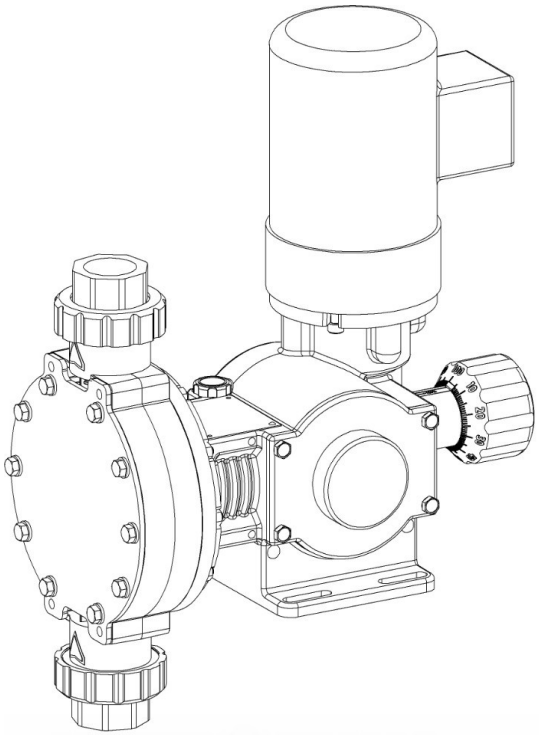
# GreenLine - GLM

## MECHANICAL DIAPHRAGM METERING PUMP

2 YEAR LIMITED WARRANTY

# Installation Operation Maintenance Instruction



**Bulletin #: IOM-GLM-US-2410-S**

**Models: DM1 – 6**


PULSAFEEDER®

A Unit of IDEX Corporation
Manufacturers of Quality Pumps, Controls and Systems.

https://pulsafeeder.com/

2883 Brighton-Henrietta Townline Rd.
Rochester, NY 14623 U.S.A.
ph. 585-292-8000; fax 585-424-5619

27101 Airport Rd.
Punta Gorda, FL 33982 U.S.A.
ph. 800-333-6677

# Pulsafeeder Factory Service Policy

Should you experience a problem with your GreenLine - GLM pump, first consult the troubleshooting guide in this installation, operation, and maintenance manual. If the problem is not covered or cannot be solved, please contact your local Pulsafeeder Distributor or our Technical Services Department for further assistance.

Trained technicians are available to diagnose your problem and arrange a solution. Solutions may include purchase of replacement parts or returning the unit to the factory for inspection and repair. All returns require a Return Authorization number to be issued by Pulsafeeder. Parts purchased to correct a warranty issue may be credited after an examination of original parts by Pulsafeeder. Warranty parts returned as defective which test good will be sent back freight collect. No credit will be issued on any replacement electronic parts.

Any modifications or out-of-warranty repairs will be subject to bench fees and costs associated with replacement parts.

## Safety Considerations:

1. Read and understand all related instructions and documentation before attempting to install or maintain this equipment.
2. Observe all special instructions, notes, and cautions.
3. Act with care and exercise good common sense and judgment during all installation, adjustment, and maintenance procedures.
4. Ensure that all safety and work procedures and standards that are applicable to your company and facility are followed during the installation, maintenance, and operation of this equipment.

# Table of Contents

# 1. Equipment Inspection

Check all equipment for completeness against the order and for any evidence of shipping damage. Shortages or damage must be reported immediately to the carrier and your authorized representative or distributor of GreenLine - GLM pumps.

Included Items:

- GreenLine - GLM Metering Pump with Motor Adaptor

Optional Items:

- Motor (pre-installed at the factory)

# 2. Installation

## 2.1 Location

When selecting an installation site or designing a chemical feed system, plan for operation and routine maintenance. Provide 3.25FT(1M) of space around the pump for this purpose.

GreenLine - GLM pumps are designed to operate in an environment where the pump is protected from direct sunlight, and precipitation (i.e., under shelter). The ambient temperature must be between 32° F (0° C) and 104° F (40° C). If necessary, add environmental controls.

The pump must be rigidly bolted to a solid and flat foundation to minimize vibration and prevent loosening of the connections. The pump must be level within 5° to assure proper check valve operation.

## 2.2 Motor

The GreenLine - GLM is typically shipped with the motor pre-installed. It must be wired in accordance with local and national requirements by a qualified electrician. Please refer to the motor nameplate for further manufacture specific information.

If the GreenLine - GLM was purchased less motor, please refer to section 4.4 Motor Installation for further instructions.

## 2.3 Piping System

Attention to piping detail will assure an easy startup and long life of your GreenLine - GLM. Please follow these guidelines:

**Suction Piping**

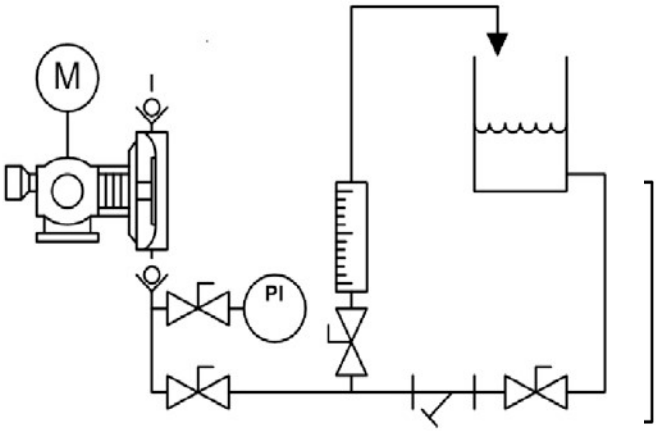



*Figure 2: Suction P&ID*

**Isolation Valve and Unions:** Isolation valves allow the system to be isolated from the process fluid to facilitate safe servicing. They also aid in the operation of Calibration columns. Valves should include good visible indications of open/closed condition. Unions assist with installation and maintenance. Valves that integrate union fittings are ideal.

**Strainer:** Successful installations always include a strainer on the suction side of the pump to exclude material that can cause the check valves to malfunction or the diaphragm to rupture. Select the material, size and mesh to be compatible with the fluid type, intended flow rate and service interval. A 100 mesh screen is generally recommended.

**Calibration Column (Optional):** Used to calibrate pump performance. Include an isolation valve and vent line back to the supply tank to facilitate safe operation.

**Pressure Gage (Optional):** A pressure gage should be included on the suction side of the pump when the suction pressure of the system is unknown or variable. The gage is also a good indicator of Strainer maintenance status.

**Discharge Piping**

**Discharge Pressure Gage:** Install a pressure gage no less than 2 pipe diameters from the threaded fitting on the discharge valve. A discharge pressure gage is critical to confirming proper operation of the pump and setting the pressure relief and back pressure valves.

NOTE **IMPORTANT: DO NOT Install an elbow directly into the discharge valve threaded fitting as it will create excessive back pressure that can lead to premature diaphragm failure.**

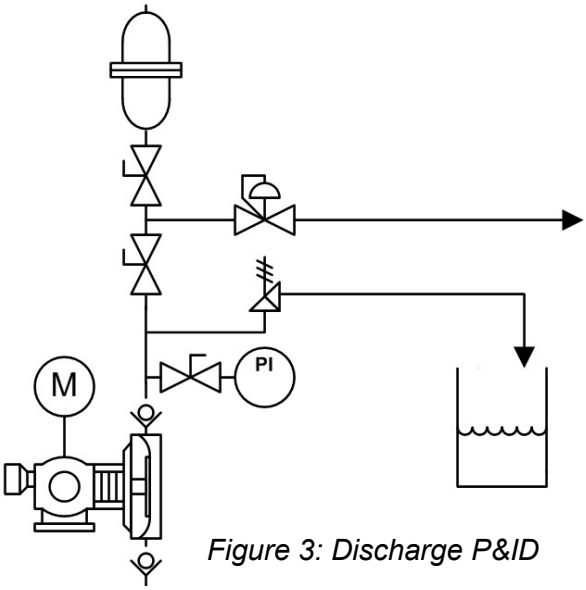



*Figure 3: Discharge P&ID*

**Pressure Relief Valve**: Install a Pressure Relief Valve as close to the pump as possible. Using the leg of a T fitting for this purpose is acceptable (with the normal discharge taking the straight path and the relief flow taking the leg). The relief pressure must be set at or below the rated pressure indicated on the pumps nameplate.

NOTE **NOTE: Failure to install and properly set a Pressure Relief Valve can lead to damage of the Pumps drive mechanism that will not be covered under warranty.**

**Back Pressure Valve:** Install a Back Pressure Valve to generate a consistent Back Pressure to the pump for accurate operation and to prevent siphoning.

**Pulsation Dampener:** Reciprocating diaphragm metering pumps only discharge fluid for ½ of a pump cycle. A Pulsation Dampener will smooth the associated flow/pressure variation to the down stream process.

**Piping System Recommendations**

1. When making the threaded joint to the valve cap assembly, use a sealing compound chemically compatible with the process material (for example Loctite® 8551 [Loctite is a registered Trademark of Henkel Corporation] for water service). Do not use sealing tape. The valve cap should be tightened by hand and then tightened 1 additional turn (i.e., 360 degrees) with the aid of an adjustable wrench.

2. Both new and existing piping should be cleaned, preferably by flushing with a clean liquid (compatible with process material) and blown out with air, prior to connection to the pump.


**Note - Debris from manufacturing the piping system (e.g., PVC shavings, TFE Tape, dirt, etc.) can be unknowingly assembled inside the pipe. When fluid is introduced this material can be transferred to the pump and prevent proper check valve operation. This is a common startup issue.**

3. Piping weight must **not** be supported by valve housings or other portions of the reagent head, as the resulting stresses can cause leaks. Valve loads must not exceed 10 FT-LBF (13.5 N-M) moment or 5 LBF (22N) in any direction. When temperature variations are expected provide for thermal expansion and contraction of piping components so that force and/or moments are controlled within the allowable range.

4. When making process connections, ensure that pipe joint cement and thread sealants do not run into the check valve assemblies as this will inhibit valve operation. This is a common startup issue.

## 2.4 Suction Pressure Requirements

Although GreenLine - GLM metering pumps have some suction lift capability, a flooded suction (i.e., suction pressure higher than atmospheric pressure) is preferable whenever possible. The pump should be located as close as possible to the suction side reservoir or fluid supply source.

For fluid with a vapor pressure of 5 psi (0.35 Bar) or less (at operating temperature) the wet suction lift capability is approximately 10 feet (3 meters). If this requirement is not met, the pump will not provide reliable, accurate flow. In suction lift conditions, the use of a foot valve is recommended at the lowest point of the pickup tube or pipe. Pumps operating under suction lift conditions may require some liquid priming before they will operate reliably.

## 2.5 Discharge Pressure Requirements

All GreenLine - GLM metering pumps are designed for continuous service at the rated discharge pressure. If the system suction pressure exceeds the discharge pressure (a condition sometimes described as “pumping downhill”), flow will be generated in addition to that generated by the pump. This results in a reduction in accuracy and loss of control over the metering process. To prevent this flow-through condition, the discharge pressure must exceed the suction pressure by at least 5 Psi (0.35 Bar). This can be achieved, where necessary, by the installation of a backpressure valve in the discharge line.

Conditions where the actual discharge pressure exceeds the pumps rating are to be avoided as they will cause damage to the pump components.

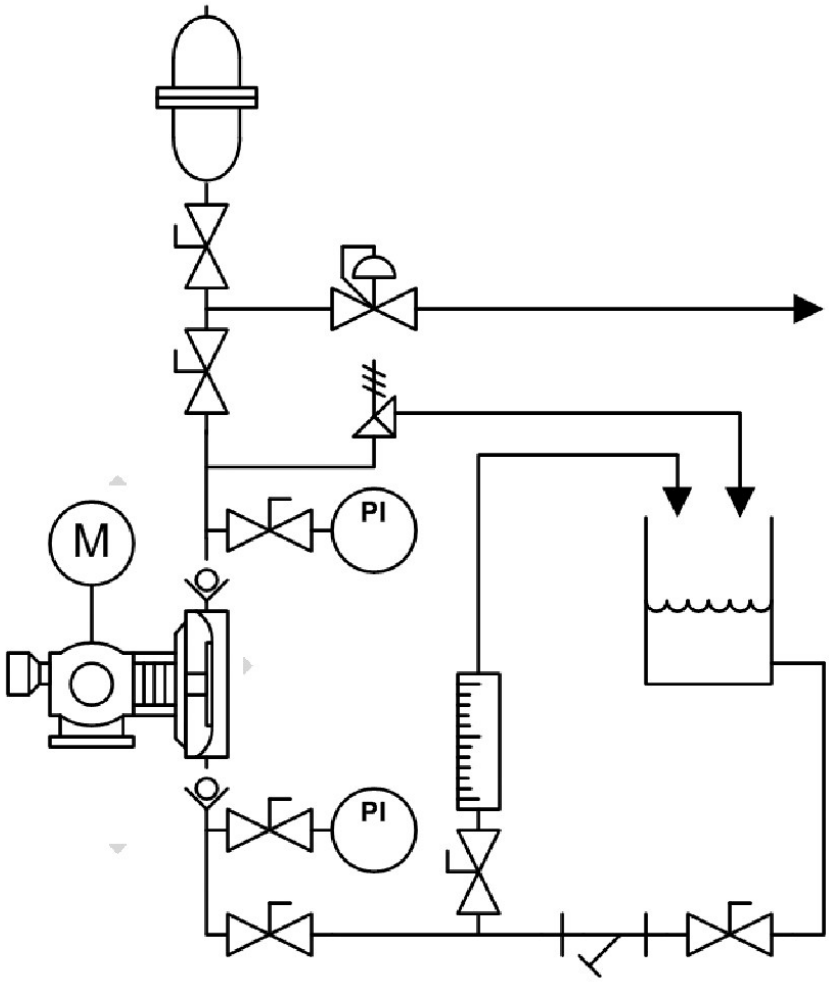



*Figure 4: GreenLine - GLM P&ID*

# 3. Equipment Startup

## 3.1 Fastener Inspection

All pump fasteners should be checked prior to pump operation, and occasionally during use. This would include reagent head mounting bolts, motor mounting bolts, and the hardware that secures the pump to its foundation.

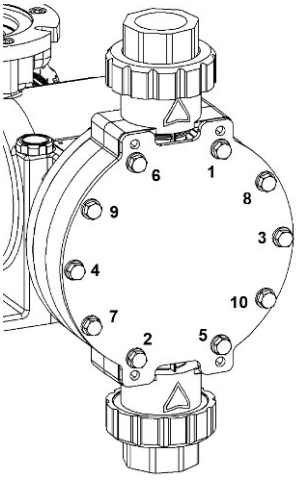
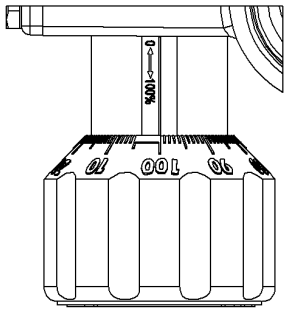



*Figure 5: Reagent Head Bolt tightening*

The motor mounting bolts should be torqued to 40 IN-LBS4 (4.5N-M). Reagent head mounting bolts should be torqued to 50 IN-LBS (5.6N-M) for DM1-3 and 70 IN-LBS (7.9N-M) for DM4-6. Bolts should be tightened in a star pattern across the head to assure uniform clamping of the diaphragm (see recommended tightening sequence in above diagram).

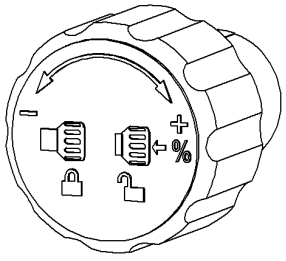
## 3.2 Output Adjustment




All GreenLine - GLM pumps have a knob for manual stroke length adjustment. The knob can be adjusted to any value between 0 to 100%. The stroke length setting is directly proportional the flow rate of the pump.

1. Push the knob in towards the gearbox to release the locking mechanism.

NOTE **Note - Making adjustments without releasing the lock may damage the locking mechanism.**




2. Adjust the knob to the desired output.
   a) Read the setting directly from the knob marking where it aligns with the stroke barrel.
   b) The knob is labeled in 10% increments with 1% graduation marks. The knob will lock in 0.5% increments.

NOTE **Note – Do not adjust the knob beyond the indicated range.**

*Figure 6: Stroke Adjustment Knob*

For example, to set the pump to 75% stroke length (starting from the factory default setting of 0%) push the knob in (to unlock) and turn it approximately ¾ turn clockwise until he 75% indicator is aligned with the line on the stroke adjustment barrel.

3. Release the knob to re-engage the locking mechanism.

NOTE **Note – Stroke adjustments should be made while pump is operating.**

## 3.3 Priming the Reagent Head

1. When handling process liquids, follow all applicable personal and facility safety guidelines.
2. Ensure that the pump is ready for operation and that all process connections are secure.
3. Open the suction and discharge line shutoff valves.
4. If the piping system design and the storage tank are such that the product flows due to gravity through the pump, reduce the discharge pressure and the system will self prime when the pump is started. In the event the discharge line contains a significant amount of pressurized air or other gas, it may be necessary to lower the discharge pressure to enable the pump to self-prime.
5. If the installation involves a suction lift, it may be necessary to prime the reagent head and suction line. Operate the pump as in step 4 above - many times the pump will be capable of self priming. If it does not begin to pump fluid, remove the discharge valve assembly. Carefully fill the reagent head through the discharge valve port with process (or compatible) liquid, and then reinstall the check valve.
6. Start the pump at the 0% stroke length setting and slowly increase the setting to 100% to prime the pump. If this does not work, it will be necessary to fill the suction line.
7. Filling of the suction line will necessitate the use of a foot valve or similar device at the end of the suction line so that liquid can be maintained above the reservoir level. Remove the suction valve assembly, fill the line with fluid, replace the suction valve, then remove the discharge valve assembly and fill the reagent head as described in Step 5 above. The pump will now self-prime when started up per step 6 above.


**Use appropriate precautions if handling process fluid. Ensure that any other fluid used for priming is compatible with the product that will be pumped.**

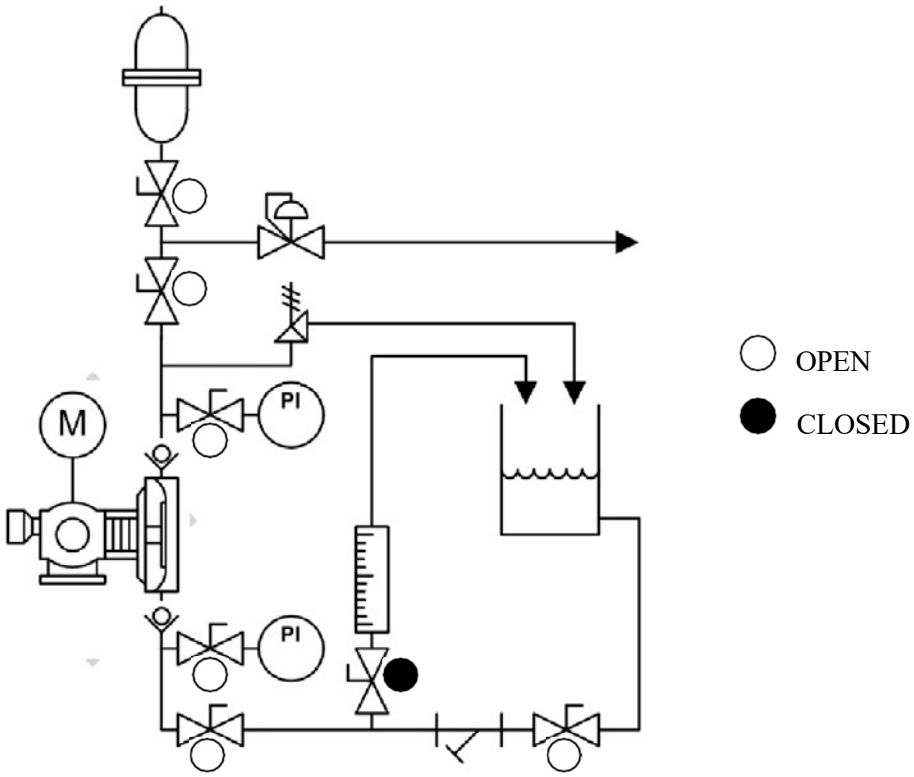



*Figure 7: System Configured for Self-Priming*

## 3.4 Calibration

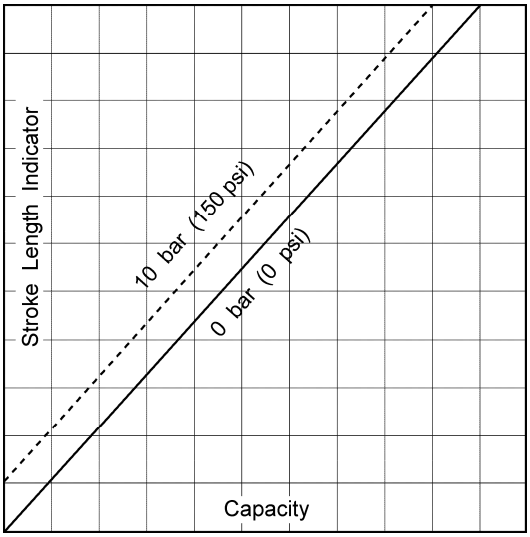



*Figure 8: Sample Flow Calibration Curve*

All metering pumps must be calibrated to accurately correlate stroke length settings to measured flow rates.

A typical calibration chart is shown above. Although output is linear with respect to the stroke length setting, an increase in discharge pressure decreases output uniformly, describing a series of parallel lines, one for each pressure (only two are shown).

The theoretical output flow rate at atmospheric discharge pressure is based on the displacement of the diaphragm, stroke length and the stroking rate of the pump. With increasing discharge pressure there is a corresponding decrease in output flow. Pumps are rated for a certain flow at a rated pressure (check nameplate). Whenever possible, calibration should be performed under actual process conditions (i.e., the same or a similar process liquid at system operating pressure).

To construct a calibration chart, measure the flow rate several times at three or more stroke settings (e.g., 25, 50, 75, and 100), plot these values on linear graph paper, and draw a best-fit line through the points. For stable conditions, this line should predict settings to attain required outputs.

NOTE

**Note - All users are encouraged to test the flow rate of their pump once installed in their system, to ensure better accuracy and reliable operation.**

# 4. Maintenance

WARNING

**BEFORE PERFORMING ANY MAINTENANCE REQUIRING REAGENT HEAD OR VALVE (WET END) DISASSEMBLY, BE SURE TO RELIEVE PRESSURE FROM THE PIPING SYSTEM AND, WHERE HAZARDOUS PROCESS MATERIALS ARE INVOLVED, RENDER THE PUMP SAFE TO PERSONNEL AND THE ENVIRONMENT BY CLEANING AND CHEMICALLY NEUTRALIZING AS APPROPRIATE. WEAR PROTECTIVE CLOTHING AND EQUIPMENT AS APPROPRIATE.**

Accurate records from the early stages of pump operation will indicate the type and levels of required maintenance. A preventative maintenance program based on such records will minimize operational problems. It is not possible to forecast the lives of wetted parts such as diaphragms and check valves. Since corrosion rates and operational conditions affect functional material life, each metering pump must be considered according to its particular service conditions.

The GreenLine - GLM KOPkit will contain all replacement parts normally used in a preventative maintenance program. It is recommended that KOPkits and GreenLine - GLM Gear Oil be kept available at all times.

## 4.1 Lubrication

GreenLine - GLM pumps have an oil bath reservoir that is pre-filled with 350mL of GreenLine - GLM Gear Oil at the factory. For optimum pump performance under normal conditions, the GreenLine - GLM Gear Oil should be replaced every 3,000 hours. For severe service in non-temperature controlled and/or dirty environments the GreenLine - GLM Gear Oil should be replaced every 1,500 hours.

1. Disconnect the power source to the drive motor, and relieve all pressure from the piping system.
2. Remove the Vent/Fill cap on top of the Gear Box under the motor adaptor lip.
3. Locate the Gear Box drain plug at the bottom of the Gear Box under the Stroke Adjustment Knob (see Figure below).
4. While holding the Gear Box over a catch reservoir, remove the drain plug (be sure to retain the sealing o-ring on the plug).
5. Replace the Drain Plug and sealing o-ring.
6. Fill the Gear Box with 350mL of GreenLine - GLM Gear Oil so that the level indicates in the center of the sight glass on the side.
7. Replace the Vent/Fill cap and sealing o-ring.

| Pulsafeeder Part No. | Description | Container Size |
|---|---|---|
| 9M-1GL | PULSALUBE PREMIUM 9M | 1 Gallon |
| 9M-1QT | PULSALUBE PREMIUM 9M | 1 Quart |

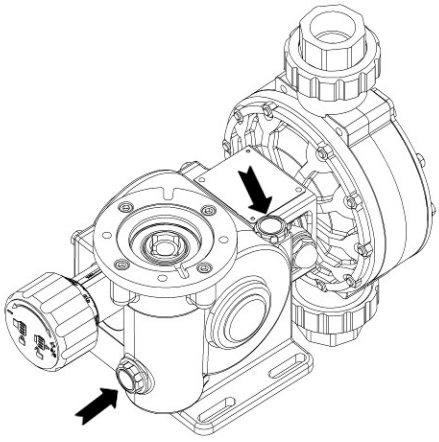


*Figure 9: Gear Box Fill/Drain Points*

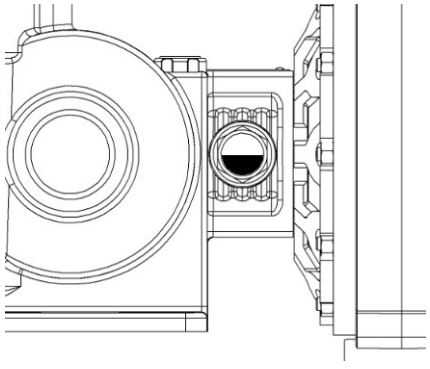


*Figure 10: Gear Box GreenLine - GLM Gear Oil Normal Level*

## 4.2 Wet End Removal, Inspection, & Reinstallation

**WARNING**

**IF THE DIAPHRAGM HAS FAILED, PROCESS FLUID MAY HAVE CONTAMINATED OTHER PARTS OF THE PUMP INCLUDING THE DRIVE COMPONENTS (ALTHOUGH NORMALLY, ANY PROCESS FLUID BEHIND A FAILED DIAPHRAGM WOULD PASS THROUGH THE BOTTOM DRAIN HOLE). HANDLE WITH APPROPRIATE CARE.**

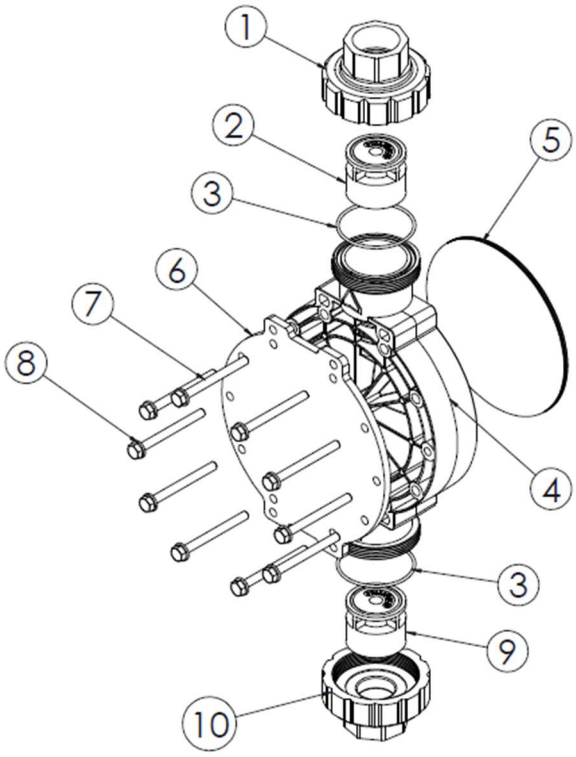



*Figure 11: Wet End Components*

| Item | Description | Qty. | | |
|---|---|---|---|---|
| | | DM1 and DM2 | DM3 and DM4 | DM5 and DM6 |
| 1 | Discharge Connection Assembly | 1 | 1 | 1 |
| 2 | Discharge Valve Assembly | 1 | 1 | 1 |
| 3 | O-ring | 2 | 2 | 2 |
| 4 | Reagent Head | 1 | 1 | 1 |
| 5 | Diaphragm | 1 | 1 | 1 |
| 6 | Front Cover Plate | 1 | 1 | 1 |
| 7 | Hex Head Bolt | 8 | 10 | 12 |
| 8 | Flat Washer | 8 | 10 | 12 |
| 9 | Suction Check Valve Assembly | 1 | 1 | 1 |
| 10 | Suction Connection Assembly | 1 | 1 | 1 |

GreenLine - GLM diaphragms do not have a specific cycle life; however, the accumulation of foreign material or debris sufficient to deform the diaphragm can eventually cause failure. Failure can also occur as a result of system over pressure or chemical attack. Periodic diaphragm inspection and replacement are recommended. Each user should perform regular inspections to determine the replacement interval that is appropriate to their system conditions.

### 4.2.1 Diaphragm Removal & Reinstallation

1. Adjust the stroke setting to 0% and disconnect the power source to the drive motor.
2. Relieve all pressure from the piping system.
3. Close the inlet and outlet shutoff valves.
4. Place a pan underneath the pump head adaptor to catch any liquid leakage.
5. Disconnect piping to the reagent head and drain any process liquid, following all recommended material safety precautions.
6. Remove all but one top reagent head bolt. Product will leak out between the pump head adaptor and reagent head as the bolts are loosened. Use prescribed engineering controls to prevent exposure and accidental discharge to environment.
7. Tilt the head and pour out any liquids retained by the check valves into a suitable container, continuing to follow safety precautions as appropriate.
8. Remove the final bolt and rinse or clean the reagent head with an appropriate material.
9. Remove the diaphragm by turning it counter-clockwise.
10. Inspect the diaphragm. The diaphragm must be replaced if it is cracked, separated, or obviously damaged.
11. Install the diaphragm.
    a) Ensure that the critical sealing areas of diaphragm, reagent head, and pump head are clean and free of debris.
12. Thread the diaphragm (clockwise) fully onto the shaft.
13. Install the reagent head bolts and tighten in an alternating pattern to ensure an even seating force. Torque bolts 50 IN-LBS (5.6N-M) for DM1-3 and 70 IN-LBS (7.9N-M) for DM4-6.
14. Re-prime the pump following the procedure outlined in ***Section 3.3***

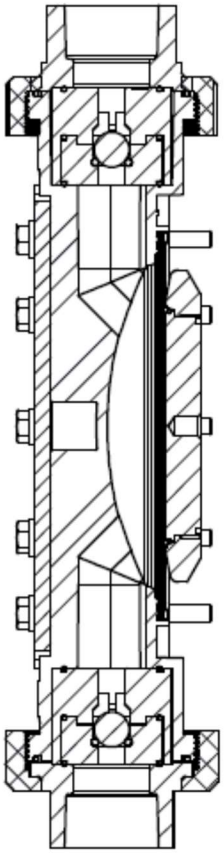


*Figure 12: Reagent Head Assembly Cross Section*

## 4.3 Check Valves

### 4.3.1 General Description

The valve incorporates a ball, guide, and seat. Flow in the unchecked direction lifts the ball off the seat, allowing liquid to pass through the guide. Reverse flow forces the ball down, sealing it against the bevel edge of the seat and o-ring. The guide permits the ball to rotate but restricts vertical and lateral movement in order to minimize “slip” or reverse flow. Ball rotation prolongs life by distributing wear over the entire surface of the ball. Since ball return is by gravity, the valve must be in the vertical position in order to function properly. Parts are sealed by o-rings.

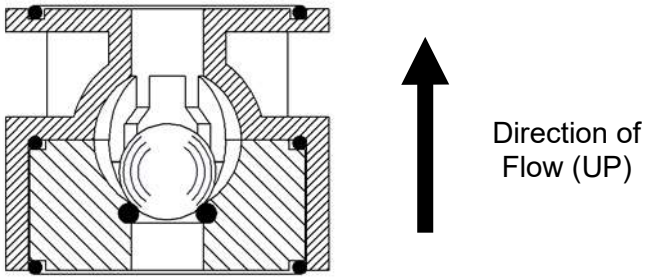



*Figure 13: Cartridge Check Valve*

### 4.3.2 Check Valve Removal & Reinstallation, Cartridge type

NOTE **Valving that is of the cartridge design is intended to be replaced as an assembly.**

1. Disconnect and Lockout the power supply to the drive motor.
2. Relieve all pressure from the piping system.
3. Take all precautions necessary to prevent contamination to the environment and personnel exposure to hazardous materials.
4. Close the inlet and outlet shutoff valves.
5. Disconnect the suction piping at the suction shut-off valve union by releasing the union retaining nut.

WARNING **Caution – Process fluid may drain from the Piping. Take necessary precautions.**

6. Disconnect the discharge piping at the discharge shut-off valve union by releasing the union retaining nut.

WARNING **Caution – Process fluid may drain from the piping. Take necessary precautions.**

7. Loosen and remove the suction valve cartridge retaining nut and drain any liquid from the reagent head.
8. Disconnect the discharge piping at the installed union near the discharge port.
9. Loosen and remove the discharge valve cartridge slowly to drain any trapped liquid.
10. Reinstall both new valve assemblies. For both the suction and discharge the valve orientation should be as shown in Figure 13.

NOTE **Take care to assure o-rings are fully seated in groves and are not displaced during assembly. A pinched o-ring can cause the assembly to leak. If necessary, use a compatible o-ring retaining compound.**

## 4.3.3 Check Valve Removal & Reinstallation, Tie-bar type

1. Disconnect and Lockout the power supply to the drive motor.
2. Relieve all pressure from the piping system.
3. Take all precautions necessary to prevent contamination to the environment and personnel exposure to hazardous materials.
4. Close the inlet and outlet shutoff valves.
5. Loosen the suction valve tie-bar bolts (4) and spring the suction piping slightly away from the head, allowing liquid to drain. It may be necessary to loosen a union or flange.

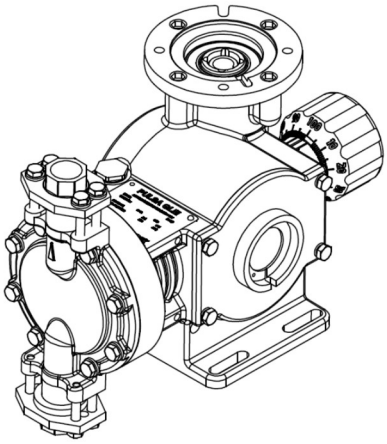


*Figure 14: Tie Bar Style Metal Valves*

WARNING **Caution – Process fluid may drain from the Piping. Take necessary precautions.**

6. Remove the suction check valve assembly by sliding it towards you, holding it together as a unit. Carefully note the position of the component parts, to assist in re-assembly.
7. Loosen the discharge valve tie-bar bolts (4) and spring the discharge piping slightly away from the head, allowing liquid to drain. It may be necessary to loosen a union or flange.

WARNING **Caution – Process fluid may drain from the Piping. Take necessary precautions.**

8. Remove the discharge check valve assembly by sliding it towards you, holding it together as a unit. Carefully note the position of the component parts, to assist in re-assembly.
9. Disassemble both valves and check components for wear or damage. The seats should have a sharp edge and be free from dents or nicks. Hold a ball firmly against the seat in front of a bright light and inspect for fit. Observation of light between the ball and seat is cause for replacement.
10. Reassemble both valves using new parts as required. Sealing o-rings should always be replaced.
11. Replace both valve assemblies onto the pump, taking care to ensure they are oriented correctly, with the balls above the seats, and the seats oriented with the sharp edge up and the chamfered edge down.

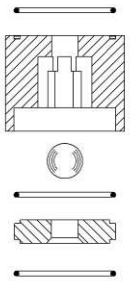


*Figure 15: Metal Valve*

NOTE **Inserting the check valve assembly into the pump in the wrong direction, or having the check seat upside down, will prevent proper seals at the o-rings, decrease pump performance, and can cause damage to the diaphragm.**

12. Carefully make sure that the check assemblies are in proper position, and tighten the four tie-bar bolts, using a star pattern, to a torque of 6 FT-LBS (8 N-M).
13. Retighten any unions, flanges, or other process connections that may have been loosened previously.

## 4.4 Motor Removal & Reinstallation

**Removal**

1. Disconnect and Lockout the power supply to the drive motor.
2. Disconnect the motor wiring from the motor.
3. Remove the four bolts retaining the motor to the motor adaptor.
4. The motor shaft is keyed to a plastic coupling that slides into a splined bore in the pump input shaft. Lift the motor straight up to slide the motor shaft coupling out of the pump input shaft.

**Installation**

1. Install the plastic coupling over the motor key onto the motor shaft. For the NEMA 56C frame motor the coupling should be installed over the shaft up to the collar (the end of the shaft will be slightly recessed into the coupling).

NOTE **Note: Assure the motor key is fully covered by the motor coupling.**

2. Reinstall the motor by sliding the motor vertically into the pump input shaft.
3. Align the motor bolts holes to the motor adaptor plate.
4. Install the 4 motor retaining bolts. Torque to 40 IN- LBF (4.5 N-M).
5. Connect the motor wiring to the motor in accordance with Local, National and Motor Manufacturer requirements.
6. Restore power.

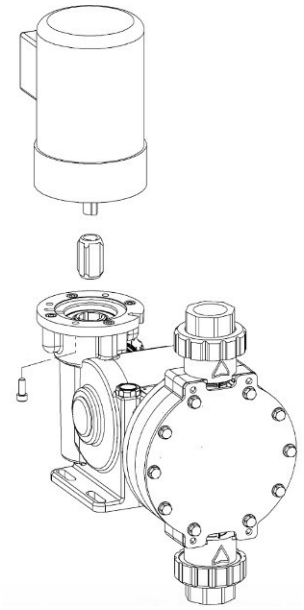


*Figure 16: Motor Mounting*

NOTE **The GreenLine - GLM is designed to operate with Motor rotation direction clockwise viewing from the fan side.**

## 4.5 Pump Head Removal

The GreenLine - GLM includes a Pump Head that clamps the diaphragm to the Reagent Head. In the event of diaphragm failure process fluid can come into contact with this part (it includes a drain hole to prevent fluid accumulation). Over time, it is possible for this part to suffer some level of deterioration and need replacement.

1. Disconnect and Lockout the power supply to the drive motor.
2. Relieve all pressure from the piping system.
3. Take all precautions necessary to prevent contamination to the environment and personnel exposure to hazardous materials.
4. Close the inlet and outlet shutoff valves.
5. Remove the Valving, Reagent Head and Diaphragm as described in section 4.2.1.
6. Drain the oil from the pump.
7. Set the pump stroke setting to 100%.
8. Rotate the pump motor until the Cross Head (the part that the Diaphragm threads onto) is fully retracted into the Gear Box.
9. Evenly loosen all (4) bolts that retain the Pump Head to the Gear Box.


**Warning – Stored energy release possible - use caution! The pump head compresses a large spring that is used to return the diaphragm to its retracted position. Special tools may be required to reattach the pump head.**

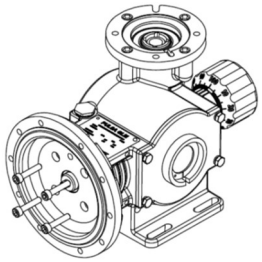
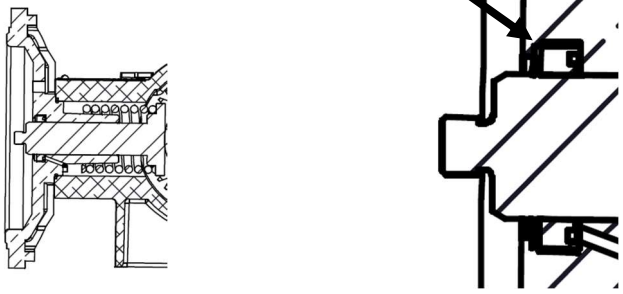


*Figure 17: Pump Head Retaining Bolt Removal*

10. Remove old pump head from front of Gear Box.



*18, Pump Head Cross Section and Lip Seal*

11. Orient replacement Pump Head with drain hole pointed down. Assure o-ring is in place on Gearbox side.
12. Ensure the lip oil seal is seated on the end of the cross head as shown above.
13. Insert Spring Guide of Pump Head over Cross Head and into spring. Take care to assure spring does not catch on tapered guide during installation.
14. Install the four retaining bolts. Tighten evenly. Torque to 70IN-LBF (7.9N-M) for DM1-DM2, 160IN-LBF (18.1N-M) for DM3-DM6

15. Install Diaphragm, Reagent Head and Valving as defined in Section 4.2.1.

NOTE **The O ring is quick-wear part. Need to change when leakage is happened.**

# 5. Replacement Parts

## 5.1 KOPkit Program

GreenLine - GLM KOPkits contain all replacement parts normally used in a preventative maintenance program. (*PULSAlube* is also available separately for preventative maintenance programs. Refer to ***Section 3 – Equipment Startup***). There is a specific KOPkit for every GreenLine - GLM pump model. Each KOPkit is vacuum-packed for extended storage. All GreenLine - GLM pumps have the KOPkit number identified on the pump nameplate and Pulsafeeder order documents. KOPkits can also be selected from the technical data sheet shipped with the pump or by a Pulsafeeder representative. A list of the GreenLine - GLM KOPkit numbers can also be found on the next page. The kit is identified by the model number of the pump, the wetted end material, and the process connection thread type. For models with tie-bar type check valves, the appropriate components (check valve balls, seats, and o-rings) are supplied instead of the cartridges pictured.

## 5.2 Ordering KOPkits or Parts

When ordering replacement parts always specify:

- Pump model and serial number (from pump nameplate), e.g., Model No. DM1AVFC with Serial No. 1234567.

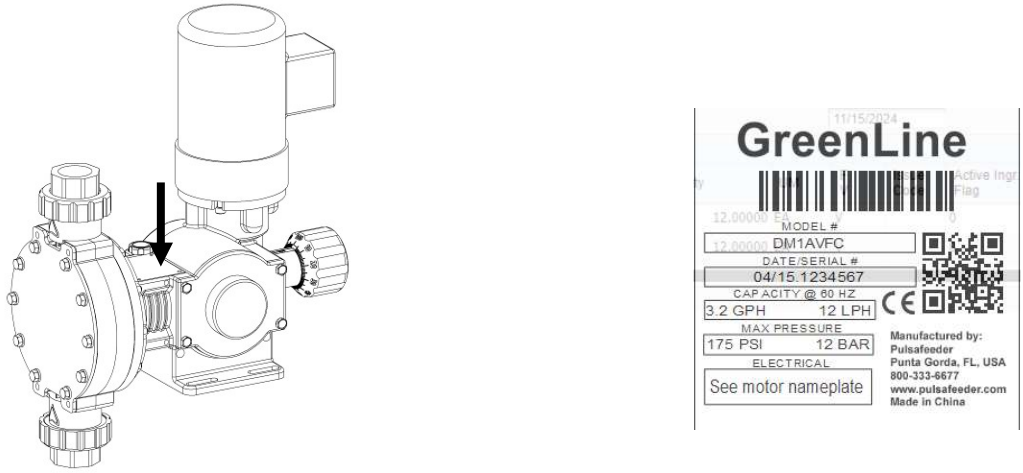



*Figure 19: GreenLine - GLM Nameplate*

- Part number and description from the GreenLine - GLM parts list. Include the three-character suffix. (Note: GreenLine - GLM part numbers begin either with the letters **NP**, or the letter **W**, e.g., NP170001- THY or W210221-001.)

## 5.3 KOPkit numbers by model:

| Pump Model | Wetted Material | KOPkit Number (W/O LD) | KOPkit Number (WITH LD) |
|---|---|---|---|
| **DM1** | **PVDF** | KD1FX | KD1FL |
| **DM2** | | KD2FX | KD2FL |
| **DM3** | | KD3FX | KD3FL |
| **DM4** | | KD4FX | KD4FL |
| **DM5** | | KD5FX | KD5FL |
| **DM6** | | KD6FX | KD6FL |
| **DM7 & DM7 Duplex** | | KD7FX | KD7FL |
| **DM1** | **316SS** | KD1AX | KD1AL |
| **DM2** | | KD2AX | KD2AL |
| **DM3** | | KD3AX | KD3AL |
| **DM4** | | KD4AX | KD4AL |
| **DM5** | | KD5AX | KD5AL |
| **DM6** | | KD6AX | KD6AL |
| **DM7 & DM7 Duplex** | | KD7AX | KD7AL |

# 6. Troubleshooting

| Difficulty | Probable Cause | Remedy |
|---|---|---|
| **Pump motor does not start** | Faulty power source. | Check power source. |
| | Blown fuse, circuit breaker. | Replace - eliminate overload. |
| | Broken wire. | Locate and repair. |
| | Wired improperly. | Check diagram. |
| | Process piping blockage. | Open valves, clear other obstructions. Test by setting stroke to 0%. |
| **No fluid delivery** | Motor not running. | Check power source. Check wiring diagram (see above). |
| | Supply tank empty. | Fill tank. |
| | Line clogged. | Clean and flush. |
| | Closed in-line valve(s). | Open valve(s). |
| | Ball check valves held open with solids. | Clean – inspect, flush with clear fluid. |
| | Vapor lock, cavitation. | Increase suction pressure. |
| | Prime lost. | Re-prime, check for leak. |
| | Strainer clogged. | Remove and clean. Replace screen if necessary. |
| | Stroke adjustment set at zero. | Increase stroke length setting. |
| **Low fluid delivery** | Motor speed too low. | Check voltages, frequency, wiring, and terminal connections. Check nameplate vs. Specifications. |
| | Check valves worn or dirty. | Clean, replace if damaged. |
| | Calibration system error. | Evaluate and correct. |
| | Product viscosity too high. | Lower viscosity by increasing product temperature or dilution. Increase pump and/or piping size. |
| | Product cavitating. | Increase suction pressure. |
| **Delivery gradually drops.** | Check valve leakage. | Clean, replace if damaged. |
| | Leak in suction line. | Locate and correct. |
| | Strainer fouled. | Clean or replace screen. |
| | Product change. | Check viscosity and other variables. |
| | Supply tank vent plugged. | Unplug vent. |
| **Delivery erratic.** | Leak in suction line. | Locate and correct. |
| | Product cavitating. | Increase suction pressure. |
| | Entrained air or gas in product. | Consult factory for suggested venting. |
| | Motor speed erratic. | Check voltage and frequency. |
| | Fouled check valves. | Clean, replace if necessary. |
| | Inadequate backpressure | Increase discharge pressure to obtain a minimum pressure difference of 5 psi from suction to discharge. |
| **Delivery higher than rated.** | Suction pressure higher than discharge pressure. | Install backpressure valve or consult factory for piping recommendations. |
| | Back pressure valve set too low. | Increase setting. |
| | Back pressure valve leaks. | Repair, clean, or replace. |
| | | |
| **Noisy gearing, knocking** | Discharge pressure too high. | Reduce pressure. |
| | Water hammer. | Install pulsation dampener. |
| | Stroke length at partial setting. | Some operating noise is characteristic of lost motion pumps. |
| | Low grease level. | Add or replace grease. |

| Difficulty | Probable Cause | Remedy |
|---|---|---|
| **Piping noisy.** | Pipe size too small. | Increase size of piping - install pulsation dampener. |
| | Pipe runs too long. | Install pulsation dampener in line. |
| | Pulsation dampener inoperative or flooded. | Refill with air or inert gas. Inspect and replace diaphragm and recharge. |
| | No surge chamber or dampener used. | Install pulsation dampeners. |
| **Motor overheats.** | Pump overloaded. | Check operating conditions against pump design. Verify discharge pressure. |
| | High or low voltage. | Check power source. |
| | Loose wire. | Trace and correct. |
| | Incorrect motor wiring. | Verify and correct. |

# 7. Piping Accessories

### Pressure Relief Valves

Pressure relief valves are designed to protect chemical feed systems from damage that may be caused by defective equipment or a blockage in the discharge line. These valves function to limit the pressure downstream of the pump. Field adjust the pressure relief valve to operate when the discharge pressure exceeds operating pressure by 10-15%. Pressure relief valve should always be adjusted to a setting below the maximum rated pressure of the pump. No potentially restrictive components, such as a valve, should be installed between the pump discharge and the PRV.

### Diaphragm Backpressure Valve

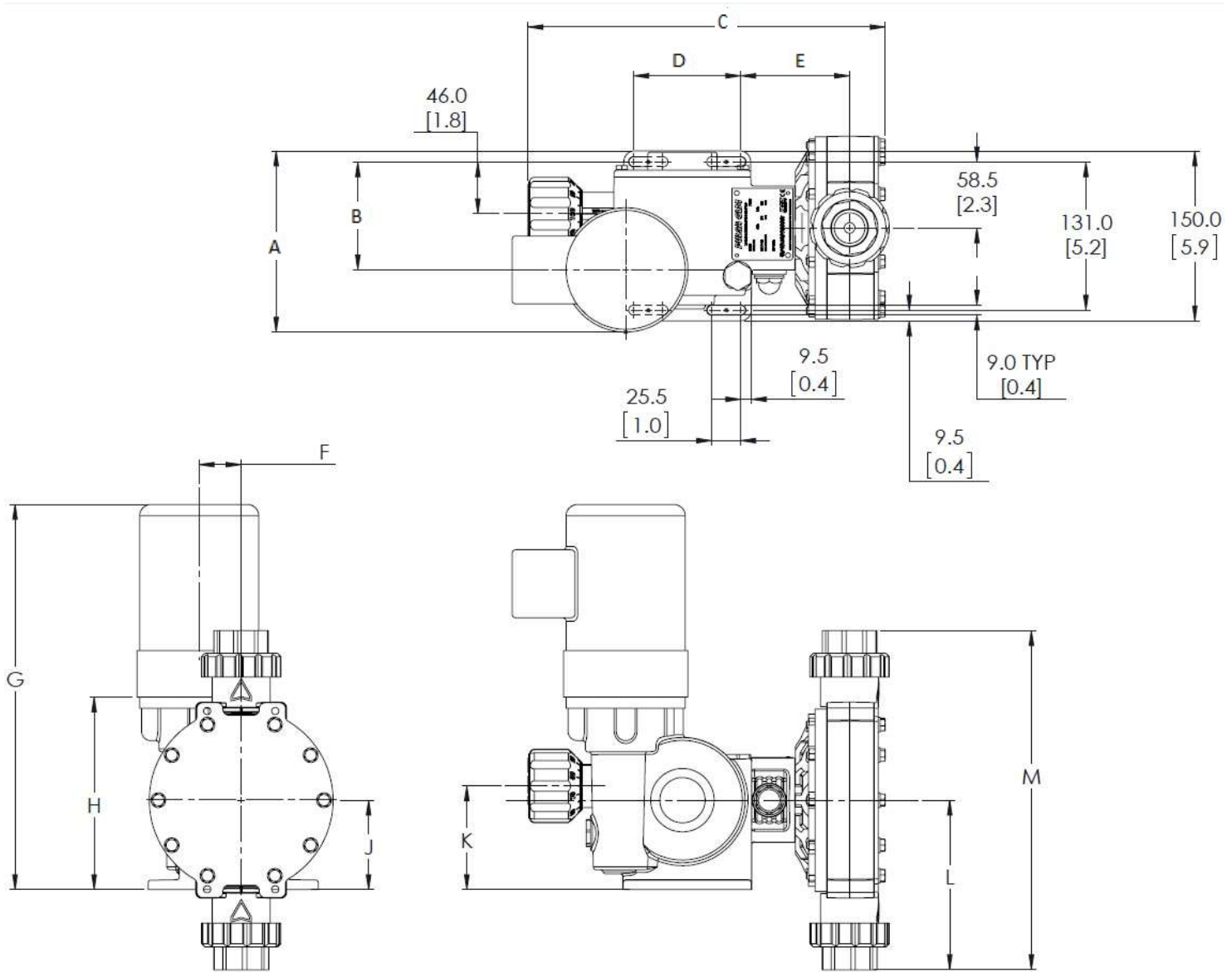
A diaphragm style backpressure valve creates constant back pressure. A PTFE or PTFE-faced diaphragm offers better chemical protection and service life, and seals spring and bonnet from product.

Be sure to install with fluid flow in direction of arrow on valve body.

### Pulsation Dampener

A pulsation dampener is a pneumatically charged diaphragm-type chamber that intermittently stores hydraulic energy. Used on the inlet, it can improve NPIPa (Net Positive Inlet Pressure Available) characteristics of the suction piping system. On the discharge line it will reduce discharge pressure peaks and pulsating flow variations.

# 8. Dimensional Drawing




Dimension table in mm / inches

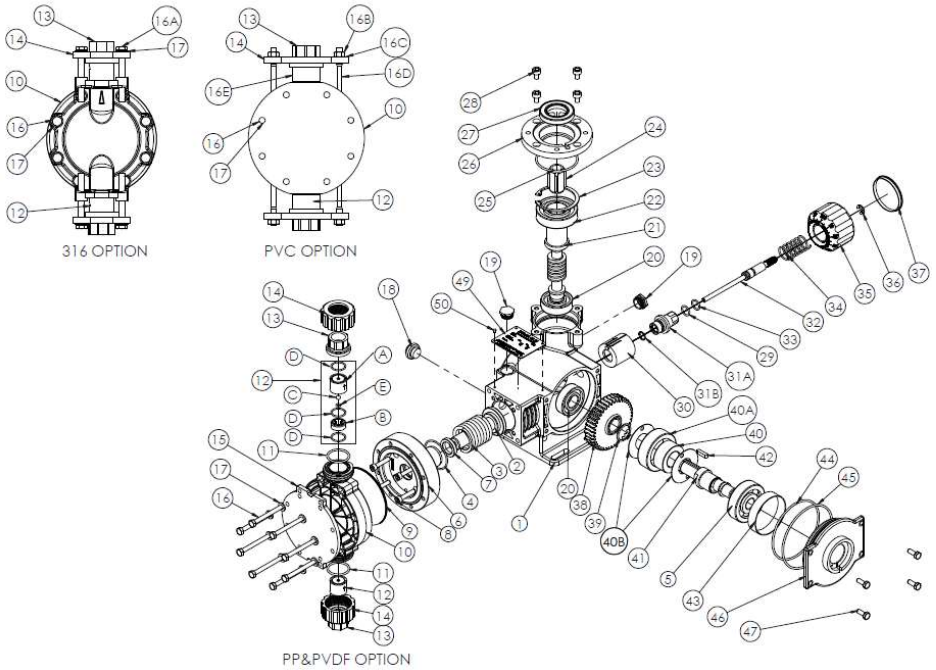
Dimensions are with standard NEMA56C frame motor

Dimensions are measured with standard motor and VF motor

| Model | Dimension | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | | B | C Without LD | C With LD | D | E Without LD | E With LD | F |
| DM1 | NEMA 56C | 192.6 / 7.6 | 95.5 / 3.8 | 300.0 / 11.8 | 322.0 / 12.7 | 94.5 / 3.7 | 85.5 / 3.4 | 107.5 / 4.2 | 37.0 / 1.5 |
| DM2 | NEMA 56C | 192.6 / 7.6 | 95.5 / 3.8 | 300.0 / 11.8 | 322.0 / 12.7 | 94.5 / 3.7 | 85.5 / 3.4 | 107.5 / 4.2 | 37.0 / 1.5 |
| DM3 | NEMA 56C | 192.6 / 7.6 | 95.5 / 3.8 | 315.0 / 12.4 | 339.0 / 13.3 | 94.5 / 3.7 | 95.8 / 3.7 | 119.8 / 4.7 | 37.0 / 1.5 |
| DM4 | NEMA 56C | 192.6 / 7.6 | 95.5 / 3.8 | 315.0 / 12.4 | 339.0 / 13.3 | 94.5 / 3.7 | 95.8 / 3.7 | 119.8 / 4.7 | 37.0 / 1.5 |
| DM5 | NEMA 56C | 192.6 / 7.6 | 95.5 / 3.8 | 325.0 / 12.8 | 349.0 / 13.7 | 94.5 / 3.7 | 99.3 / 3.9 | 123.3 / 4.9 | 37.0 / 1.5 |
| DM6 | NEMA 56C | 192.6 / 7.6 | 95.5 / 3.8 | 325.0 / 12.8 | 349.0 / 13.7 | 94.5 / 3.7 | 99.3 / 3.9 | 123.3 / 4.9 | 37.0 / 1.5 |

| Model | Dimension | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | G(Common Motor) | | H | J | K | L | | M | |
| DM1 | NEMA 56C | 449.5/17.7 | 175.0/6.9 | 79.0/3.1 | 91.5/3.6 | 103.0/4.1 | TUBING | 206.0/8.1 | TUBING |
| DM2 | NEMA 56C | 449.5/17.7 | 175.0/6.9 | 79.0/3.1 | 91.5/3.6 | 103.0/4.1 | TUBING | 206.0/8.1 | TUBING |
| DM3 | NEMA 56C | 449.5/17.7 | 175.0/6.9 | 79.0/3.1 | 91.5/3.6 | 150.0/5.9 | NG | 300.0/11.8 | NG |
| DM4 | NEMA 56C | 449.5/17.7 | 175.0/6.9 | 79.0/3.1 | 91.5/3.6 | 150.0/5.9 | NG | 300.0/11.8 | NG |
| DM5 | NEMA 56C | 449.5/17.7 | 175.0/6.9 | 79.0/3.1 | 91.5/3.6 | 172.0/6.8 | NG | 344.0/13.5 | NG |
| DM6 | NEMA 56C | 449.5/17.7 | 175.0/6.9 | 79.0/3.1 | 91.5/3.6 | 172.0/6.8 | NG | 344.0/13.5 | NG |

# 9. Parts Diagrams and Item Numbers

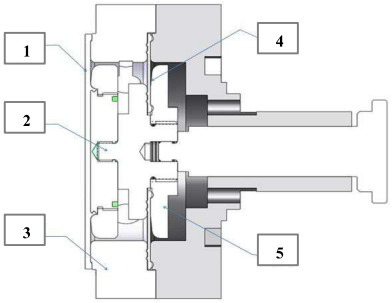



| Item Number | Description | QTY / PUMP | Part Number (DM1) | Part Number (DM2) | Part Number (DM3) | Part Number (DM4) | Part Number (DM5) | Part Number (DM6) |
|---|---|---|---|---|---|---|---|---|
| 1 | GEARBOX | 1 | GL010001-ALU | | | | | |
| 2 | CROSSHEAD | 1 | GL120001-000 | | | | | |
| 3 | RETURN SPRING | 1 | GL430001-000 | | | | | |
| 4 | GASKET | 1 | GL440002-NTR | | | | | |
| 5 | LARGE BEARING | 1 | GL400006-000 | | | | | |
| 6 | PUMP HEAD | 1 | GL150001-000 | | GL150002-000 | | GL150003-000 | |
| 7 | LIP SEAL | 1 | GL450003-000 | | | | | |
| 8 | PMP HEAD BOLT | 4 | GL990007-STL | | | | | |
| 9 | DIAPHRAGM ASSY | 1 | GL170013-074 | | GL170014-118 | | GL170015-145 | |
| 10 | REAGENT HEAD (P) | 1 | GL160001-FPP | | GL160002-FPP | | GL160008-FPP | |
| | REAGENT HEAD (F) | | GL160001-PVD | | GL160002-PVD | | GL160008-PVD | |
| | REAGENT HEAD (C) | | GL160001-PVC | | GL160002-PVC | | GL160008-PVC | |
| | REAGENT HEAD (A) | | GL160004-000 | | GL160005-000 | | GL160006-316 | |
| 11 | BACKUP SEAL(P&F) | 2 | NP440123-VTN | | NP440136-VTN | | NP440144-VTN | |
| | BACKUP SEAL (A&C) | N/A | N/A | | | | | |
| 12 | VALVE ASSY (P&F) | 2 | GL87XLFVCA-XXXX | GL87XLFVCC-XXXX | GL87XLFVEE-XXXX | | GL87XLFVFJ-XXXX | |
| | VALVE ASSY (C) | 2 | GL87XLCVCA-XXXX | GL87XLCVCC-XXXX | GL87XLCVEE-XXXX | | GL87XLCVFJ-XXXX | |
| 12A | VALVE GUIDE (P&F&C) | 2 | GL310001-PVD | GL310005-PVD | GL310002-PVD | | GL310004-PVD | |
| 12B | VALVE SEAT (P&F&C) | 2 | GL330006-PVD | GL330005-000 | GL330002-000 | | GL330004-000 | |
| 12C | BALL (P&F&C) | 2 | L1000400-ALA | W032580-ALA | W041935-ALA | | W034581-ALA | |
| 12D | VALVE SEALS (P&F) | 6 | NP440018-TFE | | NP440027-TFE | | NP440031-TFE | |
| | VALVE SEALS (C) | 6 | NP440018-VTN | | NP440027-VTN | | NP440031-VTN | |
| 12E | ORING SEAT (P&F&C) | 2 | N/A | N/A | NP440110-VTN | | NP440210-VTN | |

| Item Number | Description | QTY / PUMP | Part Number (DM1) | Part Number (DM2) | Part Number (DM3) | Part Number (DM4) | Part Number (DM5) | Part Number (DM6) |
|---|---|---|---|---|---|---|---|---|
| 12 | VALVE ASSY (A) | 2 | GL87XAATCA-XXXX | GL87XAATCC-XXXX | GL87XAATEE-XXXX | | GL87XAATFJ-XXXX | |
| 12A | VALVE GUIDE (A) | 2 | GL310006-000 | GL310007-000 | GL310008-000 | | GL310010-000 | |
| 12B | VALVE SEAT (A) | 2 | GL330006-316 | GL330007-316 | GL330008-316 | | GL330010-316 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12C | BALL (A) | 2 | W046646-316 | W032580-316 | W041935-316 | W034581-316 |
| 12D | VALVE SEALS (A) | 6 | NP440018-TFE | NP440018-TFE | NP440027-TFE | NP440031-TFE |
| 12E | ORING SEAT (A) | N/A | N/A | | | |
| 13 | VALVE CAP (PT) | 2 | GL300001-FPP, L1100400- FPP | | N/A | N/A |
| | VALVE CAP (FT) | | GL300001-PVD, L1100400- FPP | | N/A | N/A |
| | VALVE CAP (P) | | GL300002-FPP | | GL300003-FPP | GL300004-FPP |
| | VALVE CAP (F&C) | | GL300002-NVD | | GL300003-NVD | GL300004-NVD |
| | VALVE CAP (A) | | GL300005-NPT | | GL300006-NPT | GL300007-NPT |
| 14 | UNION NUT (P) | 2 | GL360001-FPP | | GL360002-FPP | GL360003-FPP |
| | UNION NUT (F) | | | | | GL360003-PVD |
| | TIE BAR (C) | | HM050078-STL | | HM050080-STL | HM050082-STL |
| | TIE BAR (A) | | GL360004-STL | | GL360005-STL | GL360006-STL |
| 15 | PLATE (P&F ONLY) | 1 | GL140011-STL | | GL140012-STL | GL140013-STL |
| 16 | RH BOLT(P&F&A) | -- | GL990008-188 (8) | | GL990008-188 (10) | GL990001-188 (12) |
| | RH BOLT(C) | -- | | | | GL990006-188 (12) |
| 16A | VALVE BOLT | 8 | GL990002-188 | | GL990004-188 | GL990004-188 |
| 16B | VALVE NUT | 4 | NP991217-188 | | NP991219-188 | NP991219-188 |
| 16C | VALVE WASHER | 4 | NP991017-188 | | NP991019-188 | NP991019-188 |
| 16D | VALVE BOLT | 2 | HM953001-188 | | HM953000-188 | HM953002-188 |
| 16E | VALVE COVER | 2 | HM050079-STL | | HM050081-STL | HM050083-STL |
| 17 | RH WASHER | -- | NP991017-188 (8) | | NP991017-188 (10) | NP991017-188 (12) |
| 18 | OIL SIGHT GLASS | 1 | GL994001-000 | | | |
| 19 | OIL PLUG | 2 | GL030002-001 | | | |
| | | | NP440014-NTR | | | |
| 20 | SMALL BEARING | 2 | GL400002-000 | | | |
| 21 | WORM SHAFT | 1 | N/A(Customer provides model number to factory to get the PN for replacement) | | | |
| 22 | UPPER BEARING | 1 | GL400003-000 | | | |
| 23 | RETAINING RING | 1 | GL995001-STL | | | |
| 24 | COUPLING | 1 | GL410001-56C | | | |
| 25 | GASKET | 1 | NP440141-NTR | | | |
| 26 | MOTOR ADAPTOR | 1 | GL490002-ALU | | | |
| 27 | MOTOR SEAL | 1 | GL450002-000 | | | |
| 28 | ADAPTOR BOLTS | 4 | NP990024-188 | | | |
| 29 | GASKET | 1 | GL440001-NTR | | | |
| 30 | BARREL | 1 | GL410002-000 | | | |
| 31 | STROKE LABEL | 1 | N/A | | | |
| 31A | OUTER ADJ SHAFT | 1 | GL410005-001 | GL410005-003 | GL410005-004 | GL410005-006 |
| 31B | SNAP RING | 1 | GL995004-STL | | | |
| 32 | INNER ADJ SHAFT | 1 | GL410004-001 | GL410004-003 | GL410004-004 | GL410004-006 |
| 33 | GASKET | 1 | NP440012-NTR | | | |
| 34 | LOCK SPRING | 1 | GL430002-000 | | | |
| 35 | STROKE KNOB | 1 | GL260001-000 | | | |
| 36 | STROKE | 1 | GL995003-STL | | | |
| 37 | STROKE CAP | 1 | GL250002-PEB | | | |
| 38 | GEAR | 1 | N/A(Customer | | | |
| 39 | RETAINING RING | 1 | GL995002-STL | | | |
| 40 | INNER ECC | 1 | GL400005-000 | | | |
| 40A | OUTER ECC BEARING | 1 | GL400004-000 | | | |
| 40B | SPACER | 2 | GL470001-STL | | | |
| 41 | ECC SHAFT | 1 | GL070001- 001 | | | |
| 42 | GEAR KEY | 1 | GL420001-STL | GL070001-003 | GL070001-004 | GL07000 1-006 |
| 43 | TOLERANCE RING | 1 | NP470002-000 | | | |
| 44 | INNER GASKET | 1 | HM955009-NTR | | | |
| 45 | OUTER GASKET | 1 | Delete based on design change | | | |
| 46 | SIDE CAP | 1 | GL030001-ALU | | | |
| 47 | SIDE CAP BOLTS | 4 | NP990415-188 | | | |
| 48 | COVER | 1 | NP530138-PVC | | | |
| 49 | PUMP TAG | 1 | GL550001-000 | | | |
| 50 | TAG BOLTS | 2 | W771000-188 | | | |

# 10. Leak Detection Parts Diagrams &Item Numbers




## 10-1 Leak Detection BOM List

| Item Number | Description | QTY / PUMP | Part Number (DM1) | Part Number (DM2) | Part Number (DM3) | Part Number (DM4) | Part Number (DM5) | Part Number (DM6) |
|---|---|---|---|---|---|---|---|---|
| 1 | DIAPHRAGM ASSY | 1 | GL170013-074 | | GL170014-118 | | GL170015-145 | |
| - | Leak Detection DIAPHRAGM ASSY (Item Number 2,4,5) | 1 | GL89CS00-SZ | | GL89ES00-SZ | | GL89FS00-SZ | |
| 3 | SPACER RING(P&F) | 1 | GL180001-PPL | | GL180002-PPL | | GL180003-PPL | |
| | SPACER RING(C) | | GL180001-PVC | | GL180002-PVC | | GL180003-PVC | |
| | SPACER RING(A) | | GL180001-316 | | GL180002-316 | | GL180003-316 | |
| - | SWITCH,LEAK DETECTION | 1 | NP530227-000 | | | | | |
| - | GAUGE | 1 | NP560030-316 | | | | | |
| - | 1/4" NPT PIPE PLUG, 316 SS | 1 | NP990544-188 | | | | | |

## 10-2 Leak Detection Kit-Wet Hardware

| KIT-WET | QTY / PUMP | Part Number (DM1&DM2) | Description |
|---|---|---|---|
| **Component Part No.** | / | **GL93SCCKKS-XXXX** | Kit-Wet Hardware-Plastic Pump Head |
| Material Bill List (Plastic Pump Head) | 8 | GL990009-188 | M6-1.00X90 BOLT HEX HD |
| | 8 | NP991017-188 | M 6 FLT NARR WSHR |
| **Component Part No** | / | **GL93SCCBBS-XXXX** | Kit-Wet Hardware-Metal Pump Head |
| Material Bill List (Metal Pump Head) | 8 | GL990002-188 | M 6-1.00 X 35 HEXHD BOLT |
| | 8 | NP990541-188 | M 6-1.00 X 80 BOLT HEXHD 933 |
| | 16 | NP991017-188 | M 6 FLT NARR WSHR |

| KIT-WET | QTY / PUMP | Part Number (DM3&DM4) | Description |
|---|---|---|---|
| **Kits Part No** | / | **GL93SCEKKS-XXXX** | Kit-Wet Hardware- Plastic Pump Head |
| Material Bill List (Plastic Pump Head) | 10 | GL990009-188 | M6-1.00X90 BOLT HEX HD |
| | 10 | NP991017-188 | M 6 FLT NARR WSHR |
| **Kits Part No** | / | **GL93SCEBBS-XXXX** | Kit-Wet Hardware-Metal Pump Head |
| Material Bill List (Metal Pump Head) | 10 | GL990009-188 | M6-1.00X90 BOLT HEX HD |
| | 8 | GL990004-188 | M 6-1.00X55 BOLT HEX |
| | 18 | NP991017-188 | M 6 FLT NARR WSHR |

| KIT-WET | QTY / PUMP | Part Number (DM5&DM6) | Description |
|---|---|---|---|
| **Kits Part No** | / | **GL93SCFKKS-XXXX** | Kit-Wet Hardware-Plastic Pump Head |
| Material Bill List (Plastic Pump Head) | 12 | GL990009-188 | M6-1.00X90 BOLT HEX HD |
| | 12 | NP991017-188 | M 6 FLT NARR WSHR |
| **Kits Part No** | | **GL93SCFBBS-XXXX** | Kit-Wet Hardware Metal Pump Head |
| Material Bill List (Metal Pump Head) | 12 | GL990009-188 | M6-1.00X90 BOLT HEX HD |
| | 8 | GL990006-188 | M 6-1.00 X 75 BOLT HEXHD |
| | 20 | NP991017-188 | M 6 FLT NARR WSHR |

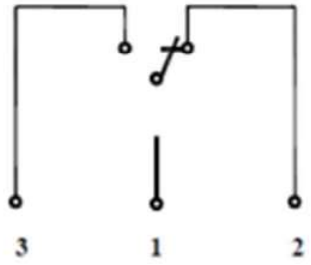
# 11. LEAK DETECTION PRESSURE SWITCH

a. **Function.** Pressure switch has an internal piston and precision spring, is ideal for high pressure resistance and long service life and is designed for small size and excellent sealing. Switch will allow for alarm indication when the pressure reaches a set value.

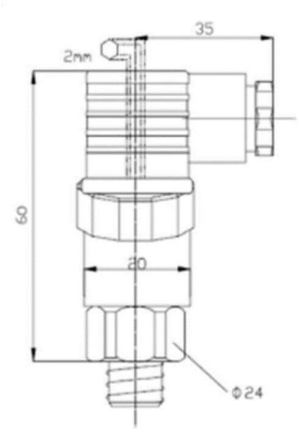
b. **Features.** Small and economical, the switch has standard DIN connections, is easy to wire and has a wide measuring range, with high capacity overload and NO and NC contacts.

c. **Specification.**
   - **i.** Range: 11.6-360 psi (0.8-24.8 bar)
   - **ii.** Retardation: 10-20% set value
   - **iii.** Output: NO + NC (SPDT)
   - **iv.** Voltage: 24VDC +/- 20%
   - **v.** Amperage: 0.5A
   - **vi.** Medium Temperature: 32F to 176F (0C to 80C)
   - **vii.** Environment Temperature: -13F to 176F (-25C to 80C)
   - **viii.** Lifetime: 1x10E6 Cycles
   - **ix.** IP Grade: IP65

d. **Wiring Diagram:**




e. **Dimensions (mm):**




**f. Installation:**

i. Install gauge and switch with Teflon® tape
ii. Gauge and switch locations and orientation can be as needed
iii. Maximum torque for gauge and switch is 120 in-lb.

# Policies and Procedures

**1. Manufacturer's Equipment Warranty**

a. Pulsafeeder warrants all pumps and controllers of its manufacture to be free of defects in material or workmanship. Liability under this policy extends for 24 months from the date of shipment. The manufacturer's liability is limited to repair or replacement of any failed equipment or part which is proven defective in material or workmanship upon manufacturer's examination. This warranty does not include removal or installation costs and in no event shall the manufacturer's liability exceed the selling price of such equipment or part.

b. The manufacturer disclaims all liability for damage to its products through improper installation, maintenance, use or attempts to operate such products beyond their functional capacity, intentionally or otherwise, or any other unauthorized repair. The manufacturer is not responsible for consequential or other damages, injuries or expense incurred through the use of its products.

c. The above warranty is in lieu of any other warranty, whether expressed or implied. The manufacturer makes no warranty of fitness or merchantability. No agent of ours is authorized to provide any warranty other than the above.

**2. Pulsafeeder's Parts and Accessory Warranty**

a. Pulsafeeder, Inc. warrants parts and accessories provided to be free of defects in material or workmanship. Unless otherwise noted below, liability under this policy extends for 90 days from date of shipment from the factory when sold as service parts. (Any pump warranty claim due to a replaceable elastomeric part (PTFE) is not covered by any warranty, either expressed or implied)

b. This policy is extended to a full 12 months from the date of installation or 18 months from shipment from the factory whichever comes first on the following accessories;

| | | |
|---|---|---|
| Digital Glycol Feeders | Pre-Engineered Systems | Corrosion Coupon Racks |
| Analog Timers | Water Meters | Flow Controllers |

c. Toroidal probes are warranted for 24 months from date of shipment from the factory when purchased as a spare.
MicroVision EX when purchased as a spare a part is warranted for 24 months.
All other electrodes/probes and sensors are considered maintenance items and such are warranted for six (6) months from the date of shipment when purchased in conjunction with the controller.
Any electrodes/probes other than toroidal and sensors purchased as spare parts are warranted for 90 days from date of shipment.

d. The manufacturer's liability is limited to repair or replacement of any failed equipment or part which is proven defective in material or workmanship upon manufacturer's examination. This warranty does not include removal or installation costs and in no event shall the manufacturer's liability exceed the selling price of such equipment or part.

e. The manufacturer disclaims all liability for damages to its products through improper installation, maintenance, use or attempts to operate such products beyond their functional capacity, intentionally or otherwise, or any unauthorized repair. The manufacturer is not responsible for consequential or other damages, injuries or expense incurred through the use of its products.

f. The above warranty is in lieu of any other warranty, whether expressed or implied. The manufacturer makes no warranty of fitness or merchantability. No agent of ours is authorized to provide any warranty other than the above.

**3. Process for All Returned Goods (Warranty Items)**

a. Please contact our Technical Service Department to request a RMA (Return Material Authorization) number prior to returning any goods. The following information will be required:
SDS sheet
Billing and ship-to address
Model number and serial number
Contact name and phone number
Reason for return
Purchase order (where applicable)
A packing slip will be provided to the shipper and MUST accompany the product being returned. Packages received without our proper packing list will be refused by the receiver.

b. All material must be returned freight prepaid.

c. All material must be properly packaged to prevent damage in shipment.

d. All products used in a chemical application MUST accompany an MSDS

e. All products MUST be wiped and flushed clean of any and all chemicals, solvents or buffers and be warranted to be safe for handling. You will be requested to acknowledge the condition of the product being returned on our packing list. Any product received that is deemed to be unsafe for handling or without this acknowledgement will be refused by our receiver.

f. All warranty repairs will follow the 2 year warranty policy and will refer to the original purchase date.

**4. Credit for Return of New, Unused Equipment**

a. RMA for returning product for credit is effective for 60 days from the date of issue. After 60 days if the product has not been returned to Pulsafeeder the RMA number will be cancelled, and a new request must be made by the customer to continue with the return procedure.

b. No equipment will be accepted beyond 6 months after date of shipment from factory for credit.

c. Only new, unused and undamaged standard equipment will be accepted for return to stock.

d. All credits are based on evaluation and acceptance of material as new and unused by Pulsafeeder. You will be requested to acknowledge the condition of the product being returned on our packing list. Any product received that is deemed to be unsafe for handling or without this acknowledgement will be refused by our receiver.

e. A restocking fee of 25% will apply to returned goods. When a PO is provided for a replacement item at the time of the return request the restocking fee will be 15%. Note: any product mounted on a panel or skid will be charged a 50% re-stocking fee.

f. A restocking fee of up to 75% will apply to (NSF 61) returned goods. a. National Sanitation Foundation (NSF 61) - is an American National Standard that establishes minimum health-effects requirements for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

g. A request for a Returned Material Authorization (RMA) number must be made prior to returning product to Pulsafeeder.

h. All equipment shall be returned with the RMA Packing List form attached to the outside of the box.

i. If any chemical, solvent or buffer has been introduced into the product it must be wiped and flushed clean of any and all substances prior to returning to Pulsafeeder.

j. All material shall be returned freight prepaid.

k. Private label products or Engineered Panel Mount Systems and Pre-Engineered System are not returnable.

**5. Pricing Errors**

a. Pulsafeeder does our very best to avoid errors in billing. You will receive a confirmation of your order within 24 hours of order entry. If upon review the customer feels there is a discrepancy, they should contact Pulsafeeder Customer Service as soon as possible to resolve.

b. Should an invoice be received that the customer believes to have incorrect pricing, they should notify Pulsafeeder Customer Service to investigate.

**6. Missing Items**

a. If a product is received by the customer with an item missing the customer must notify Pulsafeeder Customer Service within 7 days of receipt of the product by the end user. A replacement item will be sent at no charge as quickly as possible.

b. If a shipment is received by the customer with a line item missing they must notify Pulsafeeder Customer Service within 7 days of receipt of the product by the end user. If the customer had been billed for that item, a credit will be issued against the original Sales Order and a new Sales Order will be created for the replacement product.

**7. Damaged Items**

a. Should the customer receive an order that was damaged in transit, whoever paid the freight charges is responsible for filing the freight damage claim.

b. Should the customer receive a product with damaged components due to improper packaging they should notify Pulsafeeder Customer Service within 7 days of receipt of product by end user. A replacement item will be sent at no charge as quickly as possible.

**8. Technical Support Services Available**

a. Pulsafeeder's Technical Sales Support team is available to provide all your sales and support needs. The principle mission of this group is to sell and support our customer base in a timely and effective manner. This includes the ability to provide in-field service training, assistance in start-up of our products and perform field repair of goods when required.

# Introduction of QR Code

Thanks for purchasing Pulsafeeder metering pump, you can scan the QR code on the name plate to check KOPkits information, Manual and Parts information.

## Use QR Code:

Scan QR code to open the Web.

## How To Use:

1. Scan the QR code on the name plate
2. Check KOPkits information located just below the Serial Number
3. Check related information by clicking on replacement parts list, tech sheet or manual button, etc
4. Speak to someone or email Technical Services clicking on buttons
5. Email This Information to yourself or someone else by clicking on the buttons