

SIEMENS

PolyBlend PB200-0.4

02/07

Siemens Water Technologies Corp.

PO Box 389

Bradley, IL 60915

(815) 932-8154 Phone

(815) 932-0674 Fax

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PolyBlend

Model #PB200-0.4

INSTALLATION, OPERATION, AND MAINTENANCE INFORMATION

CONTENTS

Overview	Warranty
Installation	Appendixes
Operation	Drawings
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**READ THIS MANUAL BEFORE YOU
INSTALL, OPERATE, OR SERVICE THIS
UNIT.**

OVERVIEW

SAFETY PRECAUTIONS

Ensure that the control panel is grounded to avoid possible electrical shock or damage to equipment.

Before servicing, turn off all power and assure power "lockout" to avoid possible electric shock.

Disconnect external power to the control panel before removing or replacing fuses.

SPECIFICATIONS

Pump	Diaphragm
Inlet	1/2" FPT, Water Supply
	5/8" Hose Barb, Polymer Supply
Outlet	3/4" FPT, Solution Discharge
Water Capacity	100 GPH Primary
	100 GPH Post Dilution
Polymer Capacity	0.4 GPH
Pressure Rating	100 PSI
Electrical Supply	120/1/60, 6 Amps
Dimensions	23" H x 12" W x 16" D
Weight	65 lbs.
Motor(s)	(1) 1/6 HP, 120VAC, 3.6 AMPS

INSTALLATION

LOCATION

Select a location that provides:

- Electrical Supply
- Potable Water (Clean)
- Proximity to the Point of Use
- Easy Handling and Storage of Polymer
- Access to Unit
- Protection Against Severe Weather

UNPACKING

Examine package contents for damage. Report any to freight forwarder. Check plastic bag(s) for contents against individual packing list(s).

NOTE: Disregard any moisture; this unit was wet tested.

CONNECTIONS

- Use Teflon tape on threads. Use joint compound (pipe dope) in small amounts, if necessary.
- Do not over-tighten fittings.
- Insure that supply water pressure is **less than 100 psi.**
- Install water isolation valve with unions.
- Insure that neat polymer feed line has a **flooded suction.**

NOTE: To enhance performance, reduce the number of piping turns and elevation changes.

STORAGE

Store in atmosphere controlled environment. Protect from extreme temperature (above 110°F, 52°C, below 32°F, 0°C) and wide ambient temperature fluctuations.

Protect from direct weather exposure, i.e., sun, rain, high wind, etc.

OPERATION

GENERAL

This PolyBlend unit will perform the following functions: meter polymer dosage, regulate mixing water, provide uniform dilution and activation, operate on-line continuously, and feed solution to the point of use.

Neat polymer from the metering pump and dilution water controlled by the solenoid valve enter the mixing chamber. Dilution and activation occur, yielding prepared solution ready for use.

Neat polymer dosage rate is adjusted at pump face or at electronic controller (REM-1E, SCR, etc.). Primary dilution (and post dilution) water are controlled by individual flow control valves.

START-UP

- Step 1: Switch pump to external mode at pump face.
- Step 2: Prime polymer pump, using priming kit provided with unit.
- Step 3: Place unit power switch in Off position.
- Step 4: Energize power circuit that feeds unit. Solenoid opens. Allow mixing chamber to fill with water by opening primary dilution water control valve.

NOTE: Do not turn mixer motor on until chamber is filled with water, running dry will damage mechanical seal.

- Step 5: Place unit power switch in On position.
Mixing chamber motor starts.
- Step 6: Access REM-1E controller to turn pump On/Off and for polymer output adjustment. Output can also be adjusted at pump face by varying the stroke length.

NOTE: For optimum pump performance, keep stroke frequency as high as possible. This is done by decreasing the stroke length setting. More stroke repetition with a shorter length is better than fewer strokes with a long stroke length. If stroke length is too short, pump prime may be affected.

- Step 7: Adjust water flow at mixing chamber by turning control valve. (The other control valve should be turned for post-dilution adjustment, if applicable.)

NOTE: Do not run polymer pump unless water flow is established. Polymer alone can plug discharge plumbing

WATER PRESSURE

This unit is equipped with a differential pressure switch. It has been factory set. See Appendix for details.

SOLUTION OUTPUT

Unit output is determined by setting pump stroke length and stroke frequency together with setting dilution water flow. Establish desired solution volume and solution concentration, then proceed.

EXAMPLE: 100 GPH (380 LPH) of .5% polymer solution desired. A 2 GPH (7.6 LPH) diaphragm pump is used.

— Determine neat polymer requirement.

$$(100 \text{ GPH}) \times (.005) = 0.5 \text{ GPH neat polymer}$$
$$(380 \text{ LPH}) \times (.005) = 1.9 \text{ LPH neat polymer}$$

— Determine pump usage.

$$(0.5 \text{ GPH}) \div (2 \text{ GPH}) = 25\% \text{ pump capacity}$$
$$(1.9 \text{ LPH}) \div (7.6 \text{ LPH}) = 25\% \text{ pump capacity}$$

— Set Controls

A 2 GPH (7.6 LPH) pump @ 100% stroke length and 25 strokes per minute will deliver 0.5 GPH (1.9 LPH). However, 2 GPH (7.6 LPH) pump @ 50% stroke length and 50 strokes per minute will also deliver 0.5 GPH (1.9 LPH) with a more homogeneous mix.

NOTE: Do not exceed polymer concentrations of 1% in the PolyBlend.

MAINTENANCE

SHUTDOWNS

If out of service more than one week, flush mixing chamber.

- Turn pump off.
- Place unit power switch in On position to establish water flow for five minutes.

If out of service for more than two weeks, flush pump and mixing chamber.

- Connect pump suction to a container of mineral oil (not water).
- Place unit power switch in On position to establish water flow.
- Turn pump on and run for three minutes.
- Turn pump off.
- Continue water flow for five additional minutes.
- Drain water from chamber and piping to prevent freezing.

MAINTENANCE

1. Clean ancillary water and/or polymer strainers weekly.
2. Flush system monthly following one-week procedure.
3. Refer to the appendix for specific information on drawings, part identification, and components.

SPECIAL TOOLS

No special tools needed for operation, maintenance, and repair of components.

LUBRICATION

No lubrication is required.

PREDICTED LIFE SPAN

There is no predicted life span of wear parts as each application and operation varies.

OPERATING PROCEDURES

For normal operation, once settings are adjusted based on operation parameters, the system can simply be turned ON or OFF. Special operating instructions for Seasonal operation do not apply.

EMERGENCY OPERATING INSTRUCTIONS

Emergency operating instructions do not apply to USFilter Stranco equipment. In case of an emergency, **TURN OFF POWER TO STOP RUNNING.**

DISASSEMBLY, REPAIR, & REASSEMBLY

This equipment is an open-frame design. It allows for easy removal of all components. There are no special procedures for removal of parts. If assistance is required, contact USFilter Stranco Technical Service at 800-882-6466.

RECOMMENDED SPARE PARTS

<u>QTY.</u>	<u>PART #</u>	<u>DESCRIPTION</u>
1	SP-156HV	Pump Liquid End
1	7802910	Chamber Mechanical Seal
1	1450318	Belt, Chamber
1	1414001	Bearing, Chamber Base
1	1410002	Bearing, Chamber Top
1	28930-1	Pump Head

PUMP REPLACEMENT

<u>QTY.</u>	<u>PART #</u>	<u>DESCRIPTION</u>
1	AA771-155PBX	Pump

TO ORDER PARTS

You may order parts by calling, faxing or mailing your order.

Phone 800.882.6466 and ask for PolyBlend Parts.
Hours: 8 a.m. - 5 p.m., Central Time, M - F.
Fax Our fax number is 815.932.5634.
E-mail Our E-mail address is stranco@usfilter.com
Address Siemens Water Technologies Corp.
P.O. Box 389
595 Industrial Drive
Bradley, IL 60915

PB200 TROUBLESHOOTING

Symptom	Possible Cause	Corrective Action
No Water Flow	<ul style="list-style-type: none"> • Closed Valve on Water Supply • Blocked Solenoid Valve • Closed or clogged discharge line • Rate Control Valve Closed 	<ul style="list-style-type: none"> • Make sure valve is open • Dis-assemble and clean valve • Remove any blockages or open any closed valves • Make sure valve is open
Pump won't pump Chemical	<ul style="list-style-type: none"> • Pump is turned OFF • No Water Flow • Blocked Pump Discharge Line • Back Pressure is too high • Not enough water flow 	<ul style="list-style-type: none"> • Make sure pump is in ON position • Make sure all water valves (supply and discharge) are open • Take discharge line apart, check for blockage and clean if necessary • Reduce Back pressure on unit • Increase water flow or adjust water monitoring device (flow switch, DP switch, etc.) setpoint lower than the desired flow rate
Clogged Injection Check Valve	<ul style="list-style-type: none"> • Debris or Clumps in Polymer • Valve is stuck open allowing water into polymer line 	<ul style="list-style-type: none"> • Check polymer supply for contamination • Remove valve from chamber and clean it
Pump won't stop	<ul style="list-style-type: none"> • Water flow is still established • Pump is in internal mode 	<ul style="list-style-type: none"> • Shut off water valve or power to the unit • Switch pump to external

SIEMENS WATER TECHNOLOGIES CORP.
P.O. BOX 389
BRADLEY, IL 60915

TELEPHONE: 815-932-8154
800-882-6466
FACSIMILE: 815-932-0674

PolyBlend® Product Warranty

Siemens Water Technologies Corp. warrants equipment of its manufacture and bearing its trademark to be free of defects in material and workmanship and to materially conform to any applicable specifications and drawings approved in writing by Siemens Water Technologies. If the customer gives Siemens Water Technologies Corp. prompt written notice of a breach of this warranty within twelve (12) months from the date of start-up by an authorized Siemens Water Technologies Corp. technician or eighteen (18) months from the date of shipment, whichever occurs first (the "Warranty Period"), Siemens Water Technologies Corp. will, at its sole option and as the customer's exclusive remedy, either repair or replace free of charge, or refund the purchase price paid with respect to, any material found to be defective during the Warranty Period. No repair or replacement of defective products shall extend the Warranty Period, but any such repaired or replaced product shall be covered by the balance of the original Warranty Period. If Siemens Water Technologies Corp. determines that any claimed breach is not, in fact, covered by this warranty, the customer shall pay Siemens Water Technologies Corp.'s then customary charges for any repair or replacement.

The foregoing warranty is conditioned upon the customer's (i) the customer shall have operated and maintained the equipment in accordance with all instructions provided by Siemens Water Technologies Corp. (ii) the customer shall not have made any unauthorized repairs or alterations; (iii) the customer shall not be in default of any payment obligation to Siemens Water Technologies Corp. (iv) if requested, the customer will deliver the equipment to a Siemens Water Technologies Corp. authorized service center and the customer shall pay all inbound and outbound freight costs; (v) the customer must provide a complete and detailed description of the problem including, without limitation, the Siemens Water Technologies Corp. job number, date of delivery, date of installation, date of start-up and the operating conditions of the unit(s); (vi) return a duly completed Start-Up and Field Test Report to Siemens Water Technologies Corp. within thirty (30) days of start-up; and (vii) for equipment which is destined for extended storage, such equipment must have been stored in accordance with the Storage Requirements

detailed in the operation and maintenance manual (storage of equipment does not extend the Warranty Period).

The foregoing warranty does not extend to, and Siemens Water Technologies Corp. assumes no responsibility for, (i) the installation quality or any service defects resulting therefrom unless a Siemens Water Technologies Corp. representative or designee supervised the installation; (ii) in the event that the unit size and location are predetermined by someone other than Siemens Water Technologies Corp. or our local representative, the serviceability and/or performance of the unit for the specified design and/or actual operating conditions (this exclusion shall not apply if all necessary design information is submitted to and approved in writing by Siemens Water Technologies Corp.); (iii) any auxiliary equipment or accessories supplied by Siemens Water Technologies Corp. but manufactured by others (the original manufacturer's warranty, if any, shall apply to such products); (iv) damage to the equipment or products resulting from normal wear, abuse, neglect or operation in a manner inconsistent with Siemens Water Technologies' recommendations; and (v) damage to equipment or products that have been modified, tampered with or altered without written consent from Siemens Water Technologies.

In addition to the foregoing conditions and limitations, the following product-specific limitations and conditions must be satisfied for the foregoing warranty to apply:

1. This warranty does not cover damage caused by chemical action or abrasive material (including, without limitation, particulates in the makeup water), damage caused by handling or during transportation, or damage arising from misuse, installation or any other cause beyond Siemens Water Technologies' control. Standard units not in outdoor configurations are not warranted in outdoor applications.
2. If a non-potable water source is used as primary or secondary dilution water to the PolyBlend® unit, the warranty period shall not exceed ninety (90) days from the date of shipment.

HydroForce® Product Warranty

The HydroForce® mixing assembly, part of the PolyBlend® product line, is covered for the life of the product by the limited warranty set forth herein, provided that the limited lifetime warranty extends only to the original user of the product.

THE WARRANTIES SET FORTH ABOVE ARE SIEMENS WATER TECHNOLOGIES CORP.'S SOLE AND EXCLUSIVE WARRANTIES. SIEMENS WATER TECHNOLOGIES CORP. MAKES NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED,

INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, ALL WARRANTIES ARISING FROM COURSE OF DEALING AND USAGE OF TRADE AND ALL SUCH EXPRESS OR IMPLIED WARRANTIES ARE HEREBY DISCLAIMED.

THE REMEDIES PROVIDED ABOVE ARE THE CUSTOMER'S SOLE REMEDIES FOR SIEMENS WATER TECHNOLOGIES' FAILURE TO COMPLY WITH ITS OBLIGATIONS. CORRECTION OF ANY NONCONFORMITY IN THE MANNER AND FOR THE PERIOD OF TIME PROVIDED ABOVE SHALL CONSTITUTE COMPLETE FULFILLMENT OF ALL THE WARRANTY LIABILITIES OF SIEMENS WATER TECHNOLOGIES CORP. WHETHER THE CLAIMS OF THE PURCHASER ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE) OR OTHERWISE WITH RESPECT TO OR ARISING OUT OF THE WORK PERFORMED HEREUNDER.

LIMITATION OF LIABILITY:

NOTWITHSTANDING ANYTHING ELSE TO THE CONTRARY, SIEMENS WATER TECHNOLOGIES CORP. AND ITS SUPPLIERS AND ANY AFFILIATED COMPANIES SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, PUNITIVE OR OTHER INDIRECT DAMAGES, AND SIEMENS WATER TECHNOLOGIES' TOTAL LIABILITY ARISING AT ANY TIME FROM THE SALE OR USE OF THE EQUIPMENT SHALL NOT EXCEED THE PURCHASE PRICE PAID FOR THE EQUIPMENT. THESE LIMITATIONS APPLY WHETHER THE LIABILITY IS BASED ON CONTRACT, TORT, STRICT LIABILITY OR ANY OTHER THEORY.

Whether in or out of warranty, a Return Materials Authorization number (RMA) is required and can be obtained by calling our customer service department telephone at 800.882.6466. Have the make, model, and serial number of the item being returned. Reference the RMA number on the outside of the shipping container.

Differential Pressure Switch

Location of Differential Pressure Switch

The high pressure port connects to the inlet manifold between the solenoid valve and the rotameter/rate-adjusting valve. The low pressure port connects to the discharge side of the rotameter.

Function of Differential Pressure Switch

The differential pressure switch ensures sufficient water flow is present before the polymer pump is energized. This integral, automatic safety feature eliminates the problem of overfeeding neat polymer to an application without proper dilution.

In operation, the rate valve is adjusted to produce the desired flow through the system. This causes a pressure drop to occur across the valve which is applied to the differential pressure switch.

If supply pressure decreases enough to affect flow rate or if back pressure between the PolyBlend and the point of solution application increases enough to affect flow rate, the differential pressure across the rotameter and valve decreases. This causes power to be interrupted to the polymer pump and prevents damage to the mixing system caused by extremely high viscosity developing in the mixing chamber.

<p>NOTICE: If system pressure or flow are <u>not adequate</u>, investigate the cause of lack of flow. (For example, inadequately sized piping can produce inadequate flow.) To avoid undesirable water dilution conditions and damage to equipment, do not bypass or adjust the differential pressure switch for a lower pressure/flow setting.</p>
--

Question: *Why doesn't the polymer pump turn off when I turn the water off using the rotameter?*

The differential pressure switch senses flow on either side of a pressure drop. Because the rotameter is the sensing point, the rotameter closing is the only cause of loss of flow that the differential pressure switch cannot see.

Test the differential switch by turning off the source water or the discharge flow. (See step 5 on the next page.)

Differential Pressure Switch

Adjusting the Differential Pressure Switch

Adjust the PolyBlend differential pressure switch only if pressure and flow to the system **are adequate**.

The adjustment logic is the **opposite** of what you might expect. The PolyBlend differential pressure switches have a red light (on the left side) that lights up whenever source water flow is too low and the polymer pump is disabled. The pump stops pumping when the flow is too low. Low flow may be from lack of incoming water or from too much back pressure on the outgoing side.

	Adjustment		System Reaction
1.	Turn the PolyBlend rotameter until water flow is at maximum on the flow gauge.		
2.	Screw in the <i>differential pressure knob</i> until the red alarm light goes on.		Polymer pump is disabled.
3.	Back off the differential pressure knob until the red alarm light goes off.		The pump starts again.
4.	4a. If you want very close control of flow, leave the knob at this setting. <i>At this setting, any loss of flow (as observed by the rotameter) results in the pump being disabled.</i>	4b. If you want to make the system "more forgiving" prior to shutdown, continue to turn the knob another 1-2 turns. <i>The further you turn the knob, the more flow can be lost before the pump is disabled.</i>	Step 4 determines how "forgiving" the system is before it shuts down due to inadequate flow.
5.	To test sensitivity and operation, turn off the water at the source or the solution at the discharge. The float in the flow meter will fall more for the control knob setting described in step 41) than, for 4a (above).		As the source or discharge is turned off, the float in the flow meter falls and the pump is disabled.
6.	Set the rotameter for the desired flow.		Retest (as in step 5).

REM-1E Digital Display Pump Controller

Product Sheet

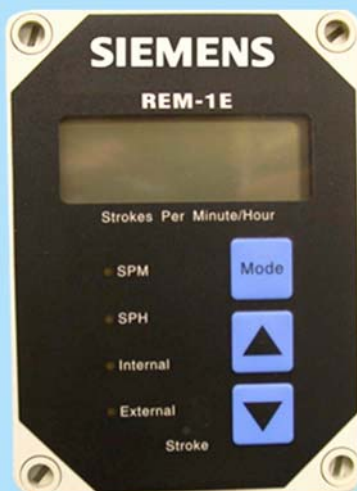
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The REM-1E Digital Display Controller serves as either a pump remote control station or a proportional pump controller (4-20 mA input) or both. The REM-1E can be used to vary the output of any Liquid Metronics (LMI) Series AA7, A7, B7, or C7 metering pump when those pumps are placed in the external mode. This is truly a "plug-n-play" accessory. A simple connection of 4-conductor cable from the control unit to the external input jack of the LMI pump is all that is required for start-up. Power is supplied by a 15 VDC source from the LMI pump through the 4-conductor cable.

The controller output, in the form of contact closures of 80 ms duration, triggers the LMI pump. In the internal mode, output is 0-100 strokes-per-hour (sph) or 0-100 strokes-per-minute (spm). A touch of the pressure-sensitive keys varies the

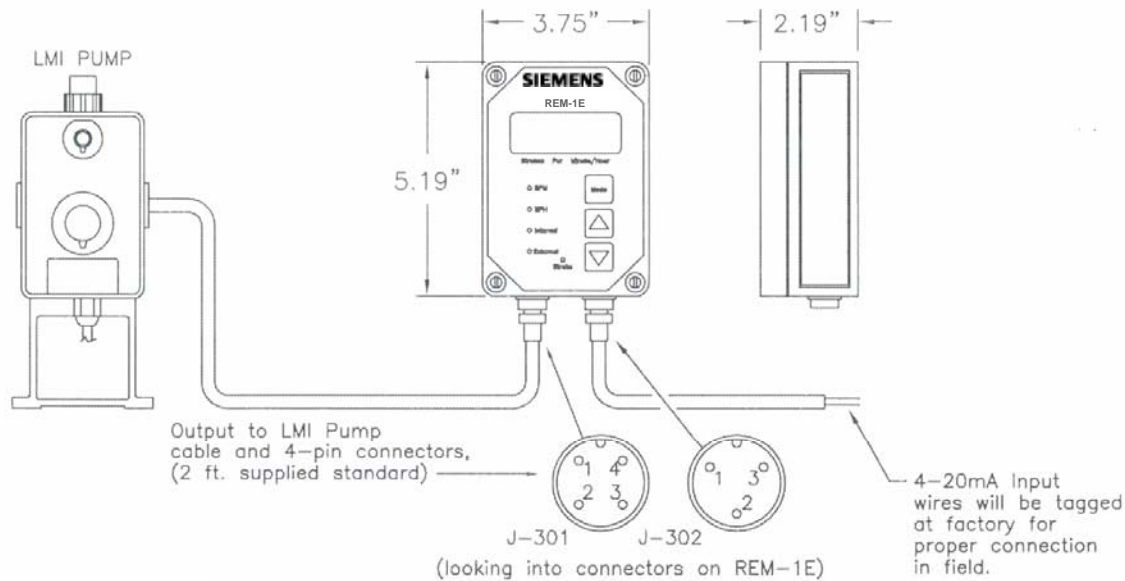
output, which is displayed in large, easy-to-read LCD digital format. Changes left for longer than 5 seconds are saved in non-volatile memory. In the external mode, output is from 0-100 sph or 0-100 spm directly proportional to the 4-20 mA analog input signal. Ten feet of 3-conductor cable and connectors are supplied as standard for the 4-20 mA application. Zero and span adjustments may be done through the outside keys of the controller.

In the "OFF" position, the 15 VDC power source will be present, but the controller output will be zero. The display will read OFF. The rugged, polycarbonate NEMA 4X enclosure is easily wall-mounted near the associated pump, or can be remotely located, using standard cable/connector sets available from Siemens.



The REM-1E Digital Display Pump Controller Offers:

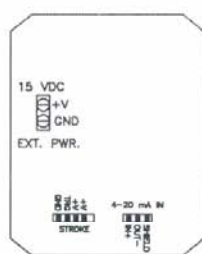
- Accurate Solid-State Microprocessor Core Technology
- Easy to Program Push-Button Control
- Multiple Control Options
- Durable, NEMA 4X Enclosure



PART NOS.

RM1974183	CABLE
2723001	3 PIN CONNECTOR
25643	4 PIN CONNECTOR

NOTE: J-301 PIN NUMBERS CORRESPOND TO IDENTICAL PIN NUMBERS ON LMI PUMP REMOTE SIGNAL INPUT CONNECTORS.



CONNECTIONS INSIDE REM-1D

+V	WHITE
GND	BLACK
TRIG	GREEN
+V	RED
OUT	BLACK
SHIELD	GREEN
4-20 IN	RED

J-301, J-302 CONNECTORS

J-301, Pin #1
J-301, Pin #3
J-301, Pin #2
J-301, Pin #4
J-302, Pin #2
J-302, Pin #1
J-302, Pin #3

CABLE CONNECTIONS

RED	Future Use	4-Pin Connector J-301
WHITE	Power - (Common)	
GREEN	Pump Trigger (+15VDC)	
BLACK	Power + (+15VDC)	
BLACK	Signal Common	3-Pin Connector J-302 External Control 4-20mAADC 220Ω Input Impedance
WHITE	Shield (mech. ground)	
RED	4-20 mA Signal	

ZERO AND SPAN ADJUSTMENTS

1. Press MODE key to enter the off mode.
2. Pump output will stop. With OFF shown in the display, press and hold the MODE button until the display shows 'SPn'.
3. After three seconds, the upper span limit will be displayed. The default is 100 SPM, (and the maximum allowed if connected to an LMI metering pump).
4. Increase or decrease the upper limit by using the arrow keys.
5. Press MODE to accept the new value and advance to the minimum span limit adjustment.
6. The minimum span limit and default is 0. Use the arrow keys to change the lower span limit.
7. Then press MODE to continue to the CAL section and follow instructions at right starting at #3, or press MODE twice to return to the OFF mode.

CALIBRATION

1. From the OFF mode press and hold the MODE button until the display changes to 'SPn', then to the upper span limit.
2. Press MODE twice until the display shows CAL.
3. Press one of the arrow keys ▲ or ▼ (pressing MODE will skip the CAL sequence).
4. Display shows C4. (Calibration - 4mA)
5. Adjust input to a stable 4.00 mA signal for at least 10 seconds, then push both arrow ▲ ▼ buttons. 'ERR' means input is not near 4mA.
6. Display will change to C20.
7. Adjust input to 20.00 mA signal for at least 10 seconds, then push both arrow ▲ ▼ buttons.
8. After the calibration sequence is completed (or skipped), the display on the REM-1E will return to OFF.

* NOTE: GASKET KIT P/N K7809901 AVAILABLE FOR PANEL MOUNTING.

The information provided in this brochure contains merely general descriptions or characteristics of performance which in case of actual use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in terms of the contract.

Siemens
Water Technologies
595 Industrial Drive
Bradley, IL 60915, USA
www.usfilter.com
stranco.water@siemens.com

Literature No. ST-REM1E-DS-0606
815.929.4101 tel.
Bradley, IL 60915
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DIAPHRAGM PUMP INFORMATION

WARNING: ALWAYS wear protective clothing, face shield, safety glasses and gloves when working near or performing and maintenance or replacement on your pump. See MSDS Sheet from polymer supplier for additional precautions.

OUTPUT ADJUSTMENT CONTROLS

In most external controlled pumps the uppermost knob serves as speed control. Graduations for the Speed Knob appear directly on the face of the control panel. The largest knob below is Stroke Control.

1. Speed adjustment: Speed control provides adjustment of the percent of maximum strokes per minute. Turning this clockwise increase stroke frequency. **Note AA7 Series Only:** When operating pump in the external mode, the speed control knob should be fully turned counter clockwise. A click indicates pump is in external mode.

2. Stroke Adjustment; Stroke control provides adjustment of percent of maximum Liquifram (diaphragm) travel. Turning this knob counterclockwise increases percent output per stroke. Only adjust while pump is running.

PRIMING THE PUMP

Hold tip of syringe firmly in fitting with one hand while using the other hand to pull back on plunger. Repeat until a small amount of polymer is drawn into the syringe. The pump is now primed.

PUMP CALIBRATION

Perform calibration if your system application requires it. Normally calibration is NOT required.

You will need:

- A watch
- A calculator
- Calibrated cylinder (with at least 1000 ml capacity).

- Length of hose or tubing (same I.D. as pump ports)

1. Maintain all usual connections to the PolyBlend unit except disconnect the polymer suction line at pump input. The flow meter and pump setting should be those used for normal service.

2. Connect hose or tubing to the pump input. Place the free end of the tubing in the graduated cylinder.

3. Fill the cylinder with polymer to its measured capacity (for example, 1000 ml etc.).

4. Turn on the metering pump. Allow the pump to run until all air has been exhausted from the tubing and pump and polymer is injected into the mixing chamber.

5. Stop the pump.

6. Refill the cylinder to the measured capacity.

7. Start the pump again, and start timing as the pump runs. For best results, let the pump run long enough to pump at least half of the polymer out of the graduated cylinder. (in general, the longer the calibration period, the greater the accuracy of the measurement).

8. Stop the pump. Record the time and level of the polymer remaining in the cylinder. Fill in the following equation to find the volume of polymer pumped per one unit of time (a minute, an hour, or a day).

$$\frac{\text{Starting ml} - \text{Remaining ml}}{\text{Calibration period}} = \text{ml/Time}$$

9. Compare the actual volume pumped to the desired volume, and adjust pump controls.

10. Check volume again to confirm the new settings.

PRESSURE CONTROL (B and C series only)

A capped potentiometer is located on the face plate of the diaphragm pump. This potentiometer is for pressure control or power to the pump solenoid. Since the PolyBlend unit is equipped with a 20 PSI backpressure/check valve, the potentiometer should be set for full power or full clockwise.

NOTE: This is preset at the factory. In a case where obvious over-pumping is present, this potentiometer may be adjusted counter-clockwise.

Liquifram (Diaphragm) Replacement

When replacing the Liquifram, valve balls, seal rings and the injection check valve spring should also be replaced.

1. Carefully depressurize, drain and disconnect the pump discharge and suction lines. Place the suction tubing into a container of mineral oil. Turn the pump on to flush the head assembly. Once the pump head has been flushed, lift the suction tubing out of the mineral oil and continue to pump air into the pump head until the pump head is purged.

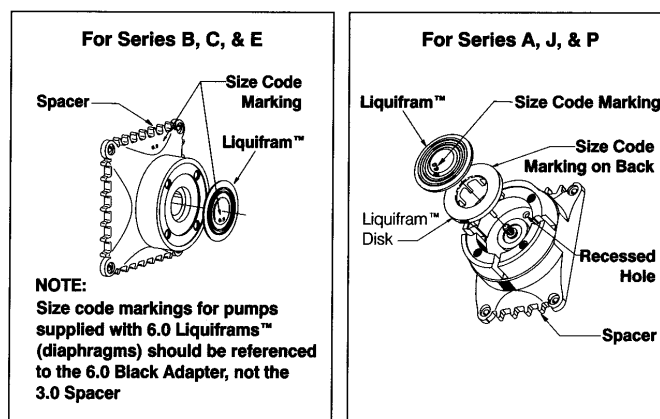
2. Start the pump. While running, set the stroke knob to zero and turn the pump off.

NOTE: See section on proper zeroing.

3. With the unit off, unscrew the Liquifram by carefully grasping the outer edge of the Liquifram and turning it counter clockwise. Discard old Liquifram disk if so equipped (locate behind the Liquifram) and check that the size code matches the size code on the replacement Liquifram (see illustration).

4. Reinstall the disk so alignment pin on the disk (if present) seats in the recessed hole in the EPU.

WARNING: Take care not to scratch the Teflon face of the new Liquifram.

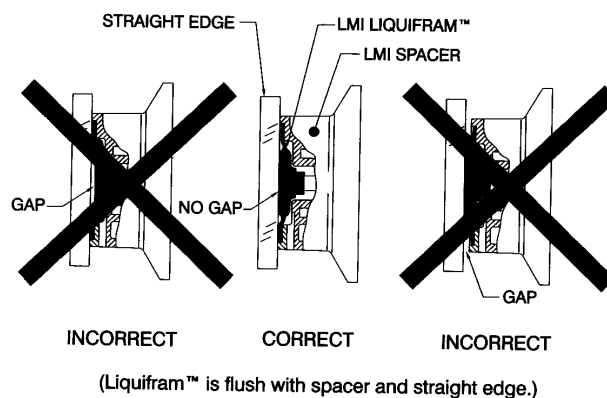


5. Start the pump and turn the stroke knob to the setting indicated on the Stroke Setting Chart which matches the pump model number located on the pump dataplate. With the pump stoking (running), screw on the new Liquifram clockwise until the center begins to buckle inward. Stop the pump.

Liquifram Stroke Setting Chart

<u>Pump Series</u>	<u>Stroke Knob Settings</u>
A11 AA, B72, C72,	90%
C77	70%

6. Grasp the outer edge of the Liquifram and adjust by screwing it in or out so that the center of the Liquifram is flush with the outside of the spacer edge (see illustration).



7. Once the Liquifram is properly positioned, remount the pump head to the spacer using the four (4) screws. Tighten in a crisscross pattern. After one week of operation, recheck the screws and tighten if necessary.

Seal Ring, Ball and Injection Check Valve Spring Replacement

1. Carefully depressurize, drain and disconnect the discharge and suction lines. Place the suction tubing into a container of mineral oil. Turn the pump on to flush the head assembly. After flushing, lift the suction tubing out of the mineral oil and continue to pump air into the pump head until the pump head is purged. If the liquid cannot be pumped due to Liquifram rupture, with protective gloves, carefully disconnect the tubing and four screws to remove the head. Immerse the head in mineral oil or other neutralizing solution.

IMPORTANT: Before disassembling valves, note the orientation of seal ring and ball. (See illustration).

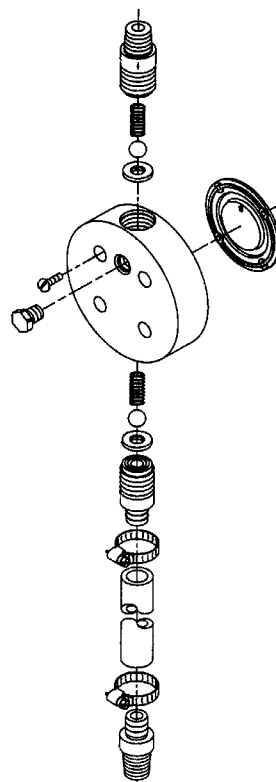
2. Carefully disconnect one tubing connection and fitting at a time and remove the worn seal ring and ball. Carefully loosen sealing by prying side to side using a small screw driver through the center hole of the seal ring.

3. Install new seal ring and ball in each location.

IMPORTANT: Note correct orientation.

4. Install the new spring valve in the Injection Check Valve.

Seal Ring, Ball and Injection Check Valve Spring Replacement



Order of Installation

Check Pump for Proper Zeroing (Stroke Knob)

1. With pump running, turn stroke knob counter clockwise toward zero or end of black or red band.

2. LISTEN to the clicking as the pump is running. The pump should operate quietly at the zero position (no clicking).

3. If the pump continues to click at zero or stops clicking before zero is reached, the pump must be reset.

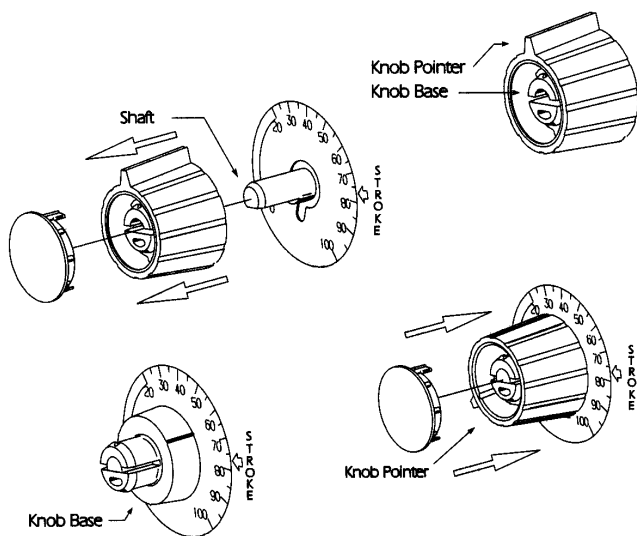
Type I – Push on Knob **Rezeroing and Stroke Knob Disassembly and Assembly**

1. Remove stroke knob from the pump by grasping the knob firmly and pulling it toward you.
2. Pry off the yellow cap.
3. Place the knob on a flat surface.
4. Using needle nose pliers, squeeze the inner section up together while lifting the outer section up.
5. Push the inner section back onto the “D” shaped stroke shaft.
6. With the pump running, zero the pump by turning the inner section of the knob counter clockwise until the pump stops clicking.
7. Position the outer section of the knob so that the pointer aligns with zero on the nameplate or end of the black or red band.
8. Push down on the outer section (a snap sound indicates parts are locked together).
9. Replace the yellow cap over the outer section of the knob, aligning the tabs on the cap with the slots inside the knob.

Type III Collet Knob **Rezeroing and Stroke Knob Disassembly and Assembly**

1. Remove yellow cap.
2. Hold knob with soft jaw pliers.
3. Disconnect knob by loosening 5/16” (8mm) collet nut. There is no need to remove nut.
4. Remove knob by pulling towards you.
5. With pump running, zero the pump using a screwdriver to turn the stroke shaft counter-clockwise until the pump just stops clicking.
6. Pump is now zeroed.
7. Position knob at zero, or the end of the low range band, and tighten 5/16” (8mm) collet nut.
8. Replace yellow cap.

Stroke Knob Assembly (Type I)



MOTOR/GEARMOTOR SAFETY, INSTALLATION, USE, AND MAINTENANCE INFORMATION

Bodine Electric Co., 2500 W. Bradley Pl., Chicago, IL 60618 U.S.A.

Form P/N 074 00045 Printed in U.S.A. (QH)

Congratulations . . . and thanks on your selection of a Bodine Motor/Gearmotor. With your new drive unit you will find yourself enjoying the same high performance and relatively trouble free operation that have been characteristic of Bodine products since 1905. We call it ADE (After Delivery Economies).

The Bodine Electric Company prides itself on the quality of design and manufacture of its products. Great care is taken in an attempt to provide products free of defective design, workmanship, or materials. It will be considered a favor to have cases of unsatisfactory service from Bodine products brought to our attention.

SAFETY

"The use of electric motors and generators, like that of all other utilization of concentrated power, is potentially hazardous. The degree of hazard can be greatly reduced by proper design, selection, installation, and use, but hazards cannot be completely eliminated. The reduction of hazard is the joint responsibility of the user, the manufacturer of the driven or driving equipment, and the manufacturer of the motor or generator."

Bodine products are designed and manufactured to comply to applicable safety standards and in particular to those issued by ANSI (American National Standards Institute), NEMA (National Electrical Manufacturers Association), U.L. (Underwriters Laboratories, Inc.), and CSA (Canadian Standards Association).

Most Bodine products are "third party approved" with respect to construction. Motors and gearmotors having component recognition by U.L. Inc. have a "C" or "UL" symbol in the left-most unlabeled space on the bottom row of their nameplates. Those that are CSA certified have a "CSA" mark in the same location. If you need specific information regarding the "third party approval" of Bodine products, contact your Bodine representative, or the home office.

However, since even well-built apparatus can be installed or operated in a hazardous manner, it is important that safety considerations be observed by the user. With respect to the load and environment, the user must properly *select, install, and use* the apparatus—for guidance on all three aspects see safety standards publication No. ANSI/NEMA MG-2.

■ Standards Publication No. ANSI/NEMA MG-2. "Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators."

Available from:
National Electrical Manufacturers Assoc.
2101 L Street N.W.
Washington, D.C. 20037, U.S.A.

SELECTION

Before proceeding with the installation, the user should review the application to confirm that the proper drive has been selected. This should be done after reading this notice and all applicable safety standards. If in doubt, contact your Bodine Representative or the Home Office if there is no Representative in your area. Any selection or application suggestions made by Bodine are only to assist the customer—and in all cases, determination of fitness for purpose or use is solely the customer's responsibility.

Unless otherwise agreed to by Bodine, all

nameplate ratings are based on the following *normal operating conditions*:

1. Duty—8 hours per day; 5 days per week if nameplated continuous duty (CONT), without frequent reversals or starts and stops. Products intended for intermittent duty show a time rating on the nameplate based on keeping the winding temperature within the maximum allowable temperature of the insulation system when the motor is started with windings within 5°C of the ambient temperature.
2. Ambient temperature 0 to 40°C (104°F).
3. Load—Uniform and free from shock or high inertia.
4. Voltage—Within 10% of nameplate rating.
5. Frequency—Within 5% of nameplate rating.
6. Combined variation of voltage and frequency—Within a total of 10% providing frequency variation does not exceed 5%.

Consult Bodine if variations from the above conditions are contemplated.

INSTALLATION

It is the responsibility of the equipment manufacturer or individual installing the apparatus to take diligent care in installing it. The National Electrical Code (NEC), sound local electrical and safety codes, and when applicable, the Occupational Safety and Health Act (OSHA) should be followed when installing the apparatus to reduce hazards to persons and property.

Inspection

Examine for damage from shipment before connecting. Any claim(s) for shipping damage should be made to the freight carrier. Do not attempt to turn the output shaft of a gearmotor with an externally applied torque arm.

Mounting

Any screws, or similar devices, that penetrate the motor frame either for mounting the Bodine product or mounting something to the product should be limited in length so as not to come in contact with, or in close proximity to, intended features that conduct electricity. Spacings as high as .158" may be required based on voltages and circuitry involved. Consult factory if necessary.

Preferred mounting positions for Bodine products are illustrated in selection literature. Gearmotor mountings other than those shown are not recommended on some gearmotors due to (a) the possibility of gearhead lubricant leakage into the motor portion and (b) possible leakage from gearhead breather and oil level holes. Also, for parallel-shaft gearmotors, the proper lubricant quantity provided for horizontal mounting is not sufficient for vertical mounting. By making the proper adjustments (normally done at the factory), mountings other than the preferred positions of gearmotors are possible.

Connection

Follow nameplate for voltage, frequency, and phase of power supply. See accompanying wiring diagram as to connections for rotation (and capacitor, resistor, relay, protector, if required). *When connecting, make sure that your motor/gearmotor is securely and adequately grounded—failure to ground properly may cause serious injury to personnel.* (If wiring diagram shipped with drive unit becomes lost or missing, contact Bodine, providing serial number (NO) and (TYPE) information shown on the nameplate of the unit).

Wiring

For wire sizes and electrical connections refer to the National Electric Code (NEC)—Article 430—"Motors, Motor Circuits, and Controllers" and/or applicable local area codes. If extension cords are used, they should be kept short for minimum voltage drop. Long or inadequately sized cords can cause motor failure, particularly with hard starting loads when current draw tends to be at its highest.

USE

Additional Safety Considerations

The chance of electric shocks, fires, or explosions can be reduced by giving proper consideration to the use of grounding, thermal and over current protection, type of enclosure, and good maintenance procedures.

The following information *supplements* the foregoing safety considerations: This information is not purporting to be all-inclusive and the aforementioned references should be consulted.

1. Do not insert objects into the ventilation openings of products.
2. Sparking of starting switches in AC motors so equipped, and of brushes in commutator type motors, can be expected during normal operation. In addition, open-type enclosures may eject flame in the event of an insulation failure. Therefore, avoid, protect from, or prevent the presence of flammable or combustible materials in the area of motors/gearmotors.
3. Bodine totally enclosed products are not explosion proof or dust ignition proof nor does Bodine offer such products for hazardous locations (flammable/explosive gas, vapor, dust). When dealing with hazardous locations, an *approved* explosion proof or dust ignition proof product is the recommended approach. Exceptions are allowed by the National Electrical Code: The NEC and the NEMA safety standard should be studied thoroughly before exercising this option.
4. Open, ventilated motors are suitable for clean, dry locations where cooling air is not restricted. Enclosed motors/gearmotors are suitable for dirty, damp locations. For outdoor use, wash downs, etc., enclosed motors must be protected by a cover while still allowing adequate air flow.
5. Moisture will increase the electrical shock hazard of electrical insulation. Therefore, consideration should be given to the avoidance of (or protection from) liquids in the area of motors. Use of totally enclosed motors/gearmotors will reduce the hazard if all openings are sealed.
6. Products equipped with thermal protectors are labeled "THERMALLY PROTECTED." If severe over-loading, jamming, or other abnormal operating conditions occur, such heat sensitive protectors operate to open the electric power supply circuit. Motors/gearmotors with "automatic" thermal protectors **MUST NOT** be used where automatic restarting of the drive unit could be hazardous in that clothing or parts of the human body could be in electrical or physical contact with a machine that *starts unexpectedly* when the thermal protector cools down. **MANUAL RESET** protectors or suitable electric supply disconnect devices/procedures should be used where such hazards could be created.

7. The windings of DC stepper motors, or their switching transistors, must be disconnected from the DC power source to avoid unexpected motion. If not, extraneous signals could turn on the power transistors and generate motion.
8. Some oil-type capacitors contain a non-PCB impregnate which is *flammable*. Such capacitors are identified by means of a Warning Label and, in addition, are stamped "NON-PCB." The user has to provide at least .57 in. (14.5mm) clearance beyond the terminal blades for case expansion to allow an internal safety switch to *permanently* open and electrically disconnect the capacitor. The internal pressure sensitive switch is designed to prevent the expulsion of the flammable dielectric medium if excessive temperatures are generated by electrical operation. Do not discard such capacitors into open fire as excessive external heat could cause them to explode.
9. Motors/gearmotors which employ capacitors, can develop more than nameplate voltage across the capacitor and/or capacitor winding (depending on design). Also, overdrive voltages may be many times greater than a stepper motor's continuous voltage rating. Suitable precautions should be taken when applying such motors.
10. Abnormal conditions such as cut-out switch failure, or a partial winding failure can very occasionally cause some AC motors/gearmotors to start in a direction reverse from normal. Also, use a capacitance or resistance value other than that recommended for Hy-Sync™ motors may result in unpredictable reverse operation. Susceptibility to unplanned reversing under such conditions is greatest when the motor's actual load is light relative to it's rated load. One-way clutches or similar devices are advisable if unexpected reverse rotation is unsafe in the application.
11. Do not rely upon self-locking gears or permanent magnet, stepper, Hy-Sync™, or energized motors to hold a load in place if movement could result in personal injury. Mechanical locking devices should be used in such applications.
12. For motors driven by electronic controls, do not use a function of the control for safety interlock purposes. An independent switch or relay should be used. On stepper motors, the device should be between the control and the motor.

Before Starting

1. Before attempting to start, check all connections and fuses.
2. Proper consideration should be given to rotating members: Before starting, be sure keys, pulleys, etc. are securely fastened. *Proper guards should be provided to prevent hazards to personnel while rotating.*
3. Other mechanical considerations include proper mounting and alignment of products and safe loads on shafting and gearing.

Starting

1. The motor/gearmotor should be test-started in an unloaded state (because of possible reaction torque, the drive should be securely mounted when starting—even when unloaded).
2. If the drive unit does not start promptly and run smoothly, disconnect at once.
3. If unable to correct the problem, contact your purchase source, or a Bodine Authorized Service Center, describing the trouble in detail. Include the serial number, type, and other nameplate data. Do not dismantle the product—unless authorized by Bodine, removing screws voids the warranty.

MAINTENANCE

IMPORTANT—Before servicing or working on equipment, disconnect power source (this applies especially to equipment using automatic restart devices instead of manual restart devices and when examining or replacing brushes

on brush-type motors/gearmotors).

Clean regularly to prevent dirt and dust from interfering with ventilation or clogging moving parts.

Brush Type Motors/Gearmotors—The wear rate of brushes is dependent upon many parameters (armature speed, amperage duty cycle, humidity, etc.). For optimum performance, brush-type motors and gearmotors need periodic user-maintenance. The maintenance interval is best determined by the user. Inspect brushes regularly for wear (replace in same axial position). Replace brushes when their length is less than ¼ inch (7mm). Periodically remove carbon dust from commutator and inside the motor—this can be accomplished by occasionally wiping them with a clean, dry, non-linting cloth. Do not use lubricants or solvents on the commutator. If necessary, use No. 0000 or finer sandpaper only to dress the commutator. Do not use solvents on a non-metallic end-shield if the product is so equipped.

Products Employing Capacitors—Before servicing motors/gearmotors employing capacitors, always discharge the capacitor by placing a conductor across its terminals before touching the terminals with any part of your body.

LUBRICATION INSTRUCTIONS

Motor Ball Bearings (not gearhead bearings)—are grease lubricated and do not normally require re-lubrication or replacement for a period of approximately five years if run under normal operating conditions (defined above). More adverse conditions generally require more frequent servicing. Do not over-grease ball bearings as shortened life can result.

Motor Sleeve Bearings (not gearhead sleeve bearings)—sleeve bearing motors are identified by the presence of oil holes or oilers on the motor endshields. Motor sleeve bearings should be re-lubricated every six months or 1000 operational hours (whichever comes first) when used under normal operating conditions as defined above. For motors under (4) inches in diameter, re-lubricate with 5-6 drops of SAE No. 10 non-detergent oil (Bodine #LO-30). For larger diameter motors, re-lubricate with 5-6 drops of SAE #20 non-detergent oil (Bodine #LO-17). More severe conditions will require more frequent servicing. Do not over-lubricate.

Gearhead Lubrication—Gearmotors consists of a motor portion and a gearhead portion. The previous sections dealt with motor bearings—the following text concerns gearhead (gear and gear-shaft bearing) lubrication.

- A. **Oil Lubricated Gearmotors** (identified by the presence of an oil level sight gauge or plug marked "Oil Level"). Oil lubricated gearheads are shipped with a red plastic plug in their vent holes. *Remove red plastic plug from oil fill vent hole before starting.* (Gearbox must be vented to prevent internal pressure build-up as the unit heats up.) When operating under normal operating conditions, check oil level every 4 to 5 months or 600 operating hours—whichever occurs first.

1. **Type "1D" Gearheads:** These gearmotors are identified by the "1D" appearing after a hyphen in the TYPE box

on the nameplate. For example: N□□-1□□□ (where the identifying designators are illustrated and a "□" indicates the location of any other number or letter). Refill "1D" gearheads to the indicated oil level with a good quality rust and oxidation inhibited oil conforming to AGMA#5 (SAE#50 non-detergent) with a viscosity range of 918-1122 SUS @ 100°F, viscosity index of 90 minimum, and pour point of 0°F (minus 17.8°C) max., or Bodine lubricant #LO-38. Do not over-fill.

2. **Oil Lubricated Gearmotors other than Type "1D":** These gearmotors can be identified as follows: examine the nomenclature in the "TYPE" box on the nameplate; if any of the combinations of numbers and letters defined below appear after a hyphen, the gearmotor is oil lubricated. (The identifying designators are illustrated and a "□" symbol indicates the position of any other number or letter).

-3□RHL -5□RL -3□RJ
-5F -5N -5H
Examples: NCI-34RHL (-3□RHL)
32D5BEPM-5F (-5F)

Refill these gearmotors to oil level indicated on the respective product with a good quality worm gear oil conforming to AGMA #5 EP compounded (SAE #90) oil, or Bodine lubricant #LO-23. Do not over-fill.

3. **Note:** For test and run-in of gearmotors that are applied to equipment for resale, remove red plastic vent hole plug from oil fill vent hole. If gearmotor may be tipped during shipment, replace plastic plug and include instructions to remove the plug before operating the gearmotor.

- B. **Grease Lubricated Gearmotors:** Grease lubricated gearmotors can be identified as follows: examine the nomenclature in the "TYPE" box on the nameplate; if any of the combinations of numbers and letters defined below appear *after a hyphen*, the gearmotor is grease lubricated. (The locations of the identifying designators are illustrated and a "□" symbol indicates the position of any other number or letter).

-2□AO -2□TO -1□R -1□RH* -3□R*
-1□RG -3□RH -5□R* -W□ -E□ -F□
Examples: NSI-12R (-1□R)
42R5BFCI-E3 (-E□)

The above gearmotors are supplied with sufficient grease to last for the "design life" of the gearmotors. Some right-angle gearheads may have oilers on their output shaft hubs. The oilers should be relubricated every three months with 5-6 drops of SAE #20 non-detergent oil (Bodine #LO-17).

- C. **General**—The above recommended lubricants may be purchased in one pint containers from the Bodine Electric Company, 2500 West Bradley Place, Chicago, Illinois 60618, U.S.A., or a Bodine Authorized Service Center. Gearmotors should be re-lubricated only with recommended lubricants for maximum life of gears, bearings, and seals.

BODINE LIMITED WARRANTY

The Bodine Electric Company warrants all products manufactured by it to be free of defects in workmanship and materials when used under Normal Operating Conditions and when applied in accordance with nameplate specifications. This warranty shall be in effect for a period of twelve months from date of purchase or eighteen months from date of manufacture, whichever comes first.

The Bodine Electric Company will repair or replace at its option, any of its products which has been found to be defective and is within the warranty period, provided that the product is shipped freight prepaid, with previous authorization, to Bodine's plant in Chicago, Illinois 60618 U.S.A., or to the nearest Bodine Authorized Service Center. At its option, all return shipments are F.O.B. Bodine's plant or Authorized Service Center. Bodine is not responsible for removal, installation, or any other incidental expenses incurred in shipping the product to or from Bodine.

This warranty is in lieu of any other expressed or implied warranty—including (but not limited to) any implied warranties of merchantability and/or fitness for a particular use or purpose.

Bodine's liability under this warranty shall be solely limited to repair or replacement of the Bodine product within the warranty period and Bodine shall not be liable, under any circumstances, for any consequential, incidental or indirect damages or expenses associated with the warranted products.

Commutators and/or brush wear and its associated effects are a normal occurrence and are not covered by this warranty unless otherwise agreed to by Bodine in writing.

Any Bodine product which is damaged due to misuse, abuse, negligence or has been modified or dismantled without the knowledge or written consent of Bodine, is not covered by this warranty.

Motor/Gearmotor Serial No. _____ Purchase Date _____ Installed By _____

Gold Ring™ Solenoid Valve Installation and Maintenance Instructions



Valves With Open Frame or D.I.N. Type Connectors

Bulletin 7271
Effective 15Nov92
Revision B

Parker Hannifin Corporation
Fluid Control Division

Warnings

1. Check adhesive data label for correct catalog number, pressure, voltage and service. Do not install if unsuitable.
2. If solenoid is disassembled, when reassembled it is mandatory all parts be properly installed, they are an important part for the magnetic circuit.
3. For protection and proper operation of the solenoid valve, install a strainer or filter suitable for the service involved as close to the valve inlet as possible.
4. Solenoid valves require periodic cleaning and inspection depending on the service. This should be done at least once every 12 months or every 500,000 cycles, whichever occurs first.
5. Turn off electrical power supply and line pressure to the valve. Bleed trapped pressure from the lines before inspecting, cleaning, servicing, or repairing the valve.

Description:

Applies to all valves with open frame type coils with spade, screw or leaded terminations and coils with D.I.N. type connectors.

D.I.N. type coils meet DIN 43 650 and ISO 4400 specifications. When supplied with an optional DIN connector kit, these valves are suitable for NEMA 4, watertight, locations.

Note: In order to meet NEMA 4 requirements, the profile gasket, included in the connector kit, must be installed.

Operation:

For specific valve operation, refer to the valve I & M Instructions.

Installation:

1. Application

Refer to Parker Gold Ring™ catalog for application information.

2. Positioning

Unit valves may be mounted in any position. It is recommended that unit valves be mounted vertical and upright to prevent accumulation of debris in plunger tube.

3. Piping

Connect piping to valve according to markings on valve body. Apply pipe compound or sealing material sparingly to male pipe threads only. If applied to valve thread, it may enter valve and cause operational difficulties. Pipe strain should be avoided by proper support and alignment of piping. Do not use valve as a lever when tightening pipe.

4. Wiring

Wiring must comply with local and national electrical codes. Coils supplied with spade or screw terminals should be connected to the electrical system by means of suitable insulated connectors. Ensure there is adequate clearance between the coil terminals and any current conducting materials.

DIN type coils should be connected to the electrical system by means of an approved DIN type connector. These connectors can be obtained by ordering Parker connector kits.

5. Solenoid Temperature

Standard catalog valves are supplied with coils designed for continuous duty service. When the solenoid is energized for a long period, the solenoid enclosure becomes hot and can be touched with the bare hand for only an instant. This is a safe operating temperature. Any excessive heating will be indicated by the smoke and odor of burning coil insulation. Ambient and fluid temperature limitations for a solenoid valve depend on the solenoid and the valve materials.

Maintenance:

1. Cleaning

Periodic cleaning of solenoid valve is recommended. Frequency will depend on fluid and service, but should never be less than every 12 months or 500,000 cycles whichever occurs first. In general, if the voltage to the coil is correct, sluggish operation, excessive leakage or noise will indicate cleaning or repair is required. Clean valve filter or strainer when cleaning valve.

2. Preventative Maintenance

- a. Keep media flowing through valve as free from dirt and foreign matter as possible.
- b. While not in service, operate valve at least once a month to insure proper opening and closing.
- c. Periodic inspection (depending on media and service conditions) of internal valve parts for damage or excessive wear is recommended. Inspect at least every 12 months or 500,000 cycles, whichever occurs first. Clean valve filter or strainer when cleaning valve.

3. Troubleshooting Guide

a. Faulty Controls Circuit

Check the electrical system by energizing the solenoid. A metallic click signifies solenoid is operating. Absence of click indicates loss of power supply. Check for loose or blown out fuses, open-circuit or grounded coil, broken lead wires.

b. Burned-Out Coil

Check for open-circuited coil. Replace coil if necessary.

c. Low Voltage

Check voltage across the coil lead. Voltage must be at least 85% of adhesive data label rating.

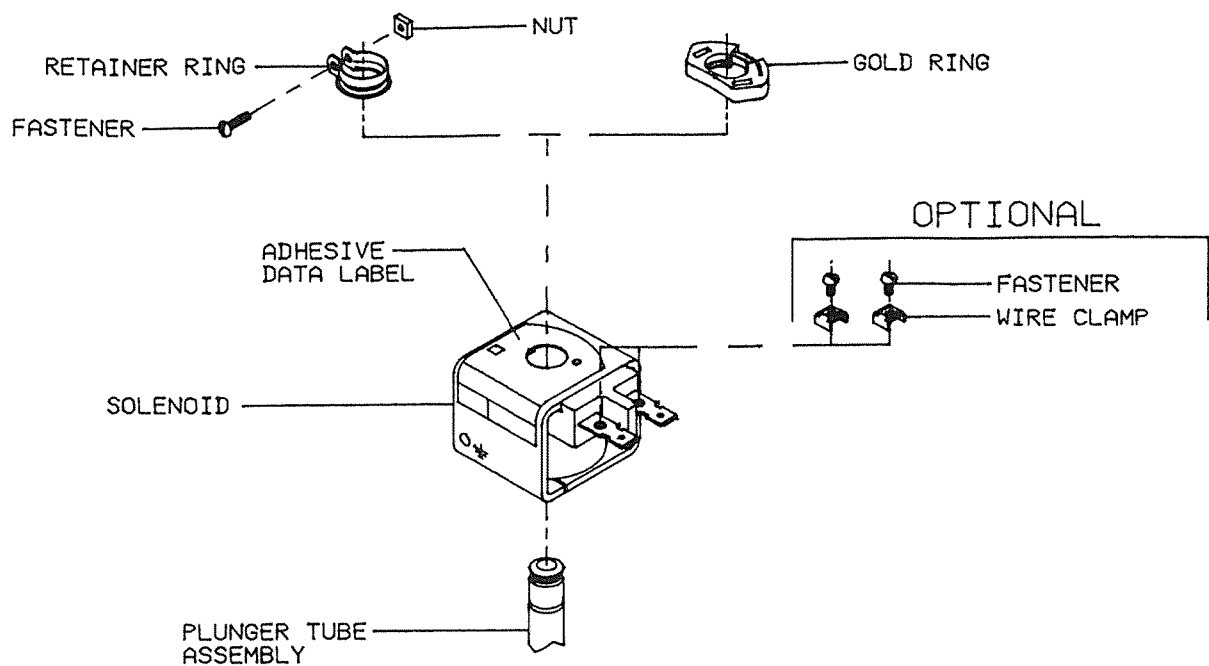
4. Coil Replacement

Turn off electrical power supply and disconnect coil lead wires. Refer to exploded view.

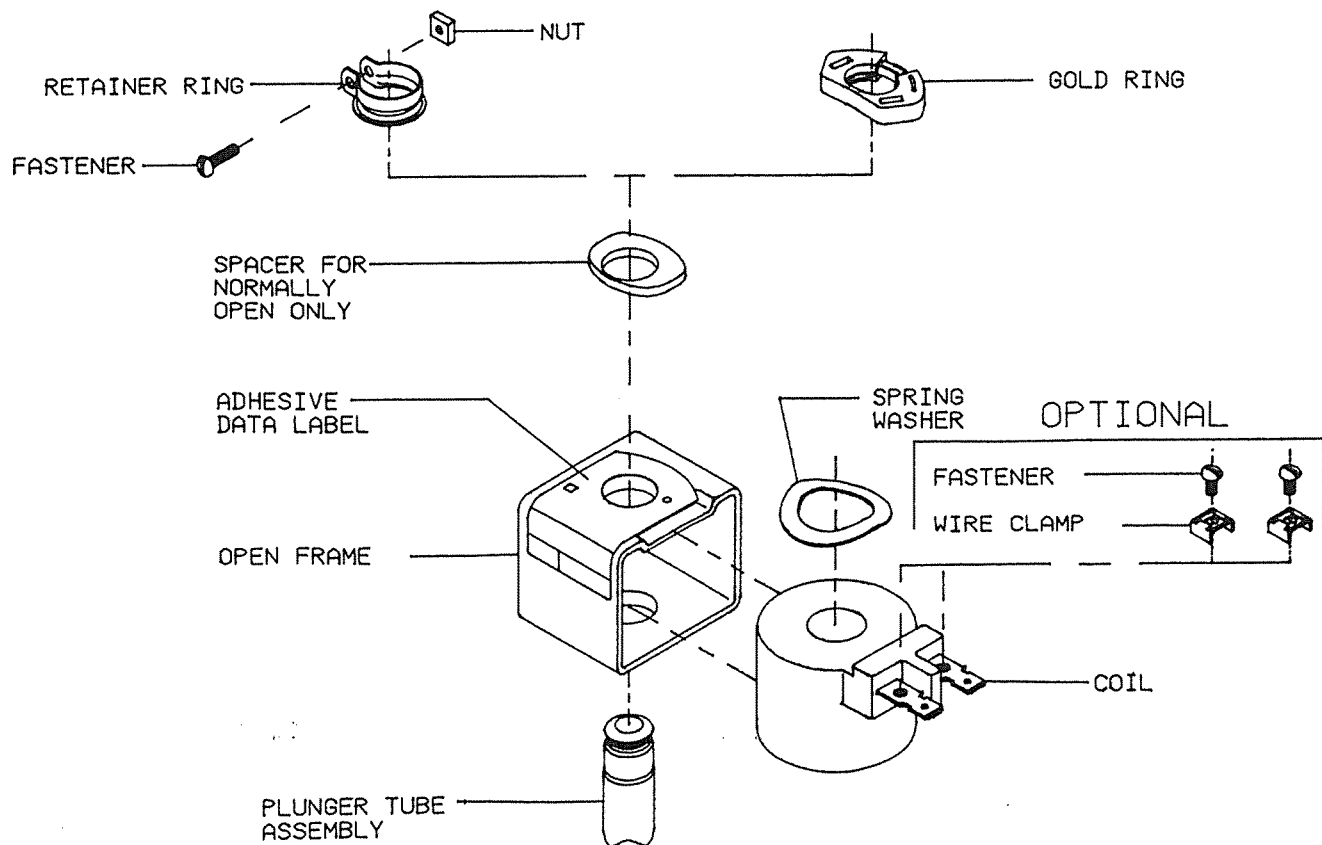
- a. Remove gold ring by inserting a 3/16" wide screwdriver in the curved slot. While holding the gold ring firmly against the unit solenoid gently twist screwdriver counterclockwise. Gold ring will open. Lift off unit solenoid. Valves with DIN type coils are supplied with E-rings which slide into the enclosure tube retaining groove.
- b. Replace old coil with new coil of correct watt, voltage and class.
- c. Reassemble by sliding new unit solenoid over plunger tube assembly. Press gold ring against adhesive data label to compress anti-vibration fingers. Squeeze the gold ring firmly together. Reconnect your electrical circuit.

Note: "This product may contain chemicals known to the state of California to cause cancer, birth defects, or other reproductive harm."

This warning is given in compliance with California Proposition 65, as detectable amounts of chemicals subject to Proposition 65 may be contained in this product".



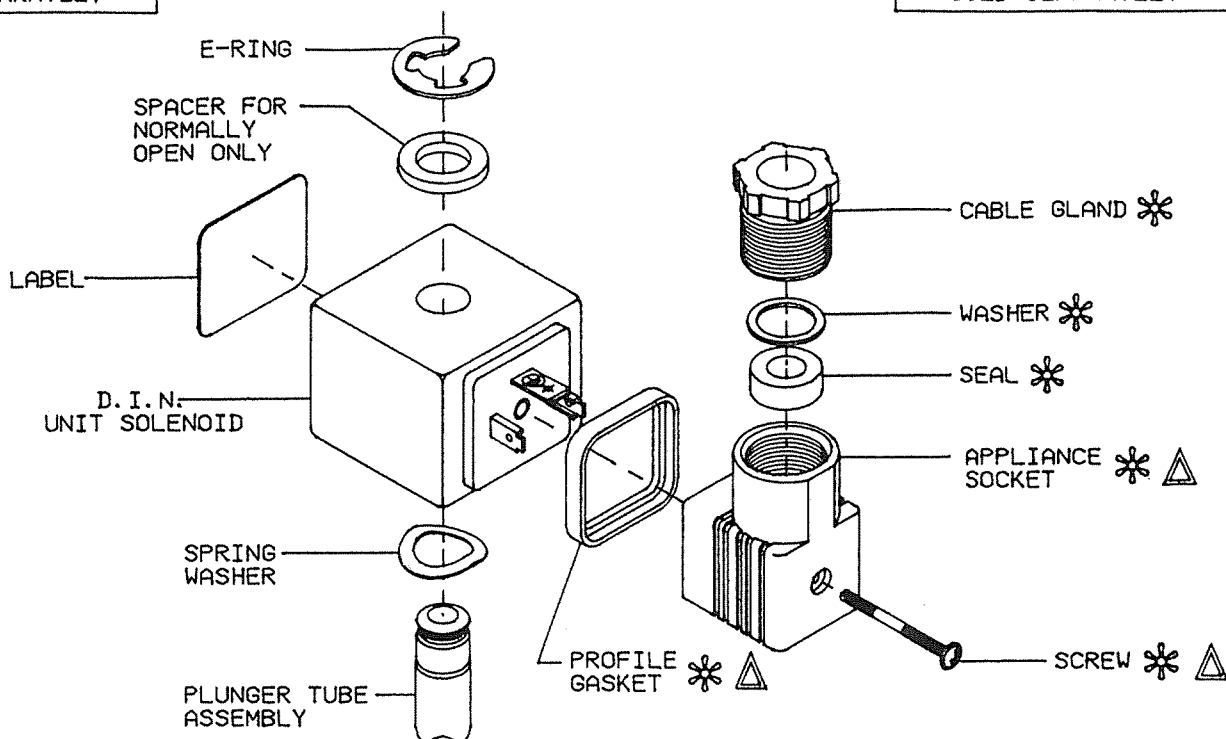
LOW WATTAGE COIL



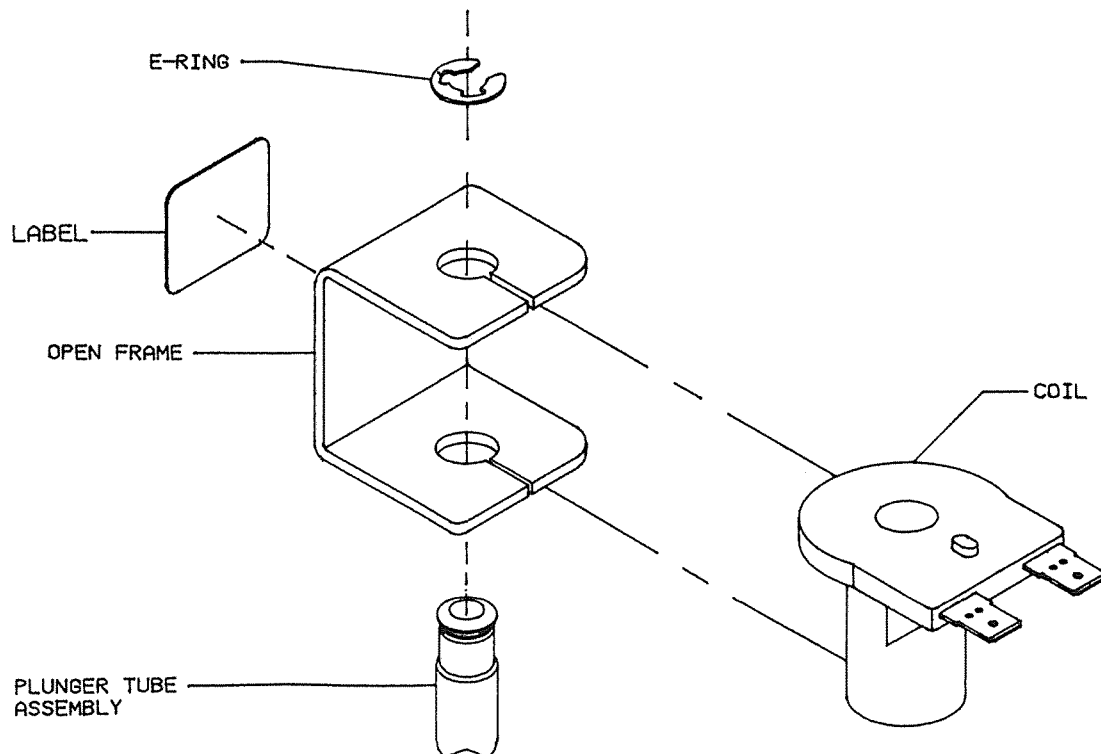
HIGH WATTAGE COIL

* PARTS INCLUDED IN
KIT SA06-004
OPTIONAL PARTS KIT
SOLD SEPARATELY

△ PARTS INCLUDED IN
KIT SA06-005
OPTIONAL PARTS KIT
SOLD SEPARATELY

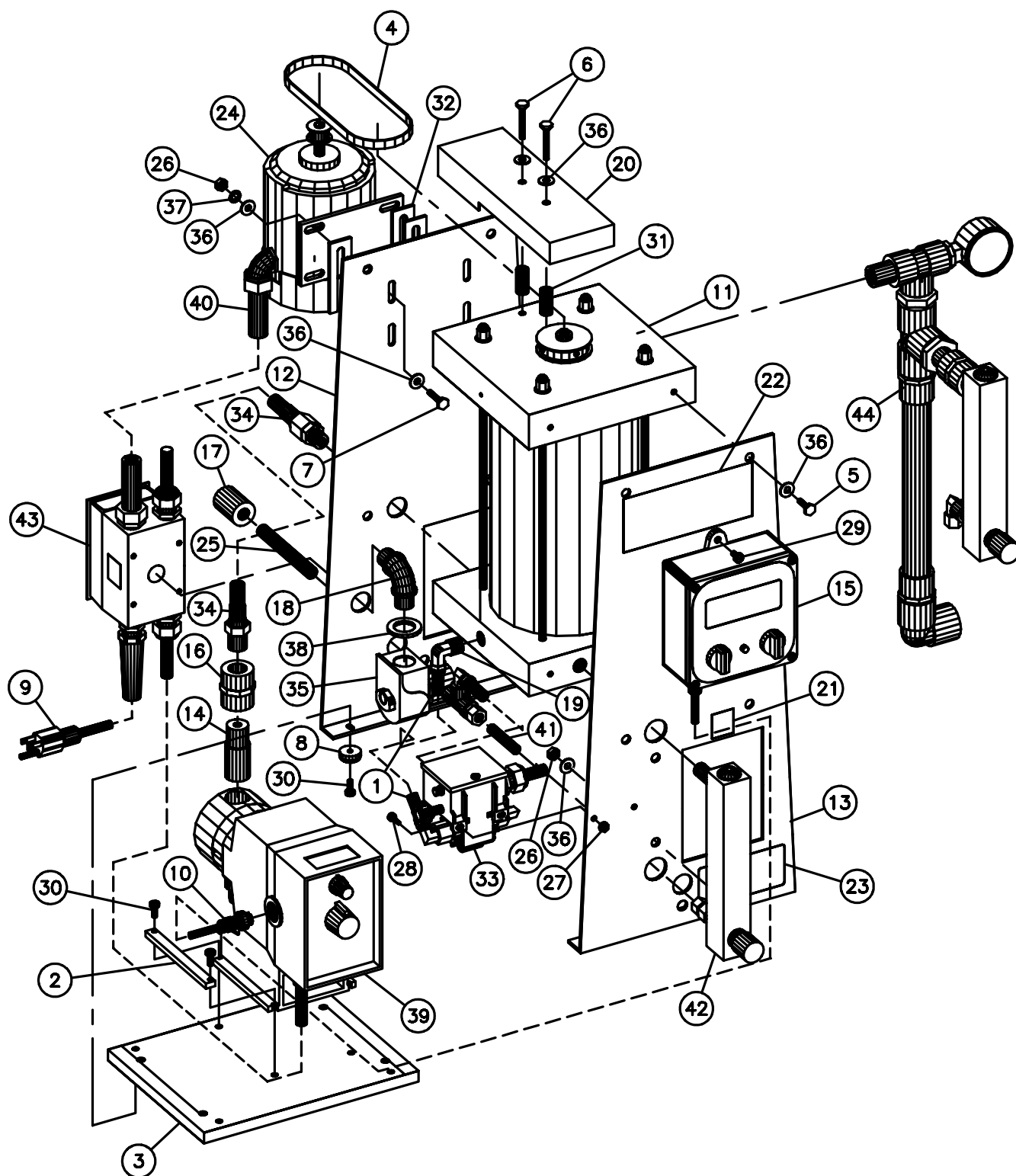


NOTE: D.I.N. COILS SHIPPED WITH TERMINAL PROTECTOR



OVERALL

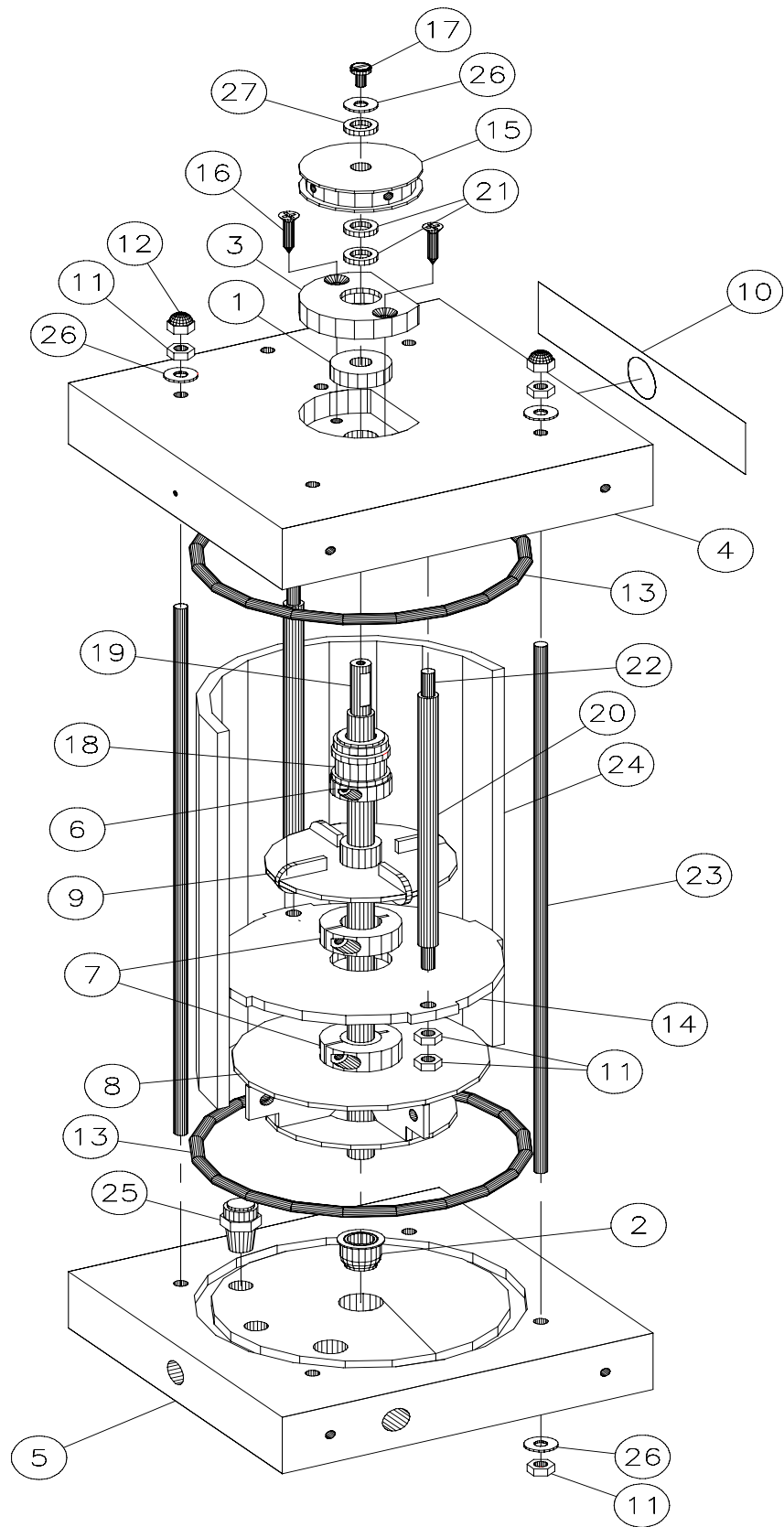
ITEM	P/N	DESCRIPTION	QTY	UM
1	10342	TUBING, 3/8" OD X 1/4" ID, POLYETHYLENE	1.00	FT
2	10746	BRACKET, PUMP	2.00	EA
3	1364001	BASE SUB-ASSY. PB100-0	1.00	EA
4	1450318	BELT	1.00	EA
5	1600312	BOLT, HH, 1/4-20 X 3/4 SS	8.00	EA
6	1600324	BOLT, HH, 1/4-20 X 1-1/2 SS (CAP SCREW)	2.00	EA
7	1600366	BOLT, HH, 1/4-20 X 1 SS	4.00	EA
8	1890001	BUMPER, RUBBER	4.00	EA
9	1983001	CABLE ASSY, 110V, 8FT GROUNDED, MALE PLG, 16/3	1.00	EA
10	1984005	CABLE ASSY.	1.00	EA
11	*****	CHAMBER ASSY., MIXING (SEE SECTION)	1.00	EA
12	2383001	CHASSIS, BACK	1.00	EA
13	2383002	CHASSIS, FRONT	1.00	EA
14	26033	VALVE	1.00	EA
15	2896006	CONTROLLER, REM-1D	1.00	EA
16	2930004	CPLG, PVC, SCH 80 1/2" FPT	1.00	EA
17	2930420	CPLG, RED, SS 1/2 X 1/4 FT X T	1.00	EA
18	3579864	ELBOW, CONDUIT	1.00	EA
19	3581604	ELBOW, 90, BRASS 3/8 OD X 3/8 MPT	1.00	EA
20	4681310	BELT GUARD	1.00	EA
21	5551209	LABEL, WATER FLOW	2.00	EA
22	5551210	LABEL, POLYBLEND	1.00	EA
23	5554000	LABEL, SERIAL PLATE	1.00	EA
24	5902001	MOTOR	1.00	EA
25	5963028	NIPPLE, SS 1/4" X 4"	1.00	EA
26	6020031	NUT, 1/4-20, HEX SS	6.00	EA
27	6020962	NUT, 8-32, HEX	2.00	EA
28	7771558	SCREW, MACH, SS PAN HD, PHIL, 8-32 X 1/2	2.00	EA
29	7772506	SCREW, MACH, 304SS, PAN HD, SLTD, 10-32 X 3/8	2.00	EA
30	7772508	SCREW, MACH, 10-32 X 1/2, SLTD PH, SS	8.00	EA
31	8140001	SPACER	2.00	EA
32	8141001	SPACER, MOTOR SHIM	3.00	EA
33	8724903	SWITCH, DIFF. PRESSURE	1.00	EA
34	9414002	TUBE BRAIDED SS, 1/2" MPT X 3/8" MPT X 14" LG*	1.00	EA
35	9571301	VALVE SOLENOID	1.00	EA
36	9740300	WASHER, SS, FLAT 1/4"	9.00	EA
37	9740330	WASHER, SS, INT TOOTH, 1/4"	4.00	EA
38	9748300	WASHER, SS, FLAT 1/8"	1.00	EA
39	*****	PUMP (SEE SECTION)	1.00	EA
40	RM2702060	CONDUIT, SEALTITE 3/8"	1.00	FT
41	RM9414061	TUBE, RIGID 304 SS 3/8"OD X 1/4"ID	1.00	FT
42	*****	FLOWMETER (SEE SECTION)	1.00	EA
43	1672002	BOX JUNCTION SUB-ASSY.	1.00	EA
44	*****	STATIC MIXER ASSY., (SEE SECTION)	1.00	EA



MIXING CHAMBER 2340101

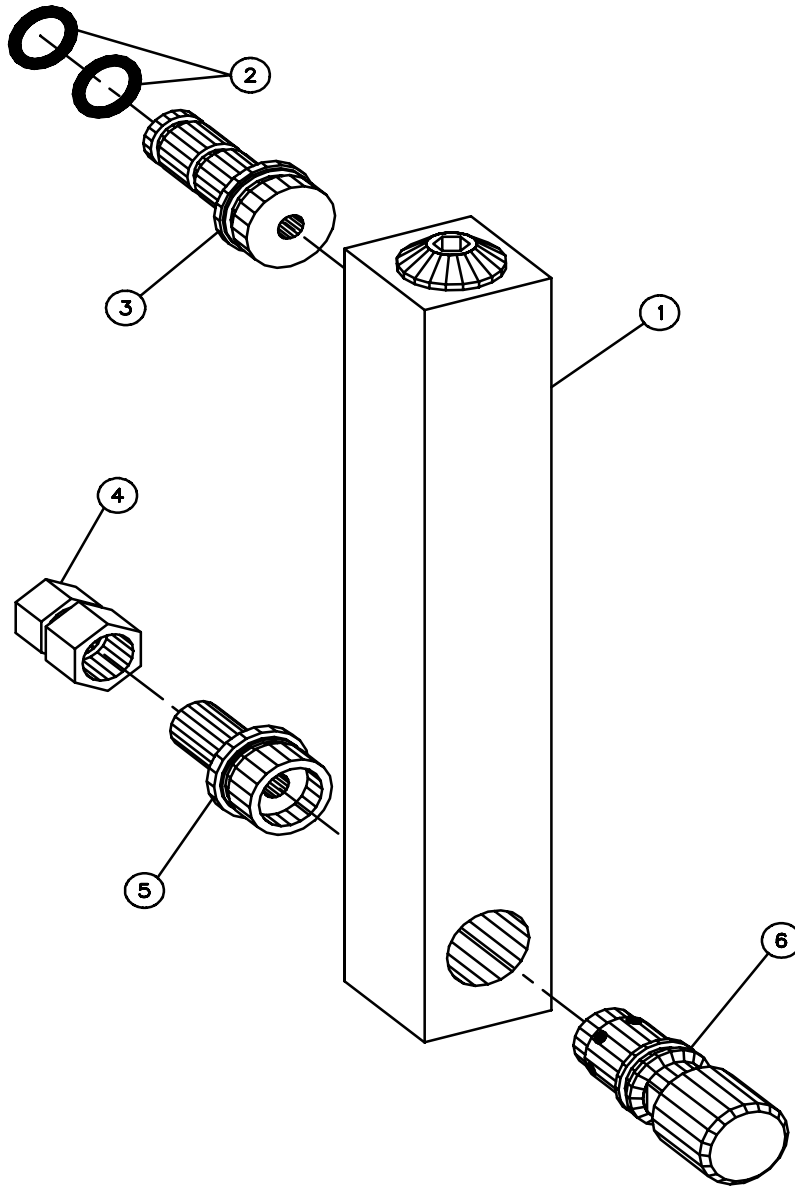
ITEM	PART NO.	DESCRIPTION	QTY.
1	1410002	BEARING	1
2	1414001	BEARING, THRUST	1
3	1419001	BEARING, FLANGE CARRIER	1
4	2124002	CAP, TOP, MIXING CHAMBER	1
5	2124003	CAP, BOTTOM, MIXING CHAMBER	1
6	2650001	COLLAR, 1/2" I.D.	1
7	2650002	COLLAR, 3/4" I.D.	2
8	5173304	IMPELLER	1
9	5173305	IMPELLER, SECONDARY	1
10	5551002	LABEL - DISCHARGE	1
11	6020031	NUT, HEX HD., 1/4"-20	12
12	6023031	NUT, ACORN, 1/4"-20, S.S.	4
13	6091801	O-RING	2
14	6676002	PLATE, BAFFLE	1
15	7071201	PULLEY	1
16	7772216	SCREW, 10-32 X 1"	2
17	7772506	SCREW, 10-32 X 3/8"	1
18	7802910	SEAL, MECHANICAL	1
19	7854303	SHAFT, IMPELLER	1
20*	8140005	SPACER ROD	2
21	8143011	SPACER	2
22	8603002	STUD	2
23	8603004	ROD	4
24	9412606	TUBE, ACRYLIC	1
25	9572304	VALVE, INJ. CHECK	1
26	9740300	WASHER, FLAT, 1/4"	9
27	8143010	SPACER	1

*Factory personnel identify item #20 as part RM6600021, which must be cut to a length of 6-3/4 inches. For replacements, request P/N 8140005 to receive spacer rods, which are pre-cut to the appropriate length.



FLOWMETER ASSEMBLY – P/N 4301102

ITEM	PART NO.	DESCRIPTION	QTY.	UM
1	4291102	FLOWMETER, KING, 100GPH	1	EA
2	6091301	O-RING, BUNA N	2	EA
3	1040093	ADAPTER, SPUD	1	EA
4	2735634	CONNECTOR, TUBE, 1/4" FPT X 3/8" OD COMP.	1	EA
5	1048401	ADAPTER, FLOWMETER	1	EA
6	9579301	VALVE, KING	1	EA

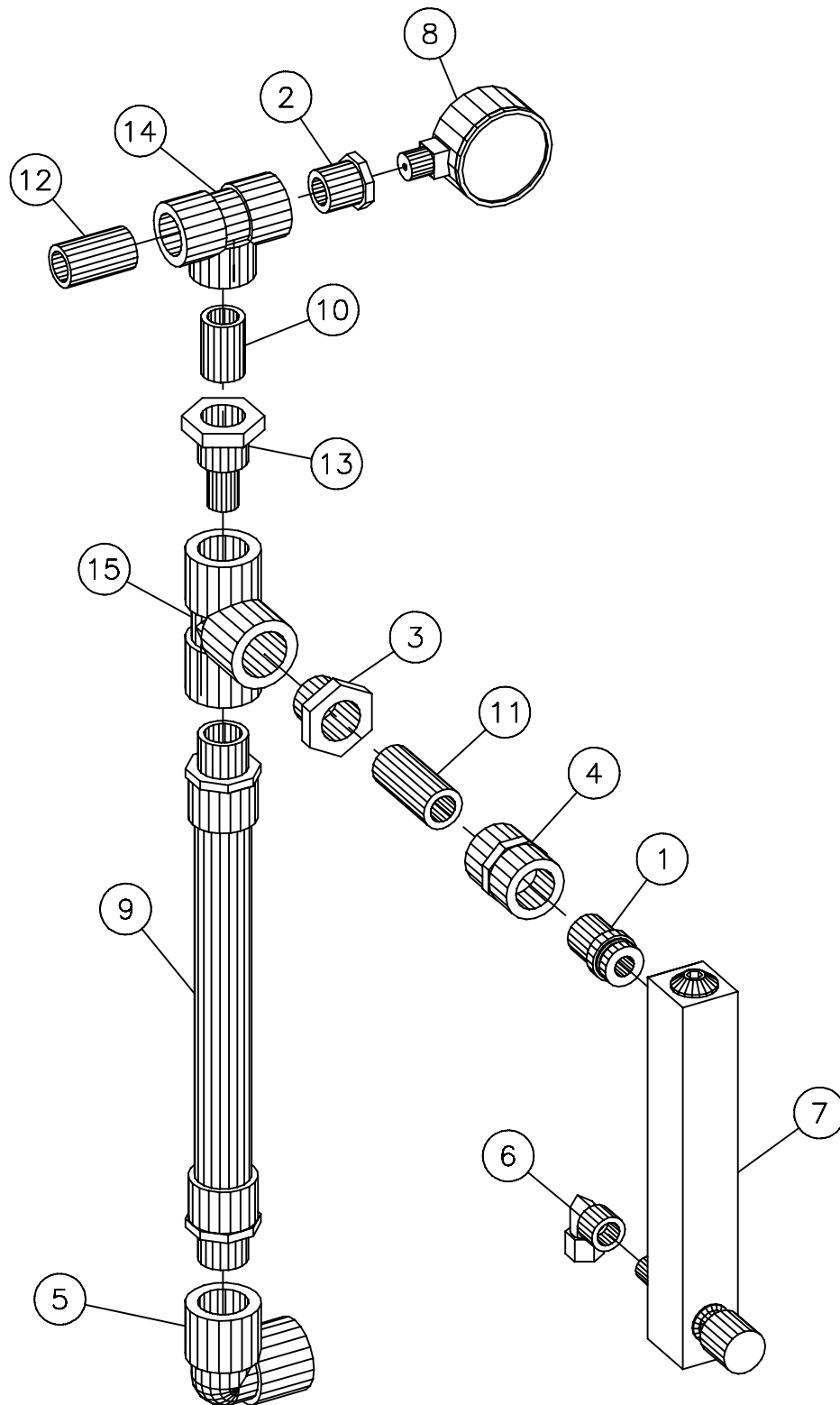


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POST DILUTION, STATIC MIXER ASSEMBLY - P/N 5860001

ITEM	PART NO.	DESCRIPTION	QTY.
1	1040692	ADAPTER, FLOWMETER	1
2	1930005	BUSH, PVC, 1/2" X 1/4", TXT	1
3	1930010	BUSH, PVC, TXT, 3/4" X 1/2"	1
4	2930004	COUPLING, PVC, 1/2", FPT	1
5	3570005	ELBOW, 90 PVC, TXT 3/4"	1
6	3585634	ELBOW, COMP, 90, NP, 3/8" OD X 1/4" FPT	1
7	4291102	FLOWMETER, KING, 100GPH	1
8	4480001	GAUGE, PRESSURE, 0-160PSI	1
9	5850002	MIXER, STATIC	1
10	5960061	NIPPLE, PVC, 1/2 X CLOSE	1
11	5960064	NIPPLE, PVC, 1/2" X 2"	1
12	5963063	NIPPLE, SS, 1/2" X 1-1/2" 304SS	1
13	6619012	PIPING SUB-ASSY., MIXER STATIC	1
14	8850004	TEE, PVC, 1/2" FPT	1
15	8850005	TEE, PVC, 3/4" FPT	1

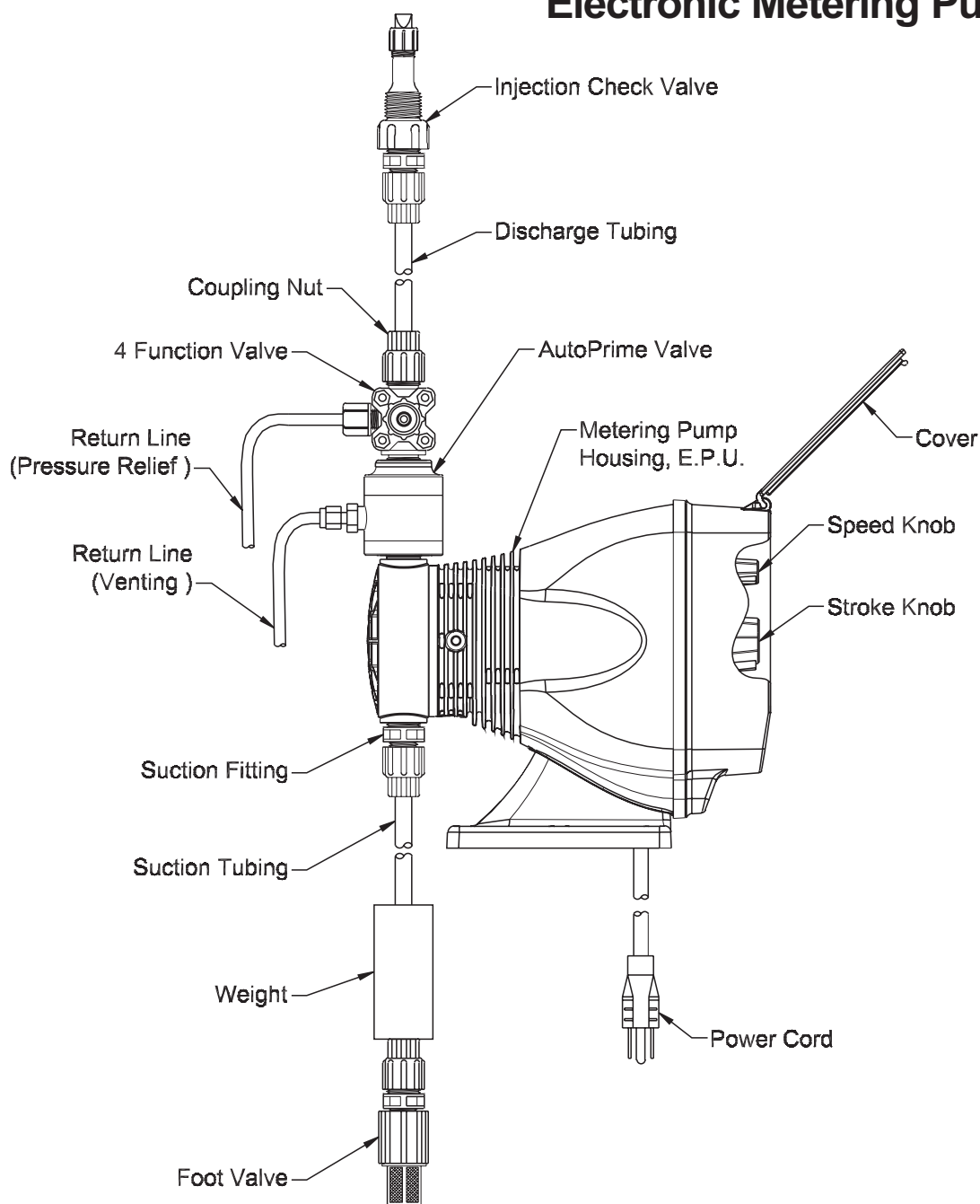
Post Dilution, Static Mixer Assembly - P/N 5860001



Instruction **Supplement**

Series AA7

Electronic Metering Pump

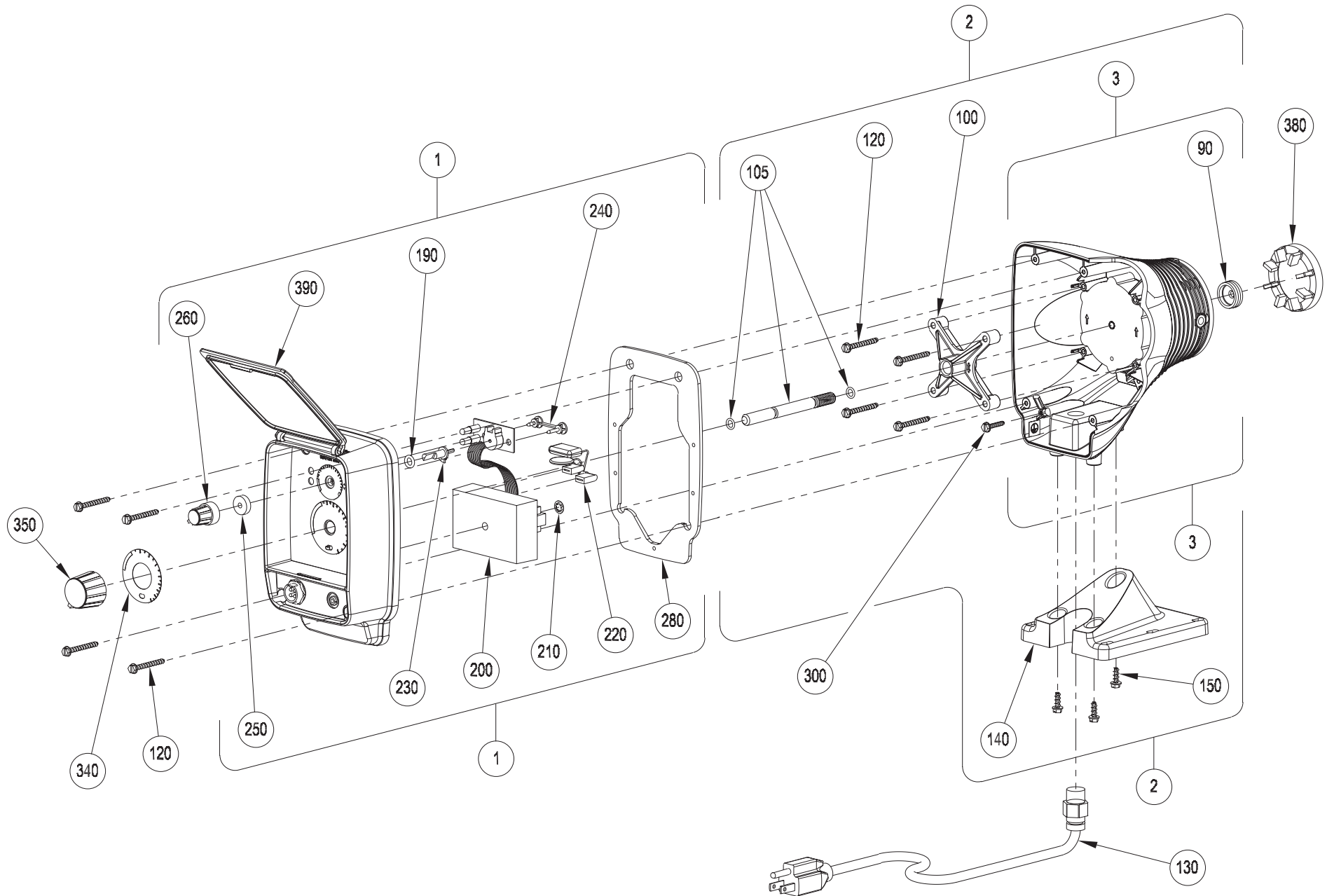


Metering Pump Component Diagram



201 Ivyland Road
Ivyland, PA 18974 USA
TEL: (215) 293-0401
FAX: (800) 327-7563
<http://www.lmipumps.com>

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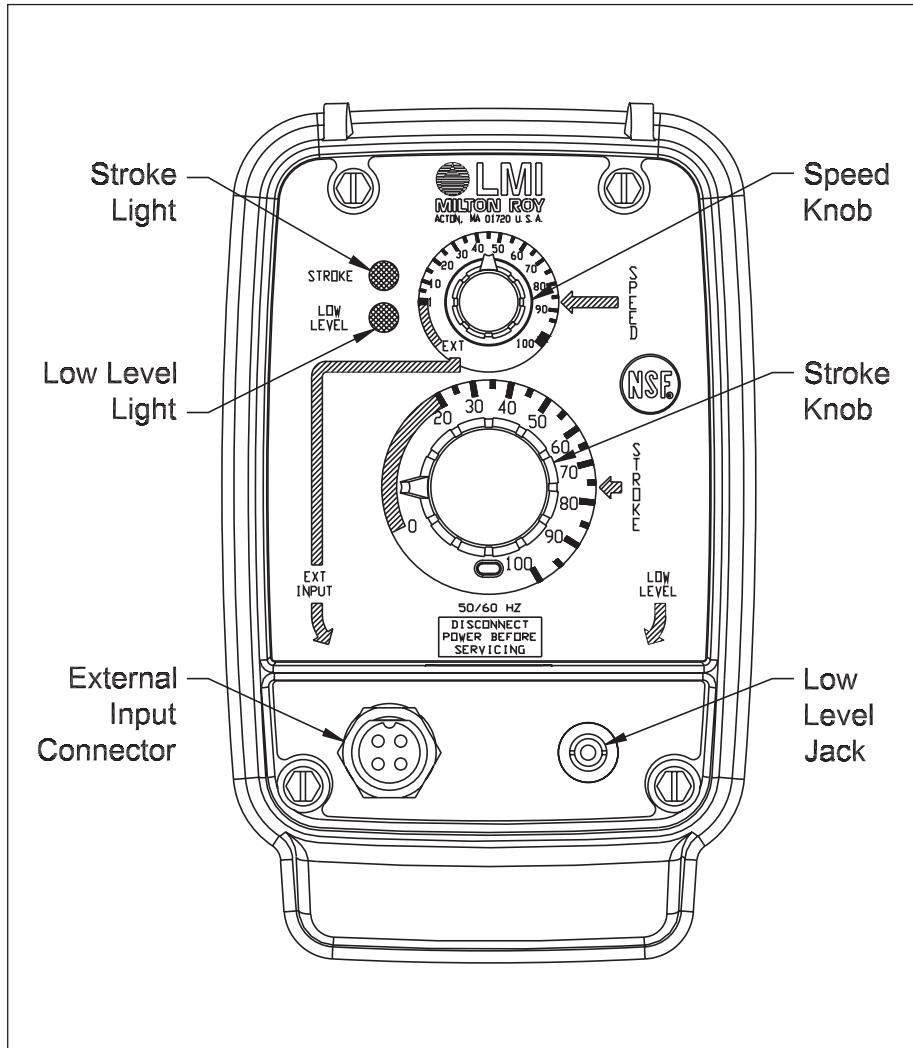


Series AA7 Drive Assembly Parts List

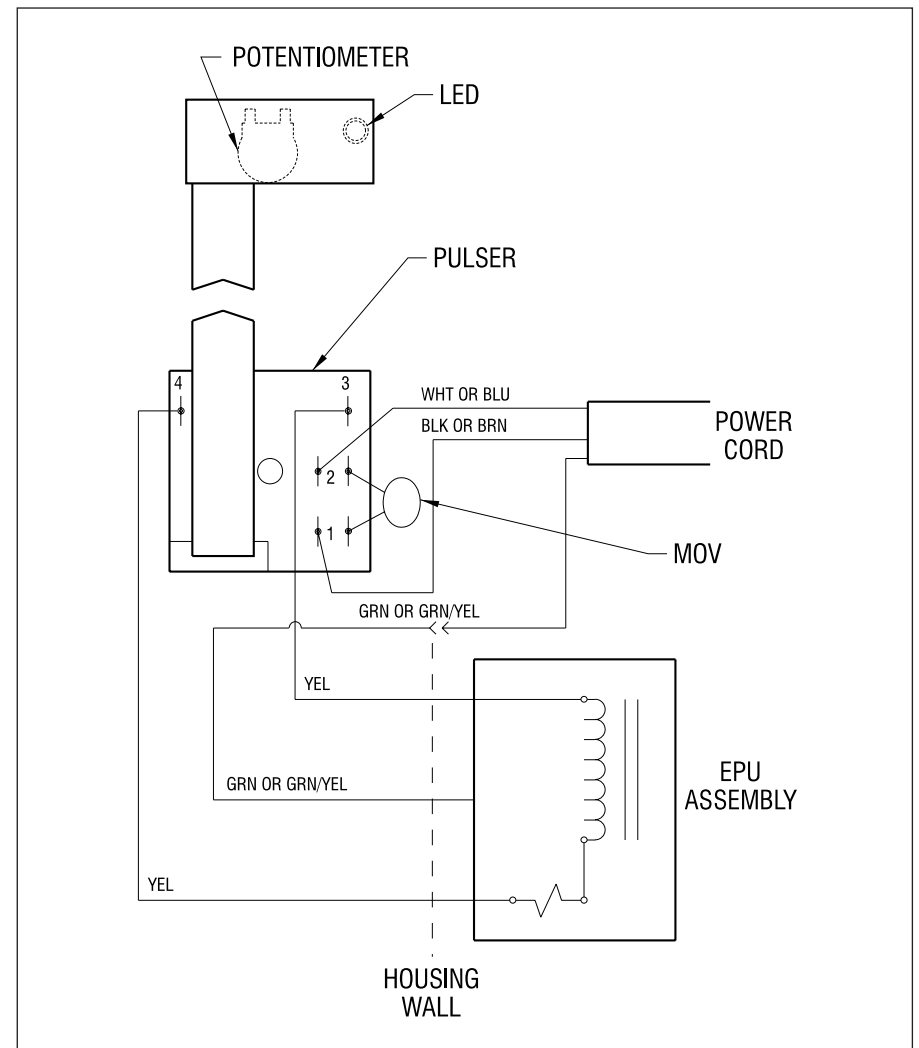
Key No.	Model Series	Part No.	Description	Qty.
1	AA741, AA751, AA761, AA771, AA781	48016	Control Panel Assembly, 115V	1
	AA742, AA752, AA762, AA772, AA782	48017	Control Panel Assembly, 230-250V	1
	AA743, AA753, AA763, AA773, AA783			
	AA745, AA755, AA765, AA775, AA785			
	AA746, AA756, AA766, AA776, AA786			
	AA747, AA757, AA767, AA777, AA787			
2	AA741, AA751	48034	EPU w/ Stroke Adjustment, 115V	1
	AA742, AA743, AA745, AA746, AA747	48035	EPU w/ Stroke Adjustment, 230-250V	1
	AA752, AA753, AA755, AA756, AA757			
	AA761	48036	EPU w/ Stroke Adjustment, 115V	1
	AA762, AA763, AA765, AA766, AA767	48037	EPU w/ Stroke Adjustment, 230-250V	1
	AA771, AA781	48038	EPU w/ Stroke Adjustment, 115V	1
3	AA772, AA773, AA775, AA776, AA777	48039	EPU w/ Stroke Adjustment, 230-250V	1
	AA782, AA783, AA785, AA786, AA787			
	AA741, AA751	48025	EPU, 115V	1
	AA742, AA743, AA745, AA746, AA747	48026	EPU, 230-250V	1
	AA752, AA753, AA755, AA756, AA757			
	AA761	48027	EPU, 115V	1
→	AA762, AA763, AA765, AA766, AA767	48028	EPU, 230-250V	1
	AA771, AA781	48029	EPU, 115V	1
	AA772, AA773, AA775, AA776, AA777	48030	EPU, 230-250V	1
	AA782, AA783, AA785, AA786, AA787			
90	AA7	10973	Seal	1
100	AA7	38886	Stroke Adjustment Bracket	1
105	AA7	48012	Stroke Adjustment Shaft Assembly	1
120	AA7	41227	Screw	8
130	AA741, AA751, AA761, AA771, AA781	29033CE	Power Cord Assembly, 115V	1
	AA742, AA752, AA762, AA772, AA782	29039CE	Power Cord Assembly, 230V US	1
	AA743, AA753, AA763, AA773, AA783	29042CE	Power Cord Assembly, 230V DIN	1
	AA745, AA755, AA765, AA775, AA785	29044CE	Power Cord Assembly, 240V UK	1

Key No.	Model Series	Part No.	Description	Qty.
140	AA7	37879	Foot	1
150	AA7	38199	Screw	3
190	AA7	34497	O-Ring	1
200	AA741, AA751, AA761, AA771, AA781	37734	Pulser, 120V	1
	AA742, AA752, AA762, AA772, AA782	37735	Pulser, 230-250V	1
	AA743, AA753, AA763, AA773, AA783			
	AA745, AA755, AA765, AA775, AA785			
	AA746, AA756, AA766, AA776, AA786			
	AA747, AA757, AA767, AA777, AA787			
210	AA7	10422	Retaining Ring	1
220	AA741, AA751, AA761, AA771, AA781	35243	MOV and Capacitor Assy, 115V	1
	AA742, AA752, AA762, AA772, AA782	35237	MOV and Capacitor Assy, 230-250V	1
	AA743, AA753, AA763, AA773, AA783			
	AA745, AA755, AA765, AA775, AA785			
	AA746, AA756, AA766, AA776, AA786			
	AA747, AA757, AA767, AA777, AA787			
230	AA7	35743	Speed Shaft	1
240	AA7	35744	Dual Pin	1
250	AA7	30803	Gasket	1
260	AA7	30709	Speed Knob	1
280	AA7	38887	Gasket	1
300	AA7	41244	Screw	1
340	AA76	30374	Stroke Dial	1
	AA77	29269	Stroke Dial	1
	AA78	29268	Stroke Dial	1
350	AA7	31890	Stroke Knob Assembly	1
380	AA74, AA77	29445	Disk, 0.5	1
	AA75, AA78	29437	Disk, 0.9	1
	AA76	29442	Disk, 1.8	1
390	AA7	37974	Cover	1

Series AA7 Control Panel Detail



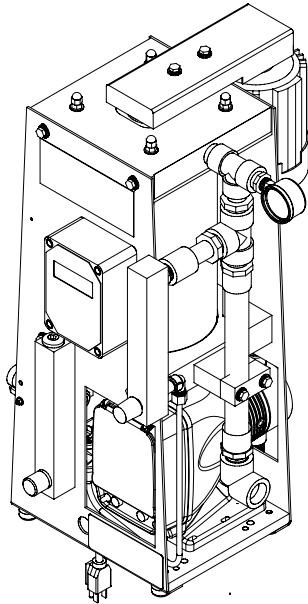
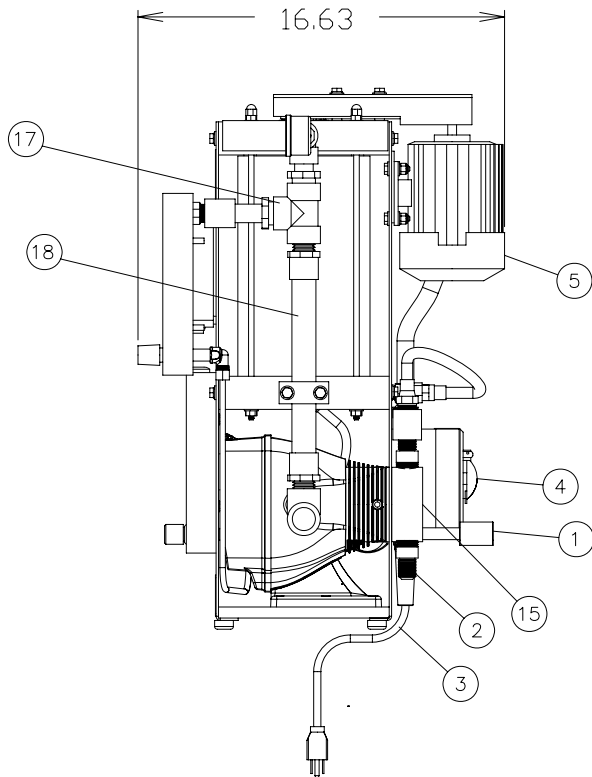
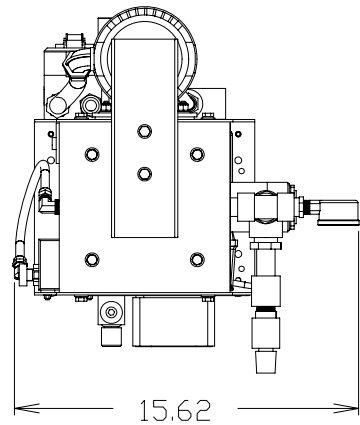
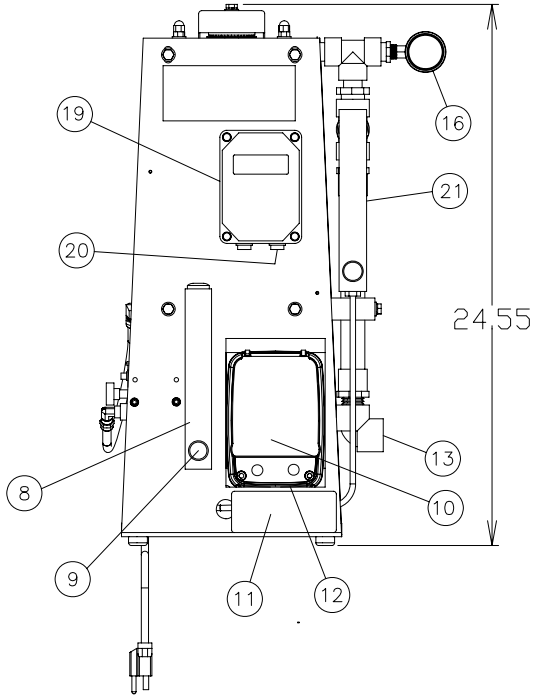
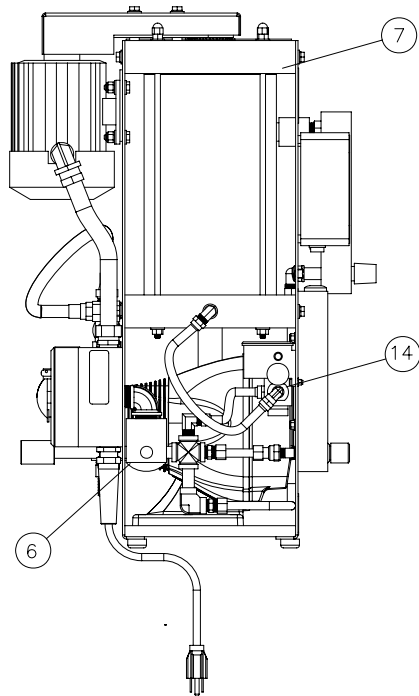
Series AA7 Wiring Diagram



STD: BORDER-0106-11X17B

INTL. REF:

BAR = 1" AT PLOT SCALE



KEY	DESCRIPTION
1	WATER INLET, 1/2" (F)NPT
2	POLYMER INLET, 5/8" O.D. BARB
3	POWER CORD
4	MIXER MOTOR SWITCH w/THERMAL OVERLOAD
5	MIXER MOTOR
6	SOLENOID VALVE, (WATER)
7	MIXING CHAMBER
8	PRIMARY ROTAMETER
9	RATE VALVE
10	DIAPHRAGM PUMP
11	SERIAL PLATE
12	EXTERNAL INPUT SIGNAL CONNECTOR
13	SOLUTION OUTLET, 3/4" (F)NPT
14	DIFFERENTIAL PRESSURE SWITCH
15	PRIMING PORT, (POLYMER)
16	PRESSURE GAUGE
17	CONFLUENCE ASSEMBLY
18	STATIC MIXER
19	DIGITAL DISPLAY PUMP CONTROLLER, (REM-1E)
20	4-20mADC INPUT
21	SECONDARY ROTAMETER

PB UNIT	PUMP OUTPUT	PRIMARY ROTAMETER RANGE	SECONDARY ROTAMETER RANGE
PB200-0.4	0-0.42GPH	10-100GPH	10-100GPH
PB200-1	0-1GPH	10-100GPH	10-100GPH
PB200-2	0-2GPH	10-100GPH	10-100GPH
PB200-2.5	0-2.5GPH	10-100GPH	10-100GPH
PB200-0.4K	0-1.5LPH	38-375LPH	38-375LPH
PB200-1K	0-3.8LPH	38-375LPH	38-375LPH
PB200-2K	0-7.6LPH	38-375LPH	38-375LPH
PB200-1A	0-3.8LPH	38-375LPH	38-375LPH
PB200-2A	0-7.6LPH	38-375LPH	38-375LPH

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
4	CHANGE PUMP TO LMI AA	11/20/03	KGS	GG	RLM	1741

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ENGINEER	DATE
ALN	06/10/98
MANAGER	DATE
N/A	
FILE:	PB200.DWG
SCALE:	N/A

TITLE		GENERAL ARRANGEMENT PB200 (STANDARD UNIT)			
CLIENT					
PROJECT		CODE	DRAWING	SHEET	REV
		PB200-0	PB200	1 OF 1	4

SIEMENS Water Technologies
BRADLEY, IL
815-932-8154 FAX 815-932-0674

