified personnel or the use of spares other than originals may cause damage to the unit and put the operator at risk.***



To prevent possible injury caused by incorrect handling of the raw materials and solvents used in the process, carefully read the Material Safety Data Sheet (MSDS) provided by your supplier.

Deal with the waste caused according to current regulations.



To avoid damage caused by the impact of pressurized fluids, do not open any connection or perform maintenance work on components subject to pressure until the pressure has been completely eliminated.



Use suitable protection when operating, maintaining or being present in the area where the equipment is functioning. This includes, but is not limited to, the use of protective goggles, gloves, shoes and safety clothing and breathing equipment.



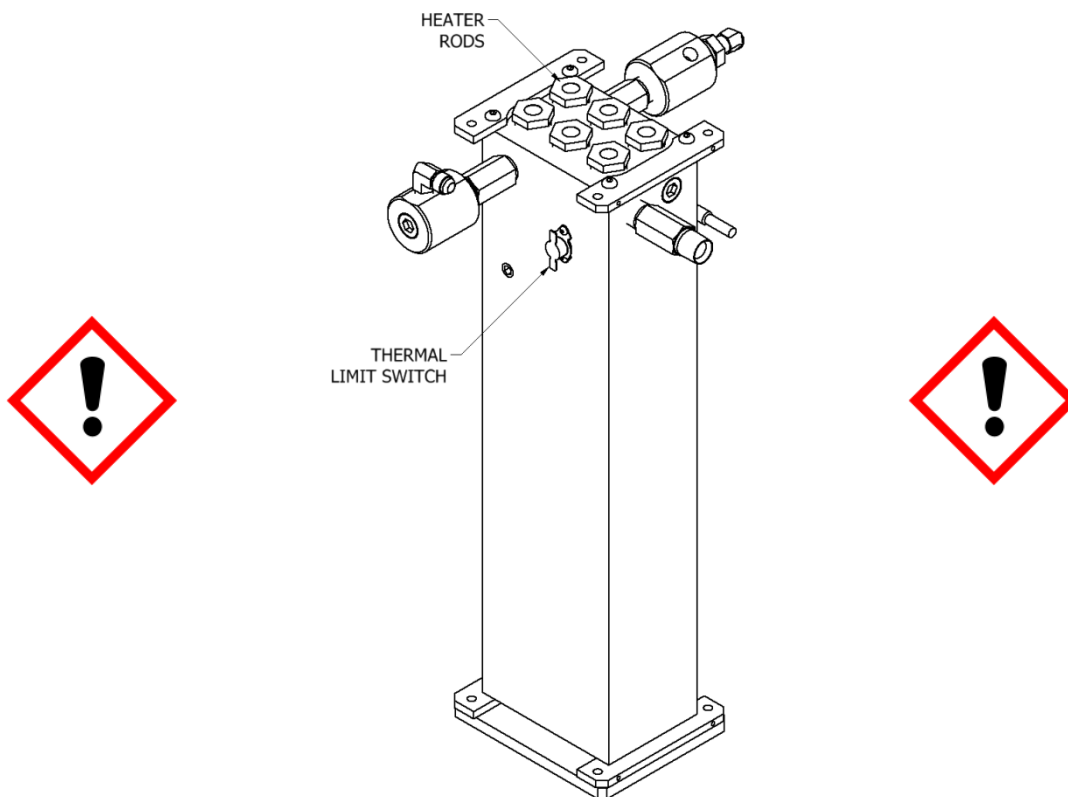
The equipment includes components that reach high temperatures and can cause burns. Hot parts of the equipment must not be handled or touched until they have cooled completely.



To prevent serious injury through crushing or amputation, do not work with the equipment without the safety guards installed on the moving parts. Make sure that all the safety guards are correctly reinstalled at the end of the repair or maintenance work of the equipment.

## Heaters

***WARNING!*** Before troubleshooting make sure the Main Power Switch is OFF and incoming power is locked OFF. NEVER access the inside of the Control Panel with the Proportioner power supply ON. The Heaters are components that reach high temperatures; you must wait until they cool before handling.



***NOTE!*** The Thermal Limit Switch is a safety switch in contact with the Heater body. If the surface temperature exceeds 220° F (109° C), the Limit Switch will shut off the Heater power. The Limit Switch will not re-set until the temperature in the Heater is below 190° F (88° C). The system is designed that in case of an over temperature a contactor will open, disabling power to both Heaters and the Hose.

Follow the recommended procedure in the indicated order to solve the problem and avoid unnecessary repairs. Make sure all Switches are in the correct position and Indicator Lights ON before determining the existence of a fault.

Problem	Solutions
Heater Circuit is interrupted	5
Heater does not heat; 01 display light on Digital Controller is not ON	1, 2
Heater does not heat; 01 display light on Digital Controller is ON	1, 2, 4
Heater partially heats; 01 display light is ON continuously	6, 4, 7
Digital Temperature Controller display shows the symbol " <i>inPt: FAiL</i> "	3
Digital Temperature Controller display shows Error Code	Contact your Distributor

### 1. Digital Temperature Controller (DTC)

The DTC for both Material Heaters are interchangeable. To determine if a Heater DTC is operating correctly; ensuring Main Power is OFF, interchange both Primary Heater DTC and determine if problem follows the suspected DTC. If it does, replace the defective DTC.

### 2. Solid State Relay (SSR)

It is not possible to check for normal operation of the SSR without electrical power. Ensuring Main Power is OFF; remove the wire from Terminal #1 on the SSR. Check for continuity across Terminals #1 and #2. If continuity is present, and all other testing fails to determine problem, it must be assumed the SSR is inoperative and must be replaced.

### 3. Thermocouple/Temperature Sensor Unit (TSU)

The Material Heaters use Thermocouples to send the material temperature to the DTC. If the DTC does not receive this signal it will automatically shut-down and show an Error Code. Refer to the Maintenance section of this Manual for replacement of the appropriate thermocouple.

Proper operation of the Thermocouple is dependent on two conditions:

- The Thermocouple must make positive contact with the Heating Rod
- The Heating Rod must be operating correctly

Lack of either of these conditions will result in erratic temperature control and possible overheating. The Thermocouple is properly positioned and locked into place at the factory. However, during changing of the Thermocouple or Heater Rod, the positioning may change. Refer to the Maintenance section for proper Thermocouple positioning.

### 4. Heating Rod

To check the operation of the Heating Rods, proceed as follows with Main Power OFF:

**9kW Heater:** Use a tester to check that the total resistance of all the Heating Rods is approximately **28 ohms**; a higher value would indicate that one or several of the elements are faulty. Disconnect them and check that the individual value of each Heating Rod is **165 ohms**.

## **5. Thermal Limit Switch**

A separate over-temperature safety circuit with a Thermal Limit Switch is attached to each Material Heater. When the Heater surface temperature exceeds 220 ° F, the Limit Switch will automatically interrupt the Heater Control Circuit. Allow the temperature of the Material Heater to cool to a safe temperature before determining over-heat problem and correcting.

***CAUTION! Do not attempt to reset the Heater Circuit Breakers more than twice. Failure of the Circuit Breaker safety mechanism will occur and the Circuit Breaker will become inoperable. The cause of the problem must be determined and corrected.***

## **6. Low Line Voltage**

Material Heater ratings are at 480 volts. Lower than 480 volts will reduce the heating capability of the Material Heaters and Hose Heater.

## **7. Excessive $\Delta T$**

The PMC GH Series of Material Heaters are designed to offer maximum heat transfer based on power (voltage), Proportioner output (lb/min, gal/min) and desired material temperature increase. This heat transfer number is easiest defined as temperature delta ( $\Delta T$  in °F).

## **Hydraulic Drive System**

Follow the recommended procedure in the indicated order to solve the problem and avoid unnecessary repairs. Make sure all Switches are in the correct position and Indicator Lights ON before determining the existence of a fault.

***WARNING!*** Before correcting any kind of defect, make sure the Main Power Switch is OFF and the incoming power is locked OFF. NEVER access the inside of the Control Panel with the Proportioner power supply ON. The Hydraulic Unit is a component that works under pressure. Do not open any connection or carry out maintenance on components subject to pressure until all pressure has been bled to zero.

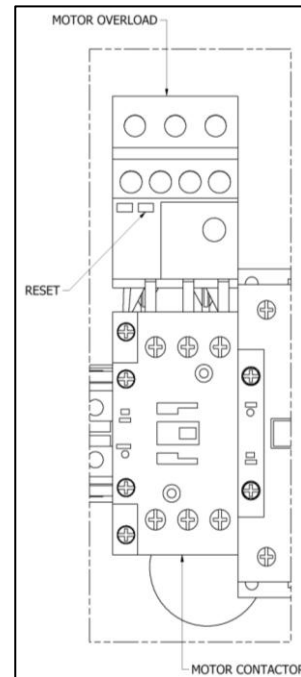
***CAUTION!*** Do not attempt to reset the Motor Contactor more than twice. Failure of the Motor Contactor safety mechanism will occur and the Contactor will become inoperable and/or the Motor will be damaged. The cause of the problem must be determined and corrected.

Problem	Solution
Motor Power Switch trips OFF	1
Hydraulic Pump does not develop pressure	2
Low or zero hydraulic pressure with unusual Hydraulic Pump noises	2d, 3

### 1. Motor Contactor Safety

The Electric Motor is protected from excessive current by an Overload Safety Switch. After allowing the Motor to cool, open the Control Panel and reset Motor Contactor Safety.

**CAUTION!** Do not attempt to reset the Motor Contactor more than twice. Failure of the Motor Contactor safety mechanism will occur and the Contactor will become inoperable and/or the Motor damaged. The cause of the problem must be determined and corrected.



### 2. Hydraulic Power Package

**NOTE!** Hydraulic pressure is not generated if the Motor Power Switch is OFF or the Pump Switch is in the OFF position.

With the Pump Switch in the NORMAL position, the failure of the Hydraulic Pump to develop pressure is loss of pump suction (prime). To ensure positive prime, check the following:

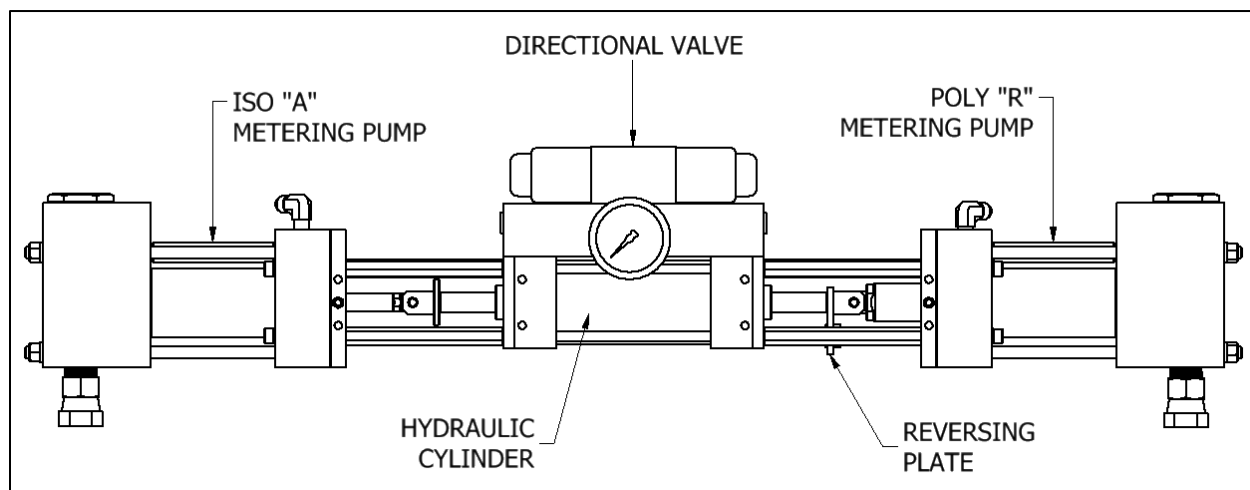
- a. Motor rotation.
- b. Hydraulic Reservoir is filled with the proper hydraulic oil and to the correct level.
- c. Hydraulic Pump Case is filled with the proper hydraulic fluid.
- d. Loose Inlet Plumbing: Check that all inlet plumbing to Hydraulic Pump is tight ensuring no air leakage into the hydraulic system.

### 3. Hydraulic Oil

The use of an incorrect hydraulic fluid can result in unusual noises from the pump, excessive wear and moisture absorption. Ensure the hydraulic oil used is from the approved list included in this manual. In addition to the above, continuous excessive hydraulic oil temperature as well as failure to change the hydraulic oil on a yearly basis will cause the oil to fail and result in excessive Hydraulic Pump wear and unusual noises.



## **Metering Pump Line**



Follow the recommended procedures in the indicated order to solve the problem and avoid unnecessary repairs. Make sure all Switches are in the correct position and Indicator Lights ON before determining the existence of a fault.

<b>PROBLEM</b>	<b>SOLUTIONS</b>
Metering Pumps do not change directions	1
Metering Pumps reversal erratic	1
Metering Pumps fail to move and Direction Indicator Light is OFF	1, 2
Metering Pump moves beyond normal reversal point and stalls	1
Metering Pressure Gauges show significant pressure difference	3, 4
Metering Pump fails to hold pressure when Proportioner stalled	4

### **Reversing Switch/Directional Valve**

The Metering Pump Line has a Reversing Plate which actuates two Reversing Switches, one at each end of the stroke. The Reversing Switches in turn actuates the appropriate Directional Valve Solenoid. Failure to make contact with either Reversing Switch may be caused by:

- Deformation of the Reversing Plate.
- Foreign material preventing the Reversing Plate from contacting the Reversing Switches.

### **Inspect and correct issue**

Passing of the Reversing Plate beyond the Reversing Switch may be caused by:

- Failure of the Reversing Switch (Part # EL-00020) on the side of the over-run.

- Failure of a component of the Direction Valve.
- Mounting Plate and/or Reversing Switch is out of adjustment.

**NOTE!** *Follow the recommended procedure in the indicated order to solve the problem and avoid unnecessary repairs. Make sure all Switches are in the correct position and Indicator Lights are ON as specified before determining the existence of a fault.*

- a. Ensure Pump Switch is OFF.
- b. Determine which direction the Reversing Plate must move to be centered. For example, the Plate overran to the Iso "A" Pump and requires moving towards the Poly "R" Pump.
- c. Go to the Directional Valve and locate the Actuation Coil closest to the Poly "R" Pump.
- d. With Pump Switch OFF, bleed material through the Spray Gun bringing the material pressures almost to zero (below 100 psi).
- e. Put the Service By-Pass Switch to the on position. Turn the Main Power ON, Control Power ON, Motor Power ON, Pump Switch NORMAL, and the Spray Gun Manual Valves OPEN. Trigger Spray Gun ON.
- f. Push in the Directional Valve Manual Override (a 3/16" Allen Wrench is recommended) until Reversing Plate is approximately centered. Release Manual Override, trigger Spray Gun OFF and CLOSE Spray Gun Manual Valves.

If the Manual Operator moved smoothly the cause of the over-run was probably electrical.

- g. Turn Main Power **ON**, Control Power **ON**, and Motor Power **OFF**, Pump Switch **NORMAL**. Push **IN** each Reversing Switch Actuation Arm and listen for Directional Valve shift. Note the correct Direction Indicator Lights on the Pump Switch lights.

If the Directional Valve does not shift and/or Direction Indicator Lights do not light up appropriately, there is a problem with the Reversing Switches (Part # EL-00020), Directional Valve Coil or Pump Switch. If the Manual Operator is hard or unable to push, it is likely there is a mechanical problem with the Directional Valve requiring disassembly for service.

## 1. Safety Pressure Switch











Each Metering Pump has a Safety Pressure Switch set to 3,250 psi. When the material system reaches this pressure, the Safety Pressure Switch will remove power from the Directional Valve and Direction Indicator Lights. Lack of Direction Indicator Lights along with high pressure indicated on one or both of the material Pressure Gauges is an indication of an over-pressure condition. The Safety Pressure Switches are a momentary design; when the pressure bleeds off the Metering Pump Line will resume normal operation. However, the cause of the over-pressure should be determined and corrected. The three most common causes are:

- a. Cavitation of the Metering Pump on the low pressure side causing high pressure on the opposite side.
- b. A restriction in the Spray Gun on the high pressure side.
- c. Hydraulic pressure set too high for Spray Gun Mixing Chamber.

## 2. Pressure/Material Imbalance

In summary troubleshooting this problem requires the applicator to:

- a. Know what the NORMAL spray pressures are for the application in progress.
- b. Determine what material is NOT exiting the Mixing Chamber.
- c. Read the Pressure Gauge on the problem side and interpret the reading.

MATERIAL CONDITION	“A” GAUGE	“R” GAUGE
NORMAL		
LACK OF ISO (A)		
LACK OF POLY (R)		
RESTRICTION OF ISO (A)		
RESTRICTION OF POLY (R)		

**Check Spray Gun for a blockage.**

### 3. Cavitation

Cavitation occurs when the Metering Pump requires a larger volume of material than the supply system (Transfer Pump) can furnish. This creates a "void" of material in the Metering Pump. The most common causes of cavitation are:

- a. Material temperature too low causing increased material viscosity resulting in the inability of the Transfer Pump to maintain sufficient supply to the Metering Pump. This is most common with today's 245fa blown systems. Ensure the material temperature in the drums is no lower than the material suppliers' recommendation.
- b. Failure to vent the material drum while drawing material out with the Transfer Pump causes a vacuum and cavitation in the Transfer Pump. Ensure the drum is vented to the atmosphere or a Desiccated Air Dyer Kit is installed as recommended by the material supplier.
- c. Air volume insufficient for Transfer Pump or Transfer Pump Air Valve partially closed will limit the ability of the Transfer Pump to operate at its maximum capability.
- d. Inlet Material Screen obstructed (See MAINTENANCE section).
- e. Metering Pump Inlet Ball does not seat properly allowing material to flow back into the Material Delivery Hose when the Metering Pump is on the "Discharge" stroke. This causes the volume of material on that Metering Pump to be less on the discharge stroke resulting in intermittent off-ratio material and Pressure Gauge fluctuation.

### 4. Pressure Loss: Discharge/Inlet Ball

Simultaneous observation of the material Pressure Gauge and Direction Indicator Light is necessary to determine which direction the Metering Pump fails to maintain pressure. Refer to the chart to determine problem:

	Left Directional Indicator Light ON	Right Directional Indicator Light ON
Iso Pressure Gauge FALLS	Iso Inlet Ball does not seat properly	Iso Discharge Ball does not seat properly
Poly Pressure Gauge FALLS	Poly Discharge Ball does not seat properly	Poly Inlet Ball does not seat properly

- h. In most cases the cause of a leaking Inlet/Discharge Ball is foreign material preventing the Ball from seating properly. If the above steps do not resolve the problem, replace the appropriate Ball, Ball Seat and Ball Seat Gasket.

**For service see MAINTENANCE/Metering Pump Line**

## Hose Heating

***WARNING!*** Before correcting any kind of defect, make sure the Main Power Switch is OFF and incoming power is locked OFF. NEVER access the inside of the Control Panel with the Proportioner power supply ON. The Heated Hoses are components which reach high temperatures. Wait until they have cooled before handling.

***CAUTION!*** All electrical testing must be done by a qualified electrician.

Follow the recommended procedure in the indicated order to solve the problem and avoid unnecessary repairs. Make sure all Switches are in the correct position and Indicator Lights ON before determining the existence of a fault.

Problem	Solution
Hose heats, but fails to reach Set Point temperature	1, 2, 6
Hose does not heat; 01 display light on Digital Controller is not ON	3, 7
Hose does not heat; 01 display light on Digital Controller is ON	2, 3, 4
Digital Temperature Controller display shows the symbol "inPt: FAiL"	5
Digital Temperature Controller display shows Error Code	Contact your Distributor

## SOLUTIONS

### 1. Hose Length

The PH-40-SUB has been designed to work with a maximum hose length of 310 ft. A longer length will render the heating capacity less effective. Under extreme ambient conditions, the hose heating system may be affected and fail to reach the required temperature.

### 2. Hose Transformer Tap Setting

The Hose Heat Transformer offers the option of connecting to different output voltages suitable for the number of Heated Hose sections in use. Refer to the Label on the Hose Transformer for the correct Tap settings.

### 3. Hose Heater Circuit Breakers

The Circuit Breaker located inside the Control Panel protects the primary (high Voltage) side of the Hose Heater Transformer. The Circuit Breaker located on the front of the Hose Heat Transformer protects the secondary side of the Hose Heater Transformer; make sure it is ON, otherwise activate it.

***CAUTION!*** *Do not attempt to reset the Hose Circuit Breakers more than twice. Failure of the Circuit Breaker safety mechanism will occur and the Circuit Breaker will become inoperable and/or the Heated Hose damaged. The cause of the problem must be determined and corrected.*

***CAUTION!*** *The replacement of either Hose Circuit Breaker with one of a different rating may cause damage to the equipment and put the operator at risk.*

**1. Solid State Relay (SSR)**

It is not possible to check for normal operation of the SSR without electrical power. Ensuring Main Power is OFF; remove the wire from Terminal #1 on the SSR. Check for continuity across Terminals #1 and #2. If continuity is present, and all other testing fails to determine problem, it must be assumed the SSR is inoperative and must be replaced.

**2. Temperature Sensing Unit (TSU)**

The Temperature Controller automatically detects the operation of the TSU. If this fault occurs, check the wiring to the TSU and replace as required.

**3. Hose Heating Temperature Adjustment**

The Hose Heater system is designed to maintain the temperature settings of the Iso "A" and Poly "R" Heaters. Common practice is to set the Hose Heater setting equal to the Iso "A" and Poly "R" Heater setting. The Hose Heater system will not elevate the material temperature under material flow conditions.

**4. Digital Temperature Controller (DTC)**

The Digital Temperature Controllers (DTC) for the Hose Heater is not interchangeable with the Heater DTCs. If a defective Hose Heater DTC is suspected, contact your distributor.

## **MAINTENANCE**

To achieve maximum output from the PH Series Proportioner, a daily or regular maintenance schedule is required.



To prevent possible injury caused by incorrect handling of the raw materials and solvents used in the process, carefully read the Material Safety Data Sheet (MSDS) provided by your supplier.

Deal with the waste caused according to current regulations.



Disconnect the unit from the power supply before carrying out any operation inside the electrical console.

The electrical maintenance of the machine must only be performed by a qualified electrician.



To avoid damage caused by the impact of pressurized fluids, do not open any connection or perform maintenance work on components subject to pressure until the pressure has been completely eliminated.



Use suitable protection when operating, maintaining or being present in the area where the equipment is functioning. This includes, but is not limited to, the use of protective goggles, gloves, shoes and safety clothing and breathing equipment.



The equipment includes components that reach high temperatures and can cause burns. Hot parts of the equipment must not be handled or touched until they have cooled completely.



To prevent serious injury through crushing or amputation, do not work with the equipment without the safety guards installed on the moving parts. Make sure that all the safety guards are correctly reinstalled at the end of the repair or maintenance work of the equipment.

***CAUTION!*** All repairs performed by unqualified personnel or the use of parts other than supplied by PMC may cause damage to the unit and put the operator at risk.

## **Inlet Material Screens**

Inspection of the Inlet Material Screens on a daily basis is no longer necessary as long as the following conditions are met.

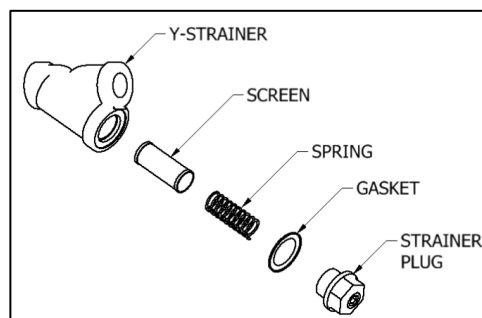
1. Material drums are stored within the recommended material storage temperature range and drums are not opened prior to installing the Proportioner Material Transfer Drum Pumps.
2. Desiccant air dryers are used to dry replacement air as material is removed from the drums to the Proportioner.
3. Consolidation of old material into a common drum for use is minimized especially the Iso (A).

If the above conditions are met, inspection of the Inlet Material Screens may be done on a **bi-weekly** basis. To check the Inlet Material Screens, proceed as follows:

**NOTE!** *Inspect and clean Inlet Material Screens before Proportioner start-up. They should not be cleaned after the days operation as the Proportioner should be purged immediately after inspection and cleaning. This is to reduce the risk of moisture contamination and contamination through the reaction with any solvent used in the cleaning operation and cross-over at the Spray Gun due to air entrapment.*

**CAUTION!** *Make sure the Main Power Switch is OFF and incoming power is locked OFF.*

1. CLOSE the Poly (R) Proportioner Inlet Valve.
2. Place a suitable container under the Material Inlet Strainer to collect the residual material. Carefully loosen the Strainer Plug to drain material into the container.
3. Completely unscrew the Strainer Plug.
4. Remove the Seal, Spring and Screen and clean them with a suitable solvent. Dry the parts and ensure the Screen is not obstructed. Replace the Screen if more than 20% of the Screen surface is obstructed by residue.
5. Reinstall the Screen, Spring and Seal. Screw on the Strainer Screw and screw in Plug.
6. OPEN the Poly (R) Proportioner Inlet Valve, pressurize the Material Transfer Pump, check for leaks and wipe Y-strainer clean.
7. Repeat above for the Iso (A) side.
8. Proceed with Proportioner Purging operation.





## Hydraulic Drive System

***WARNING! Before performing any maintenance, make sure the Main Power Switch is OFF and incoming power is locked OFF. The Hydraulic Unit is a component that works under pressure. Do not open any connection or carry out maintenance on components subject to pressure until all press has been bled to zero.***

The hydraulic unit should be serviced **yearly**:

1. Completely drain the Tank of hydraulic fluid.
2. Clean the Tank Top to prevent foreign material from falling into the Tank when the Lid is removed.
3. Unscrew the Suction Pipe from its connection with the Hydraulic Pump.
4. Remove the Lid and Suction Pipe from the Hydraulic Tank. Take care not to damage Tank Lid Gasket.
5. Inspect the bottom of the Tank for sediment and clean as required. Clean the Suction Pipe and its connections.
6. Insert the Suction Pipe into the Tank and replace the Lid. Again, take care not to damage Tank Lid Gasket. Connect the Suction Pipe securely to the Hydraulic Pump using thread sealant.
7. Fill the Tank with 20 gallons (76 Liters) of approved hydraulic fluid. See page 46 for recommendations.
8. Ensure the Hydraulic Pump Case is full of fluid (Installation, page 12) and proceed with the normal operation.

### Metering Pump Line

***WARNING! Before performing any maintenance, make sure the Main Power Switch is OFF and incoming power is locked OFF. Allow material temperature to cool below 80°F (27°C) and bleed all material pressure to zero.***



**Weekly:** When the Proportioning Pumps are functioning properly it is not unusual for a small amount of Poly (R) material to appear on the Pump Shaft. This material should be wiped away so dirt does not accumulate on the Pump Shaft and the Pump Shaft Packings are not damaged.



**Yearly or as required:** Assuming the Iso (A) and Poly (R) is free from contaminants, the maintenance of the Iso Lube Reservoir (page 37) is performed, and the maintenance of the Poly (R) Pump Shaft (above) is followed, the Proportioning Pumps will perform for many maintenance free cycles. However, it is not unusual for those who use the PH Series Proportioner on a regular basis to rebuild the Proportioning Pumps on a yearly basis and service the Hydraulic Drive System at the same time, when the Proportioner is out of service.

### Pump Base Service

To service Discharge/Inlet Ball:

1. CLOSE appropriate Proportioner Inlet Material Supply Valve and remove Air Line from Transfer Pump.
2. Ensure all material pressure in the Proportioner system is zero and remove appropriate Retainer Nut.
3. For Inlet Ball:
  - a. Remove Inlet Ball with a Magnet (DO NOT USE ANY SHARP OBJECTS), clean Ball and Ball Seat, and inspect for foreign material and any flat spots on Ball.
  - b. Using supplied Ball Seat Tool (TL-02), check for proper Ball Seat/Ball Seat Gasket compression. Snug Seat up to ¼ turn maximum 110 ft-lbs (149 N-m).
4. For Discharge Ball:
  - a. Perform steps 1 & 2 from above.
  - b. Remove Cage and Spring.
  - c. Remove Discharge Ball with a Magnet, clean Ball and Ball Seat, and inspect for foreign material and any flat spots on Ball.

- d. Using supplied Ball Seat Tool (TL-02), check for proper Ball Seat/Ball Seat Gasket compression. Snug Seat up to ¼ turn maximum 30 ft-lbs (41 N-m).

## **Pump Seal Replacement**

***NOTE!*** Refer to *Parts Identification Drawing* for reference.

- ✓ When the Iso (A) Proportioning Pump Cylinder is disassembled for service, all parts included in the Seal Kit (KT-05001-28) should be replaced.
- ✓ When the Poly (R) Proportioning Pump Cylinder is disassembled for service, all parts included in the Seal Kit (KT-07001) should be replaced.
- ✓ When assembling Proportioning Pump lubricate all Seals, Piston Rod and Pump Cylinder with #1 Lithium Grease to assist in assembly and minimize Seal damage during re-assembly.
- ✓ When the Pump Line End Block is disassembled for service, all O-rings included in the O-ring Kit (KT-05009) should be replaced.
- ✓ After reassembly of the Proportioning Pumps torque the Assembly Bolts to 30 ft-lbs (41 N-m)

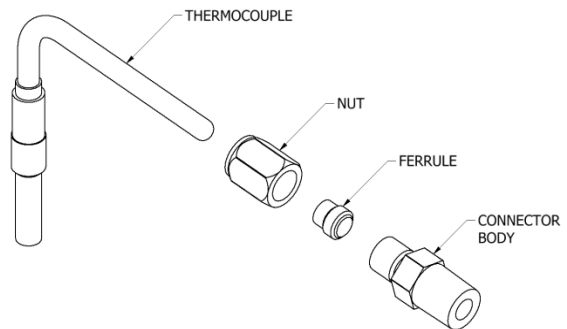
***CAUTION!*** Use *wooden or plastic tools or a brass brush for cleaning. Do not use metal or abrasive tools that can scratch the contact surfaces.*

## Material Heater

***WARNING!*** Before performing any maintenance, make sure the Main Power Switch is OFF and incoming power is locked OFF. NEVER access the inside of the Control Panel with the Proportioner power supply ON. The Heaters are components that reach high temperatures; you must wait until they have cooled before handling and bleed all material pressure to zero.

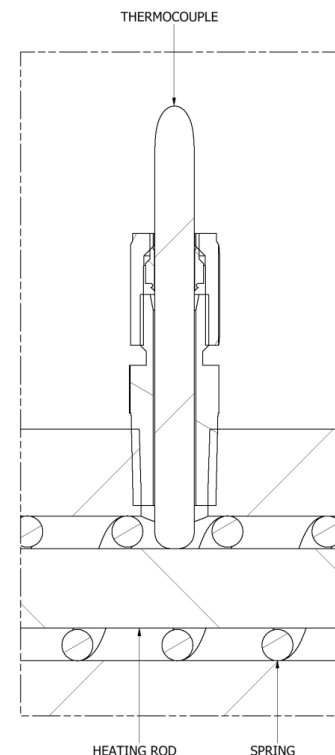


***NOTE!*** The Thermocouple is assembled into the Connector Body with a Ferrule and Nut. Once inserted into the Body and the Nut is tightened, the Ferrule locks to the Thermocouple and does not allow it to be relocated or moved. The location of the Thermocouple is very important and must be done correctly before tightening the Nut.



## Thermocouple Replacement

1. Unscrew the Nut that holds the defective Thermocouple and remove from the Body. Disconnect Thermocouple wiring located under the Top Cover of the Heater. Remove Body and discard.
2. Install Connector Body into Heater using an open-end wrench and tighten to prevent leakage. Teflon Tape or appropriate Thread Sealant should be used.
3. Slide the Nut and the Ferrule over the Thermocouple and insert this assembly into the Connector Body until it comes into **positive physical contact** with the Heating Rod. Make sure the Spring does not prevent the Thermocouple from making contact with the Heating Rod.
4. Slowly tighten the Nut using an open-end wrench (9/16"), ensuring the Thermocouple maintains positive physical contact with the Heating Rod.
5. Reinstall the Thermocouple wires.



***WARNING! Before performing any maintenance, make sure the Main Power Switch is OFF and incoming power is locked OFF. NEVER access the inside of the Control Panel with the Proportioner power supply ON. The Heaters are components that reach high temperatures; you must wait until they have cooled before handling and bleed all material pressure to zero.***

### **Heating Rod**

To replace a defective Heating Rod, proceed as follows:

1. Ensure Main Power Switch is OFF and incoming power is locked OFF. Depressurize the proportioner and remove the Cover from the Heater.

***WARNING! If the Heating Rod to be replaced is the one in contact with the Thermocouple, it is necessary to remove the Thermocouple first. Do not loosen or tighten Thermocouple Body.***

2. Disconnect the suspect Heating Rod from the wire connections and test Heating Rod for proper electrical resistance. Measurements taken at room temperature. Each 1500 Watt Heater Rod will measure 165 ohms.
3. Unscrew the Heating Rod and remove from the Heater Block along with its Spring and inspect; it must be smooth and shiny in appearance. If it is blackened or has material adhered to it replace the Heating Rod even if ohm reading is acceptable.
4. Apply Teflon Tape or appropriate Thread Sealant to the Heating Rod thread and assemble Heating Rod and Spring into the Heater Block. Tighten to 110 ft/lbs (149 N-m).
5. If necessary carefully re-install Thermocouple ensuring **positive physical contact** with the Heating Rod. Make sure the Spring does not prevent the Thermocouple from making contact with the Heating Rod. Tighten Nut with open-end wrench (9/16").
6. Reconnect wire connections and reinstall Heater Cover.
7. Ensure Heater is full of material prior to electrical testing.

## **REPLACEMENT KITS**

<b>28 A PUMP REBUILD KIT* (KT-05001-28)</b>		
<b>PART NUMBER</b>	<b>QTY</b>	<b>DESCRIPTION</b>
OR-00011A	2	O-RING
OR-00020A	2	O-RING
OR-00044A	1	O-RING
OR-00046A	2	O-RING
PU-01001A-B28	1	CYLINDER BEARING
PU-01013A	1	FLANGE GASKET
PU-01014A-028	1	PISTON SUPPORT WASHER
PU-01015A-028	1	PISTON SEAL WIPER
PU-01016A-028	1	PISTON SEAL
PU-01017A-028	1	CYLINDER SEAL
PU-05029-40	1	PIN

<b>120 R PUMP REBUILD KIT* (KT-07001)</b>		
<b>PART NUMBER</b>	<b>QTY</b>	<b>DESCRIPTION</b>
PU-03000	1	Triple Lip Seal, 120 Pump
PU-01016A-012	1	Piston Seal; 120 Pump
PU-01013A	1	Cylinder Flange Gasket
PU-03010	1	Shaft Bearing, 120, "R" Side
PU-05041	1	Piston Bearing, 120
PU-05029	1	Pin
PU-03019	1	Bullet, 120
OR-00011A	2	O-Ring; 12x2mm ID
OR-00046A	2	O-Ring #133; Viton 90D Pump Cy
PU-05030	1	Snap Ring
TN-04199	2	SHCS, Bolt, 3/8-24 x 2.5
OR-00045A	2	O-Ring #028 Viton 90D
OR-00051B	1	O-Ring #218 Alfes 80D
PU-01003-IG	1	Discharge Ball Seat Gasket
PU-01003-DG	1	Inlet Ball Seat Gasket
PU-05023-1	1	Gasket; Pump Retainer Nut

### HYDRAULIC CYLINDER REBUILD KIT (KT-05025)

PART NUMBER	QTY	DESCRIPTION
HI-05025-1	2	U-Cup
HI-05025-2	2	Back-up Ring, Piston
HI-05025-3	1	Wear Ring
HI-05025-4	2	Rod Wiper
HI-05025-5	2	Shaft Seal
HI-05025-6	2	Back-up Ring, Bushing
OR-00038A	2	O-ring
OR-00039A	2	O-ring
OR-00040A	2	O-ring

### PROPORTIONING PUMP LINE O-RING KIT (KT-05009)

PART NUMBER	QTY	DESCRIPTION
OR-00011A	4	O-ring
OR-00046A	4	O-ring
OR-00051B	2	O-ring
PU-01013A	2	Gasket
OR-00044A	1	O-ring
OR-00020A	2	O-ring

### INLET MONITORING KIT (KT-05005-SUB)

PART NUMBER	QTY	DESCRIPTION
KT-05005A-SUB	1	INLET MONITORING KIT, A-SIDE, SUB
KT-05005B-SUB	1	INLET MONITORING KIT, R-SIDE, SUB

<b>NEEDLE VALVE BLEED KIT (KT-05026)</b>		
<b>PART NUMBER</b>	<b>QTY</b>	<b>DESCRIPTION</b>
HI-05075	1	1/4" NEEDLE VALVE
HI-05076	1	1/4" NPT CAP
HI-05077	1	1/4" NPT 5.0
GP-00100-1	1	1/4" PIPE NIPPLE

<b>"A" TSU (EL-51A-SUB)</b>		
<b>PART NUMBER</b>	<b>QTY</b>	<b>DESCRIPTION</b>
EL-51A-2	1	FLEX THERMOCOUPLE
EL-00051A-3	1	1/8 NPT X 4 JIC FEM
EL-00051A-7	1	1/4 NPT X 5 JIC FEM
EL-00051A-4	1	1/4 NPT X 5 JIC FEM
EL-56	1	TSU BODY

<b>"R" TSU (EL-51R-SUB)</b>		
<b>PART NUMBER</b>	<b>QTY</b>	<b>DESCRIPTION</b>
EL-51A-3	1	FLEX THERMOCOUPLE
EL-00051A-3	1	1/8 NPT X 4 JIC FEM
EL-00051A-5	1	1/4 NPT X 6 JIC FEM
EL-00051A-6	1	1/4 NPT X 6 JIC FEM
EL-56	1	TSU BODY

<b>HEATER THERMOCOUPLE KIT (KT-05021)</b>		
<b>PART NUMBER</b>	<b>QTY</b>	<b>DESCRIPTION</b>
HI-05020	1	Body, Nut, Ferrule
HI-05021	1	Thermocouple



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## **HYDRAULIC OIL SPECIFICATIONS**

Recommended Hydraulic Oil Specification:

ISO/ASTM Viscosity Grade 32

Viscosity: 28.8 – 35.2 SSU@ 104° F

Rust and Oxidation Inhibited

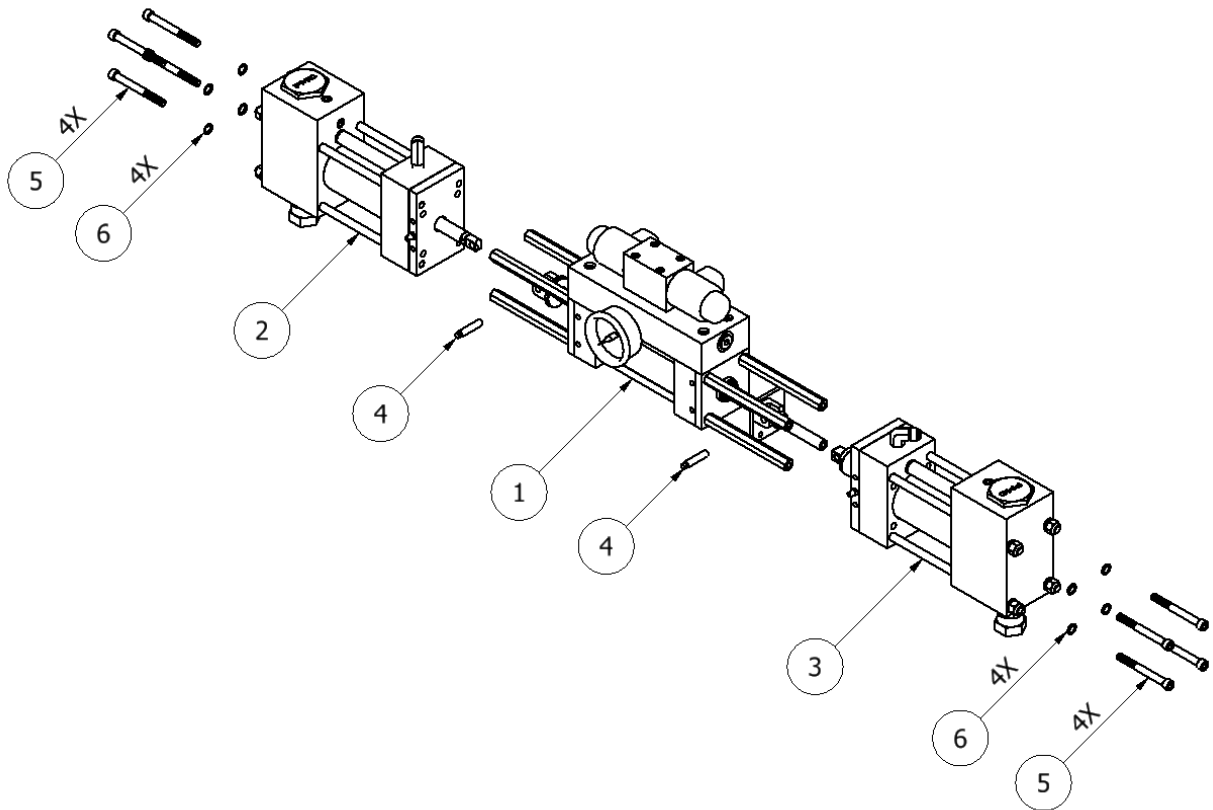
### **List of Manufacturers:**

- Mobile DTE24 **(Recommended)**
- Cook's Albavis 8
- Ashland-Valvoline AW15
- Shell – Tellus 32(25)
- Sun Oil- Sunvis 706
- Chevron ISO32
- American Oil & Supply – PQ Iso 32
- Gulf Oil – Harmony 32AW (43AW)
- Atlantic Richfield – Duro AWS-150
- BP Oil – Energol HLP-C32
- Exxon – Nuto H-32(44)
- Margolis – T.I.P.100-15-7
- Fiske Bros. – Lubriplate Hyd. #0
- SW – Alemite Hydraulic HD#0
- Texaco – Rando HD32 (HD A0)
- White & Bagley – EP Hyd. 150

## PART IDENTIFICATION

### Pump Line Assembly

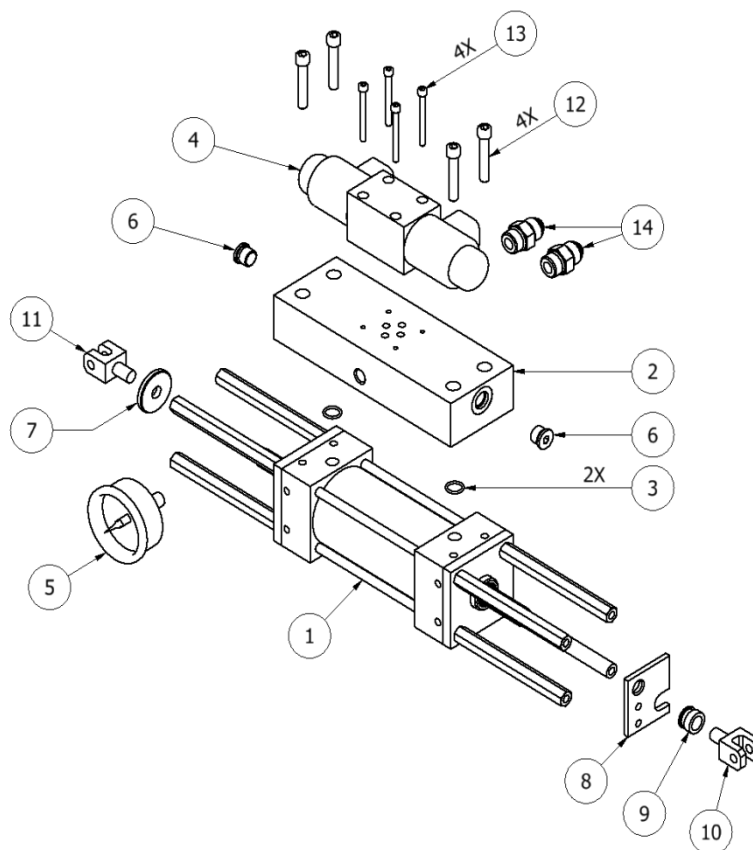
(PL-SUB)



PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	HI-01-SUB	HYDRAULIC CYLINDER COMPLETE, SUB
2	1	PU-05001-28	A PUMP ASSEMBLY, SIZE 28
3	1	PU-05002-120	R PUMP ASSEMBLY, SIZE 120
4	2	PU-05007	CLEVIS PIN
5	8	PU-05008	MOUNTING BOLT
6	8	PU-05008-1	SERRATED WASHER 5/16

## Hydraulic Cylinder Complete, SUB

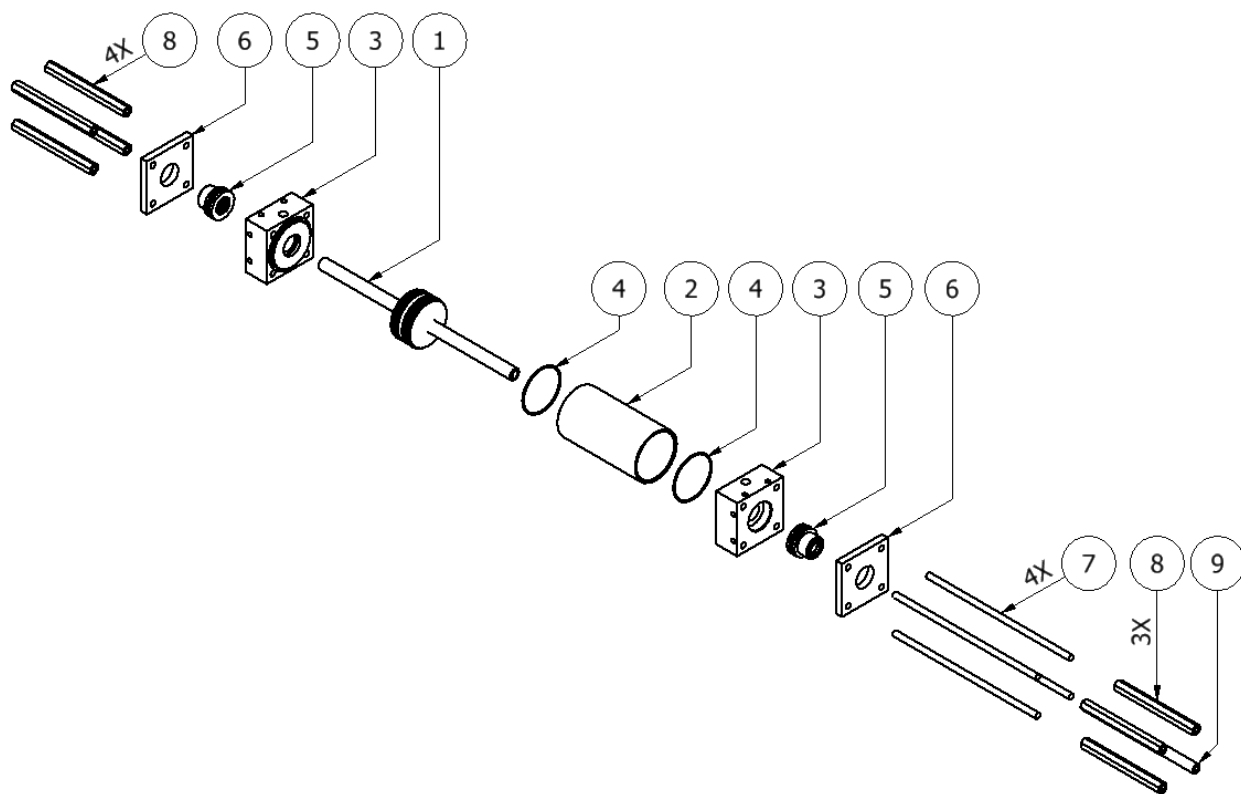
### (HI-01-SUB)



PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	HI-05025A	HYDRAULIC CYLINDER ASSEMBLY
2	1	HI-05070	HYDRAULIC MANIFOLD; CLASSIC
3	2	OR-00038A	2MMX12.5MM 75 VITON BROWN
4	1	HI-05003	DIRECTIONAL VALVE
5	1	HI-05040	PRESS GUAGE 0-2000 PSI
6	2	HI-05070-4	6 ORB PLUG
7	1	PU-05005	BAFFLE
8	1	PU-05009	PLATE; REVERSING SWITCH
9	1	PU-05010	BUSHING
10	1	PU-05006	CLEVIS; HYDRAULIC
11	1	PU-05006-28	CLEVIS, HYDRAULIC, 28
12	4	FLOOR STOCK	5/16-18 X 1-3/4 SHCS
13	4	FLOOR STOCK	#10-24 X 2 SHCS
14	2	HI-05012	3/4-16 O-RING X 3/4-16 JIC NIP

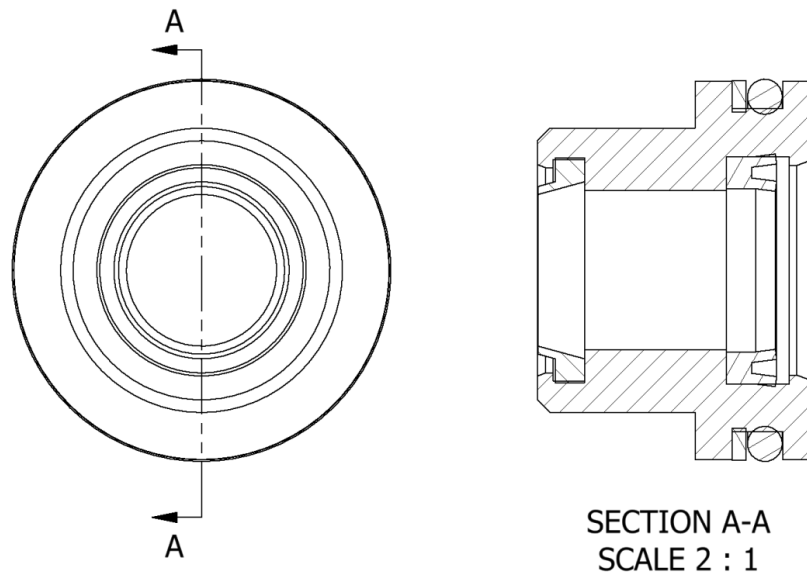
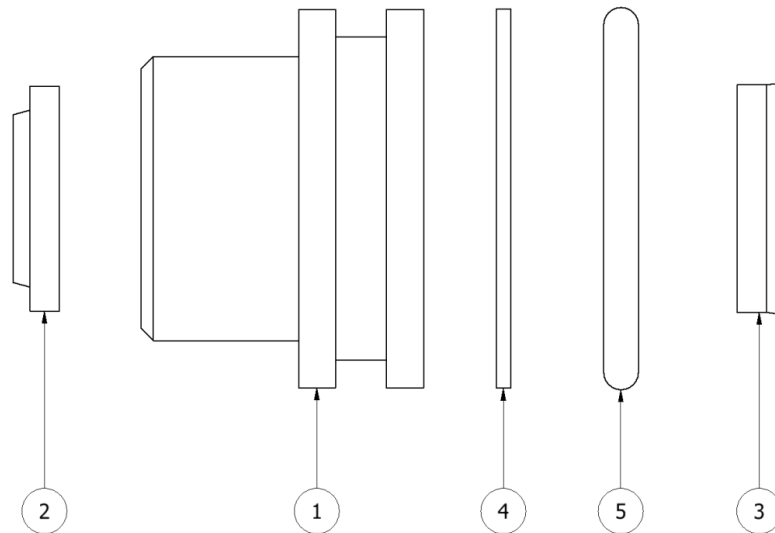
## Hydraulic Cylinder Assembly

(HI-05025A)



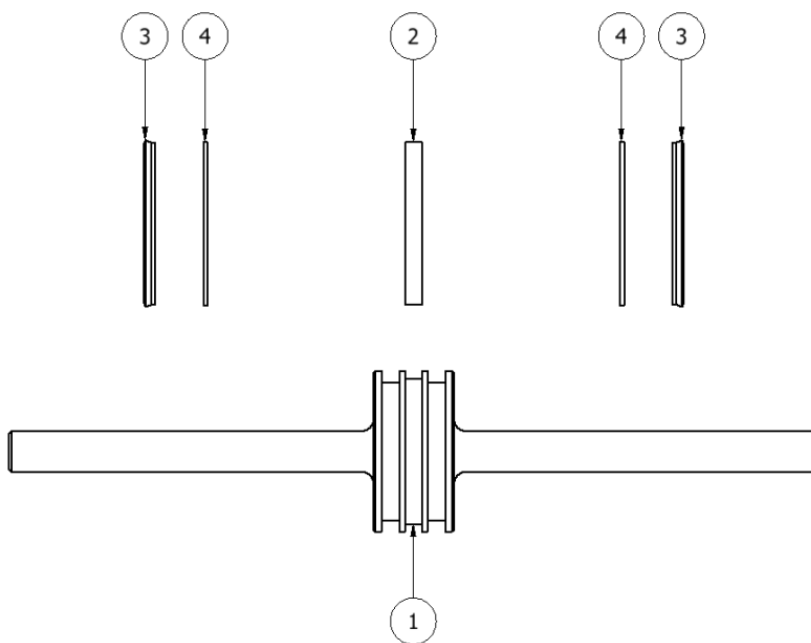
PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	-	HYDRAULIC PISTON ASSEMBLY (PG. 51)
2	1	HI-05025-8	HYDRAULIC CYLINDER
3	2	HI-05025-9	PORT BLOCK; HYDRAULIC
4	2	OR-00040A	O-RING #036 VITON
5	2	-	HYDRAULIC SEAL ASSEMBLY (PG. 50)
6	2	HI-05025-10	RETAINER FLANGE
7	4	HI-05025-14	TIE ROD; 5/16-24
8	7	HI-05025-11	HYDRAULIC STANDOFF
9	1	HI-05025-12	REVERSING SWITCH STANDOFF

## Hydraulic Seal Assembly

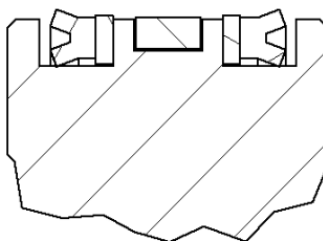


PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	HI-05025-13	BUSHING; ROD
2	2	HI-05025-4	ROD WIPER
3	2	HI-05025-5	SHAFT SEAL
4	2	HI-05025-6	BACK-UP RING; BUSHING
5	2	OR-00039A	O-RING #218 HYD CYLINDER ROD

## Hydraulic Piston Assembly



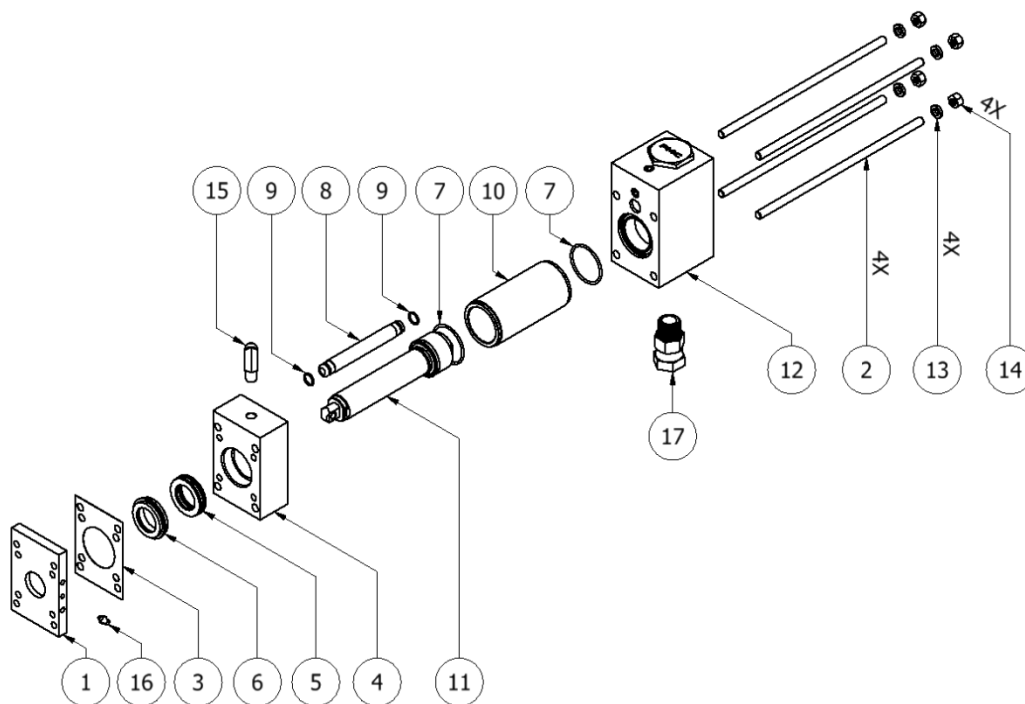
### SEAL SECTION DETAIL



PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	HI-05025-7	HYDRAULIC PISTON
2	1	HI-05025-3	WEAR RING
3	2	HI-05025-1	U CUP
4	2	HI-05025-2	BACK UP RING; PISTON

## **"R" Pump Assembly; Size 120**

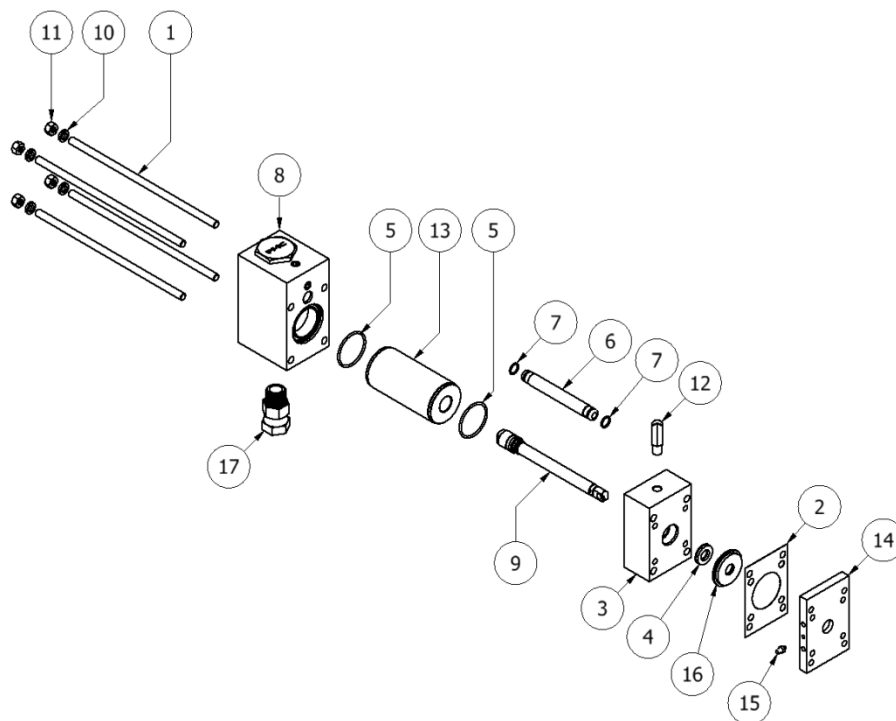
**(PU-05002-120)**



PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	PU-05032	"R" PACKING RETAINER FLANGE; SIZE 120
2	4	PU-05026	TIE ROD; 3/8-24
3	1	PU-01013A	CYLINDER FLANGE GASKET
4	1	PU-05014	PUMP FLANGE; SIZE 120
5	1	PU-03000	TRIPLE LIP SEAL, 120
6	1	PU-03010	SHAFT BEARING, 120, R
7	2	OR-00046A	O-RING #133; VITON 90D PUMP CYL
8	1	PU-05017	CROSSOVER TUBE
9	2	OR-00011A	O-RING; CROSSOVER TUBE #014
10	1	PU-05012	CYLINDER; SIZE 120
11	1	-	PISTON ASSEMBLY (PG. 54)
12	1	-	PUMP BASE ASSEMBLY (PG. 56)
13	4	PU-05027	WASHER
14	4	PU-05028	NUT
15	1	HI-05038	1/4 NPT X 9/16-18 JIC 90 DEG E
16	1	TN-04186	GREASE FITTING
17	1	HI-05016	3/4 MPT x 3/4 FPT SW

## **“A” Pump Assembly; Size 28**

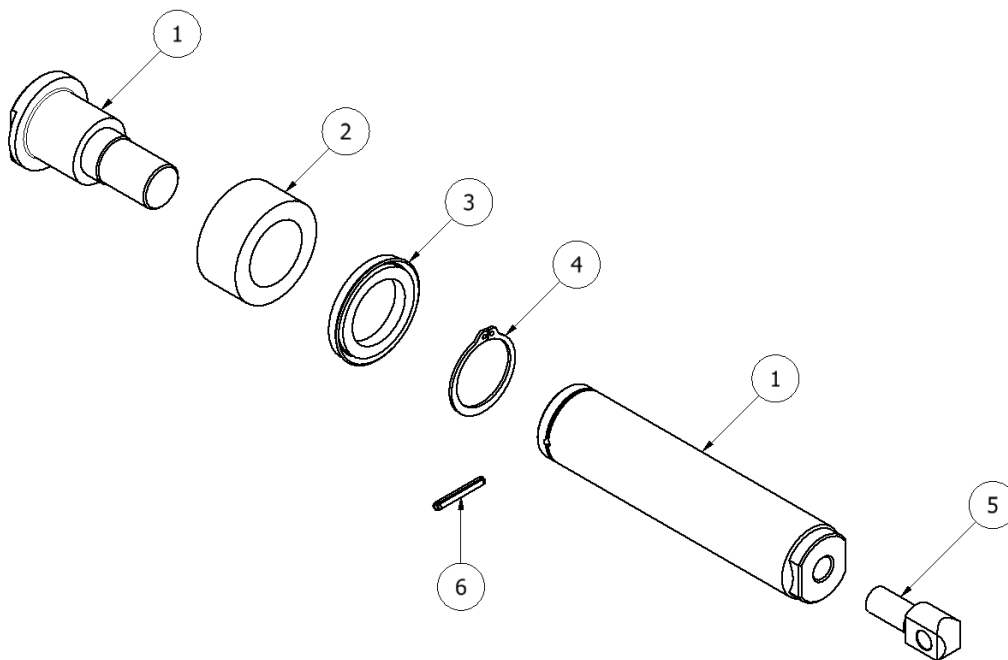
**(PU-05001-28)**



PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	PU-05026	TIE ROD; 3/8-24
2	1	PU-01013A	CYLINDER FLANGE GASKET
3	1	PU-05014-28	FLANGE, PUMP
4	1	PU-01017A-028	SEAL; CYLINDER 28 PUMP A&R
5	2	OR-00046A	O-RING #133; VITON 90D PUMP CYL
6	1	PU-05017	CROSSOVER TUBE
7	2	OR-00011A	O-RING; CROSSOVER TUBE #014
8	1	-	PISTON ASSEMBLY (PG. 55)
9	1	-	PUMP BASE ASSEMBLY (PG. 56)
10	4	PU-05027	WASHER
11	4	PU-05028	NUT
12	1	HI-05038	1/4 NPT X 9/16-18 JIC 90 DEG E
13	1	PU-05012-28	CYLINDER, 28
14	1	PU-05032-28	FLANGE, R PACKING RETAINER, 28
15	1	TN-04186	GREASE FITTING
16	1	PU-01002A-B28	"R" CYLINDER BEARING, 28
17	1	HI-05016	3/4 NPTM X 3/4 NPTF SW

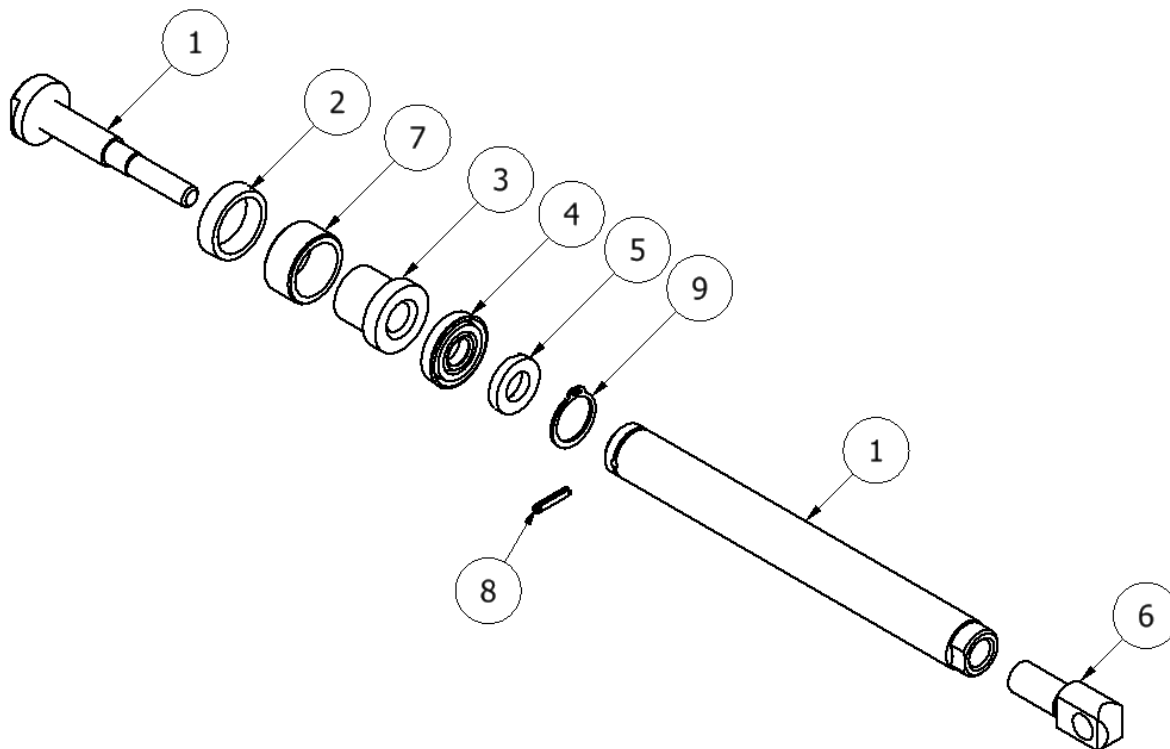


## **Piston Assembly; Size 120**



PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	PU-05011-120	PISTON SHAFT; SIZE 120
2	1	PU-05041	PISTON BEARING, 120
3	1	PU-01016A-012	PISTON SEAL; SIZE 120
4	1	PU-05030	120 SNAP RING
5	1	PU-05031	PISTON CLEVIS
6	1	PU-05029	120 SPRING PIN

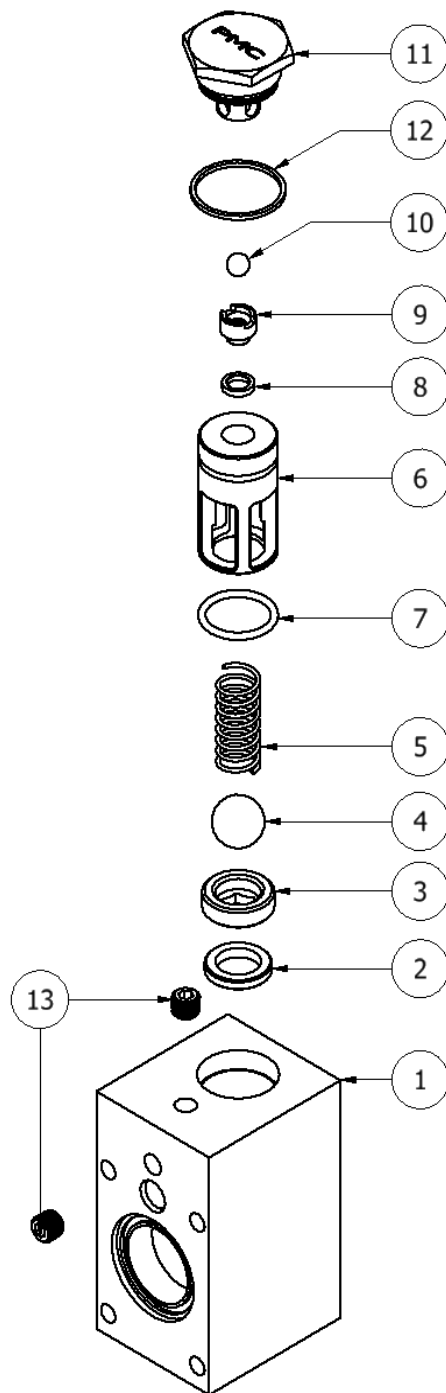
## Piston Assembly; Size 28



PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	PU-05011-28	PISTON ASSEMBLY, 28
2	1	PU-01015A-028	SEAL, WIPER
3	1	PU-05016-28	BEARING, PISTON SUPPORT
4	1	PU-01016A-028	PISTON SEAL, 28 PUMP
5	1	PU-05015-28	WASHER, PISTON SUPPORT
6	1	PU-05031-28	CLEVIS, PISTON
7	1	PU-01014A-028	WIPER RING
8	1	PU-05029-28	PIN, 28
9	1	PU-05030-28	SNAP RING, 28

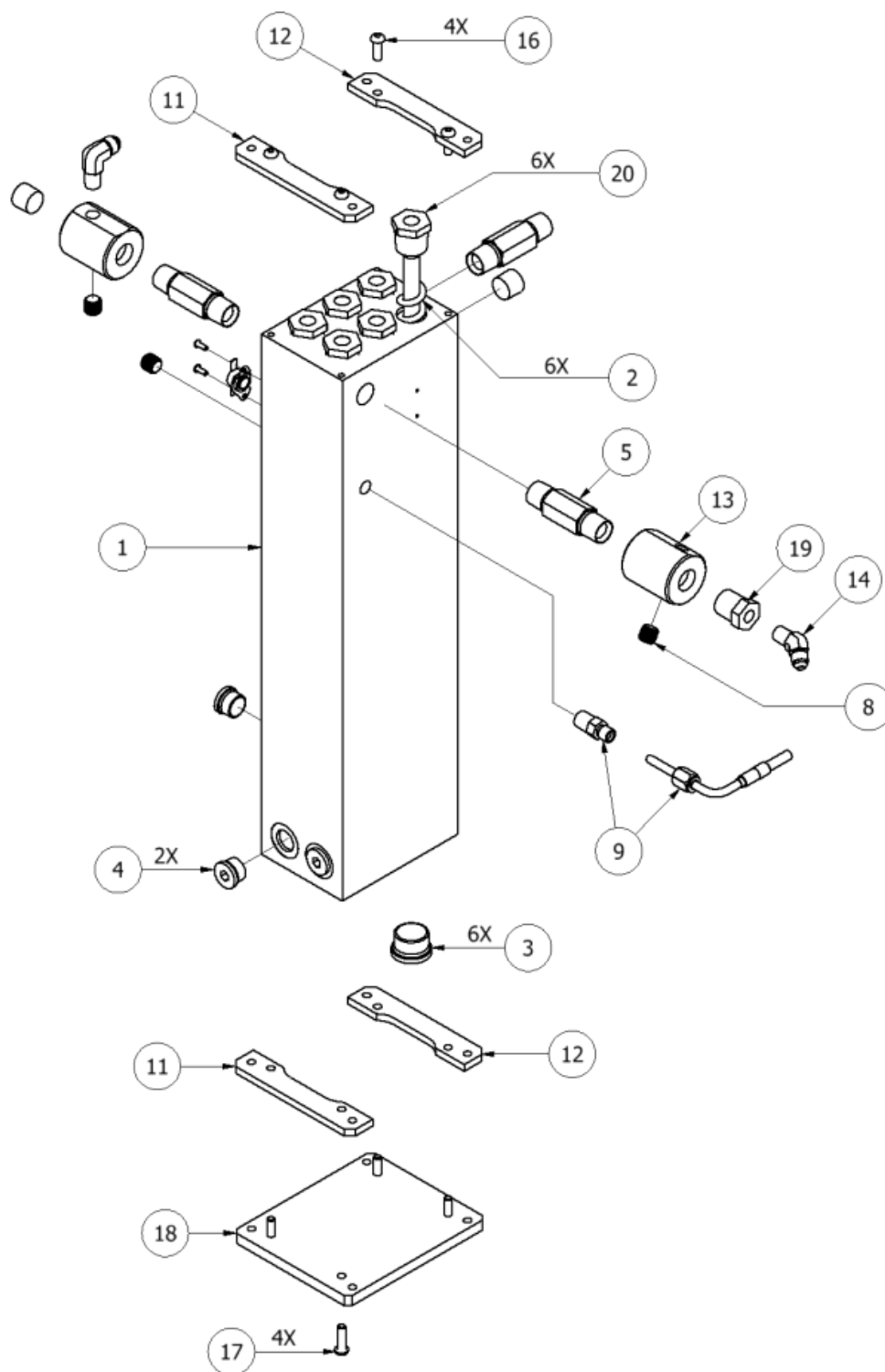
## Pump Base Assembly

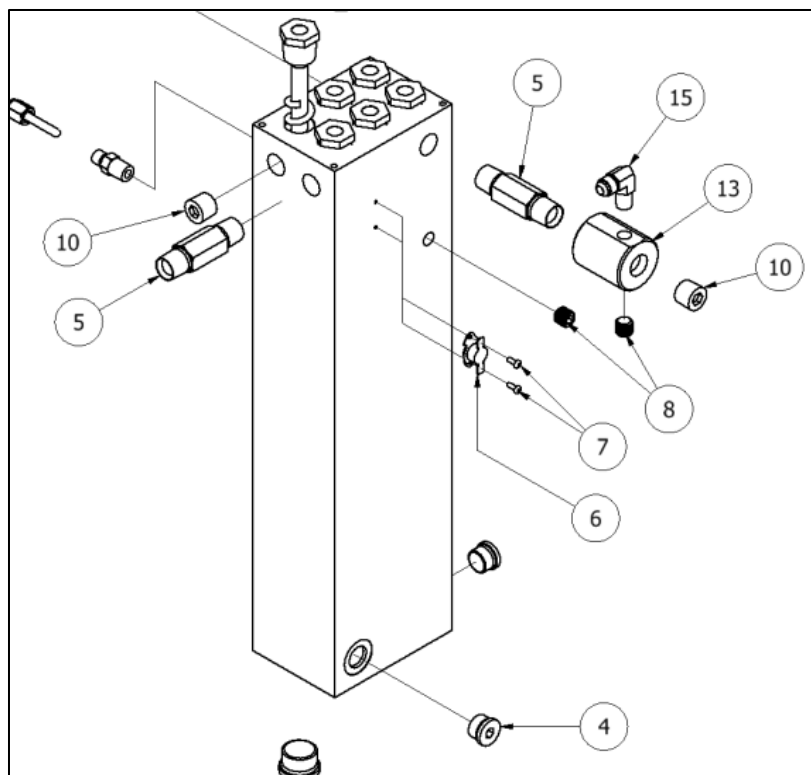
PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	PU-05018	PUMP BASE
2	1	PU-01003-DG	INLET BALL SEAT GASKET
3	1	PU-05019	INLET SEAT
4	1	PU-05020	INLET BALL
5	1	PU-05021	SPRING
6	1	PU-05022A	SLEEVE
7	1	OR-00051B	#218 AFLAS 80D O-RING
8	1	PU-01003-IG	DISCHARGE BALL SEAT GASKET
9	1	PU-05024	DISCHARGE SEAT
10	1	PU-05025	DISCHARGE BALL
11	1	PU-05023-R	PUMP RETAINER NUT
12	1	PU-05023-1	GASKET
13	2	HI-05067	PIPE PLUG 1/4-18; 7/8 TAPER



## Heater Assembly: "A" Side

(PH-7-460V)

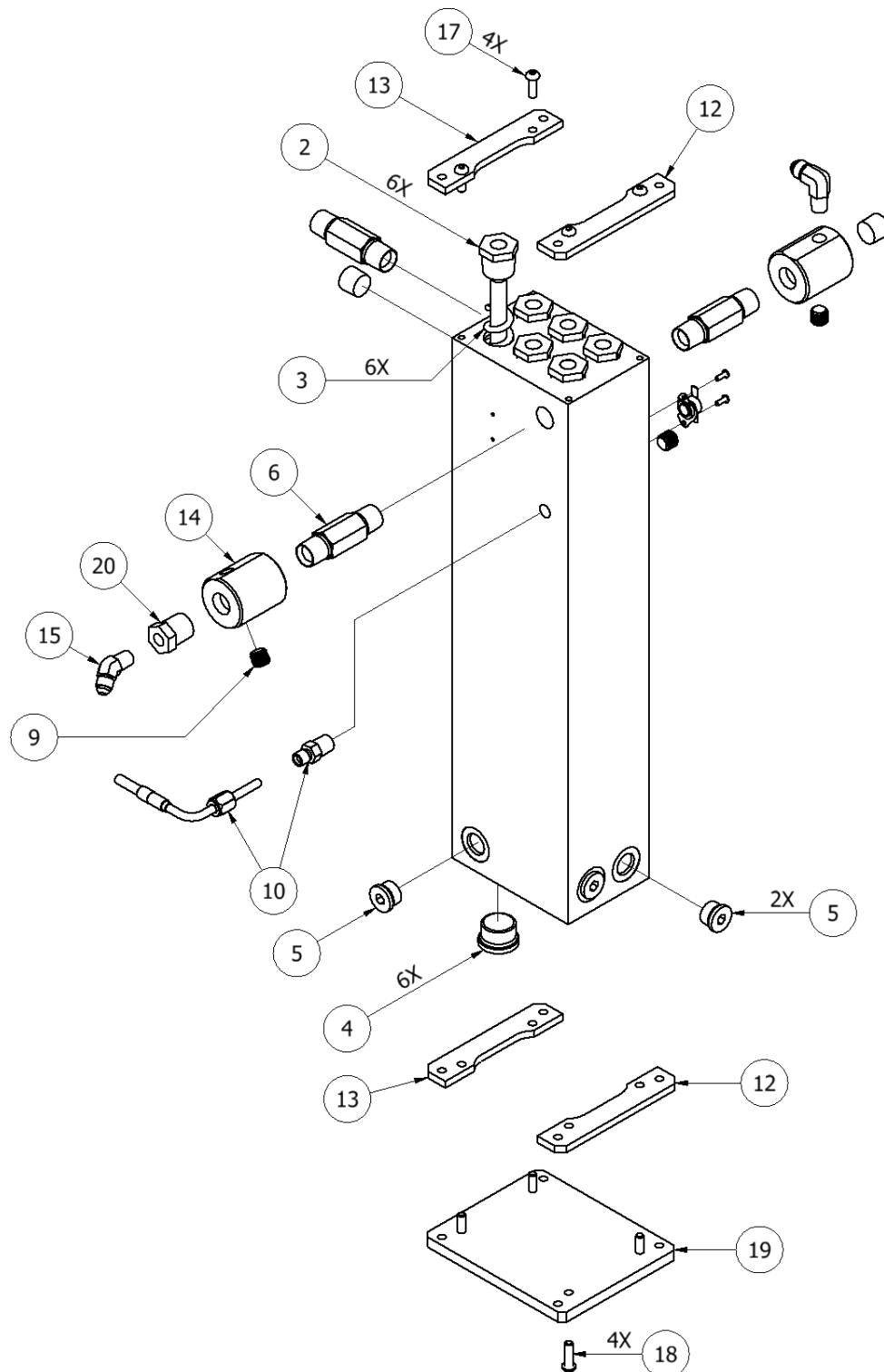


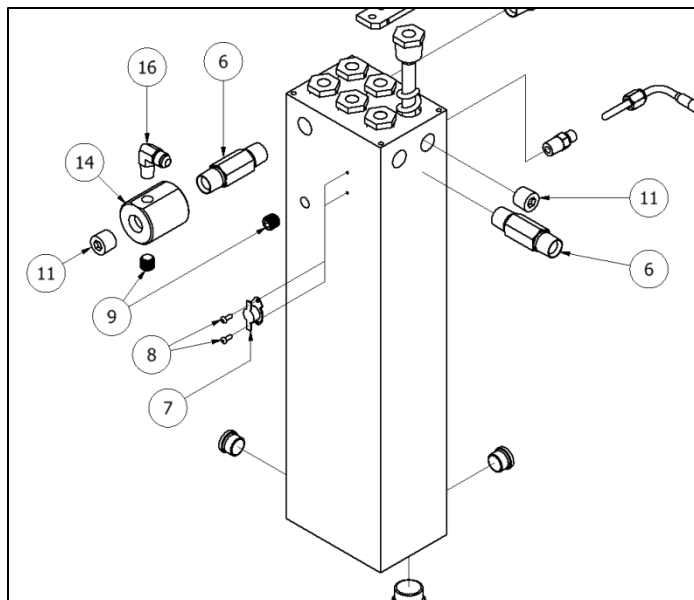


PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	GM-05423-1	HEATER; BODY
2	6	GM-05423-7	SPRING 18"
3	6	HI-05034	12 ORB PLUG
4	3	HI-05033	8 ORB PLUG
5	3	EL-05032	1/2 NPT LONG HEX NIPPLE
6	1	EL-00006A	OVERTEMP SWITCH
7	2	FLOOR STOCK	#6-32 X 3/8 BHCS
8	3	HI-05036	1/4 NPT FLUSH SEAL PIPE PLUG
9	1	HI-05021	THERMOCOUPLE; TYPE E
10	2	HI-05035	1/2 NPT FLUSH PIPE PLUG
11	2	GM-05423-9	PHENOLIC STANDOFF; BOTTOM FRONT
12	2	GM-05423-10	PHENOLIC STANDOFF; BOTTOM BACK
13	2	HI-05046-1	MANIFOLD FOR GAUGE, 1/2
14	1	HI-05027	1/4 NPT X 1/2-20 JIC 45 DEG EL
15	1	HI-05038	1/4 NPT X 9/16-18 JIC 90 DEG E
16	4	FLOOR STOCK	1/4-20 X 3/4 BHCS
17	4	FLOOR STOCK	1/4-20 X 7/8 BHCS
18	1	RM-05700-17	PREHEATER R-SIDE 4.5 KW
19	1	200219	1/2 NPTF MALE X 1/4 NPTF FEMALE
20	6	200232	FIRE ROD, 1500W, 460V

## Heater Assembly: "R" Side

(PH-8-460V)

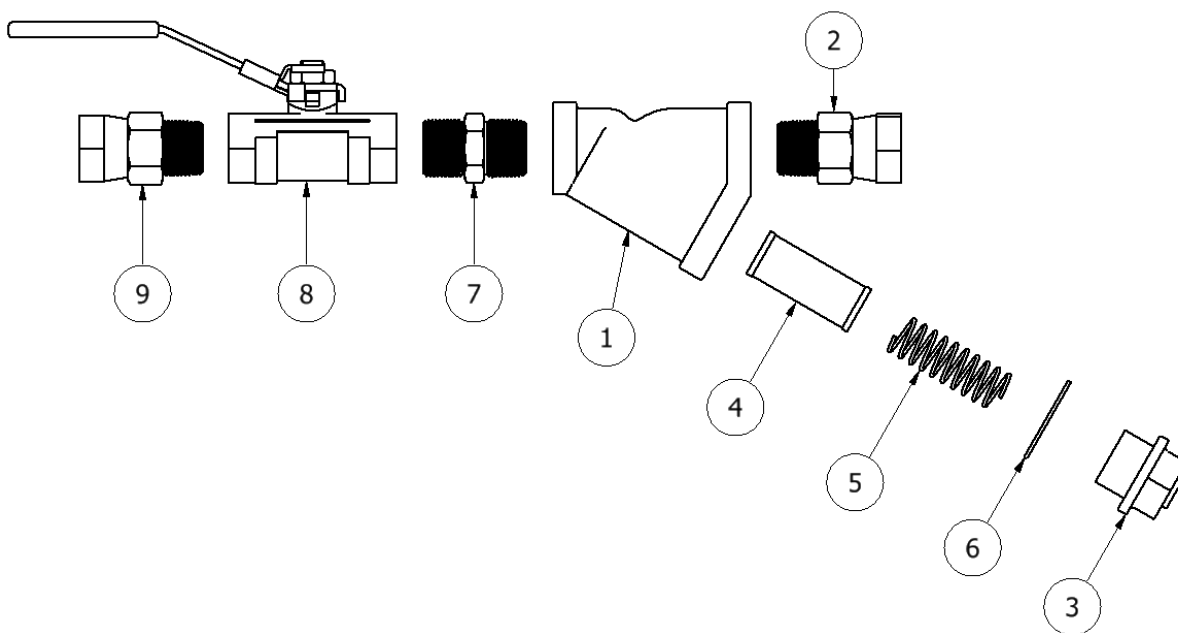




PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	GM-05423-1	HEATER; BODY
2	6	200232	FIRE ROD, 1500W, 460V
3	6	GM-05423-7	SPRING 18"
4	6	HI-05034	12 ORB PLUG
5	3	HI-05033	8 ORB PLUG
6	3	EL-05032	1/2 NPT LONG HEX NIPPLE
7	1	EL-00006A	OVERTEMP SWITCH
8	2	FLOOR STOCK	#6-32 X 3/8 BHCS
9	3	HI-05036	1/4 NPT FLUSH SEAL PIPE PLUG
10	1	HI-05021	THERMOCOUPLE; TYPE E
11	2	HI-05035	1/2 NPT FLUSH PIPE PLUG
12	2	GM-05423-9	PHENOLIC STANDOFF; BOTTOM FRONT
13	2	GM-05423-10	PHENOLIC STANDOFF; BOTTOM BACK
14	2	HI-05046-1	MANIFOLD FOR GAUGE, 1/2
15	1	HI-05027	1/4 NPT X 1/2-20 JIC 45 DEG EL
16	1	HI-05038	1/4 NPT X 9/16-18 JIC 90 DEG E
17	4	FLOOR STOCK	1/4-20 X 3/4 BHCS
18	4	FLOOR STOCK	1/4-20 X 7/8 BHCS
19	1	RM-05700-17	PREHEATER R-SIDE 4.5 KW
20	1	200219	1/2 NPTF MALE X 1/4 NPTF FEMALE

## Y-Strainer Assembly: "A" Side

(YS-1)

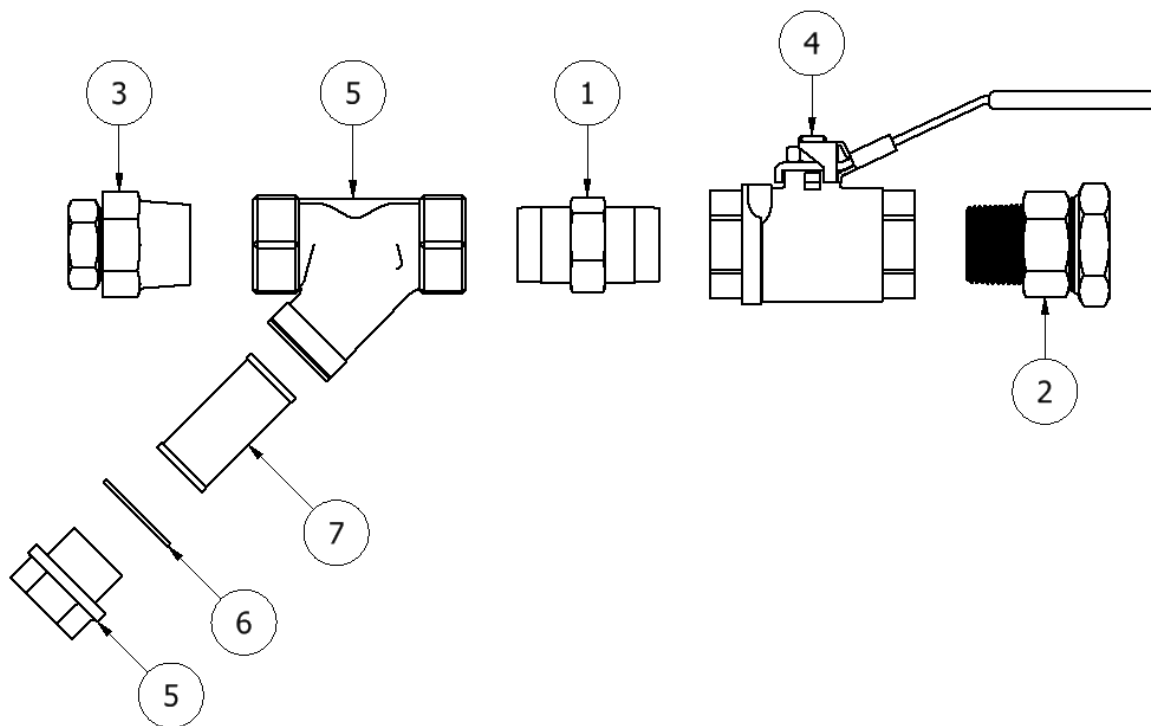


PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	RA-00074-00A	Y-STRAINER
2	1	HI-05016	3/4" SWIVEL FITTING
3	1	RA-00074-04	Y-STRAINER NUT
4	1	RA-00074-03-30A	REPLACEMENT SCREEN; 30 MESH
	1	RA-00074-03-60A	REPLACEMENT SCREEN; 60 MESH ( <b>STANDARD</b> )
	1	RA-00074-03-80A	REPLACEMENT SCREEN; 80 MESH
5	1	SP-00009A	REPLACEMENT SPRING
6	1	RA-00074-02A	REPLACEMENT GASKET
7	1	HI-05017	3/4" HEX NIPPLE
8	1	RA-00078A	3/4" BALL VALVE
9	1	HI-05018	3/4" X 1/2" SWIVEL FITTING "A" SIDE



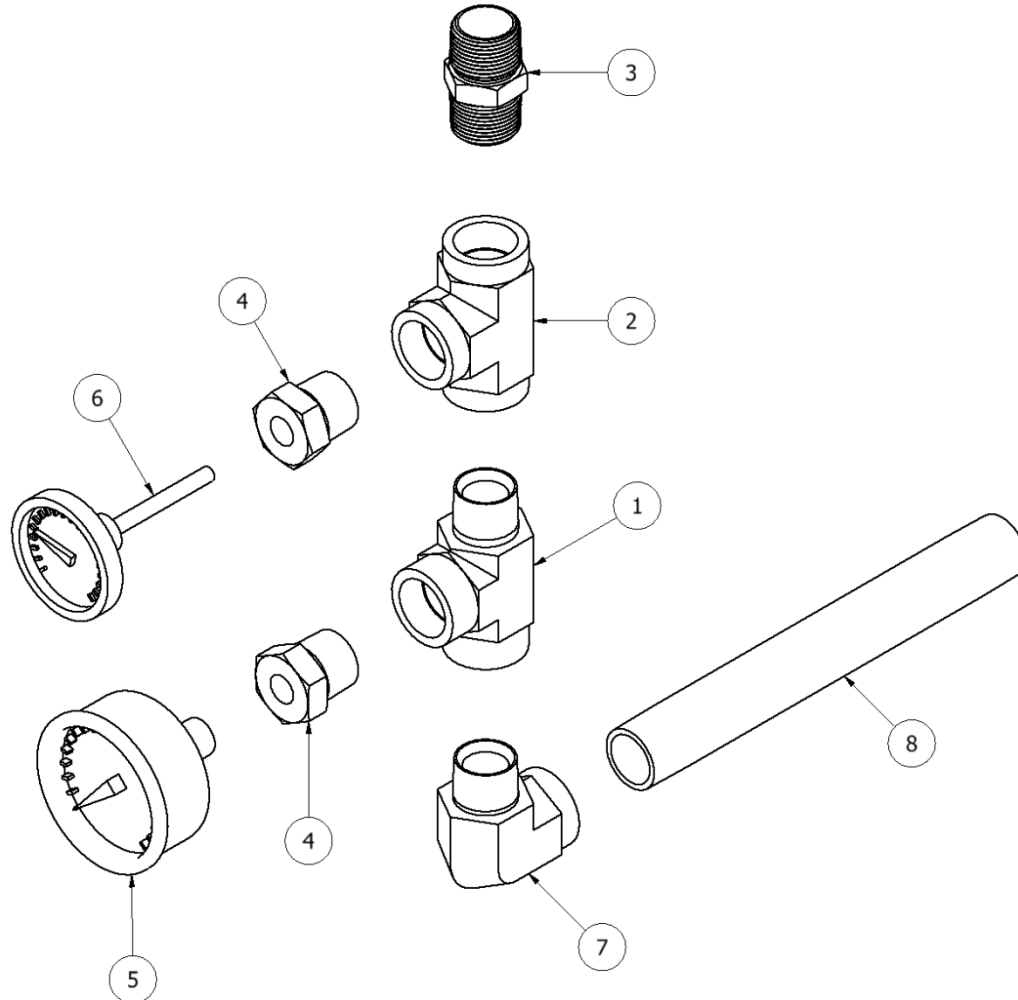
## Y-Strainer Assembly: "R" Side

(YS-3)



PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	HI-05061	NIPPLE, 1"
2	1	HI-05062	1" MALE X 1" FEMALE
3	1	HI-05068	1" MALE X 3/4" FEMALE
4	1	RA-00079	BALL VALVE, 1"
5	1	YS-3-1	Y-STRAINER, R-SIDE, 1"
6	1	YS-3-2	Y-STRAINER GASKET
7	1	YS-3-6	FILTER SCREEN 60

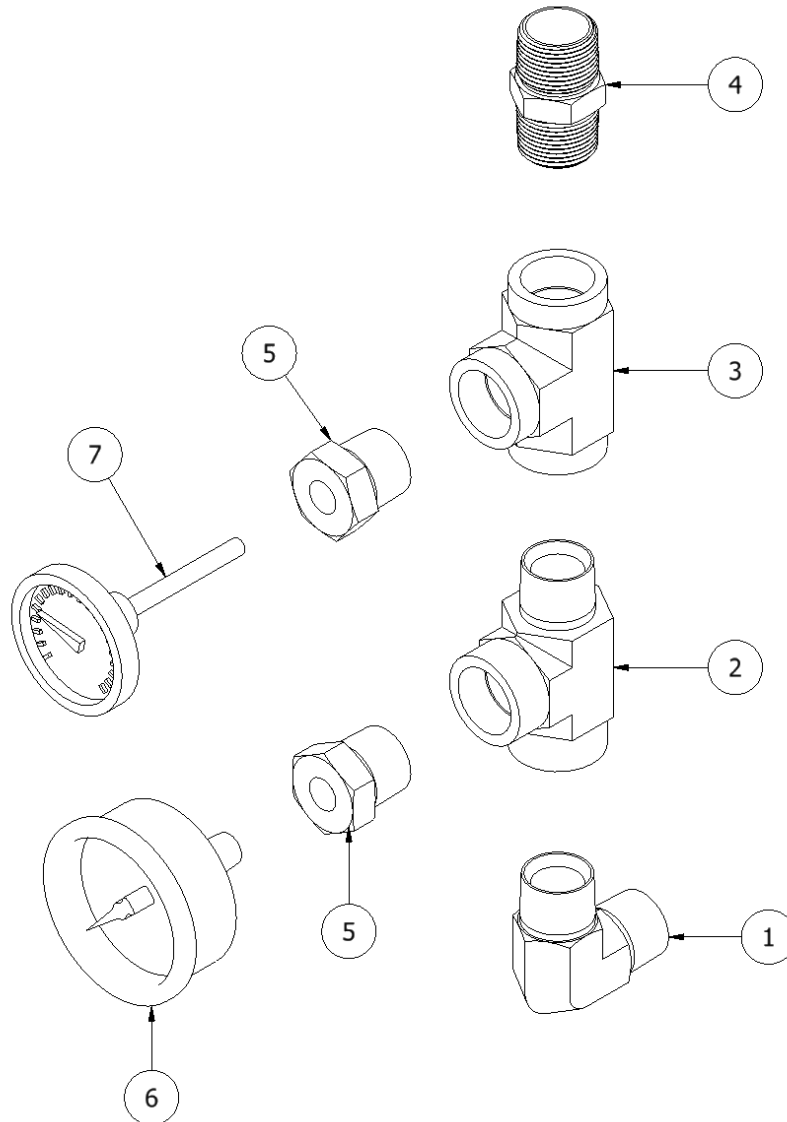
**Inlet Monitoring Assembly: "A" Side**  
**(KT-05005A-SUB)**



PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	HI-05051	PARKER PIPE FIT MALE RUN TEE M
2	1	HI-05052	PARKER PIPE FIT FEMALE PIPE TEE
3	1	HI-05017	3/4 NPTM UNION
4	2	HI-05053	PARKER PIPE FIT PIPE THREAD
5	1	HI-05103	PRESS GAUGE 0-600 PSI
6	1	HI-05055	TEMP GUAGE 0-200 F
7	1	HI-05093	3/4 NPTM X 3/4 NPTF ELBOW
8	1	AD-13	3/4 X 8 PIPE

## Inlet Monitoring Assembly, R-Side

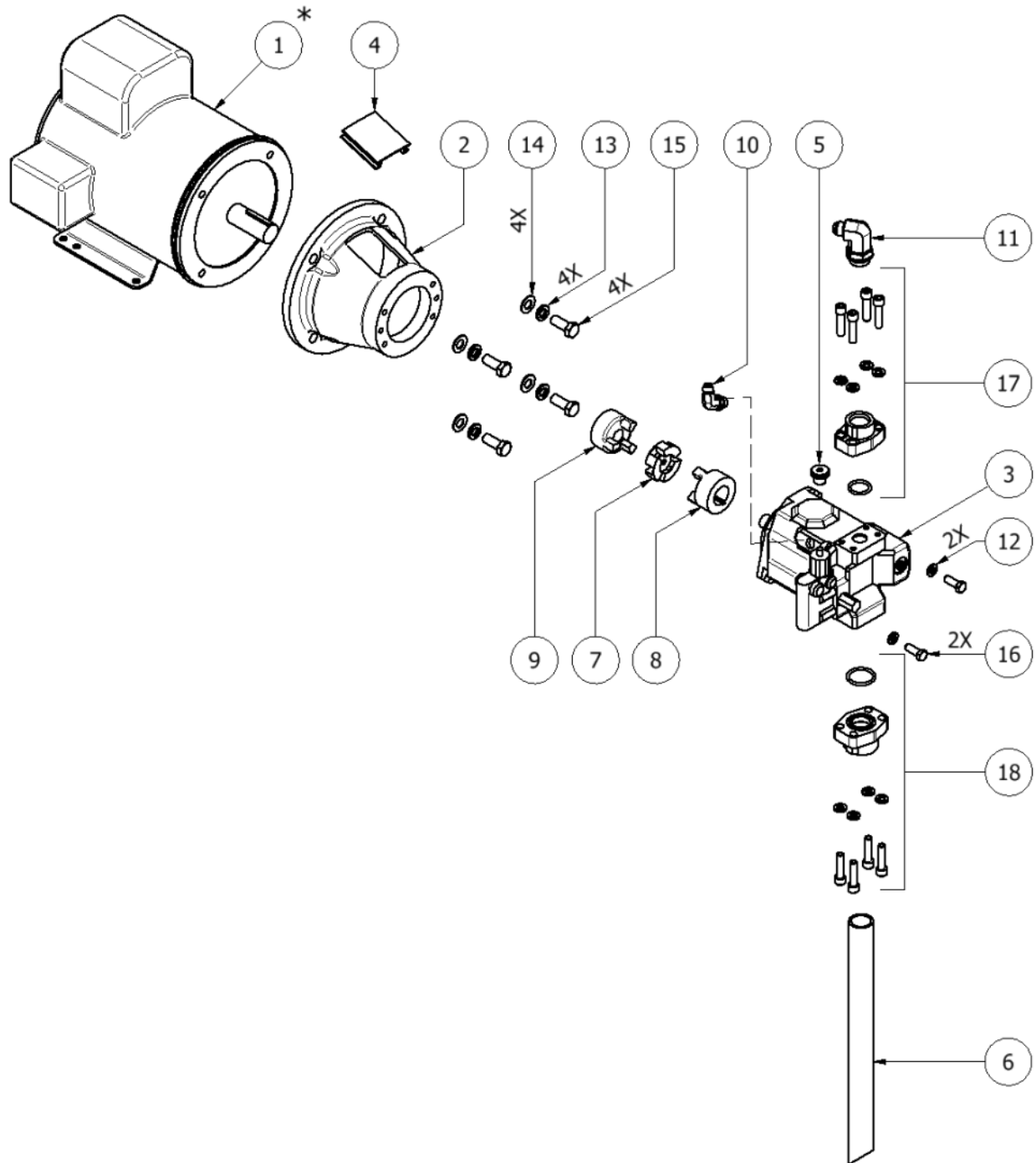
### (KT-05005B-SUB)



PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	HI-05015	3/4 NPT EXTERNAL ELBOW
2	1	HI-05051	PARKER PIPE FIT MALE RUN TEE M
3	1	HI-05052	PARKER PIPE FIT FEMALE PIPE TEE
4	1	HI-05017	3/4 NPTM UNION
5	2	HI-05053	PARKER PIPE FIT PIPE THREAD
6	1	HI-05074	PRESSURE GAUGE; CM 0-1000 PSI
7	1	HI-05055	TEMP GUAGE 0-200 F

## Motor Line Assembly

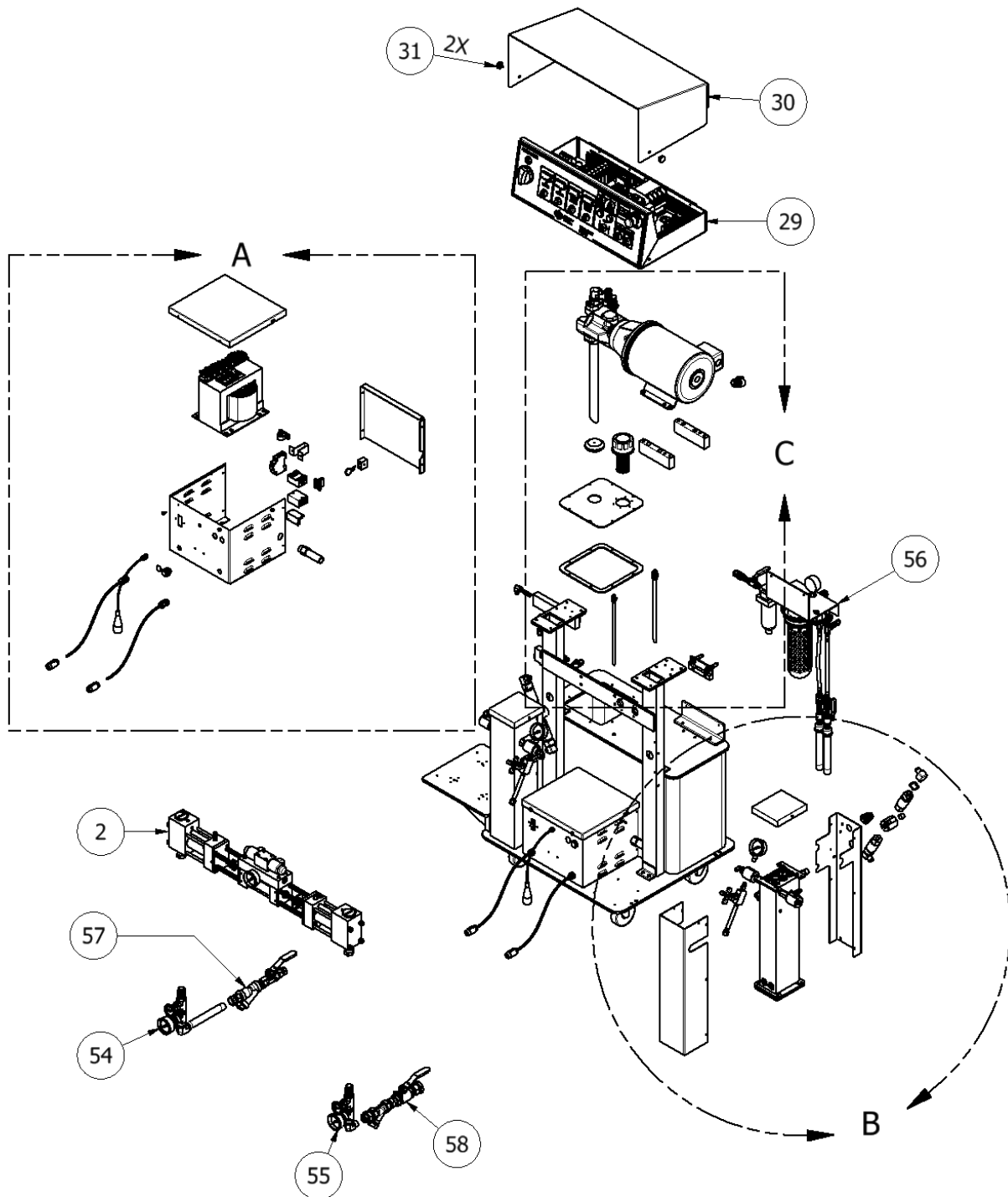
(ML-4)



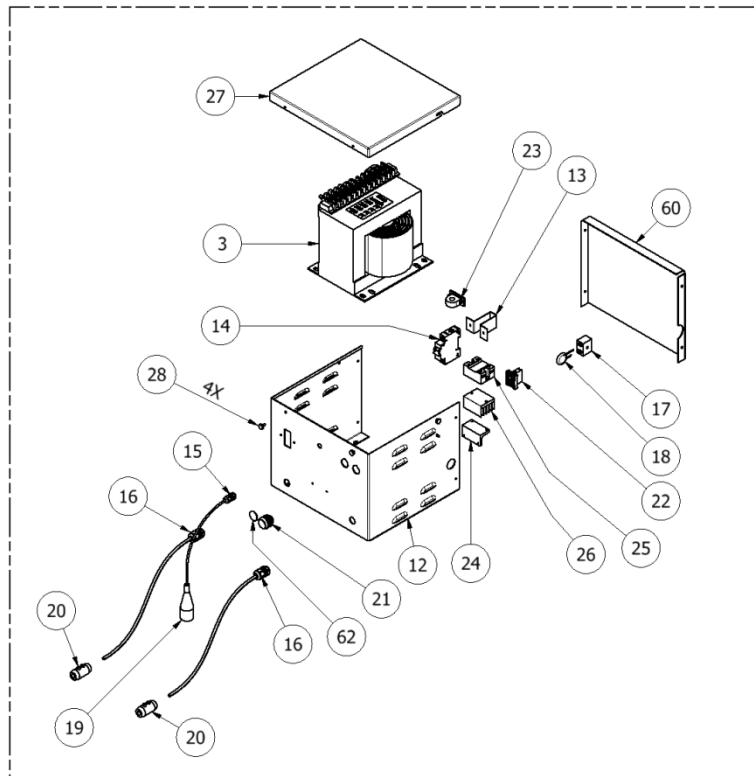
<b>PART LIST</b>			
<b>ITEM</b>	<b>QTY</b>	<b>PART NUMBER</b>	<b>DESCRIPTION</b>
1	1	EL-05223	ELECTRIC MOTOR, 5HP, 3PH, 50/60HZ
2	1	HI-05001	BELL HOUSING
3	1	HI-05004	HYDRAULIC PUMP; 18CC
4	1	HI-00005-03	ACCESS COVER
5	1	HI-05004-1	CONTROL KNOB; HYDRAULIC PUMP
6	1	HI-00049A	1X16 BLACK PIPE FOR HYDRAULIC
7	1	HI-00067	MAGNALOY INSERT 9.45HP
8	1	HI-00065-03	MAGNALOY HUB; 3/4 X 3/16
9	1	HI-00065-02	MAGNALOY HUB; 1-1/8 X 1/4
10	1	HI-05007	6 ORB X 6 JIC 90 DEGREE
11	1	HI-05008	FITTING 1-1/16 O-RING X 3/4-16 JIC
12	2	FLOOR STOCK	3/8 LOCK WASHER
13	4	FLOOR STOCK	1/2 LOCK WASHER
14	4	FLOOR STOCK	1/2 PLAIN WASHER
15	4	FLOOR STOCK	1/2-13 X 1-1/4 HEX CAP SCREW
16	2	FLOOR STOCK	3/8-16 X 1 HEX CAP SCREW
17	1	HI-05009	HYDRAULIC PUMP OUTLET FLANGE
18	1	HI-05010	HYDRAULIC PUMP INLET FLANGE

## **PH-Series Proportioner**

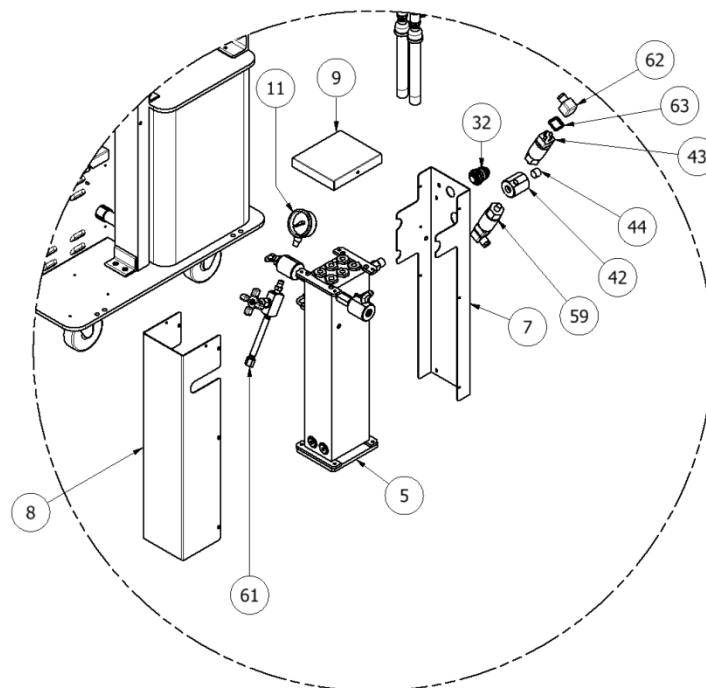
**(PH-40-SUB)**



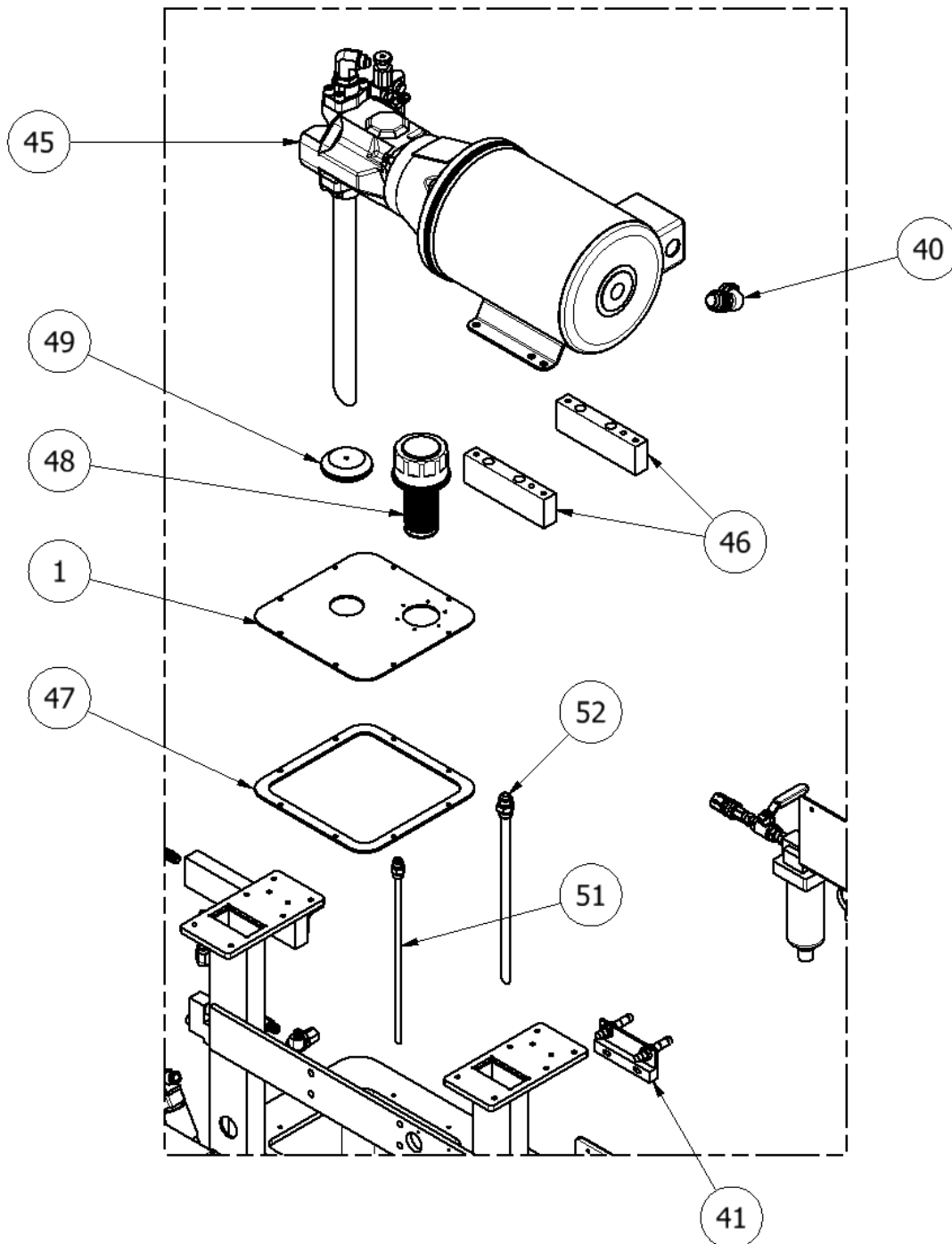
**DETAIL A**



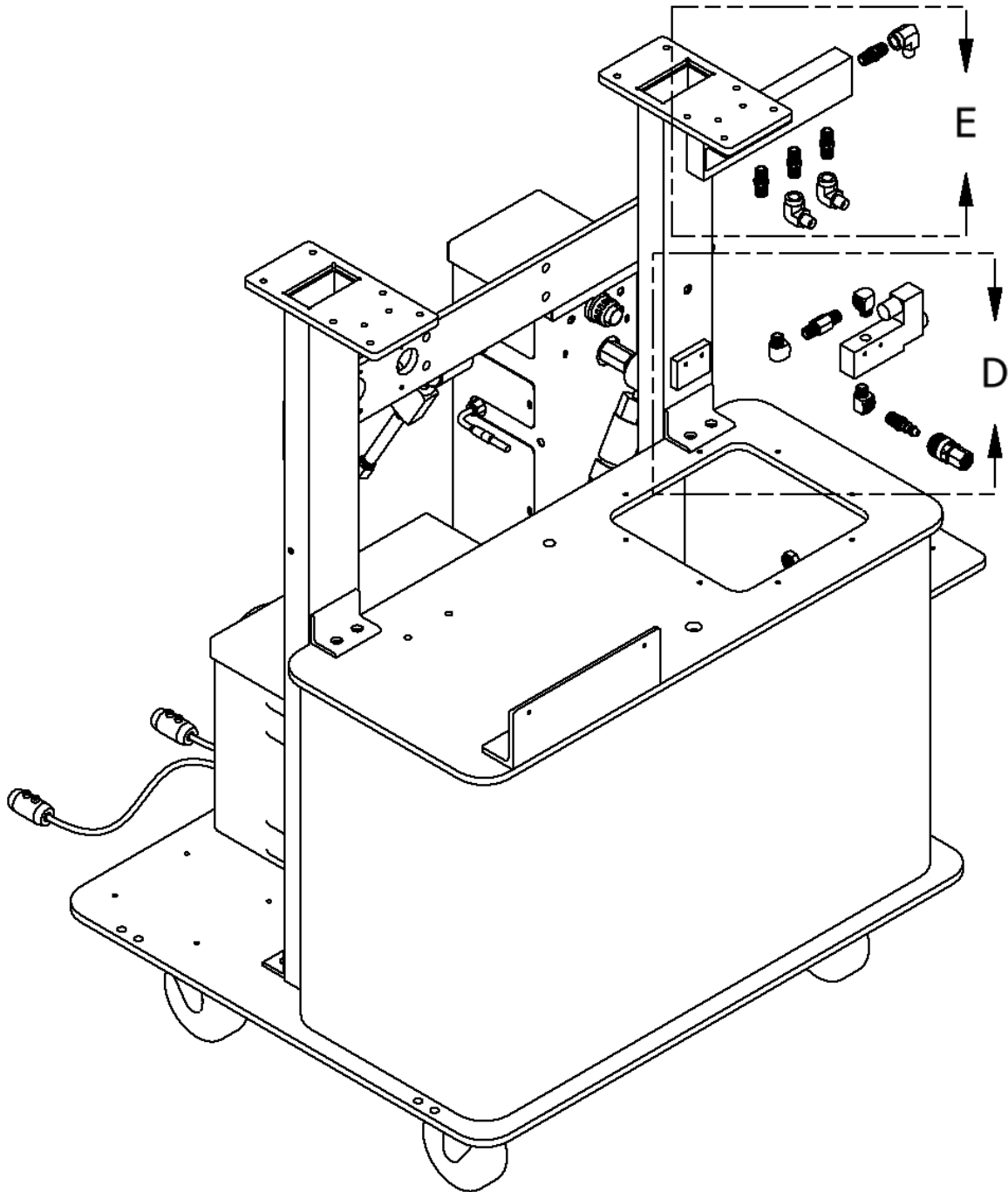
**DETAIL B**

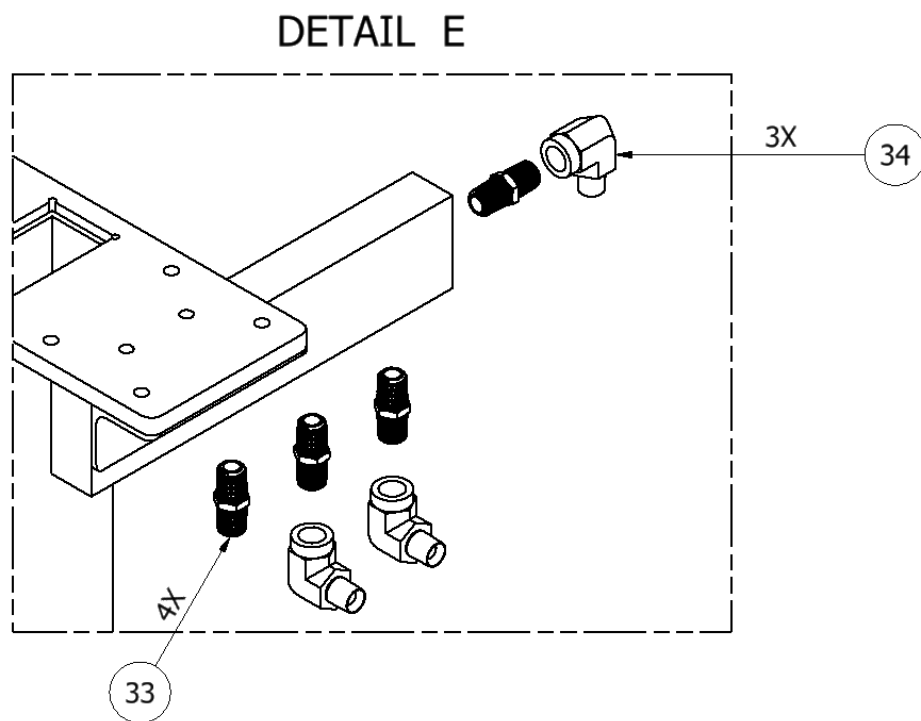
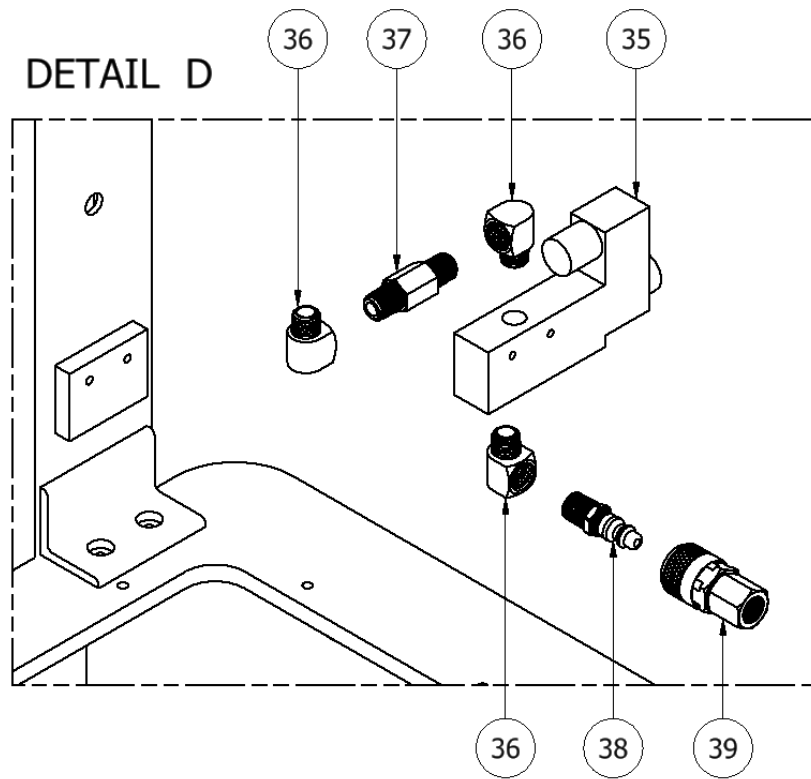


## DETAIL C







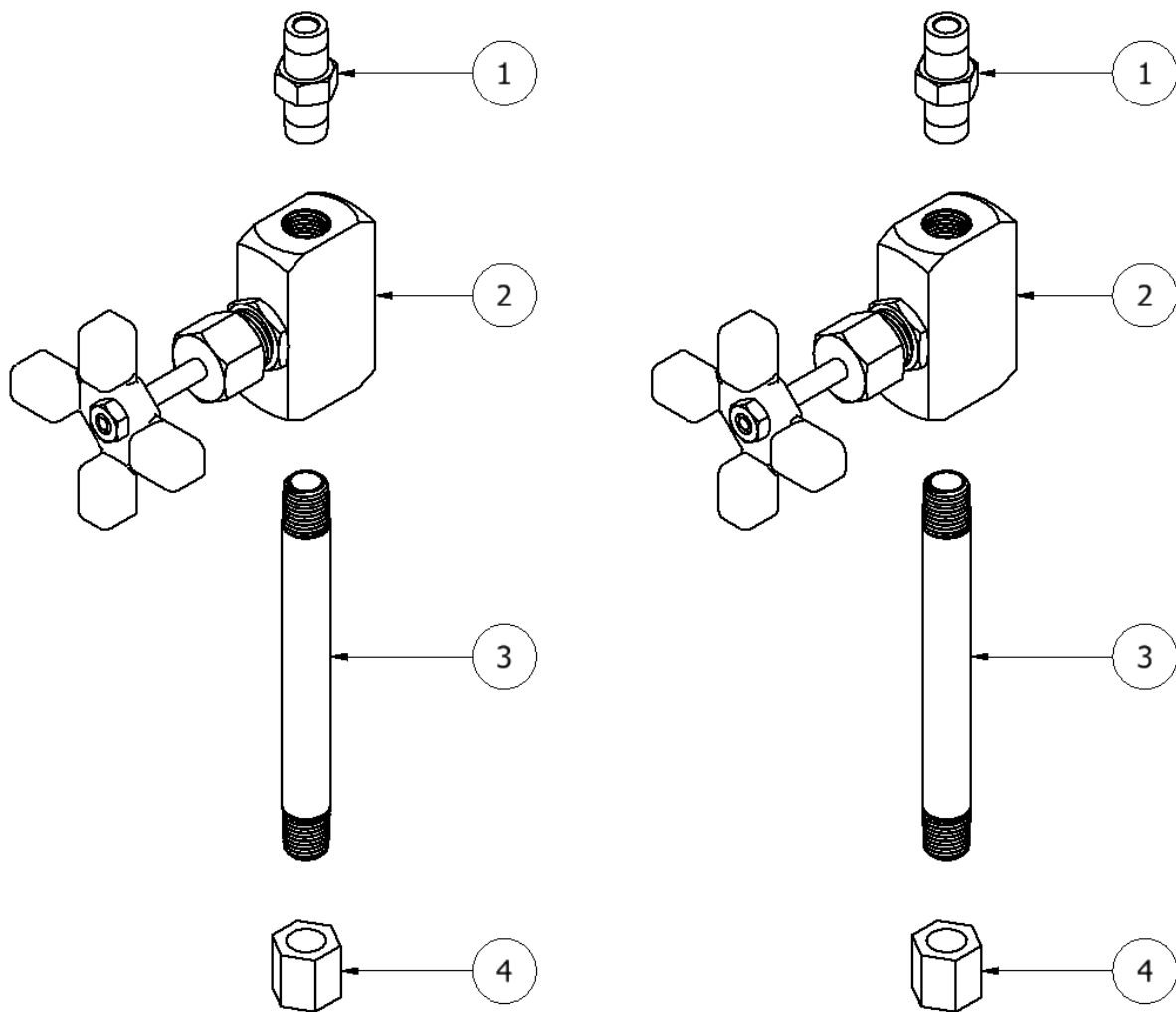


<b>PART LIST</b>			
<b>ITEM</b>	<b>QTY</b>	<b>PART NUMBER</b>	<b>DESCRIPTION</b>
1	1	FR-SUB	FRAME, SUB
2	1	PL-SUB	PUMP LINE ASSEMBLY, 28A/120R
3	2	200231	460V TRANSFORMER
5	1	PH-8-460V	HEATER ASSEMBLY, <b>R-SIDE</b> , 460V
	1	PH-7-460V	HEATER ASSEMBLY, <b>A-SIDE</b> , 460V
7	1	200422	HEATER COVER; BACK RIGHT, SUB ( <b>R-SIDE</b> )
	1	200421	HEATER COVER; BACK LEFT, SUB ( <b>A-SIDE</b> )
8	1	CL-02002-06A	HEATER COVER; FRONT RIGHT ( <b>R-SIDE</b> )
	1	CL-02001-06A	HEATER COVER; FRONT LEFT ( <b>A-SIDE</b> )
9	2	CL-02001-07A	HEATER COVER; TOP
11	2	HI-05028	PRESSURE GUAGE 0-3000 PSI
12	2	RM-05700-25	TRANSFORMER COVER; SIDES
13	2	EL-00118A-00-1	HOSE BREAKER MOUNTING PLATE
14	2	EL-150	CIRCUIT BRAKER, 63AMP
15	2	EL-000P7	HAYCO SR
16	4	EL-000P12	HAYCO #6
17	2	EL-192	TERMINAL BLOCK
18	2	EL-193	INRUSH CURRENT LIMITER
19	1	EL-05235	THERMOCOUPLE HARNESS; 24" ( <b>R SIDE</b> )
	1	EL-05236	THERMOCOUPLE HARNESS; 24" ( <b>A-SIDE</b> )
20	4	KT-00029A-1	HOSE HEAT; CONNECTOR BODY
21	2	EL-134	LIGHT SWITCH
22	2	EL-132-W	LIGHT UNIT; WHT; 220VAC
23	2	EL-37	TRANSFORMER; SIGNAL
24	2	EL-35-2	RELAY BRACKET
25	2	EL-35	HOSE HEAT RELAY
26	2	EL-35-1	HEAT SINK
27	2	RM-05700-26	TRANSFORMER COVER; TOP
28	8	EL-05700-27	TRANSFORMER KNOB
29	1	200337	CONSOL ASSEMBLY
30	1	RM-05201-2	CONSOLE ENCLOSURE; TOP
31	2	EL-05220-01	CONSOLE KNOBS
32	2	EL-05230-02	STRAIGHT CONDUIT CONNECTOR
33	4	RM-PAR216P4	PARKER BRASS NIPPLE
34	3	HI-05030	1/4 MNPT X 1/4 FNPT STREET ELBOW
35	1	NE-00009	SOLENOID VALVE, 3-WAY
36	3	HI-05083	NIPPLE, 1/4" X 2 BRASS
37	1	HI-05084	ELBOW, 1/4" BRASS
38	1	PU-04000-83	MALE PLUG COUPLER
39	1	RM-PAR-25C	PARKER QUICK COUPLING

<b>PART LIST</b>			
<b>ITEM</b>	<b>QTY</b>	<b>PART NUMBER</b>	<b>DESCRIPTION</b>
40	1	EL-05230-03	RT ANGLE CONDUIT CONNNECTOR
41	1	RM-230	MOUNTED PROXIMITY SWITCH ASSEMBLY
42	2	HI-05046-1	MANIFOLD FOR GAUGE, 1/2
43	2	EL-42-400	PRESSURE SWITCH
44	2	HI-05035	1/2 NPT FLUSH PIPE PLUG
45	1	ML-4	MOTOR LINE ASSEMBLY
46	2	RM-05700-15	MOTOR MOUNT BARS
47	1	HI-00014-03A	TANK TOP GASKET
48	1	HI-00047A	HYDRAULIC FILL STRAINER
49	1	HI-00002-A-1	MODIFIED GROMMET, 3/4"
50	1	HI-00001A	SIGHT GUAGE
51	1	HI-05041	CASE DRAIN RETURN TUBE ASY-3/8
52	1	HI-05042	CASE DRAIN RETURN TUBE ASY-1/2
53	1	HI-05048	DRAIN PLUG
54	1	KT-05005A-SUB	INLET MONITORING ASSY, A-SIDE, SUB
55	1	KT-05005B-SUB	INLET MONITORING ASSY, R-SIDE, SUB
56	1	AD-00	AIR DRYER KIT
57	1	YS-1	Y-STRAINER ASSEMBLY "A" SIDE
58	1	YS-3	R Y-STRAINER 1"
59	2	EL-42-2200	PRESSURE SWITCH
60	1	200428	TRANSFORMER COVER, REAR, SUB
61	2	KT-05026	NEEDLE VALVE BLEED KIT
62	4	EL-00052	SOLENOID VALVE CONNECTOR
63	4	EL-00053	SOLENOID VALVE GASKET

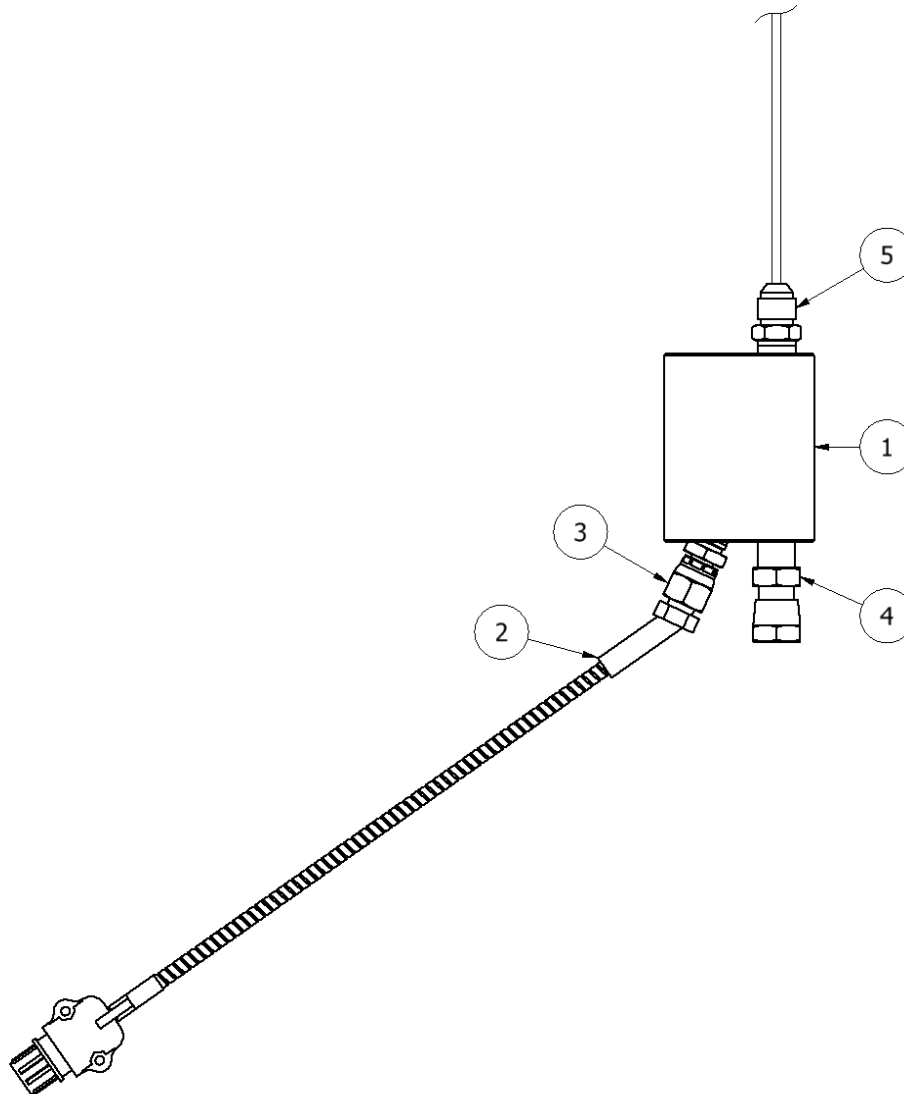
## Needle Valve Bleed Kit

(KT-05026)



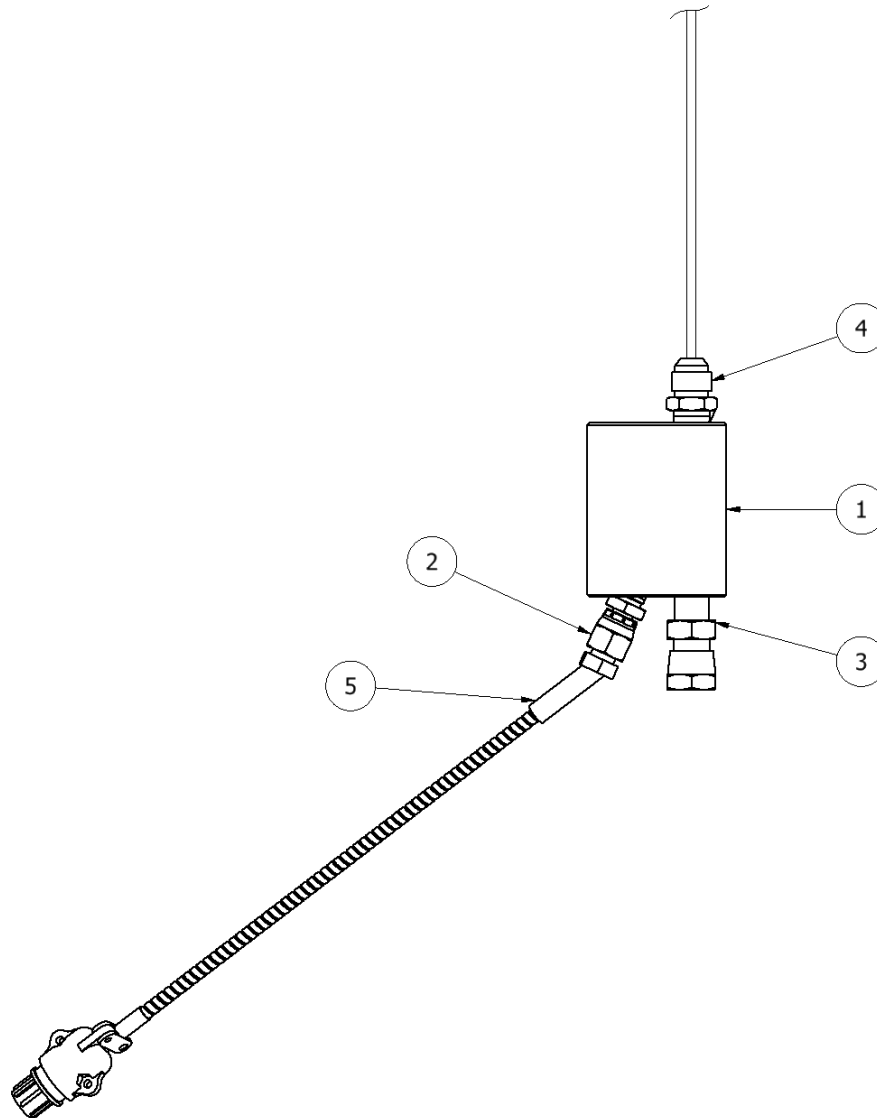
PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	GP-00100-1	1/4 PIPE NIPPLE
2	1	HI-05075	1/4 NEEDLE VALVE
3	1	HI-05077	1/4 NPT 5.0
4	1	HI-05076	1/4 NPT CAP

**Temperature Sensing Unit (TSU), "A" Side**  
**(EL-51A-SUB)**



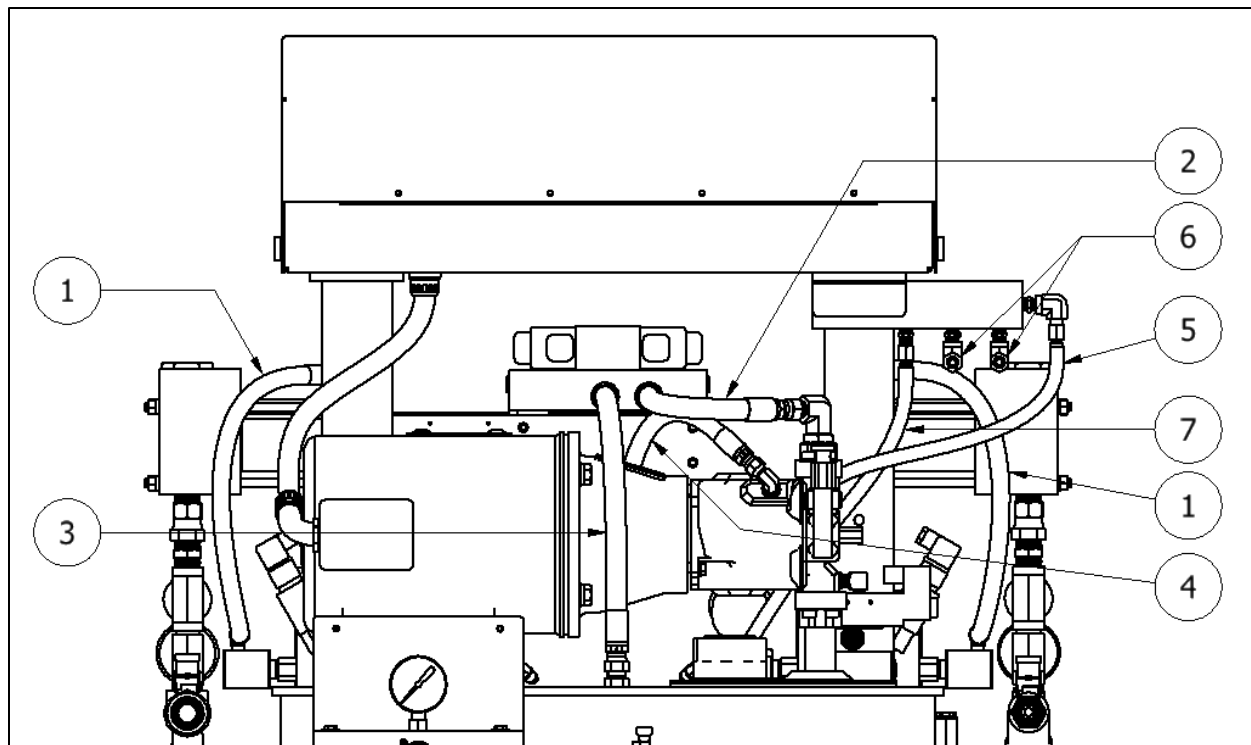
PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	EL-56	THERMOCOUPLE BLOCK
2	1	EL-51A-2	FLEX THERMOCOUPLE
3	1	EL-00051A-3	1/8 X #4 JIC FEM SWIVEL FTG
4	1	EL-00051A-7	1/4 X #5 JIC FEMALE SWIVEL FTG
5	1	EL-00051A-4	1/4 X #5 JIC MALE FTG

**Temperature Sensing Unit (TSU), R-Side**  
**(EL-51R-SUB)**



PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	EL-56	THERMOCOUPLE BLOCK
2	1	EL-00051A-3	1/8 X #4 JIC FEM SWIVEL FTG
3	1	EL-00051A-5	1/4 X #6 JIC FEMALE SWIVEL FTG
4	1	EL-00051A-6	1/4 X #6 JIC MALE FTG
5	1	EL-51A-3	FLEX THERMOCOUPLE

## Hoses



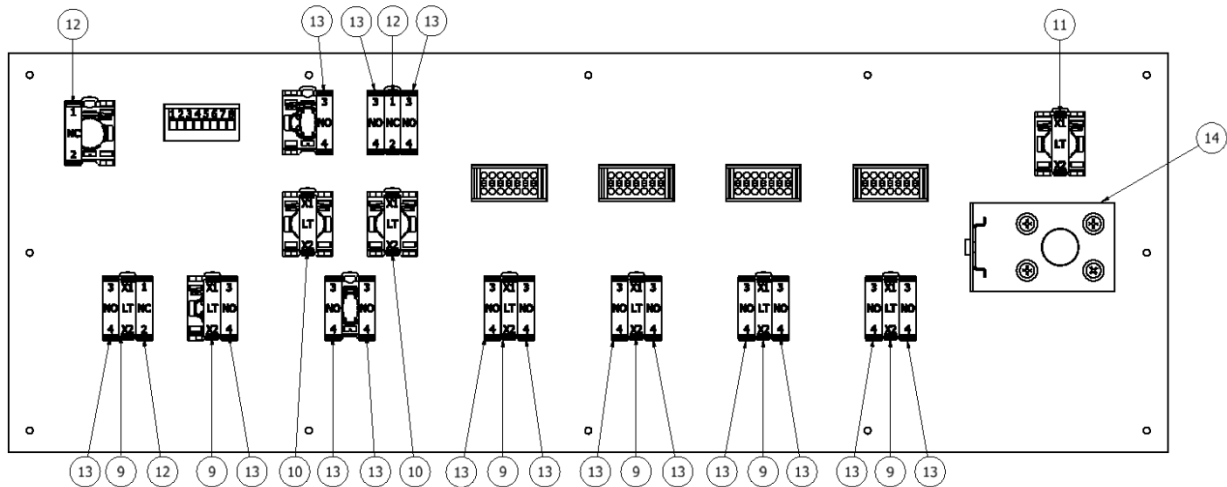
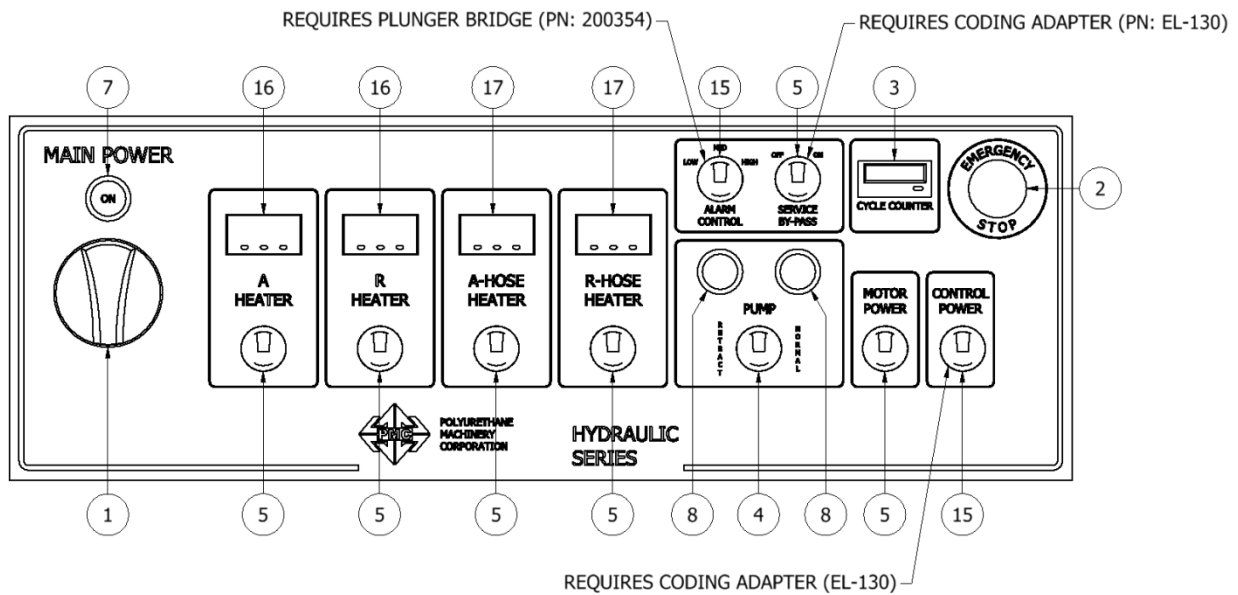
PART LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	HI-05047	PUMP TO HEATER HOSE
2	1	HI-05014	HYDRAULIC PUMP OUTPUT HOSE 1/2
3	1	HI-05013	HYDRAULIC PUMP RETURN HOSE 1/2
4	1	HI-00052A	HYDRAULIC PUMP DRAIN HOSE 3/8
5	1	200429	AIR HOSE, SOLENOID TO MANIFOLD, SUB
6	2	MA-00043A	10' AIR HOSE ASSEMBLY
7	1	200430	AIR HOSE, MANIFOLD TO HEATED HOSE, SUB



## ELECTRICAL CONSOLE

### Face Plate

(200339)

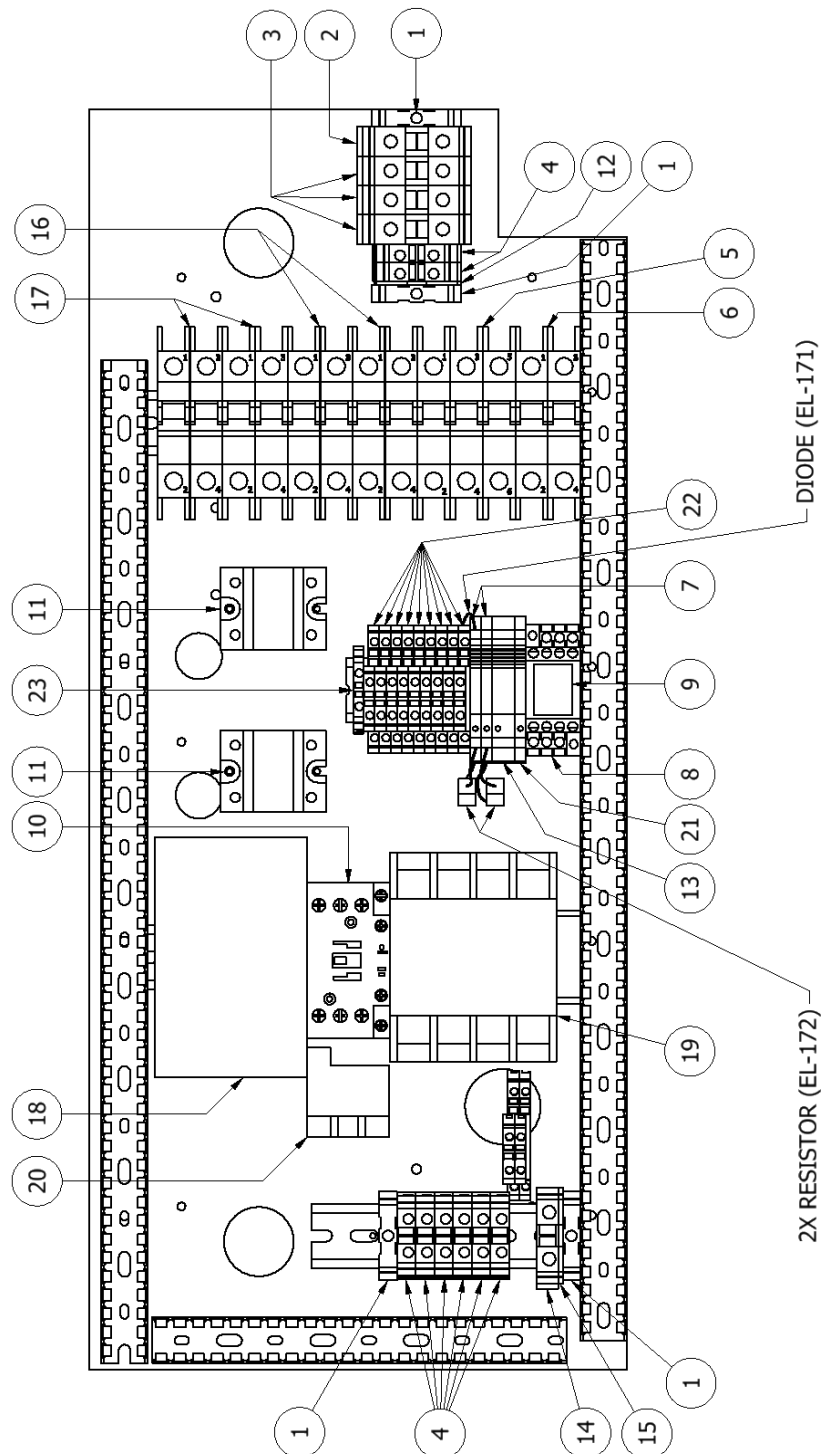


<b>PART LIST</b>			
<b>ITEM</b>	<b>QTY</b>	<b>PART NUMBER</b>	<b>DESCRIPTION</b>
1	1	EL-105	SELECTOR HANDLE; RED
2	1	EL-107	E-STOP PUSH-TWIST
3	1	EL-124	TOTALIZER; BATT OP
4	1	EL-128-W	SELECTION SW; 3 POS; WHT
5	6	EL-129-R	SELECTOR SWITCH; RED
6	3	EL-134	LIGHT SWITCH
7	1	EL-135	GREEN LENS; "ON"
8	2	EL-138	AMBER LENS; LEFT ARROW
9	6	EL-131-R	LIGHT UNIT; RED; 24VDC
10	2	EL-131-W	LIGHT UNIT; WHT; 24VDC
11	1	EL-131-G	GREEN LIGHT UNIT
12	3	EL-133-NC	CONTACT BLOCK; NC
13	15	EL-133-NO	CONTACT BLOCK; NO
14*	1	200351	BRACKET, ROTARY DISCONNECT, 480V
15	2	EL-128-R	SELECTION SW; 3 POS; RED
16	2	200411	HEATER CONTROLLER, PREHEATER, 460V
17	2	200412	HEATER CONTROLLER, HOSE, 460V

\*Note: Rotary Disconnect (Part Number: **200342**) is not included in the Face Plate assembly.

## Bottom Plate

(200338)



<b>PART LIST</b>			
<b>ITEM</b>	<b>QTY</b>	<b>PART NUMBER</b>	<b>DESCRIPTION</b>
1	5	EL-152	END STOP; 35MM
2	1	EL-146	TERMINAL BLOCK; 16MM, GRND
3	3	EL-143	TERMINAL BLOCK; 16MM
4	8	EL-141	TERMINAL BLOCK; 10.2MM
5	1	EL-176	CIRCUIT BREAKER, 15A, 3 POLE
6	1	EL-112	CIRCUIT BREAKER, 3A, 2 POLE
7	1	EL-160	SS RELAY, 24VDC, 2A
8	1	EL-155	RELAY SOCKET
9	1	EL-154	LATCHING RELAY; 24V
10	1	200345	CONTACTOR; 32A; 24VDC COIL
11	2	EL-35	HOSE HEAT RELAY
12	1	EL-156-10	TERMINAL COVER; 10MM/5.2MM
13	1	EL-174	SS RELAY, 24VDC
14	1	EL-145	12MM GROUND BLOCK 15-4 AWG
15	1	EL-156	END COVERS; 12MM TERM BLOCKS
16	2	EL-177	CIRCUIT BREAKER, 40A, 2 POLE
17	2	EL-109	CIRCUIT BREAKER, 25A, 2 POLE
18	1	200343	POWER SUPPLY, 460V
19	1	200344	CONTACTOR, HEATER, 460V
20	1	200346	OVERLOAD, 460V
21	1	EL-198	RELAY, SPDT, 24VDC
22	11	200424	TERMINAL BLOCK, DOUBLE
23	1	EL-144	TERMINAL BLOCK, 5.2MM, GRND

## Electrical Schematics

