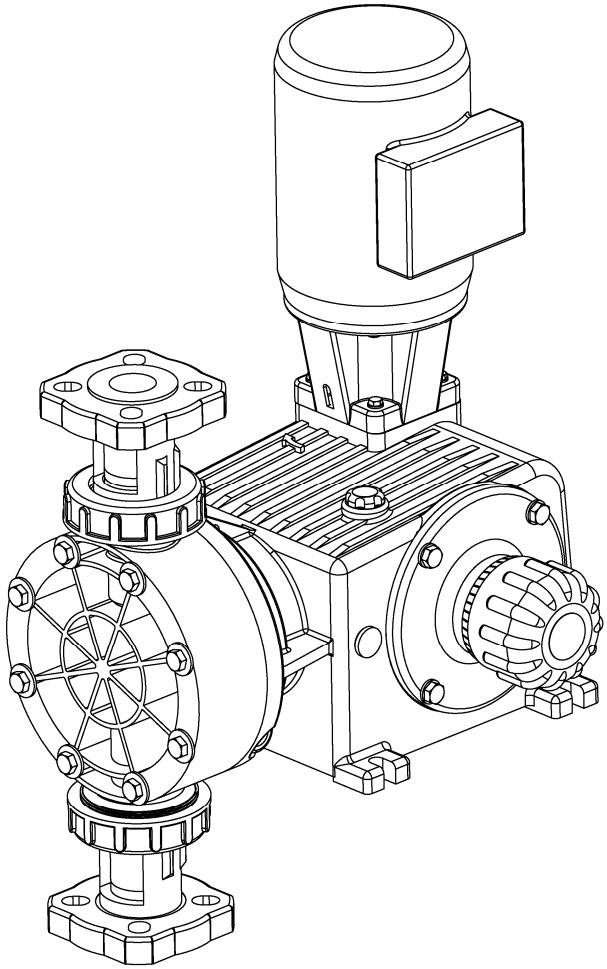
PULSAFEEDER®
A Unit of IDEX Corporation

OMNI®

Installation, Operation, & Maintenance Instruction

Model **DC7**



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PULSAFEEDER
A Unit of IDEX Corporation

Manufacturers of Quality Pumps,
Controls, and Systems

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Pulsafeeder Factory Service Policy

Should you experience a problem with your Pulsafeeder pump, first consult the troubleshooting guide in your operation and maintenance manual. If the problem is not covered or cannot be solved, please contact your local Pulsafeeder Sales Representative or 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.

Revision History:

Rev A (4-07)
- First Release

Rev B (8-07)
- Updated lubricating oil specification and part numbers
- Add instruction to fill with oil prior to storage
- Minor text revisions

Rev C (1-09)
- Added Duplex Dimensional and BOM

Table of Contents

1. Introduction

The OMNI® metering pump is positive displacement, mechanically operated reciprocating diaphragm pump. Each pump consists of a power end and a process end separated by a Teflon faced diaphragm. Individual pumps will vary in appearance due to various liquid ends and accessories; however, the basic principles of operation remain the same.

2. Principles Of Operation

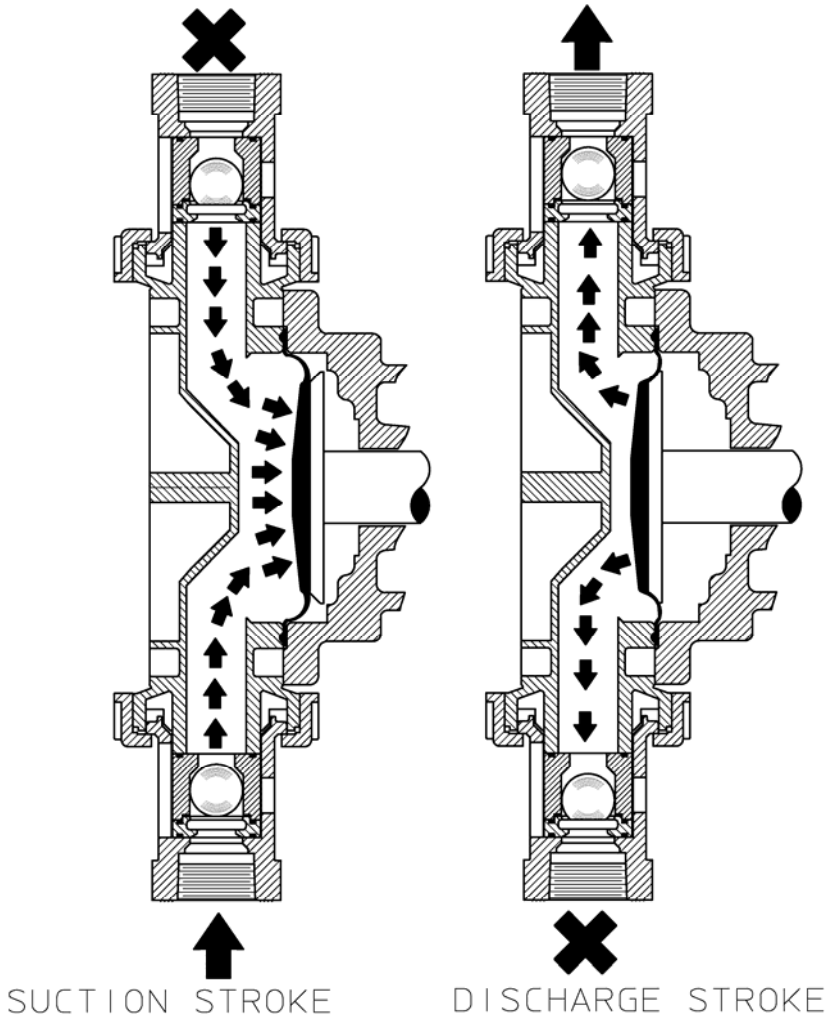


Figure 1, reagent head operation

A diaphragm reciprocates at a preset stroke length, displacing an exact volume of process fluid. Diaphragm retraction causes the product to enter through the suction check valve. Diaphragm advance causes the discharge of an equal amount of the product through the discharge check valve.

2.1 Reagent Head Assembly

The typical reagent head assembly consists of reagent head, diaphragm, and suction and discharge cartridge check valves. This assembly is the only part of the pump to contact the process liquid; consequently, maintenance is critical to pump performance.

2.2 Control Assembly

The OMNI® pump incorporates a full motion style of stroke length adjustment. The stroke length setting is indicated by a (0% – 100%) scale located on the stroke adjustment assembly.

Stroke length is changed by loosening the locking screw and turning the hand knob. This turns a mechanism, which changes the amplitude of the stroke length. As the stroke adjustment knob is turned towards 100%, it displaces the cam eccentrically to the rotating drive shaft. This in turn causes the pushrod and diaphragm to travel over a longer distance. Refer to ***Section 6.2*** for further information.

For automatic flow rate control, users can consider the Pulsafeeder MPC speed based control system, please contact your local Pulsafeeder dealer or representative for more information.

2.3 Gear Ratio Assembly

OMNI® pumps are driven by an electric motor mounted on the motor adaptor input flange. The motor drives a set of worm gears that convert rotational speed into torque. They, in turn, power the eccentric shaft assembly that converts rotary motion into reciprocating motion. The gear assembly and eccentric shaft run submerged in a lubricating oil bath.

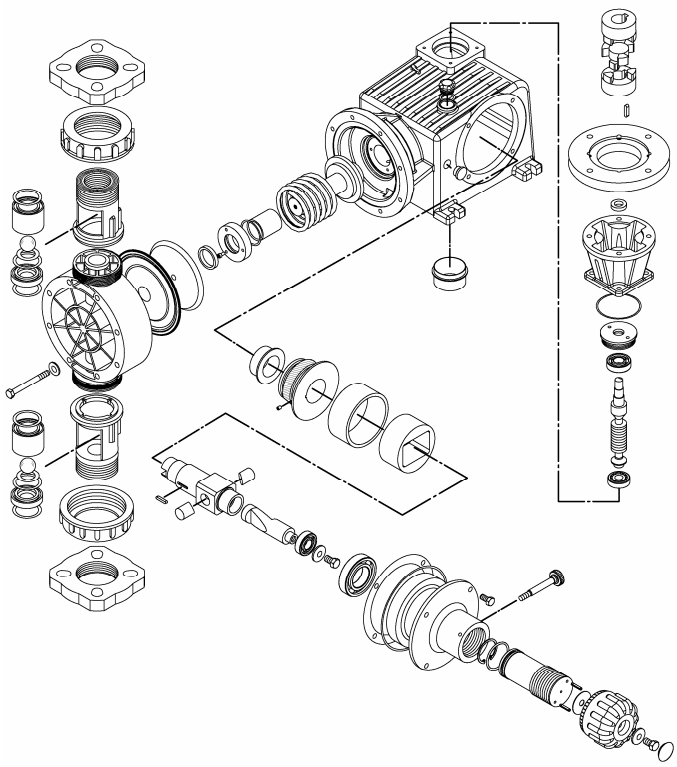


Figure 2, isometric view

3. 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 OMNI® pumps.

4. Storage

4.1.1 Short Term

Storage of your OMNI® pump for up to 12 months is considered short-term. The recommended short-term storage procedures are:

a) Store the pump indoors at room temperature in a dry environment.

b) The lubricating oil should be added to the gearbox prior to storage

c) If required by the operating environment, take precautions to prevent entry of water or humid air into the eccentric enclosure.

d) Prior to startup, perform a complete inspection and then start up in accordance with instructions in this manual.

4.1.2 Long Term

Every twelve months, in addition to the above short-term procedures, power up the motor and operate the pump for a minimum of one hour. It is not necessary to have liquid in the reagent head during this operation, but the suction and discharge ports must be open to atmosphere.

After twelve months of storage, Pulsafeeder's warranty cannot cover items that are subject to deterioration with age, such as seals, gaskets, and diaphragms. If the pump has been in storage longer than 12 months it is recommended that these items be inspected and replaced as necessary prior to startup. Lubricating oil should also be changed prior to startup. Materials and labor to replace this class of item under this circumstance are the purchaser's responsibility. Consult your local Pulsafeeder representative for assistance in obtaining parts and service for your pump.

5. Installation

5.1 Location

When selecting an installation site or designing a chemical feed system, consideration should be given to access for routine maintenance.

OMNI® pumps are designed to operate indoors and outdoors, but it is desirable to provide a hood or covering for outdoor service. External heating is required if ambient temperatures below 0° C (32° F) are anticipated, especially if pumps are not in continuous duty. Check with the factory if concerned with the suitability of the operating environment.

The pump must be rigidly bolted to a solid and flat foundation to minimize vibration, which can loosen connections. When the pump is bolted down, care must be taken to avoid distorting the base and affecting alignments. The pump must be level within 5°. This will assure that the check valves can operate properly.

5.2 Piping System

1. All systems should include a pressure relief valve on the discharge side, to protect piping and process equipment, including the pump, from excess process pressures**. An external relief valve is required!** There should be no devices capable of restricting flow (such as a valve) located between the pump and the relief device.

2. Shutoff valves and unions (or flanges) on suction and discharge piping are recommended. This permits check valve inspection without draining long runs of piping, making periodic maintenance and inspection easier.

   Shutoff valves should be of the same size as connecting pipe. Ball valves are preferred since they offer minimum flow restriction.

3. Suction systems should include an inlet strainer, if appropriate for the product being pumped. Pump check valves are susceptible to dirt and other solid contaminants, and any accumulation can cause malfunction. The strainer should be located between the suction shutoff valve and the pump suction valve. It must be sized to accommodate the flow rate and the anticipated level of contamination. A 100 mesh screen size is generally recommended.

4. Vacuum/pressure gauges in the suction and discharge lines are helpful in order to check system operation. Gauges should be fitted with protective shutoff valves for isolation while not in use.

5. Piping weight must not be supported by valve housings or other portions of the reagent head, as the resulting stresses can cause leaks. If appropriate, provide for thermal expansion and contraction so that no excess force or moments are applied to the pump.

6. In piping assembly, use a sealing compound chemically compatible with the process material. Users of sealing tape are cautioned to ensure that the entering pipe thread ends are not taped, and that tape is removed from previously-used threads to the maximum practical extent prior to re-use. 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. Debris from the piping system that prevents proper check valve operation is a common startup issue.

5.3 Suction Pressure Requirements

Although OMNI® 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 psia or less (at operating temperature) the wet suction lift capability is approximately ten (10) feet. 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 under suction lift conditions may require some liquid priming before they will operate reliably.

For long suction lines, and also for pumps that have a high stroking rate, the largest possible suction line diameter should be used to provide best suction conditions. In some cases, the proper line size may exceed the suction connection size on the pump. Consult your local Pulsafeeder Representative for assistance and further information on proper suction system design.

5.4 Discharge Pressure Requirements

All OMNI® metering pumps are designed for continuous service at the rated discharge pressure. If system suction pressure exceeds discharge pressure (a condition sometimes described as "pumping downhill"), flow would be generated (siphoning) in addition to that caused 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 suction pressure by at least 0.35 Bar (5 psi). 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 pump's rating are to be avoided as they will cause damage to the pump components.

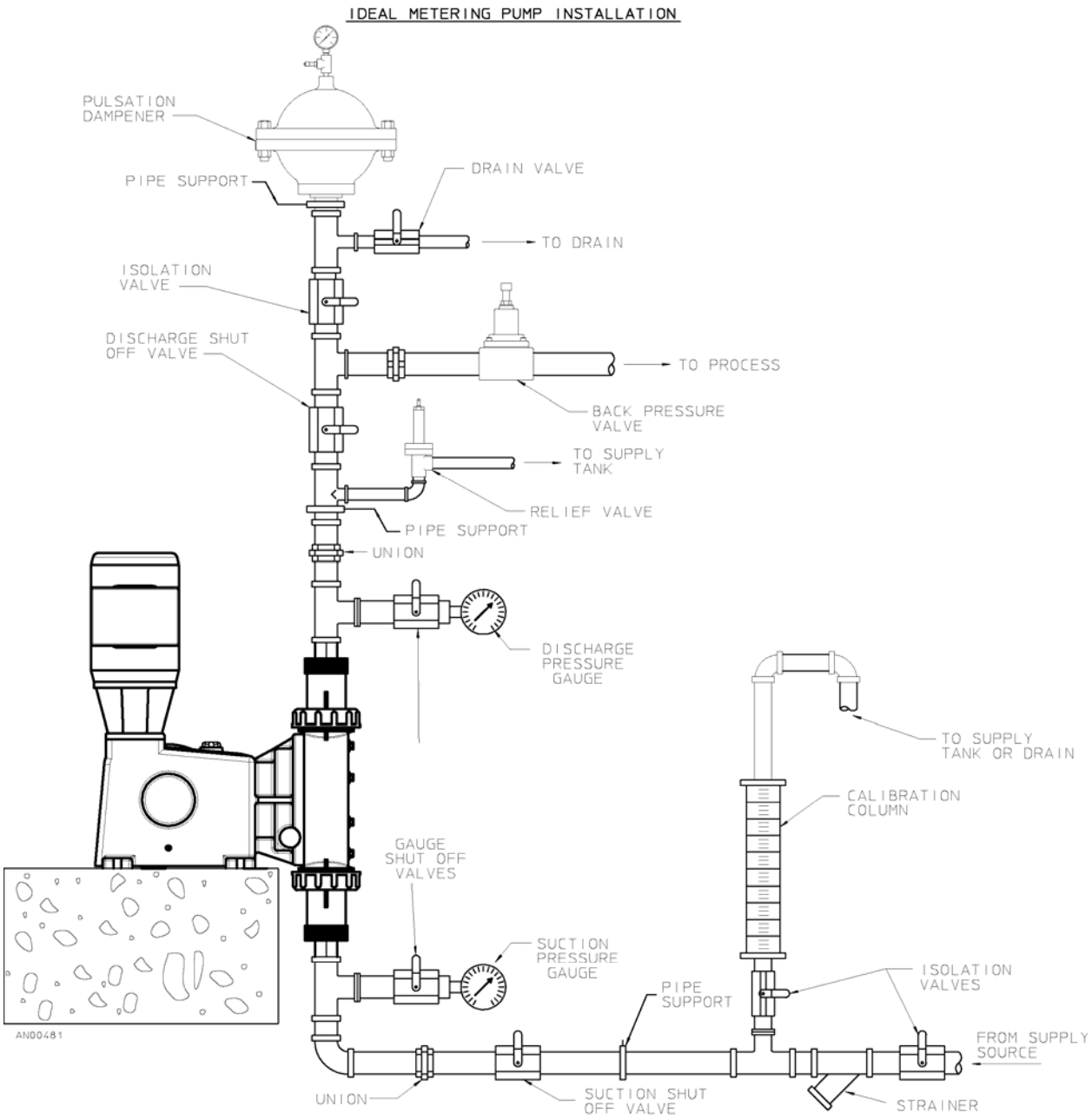


Figure 3, sample system configuration

6. Equipment Startup

6.1 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. Most hardware can be checked simply to ensure it is not loose. However, utilize the following values when checking reagent head bolt torque:

Model	Material	Reagent Head Bolt Torque		
		# Bolts and size	N-m	In. - Lbs
DC7	Plastic	(8) M10 * 1.5	8.5	75
	Metal	(8) M10 * 1.5	8.5	75

6.2 Output Adjustment

All OMNI® pumps have a hand wheel for manual stroke adjustment. The hand wheel can be adjusted to any point from 0 to 100%. This value represents the stroke length setting and therefore the flow rate of the pump relative to its maximum output.

1. Turn the red lock screw counterclockwise to release the stroke lock. **Making adjustments without releasing the lock may damage the mechanism.**

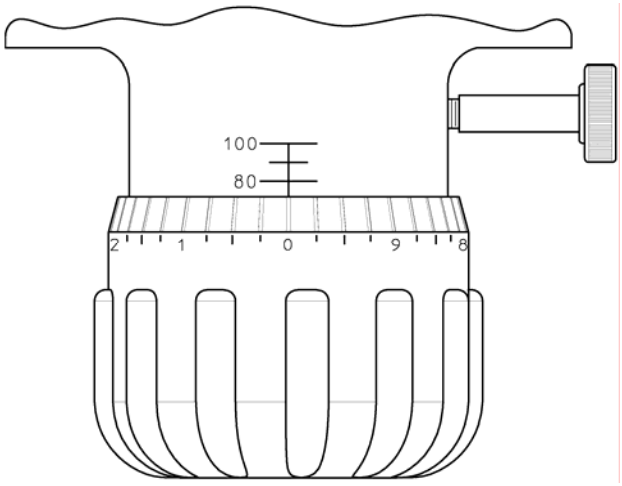


Figure 4, stroke adjustment knob and scale

2. Adjust the hand wheel to the desired output.
   a) The stroke barrel indicates stroke length in 20% increments.
   b) The hand wheel indicates stroke length in 0.25% increments.

   For example, to set the pump to 75% stroke length, (starting from the factory default setting of 0%) turn the hand wheel clockwise until the 60% indicator on the stroke barrel is aligned with the edge of the knob at the “0” position on the knob scale.

   Continue the clockwise rotation until the hand wheel indicator passes zero again (this is 70%) and comes to 5, this is 75%. Refer to *Figure 4.*
3. Turn the lock screw clockwise to lock the stroke adjustment into position.

   Adjustments can be made while the pump is at rest or operating, although adjustments are easier to make while the pump is in operation.

6.3 Oil Fill and Maintenance

6.3.1 Oil Capacities

It is recommended that adequate supplies of PulsaLube oil be on hand for periodic changes and emergency requirements. The approximate amounts of oil required to fill the OMNI DC7 pump to specified levels are:

Pump Capacity	Gearbox, Model DC7
PulsaLube EP Gear Oil	2,500 ml (2.6 Qt)

Pulsafeeder Part No.	Description	Container Size
NP980010-001	PulsaLube EP Gear Oil	500 ml
NP980010-002	PulsaLube EP Gear Oil	1 liter
NP980010-003	PulsaLube EP Gear Oil	2.5 liter
NP980010-004	PulsaLube EP Gear Oil	18 liter

6.3.2 Gearbox Oil Fill

Fill the gearbox with oil by removing the threaded oil fill cap on the top of the pump. Fill with the proper oil (PulsaLube EP Gear Oil) to the upper edge of the sight glass on the side of the pump. Replace the cover or controller. Replace the oil fill cap. See *figure 5.* Note that during operation, the oil should be visible at the middle of the sight glass.

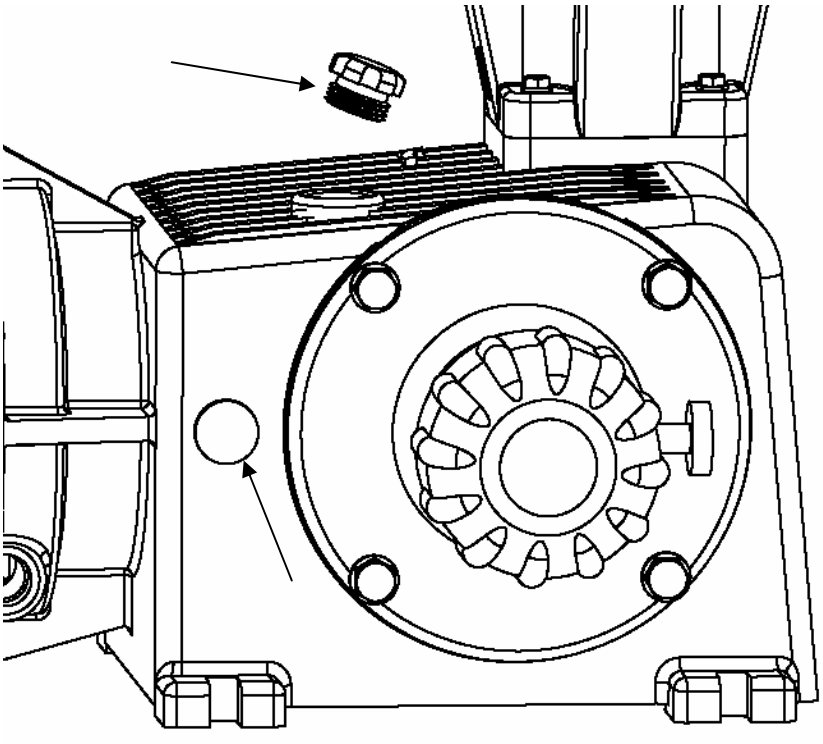


Figure 5, oil filler cap and sight glass

6.3.3 Oil Changes

The recommended oil change intervals are dependent upon the operating environment and level of pump usage, classified as follows:

Normal service: Clean/dry atmosphere, an ambient operating temperature of 0^0 C to 40^0 C (32^0 F to 104^0 F) and up to 2,000 annual operating hours.

Severe Service: Humid atmosphere, an ambient operating temperature below 0^0 C (32^0 F) or above 40^0 C (104^0 F), and over 2,000 annual operating hours.

The recommended eccentric oil change interval is two (2) years for normal service and one (1) year for severe service. The procedure is as follows:

1. Disconnect the power source to the drive motor
2. Relieve all pressure from the piping system.
3. Remove the fill plug from the top of the pump gearbox.
4. Drain the oil by removing the drain plug on the bottom of the gearbox, opposite the stroke adjustment knob.
5. Replace the drain plug.
6. Fill the eccentric box with PulsaLube oil as described under ***Gearbox Oil Fill***.
7. Replace the fill plug and double check that the drain plug is secure.

6.4 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, 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 zero 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, replace the suction valve, then remove the discharge valve assembly and fill the reagent head as described in Step (3) above. The pump will now self-prime when started up per step (4) 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.

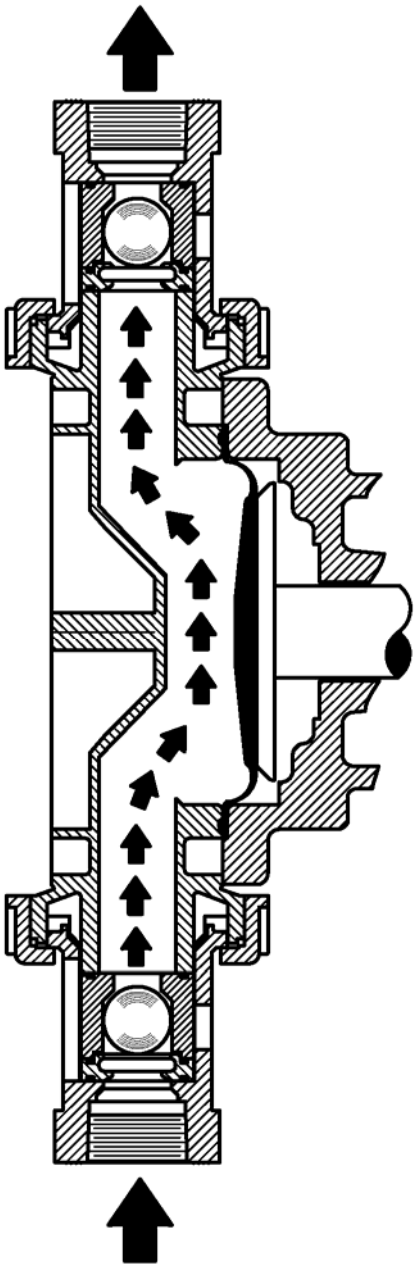


Figure 6, process flow

6.5 Calibration

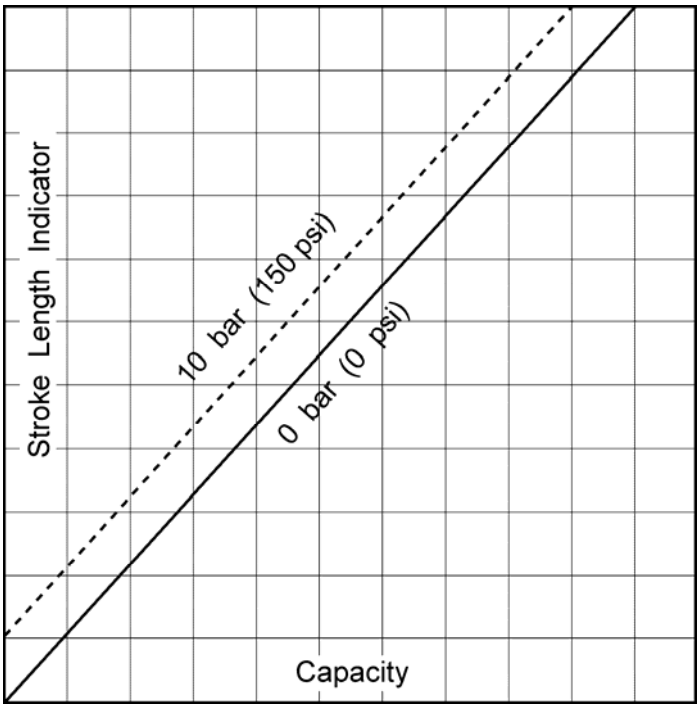


Figure 7, sample flow calibration curve

All metering pumps must be calibrated to accurately specify stroke length settings for required flow rates.

A typical calibration chart is shown above. Although output is linear with respect to 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 (i.e., 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.

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

7. Maintenance

WARNING

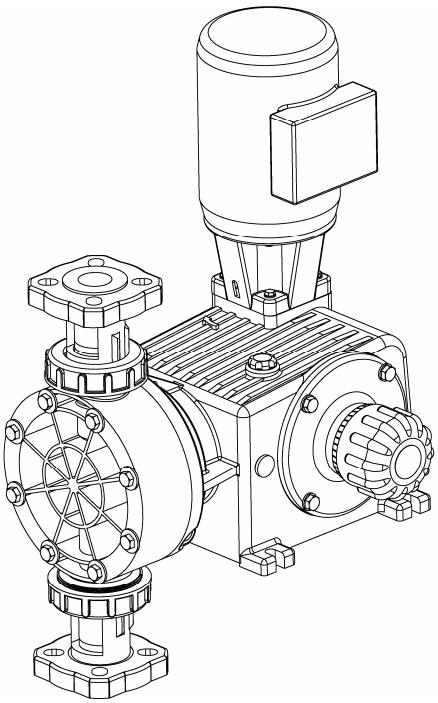
BEFORE PERFORMING ANY MAINTENANCE REQUIRING REAGENT HEAD OR VALVE (WET END) DISASSEMBLY, BE SURE TO RELIEVE PRESSURE FROM THE PIPING SYSTEM AND, WHERE HAZARDOUS PROCESS MATERIALS ARE INVOLVED, RENDER THE PUMP SAFE TO PERSONNEL AND THE ENVIRONMENT BY CLEANING AND CHEMICALLY NEUTRALIZING AS APPROPRIATE. 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 OMNI® KOPkit will contain all replacement parts normally used in a preventative maintenance program. It is recommended that KOPkits and PulsaLube EP Gear Oil be kept available at all times.

WARNING

IF THE DIAPHRAGM HAS FAILED, PROCESS FLUID MAY HAVE CONTAMINATED THE PUMP ECCENTRIC HOUSING (ALTHOUGH NORMALLY, ANY PROCESS FLUID BEHIND A FAILED DIAPHRAGM WOULD PASS THROUGH THE BOTTOM DRAIN HOLE). HANDLE WITH APPROPRIATE CARE.



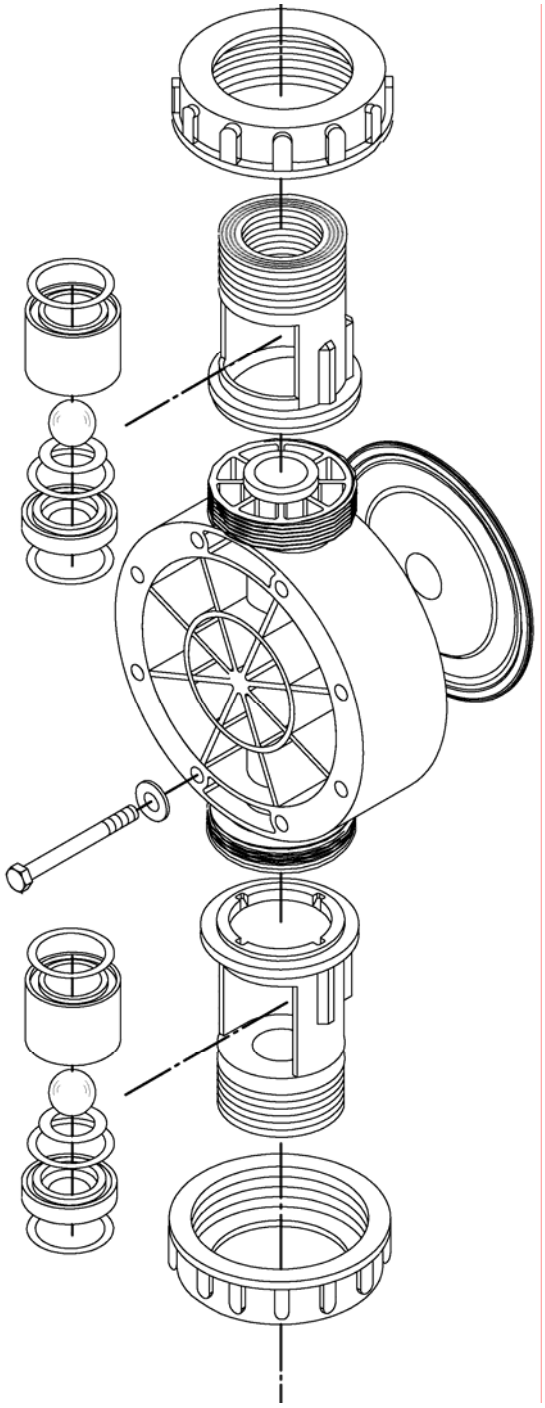


Figure 8, wet end components

OMNI® 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.

7.1 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.

Take all precautions described under the **WARNINGS** on page 14, ***Section 7*** to prevent environmental damage and exposure of personnel to hazardous materials.

3. Close the inlet and outlet shutoff valves.
4. Place a pan underneath the pump head adaptor to catch any liquid leakage.
5. Note the orientation of the existing check valve components. Loosen the union nuts holding the check valves and piping to the reagent head. Remove the check valve assemblies, drain and rinse them, and set them aside in a safe place. Unscrew the union nuts completely from the regent head.

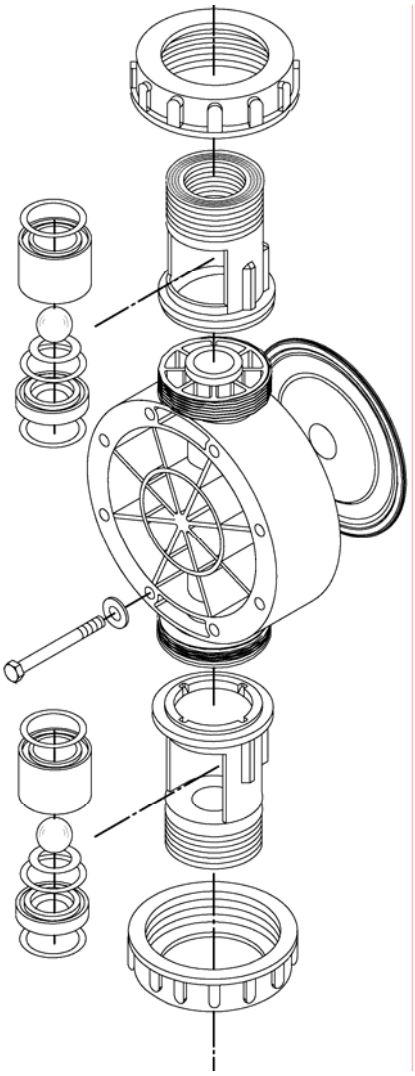


Figure 9, wet end components

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.
7. Remove the final bolt and rinse or clean the reagent head with an appropriate material.
8. Insert a screwdriver or similar tool through the oil fill hole and into the hole provided in the pushrod, this will keep the pushrod from turning as the diaphragm is removed. Note that depending on pushrod position, you may have to rotate the motor coupling or the diaphragm to access the hole.

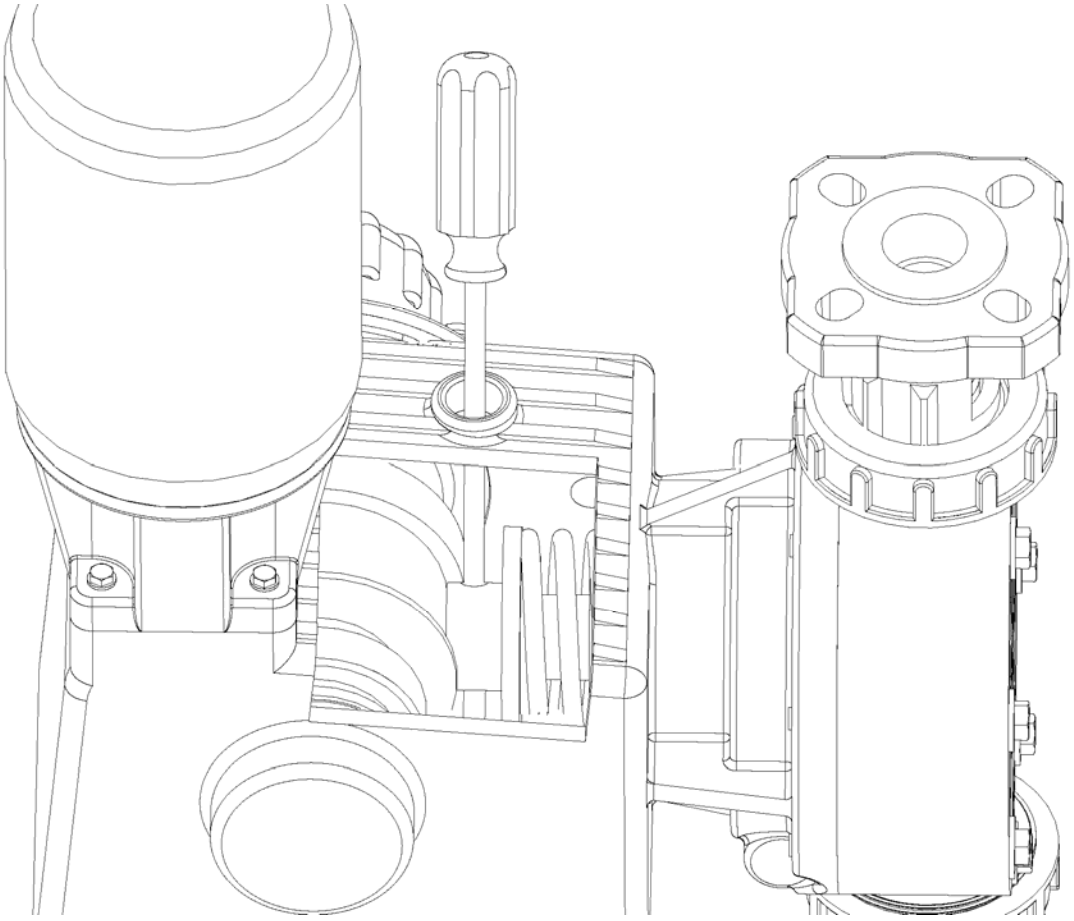


Figure 10, securing pushrod

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.
    b) Lubricate the elastomer side of the diaphragm liberally, where it is in contact against the pump head and deflection plate. Use a silicone grease or silicone-based o-ring lubricant.
    c) Coat the threads and the end of the pushrod with an anti-seize paste or lubricant.

12. Thread the diaphragm (clockwise) fully onto the shaft.

    When reinstalling a used diaphragm it is not necessary to maintain the previous orientation relative to the reagent head or pump head hole pattern.

13. Remove the screwdriver from the oil fill hole and replace the cap.
14. Install the reagent head bolts and tighten in an alternating pattern to ensure an even seating force. Torque to the values recommended in ***Section 6.1.***
15. Reassemble the piping connections and check valves to the reagent head, using care to orient all check valve parts properly (refer to *figures 9 and 12).*
16. Re-prime the pump following the procedure outlined in ***Section 6.3.***

7.2 Diaphragm Shaft Seal

While the diaphragm is removed, inspect the shaft seal located in the pump head. If there is evidence of damage or wear and/or oil leakage, the seal should be replaced.

1. Remove the three retainer screws and the seal retainer.
2. Pry the old seal out of the retainer.
3. Ensure the surfaces of the retainer are clean and clean of debris, scratches, or burrs.
4. Insert the new seal into the retainer by hand, do not use tools to prevent damage to the seal.
5. Inspect the piston shaft and remove any scratches, burrs, or surface corrosion or damage.
6. Lubricate the shaft with a small amount of pump oil.
7. Slide the seal and retainer back into position and secure with the three screws.

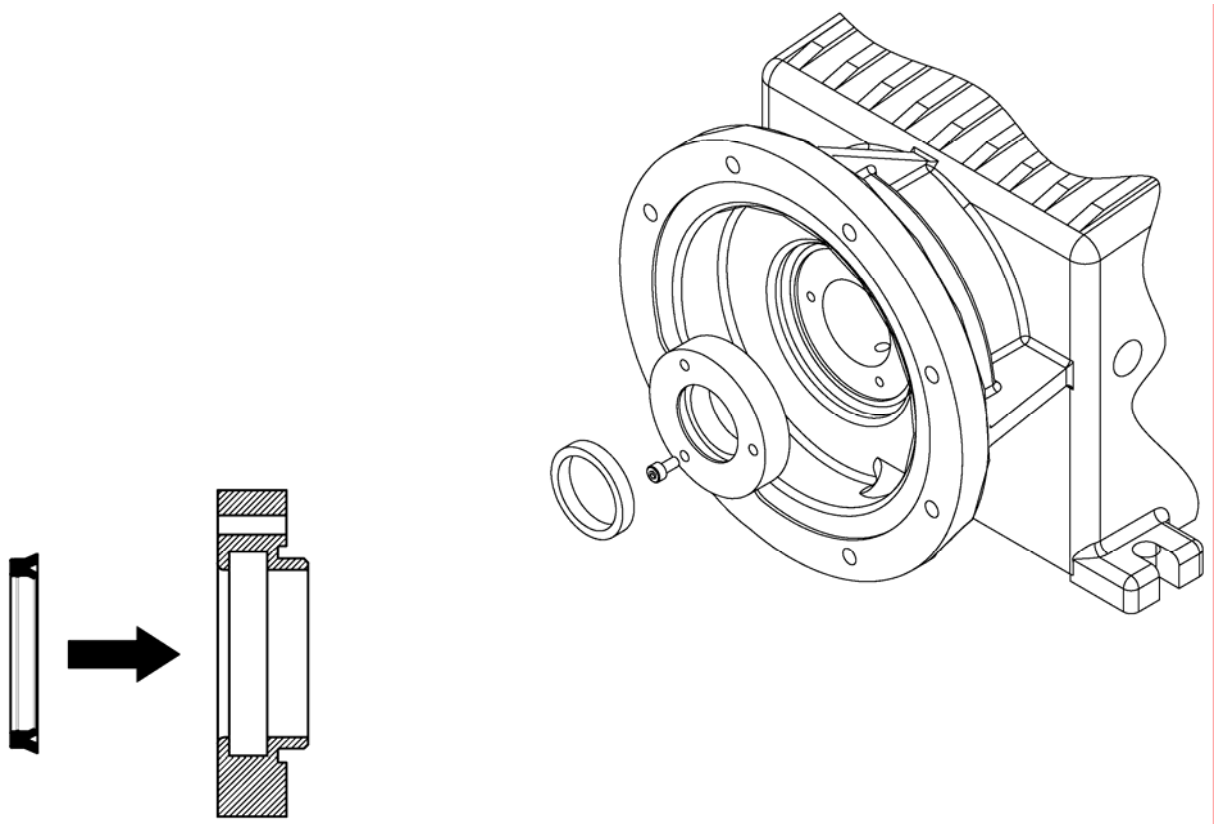


Figure 11, piston shaft seal replacement

7.3 Check Valves

Most fluid metering problems are related to check valves. Problems usually stem from solids accumulation between valve and seat, corrosion of seating surfaces, erosion, or physical damage due to wear or the presence of foreign objects.

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 sharp edge of the seat. 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.

OMNI DC7 pumps utilize a multi-part check valve assembly, secured to the reagent head with a union nut clamping arrangement (plastic construction) or a tie-bar arrangement (metal construction).

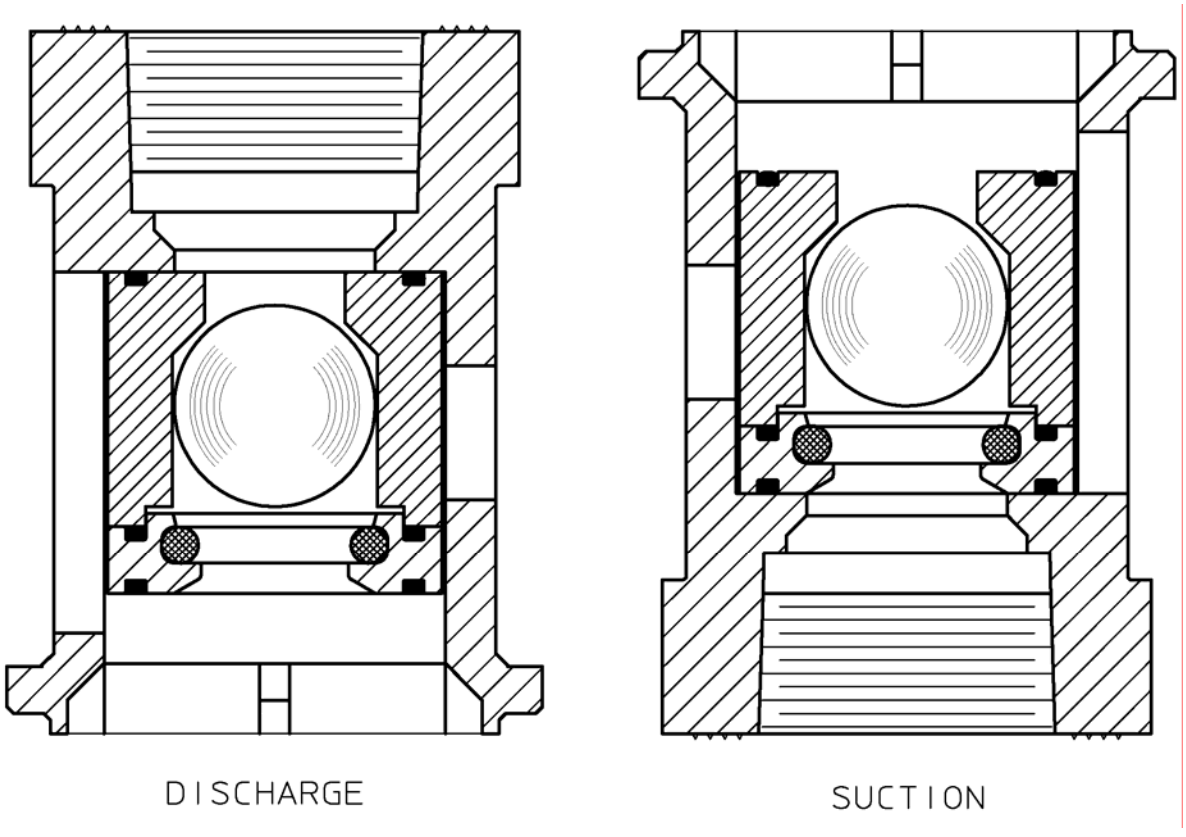


Figure 12, check valves DC7

7.4 Check Valve Removal & Reinstallation, Plastic Union-Nut type

1. Disconnect the power source to the drive motor.
2. Relieve all pressure from the piping system, and take all precautions necessary to prevent contamination to the environment and personnel exposure to hazardous materials.
3. Close the inlet and outlet shutoff valves.
4. Loosen the union nuts that hold the check valves in place. It is not necessary to completely remove the nut.
5. Push the check valve assembly out of the front by inserting your finger or a tool into the clearance hole at the back of the holder. Note carefully the position of the component parts, to assist in re-assembly. Be aware that product may leak out as the check valve parts are removed.
6. 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 o-ring seat facing up and the chamfered edge down.

NOTE **The check assemblies must be pushed into the holder until they stop against the back surface. Replace parts with new as required. Sealing o-rings should generally be replaced even if the check components are re-used.**

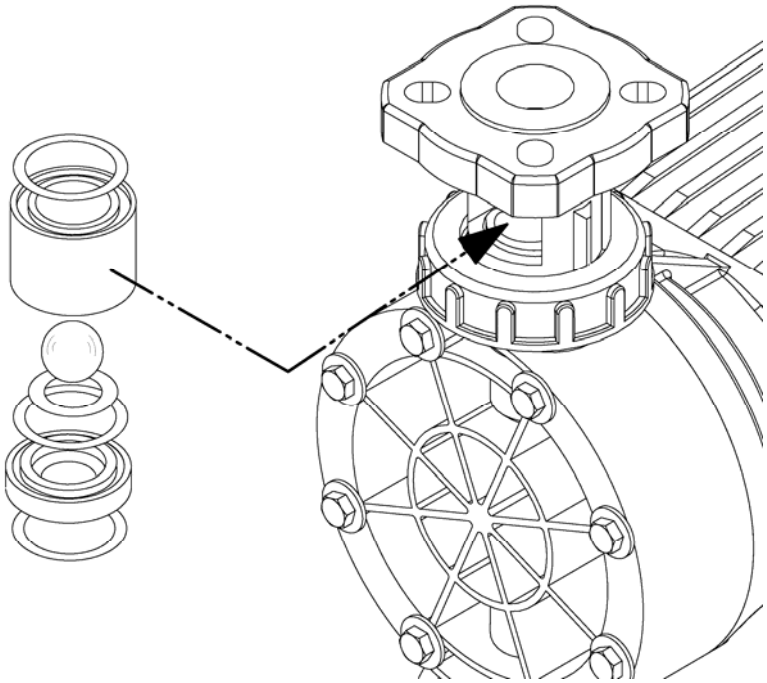


Figure 13, union-nut type check valve

NOTE **Inserting the check valve assembly into the pump in the wrong directiom, 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. Each union nut should be tightened only until the o-ring seal makes good contact.**

7. Carefully make sure that the check assemblies are in proper position, and tighten the union nuts.
8. Retighten any unions, flanges, or other process connections that may have been loosened previously.

7.5 Check Valve Removal and Reinstallation, Metal Tie-Bar type

1. Disconnect the power source 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.
6. Remove the suction check valve assembly by sliding it towards you, holding it together as a unit. Note carefully 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.
8. Remove the discharge check valve assembly by sliding it towards you, holding it together as a unit. Note carefully 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.

Inserting the check valve assembly into the pump in the wrong directiom, 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.

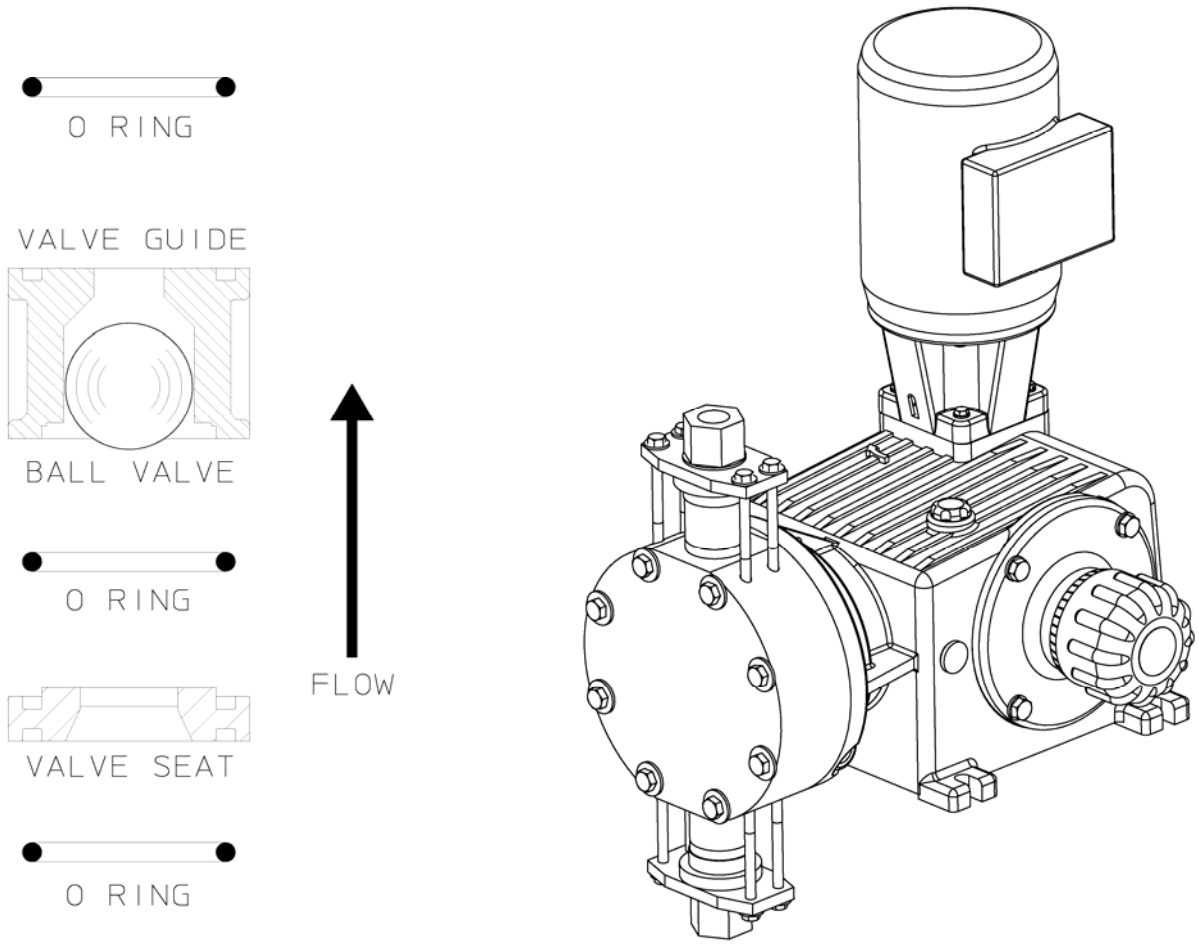


Figure 14, Check valves, metal construction

7.6 Motor Removal & Reinstallation

1. Disconnect the power source to the drive motor.
2. Disconnect the motor wiring from the motor.
3. Remove the four bolts retaining the motor to the motor adaptor.
   Lift the motor upwards away from the pump.
4. Apply an anti-seize paste or lubricant to all bolts, setscrews, and keys before reassembling..
5. Reinstall the motor in the reverse from removal.
6. Insert and tighten the four bolts removed in step 3.
7. Reconnect the motor wiring to the motor.
8. Connect power to the drive motor.

NOTE

Motor rotation must be wired for CW rotation, as viewed from the top of the motor, as noted by the arrow on the top of the pump housing.

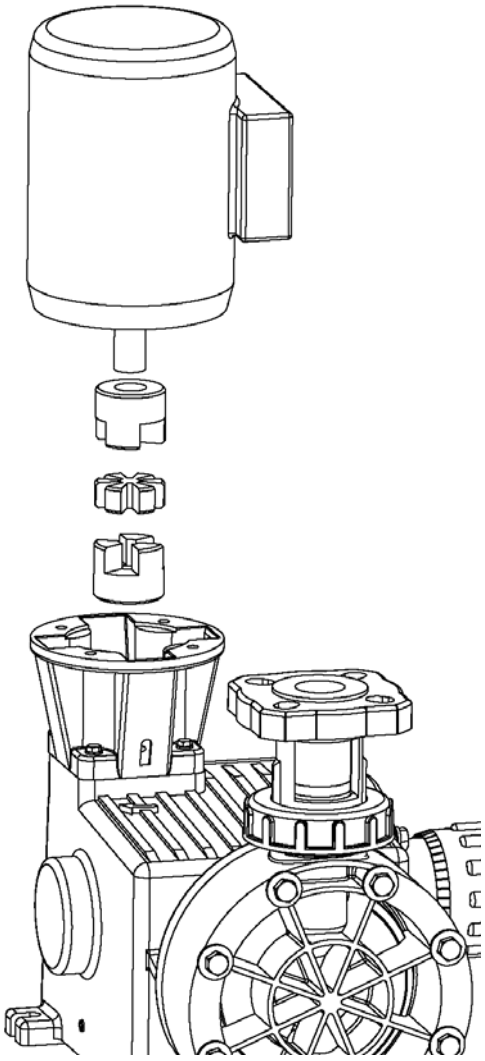


Figure 15, motor mounting

8. Replacement Parts

8.1 KOPkit Program

OMNI® KOPkits contain all replacement parts normally used in a preventative maintenance program. (*PULSAlube* oil is also available separately for preventative maintenance programs. Refer to ***Section 6 – Equipment Startup***). There is a specific KOPkit for every OMNI® pump model. Each KOPkit is vacuum-packed for extended storage. All OMNI® 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 OMNI 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.

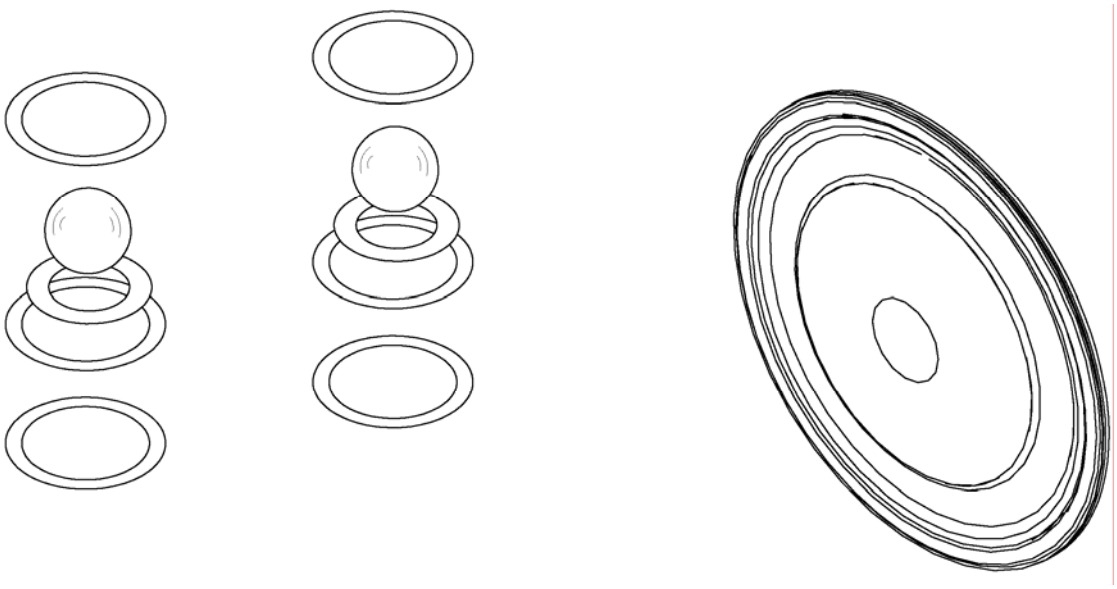


Figure 16, KOPkit parts

8.2 Ordering KOPkits or Parts

When ordering replacement parts always specify:

- Pump model and serial number (from pump nameplate), e.g., Model No. (DC7) with Serial No. F406365-3.
- Part number and description from the OMNI® parts list. Include the three-character suffix. (Note: OMNI part numbers begin either with the letters **NP**, or the letter **W**, e.g., NP170001-THY or W210221-001.)

8.3 KOPkit numbers by model:

Pump Model	Wetted Material	Connection Type	KOPkit number
DC7	PVDF	NPT / ISO / FLG	NLK070X
DC7	Polypropylene	NPT / ISO / FLG	NLK070X
DC7	316		*(future use)*
DC7	HSO(1)		*(future use)*

NOTES:

(1) "HSO" construction refers to the recommended materials for handling Sulfuric Acid at high concentrations (above 95%). This configuration consists of 316ss for the reagent head, the valve guide, and the process connection. Alloy-20 is supplied for the check valve seats, and Hastelloy-C is supplied for the check valve balls. ***HS0 configuration is supplied only as a KOPkit and not as an original pump configuration.***

(2) DC2 through 6 models are covered in a separate publication
(3) PVDF and Polypropylene KOPkits are identical as only balls and insert o-rings are supplied

9. Model Number Identification

Position	Sample	Specifies	Options
1 and 2	**DC**		**DC** = OMNI model pump
3 and 4	**7C**	Size/Flow	**7** – diaphragm diameter **C / D** – stroking rate See sales literature for flow/pressure ratings
5	**1**	Motor frame and size	**1** – IEC 90 Frame **2 –** IEC 100 Frame **3** – NEMA 56C Frame **4 –** NEMA 143/145TC Frame
6	**F**	Wetted materials	**F** – PVDF, Viton o-rings, ceramic ball **P** - Polypro, Viton o-rings, ceramic ball
7	**X**	Motor Supplied	**X** – No motor purchased with pump **M** – Pump purchased with motor

10. Wet End Materials Reference

Wet End Configuration	Model	Connection	Head	Guide	Sealing O-rings	Balls	Seats	Seat O-ring
PVDF (Kynar®)	DC2	1/4" NPT	PVDF	PVDF	PTFE	Ceramic	PVDF	n/a
	DC3	1/2" NPT or ISO 7-1						
	DC4							
	DC5	1" NPT or ISO 7-1						
	DC6							
	DC7	1 1/2" NPT & ANSI Flange and DIN40 Flange			Viton®		PVDF (o-ring seat)	Viton® (1)
PP (Polypropylene)	DC2	n/a	n/a					
	DC3							
	DC4							
	DC5	1" NPT or l ISO 7-1	PP	PP	PTFE	Ceramic	PP	n/a
	DC6							
	DC7	1 1/2" NPT & ANSI Flange and DIN40 Flange			Viton		PP (o-ring seat)	Viton® (1)
SS (316)	DC2	1/4" NPT	SS	SS	PTFE	Ceramic	PTFE	n/a
	DC3	1/2" NPT or ISO 7-1				SS	SS	
	DC4							
	DC5	1" NPT or ISO 7-1						
	DC6							
	DC7	n/a						

(1) DC7 check valve seats incorporate an o-ring seal

DC2 through 6 models are covered in a separate publication

n/a = materials not available in this pump size or component not used on this model

11. Troubleshooting

Difficulty	Probable Cause	Remedy
Pump 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.
No delivery	Motor not running.	Check power source. Check wiring diagram (see above).
	Supply tank empty.	Fill tank.
	Lines clogged.	Clean and flush.
	Closed line valves.	Open valves.
	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 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 pis 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.

Difficulty	Probable Cause	Remedy
Noisy gearing, knocking	Discharge pressure too high.	Reduce pressure.
	Water hammer.	Install pulsation dampener.
	Low oil level.	Examine sight glass on side of pump Add or replace oil as required
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
	Oil level low	Check and add as necessary

12. Piping Accessories

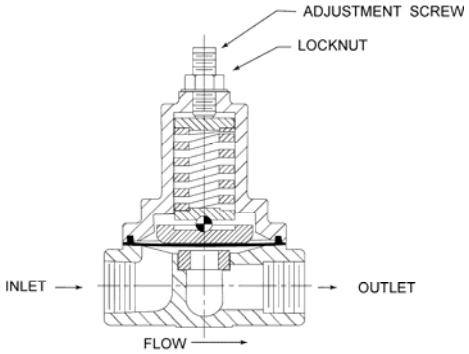
Pressure Relief Valves

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

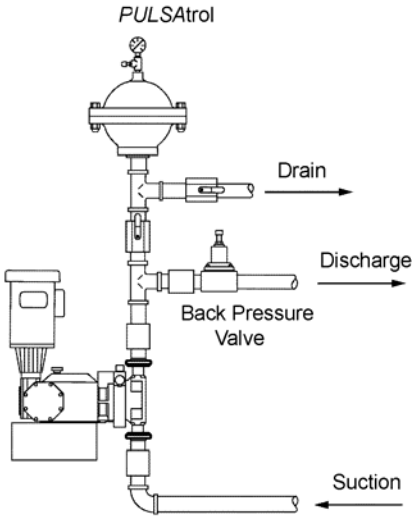
A diaphragm backpressure valve creates constant back pressure. A PTFE or PTFE-faced diaphragm offers maximum chemical protection and service life, and seals spring and bonnet from product.

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



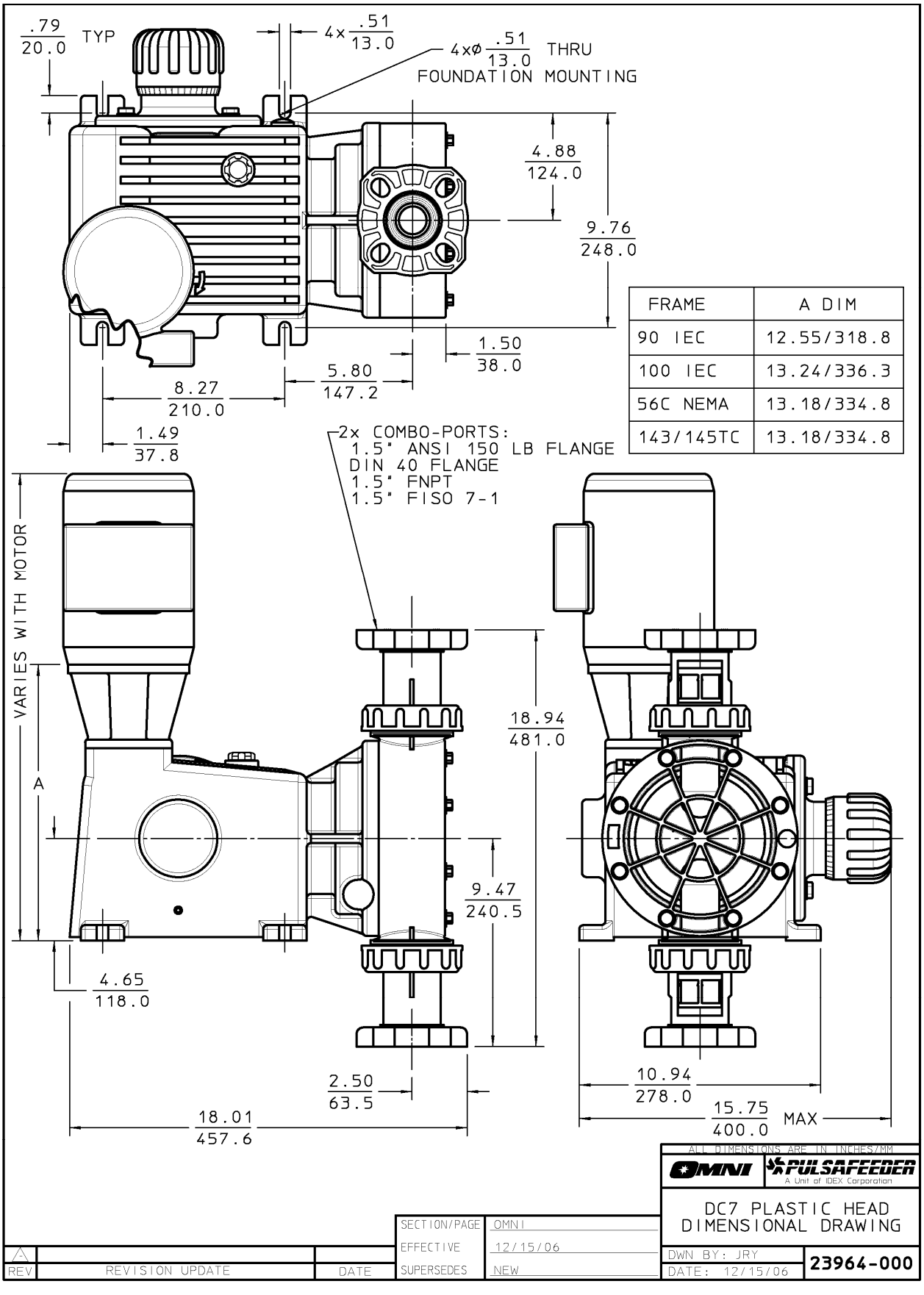
Pulsation Dampener

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



DISCHARGE INSTALLATION

13. Dimensional Drawing



FRAME	A DIM
90 IEC	12.55/318.8
100 IEC	13.24/336.3
56C NEMA	13.18/334.8
143/145TC	13.18/334.8

ALL DIMENSIONS ARE IN INCHES/MM

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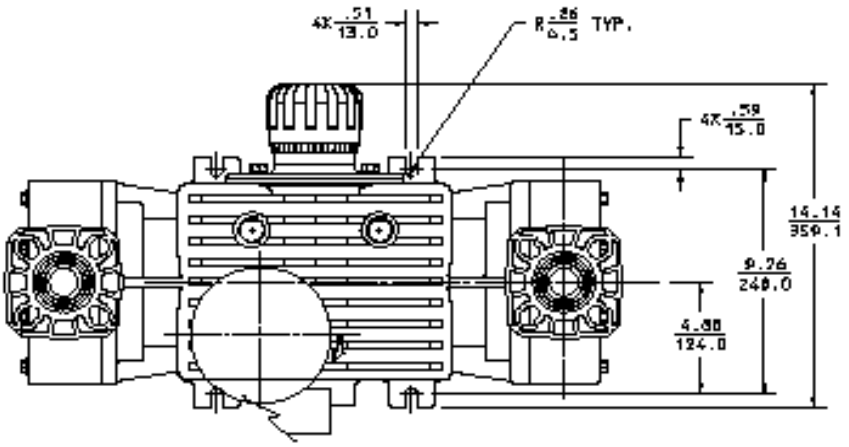
DC7 PLASTIC HEAD
DIMENSIONAL DRAWING

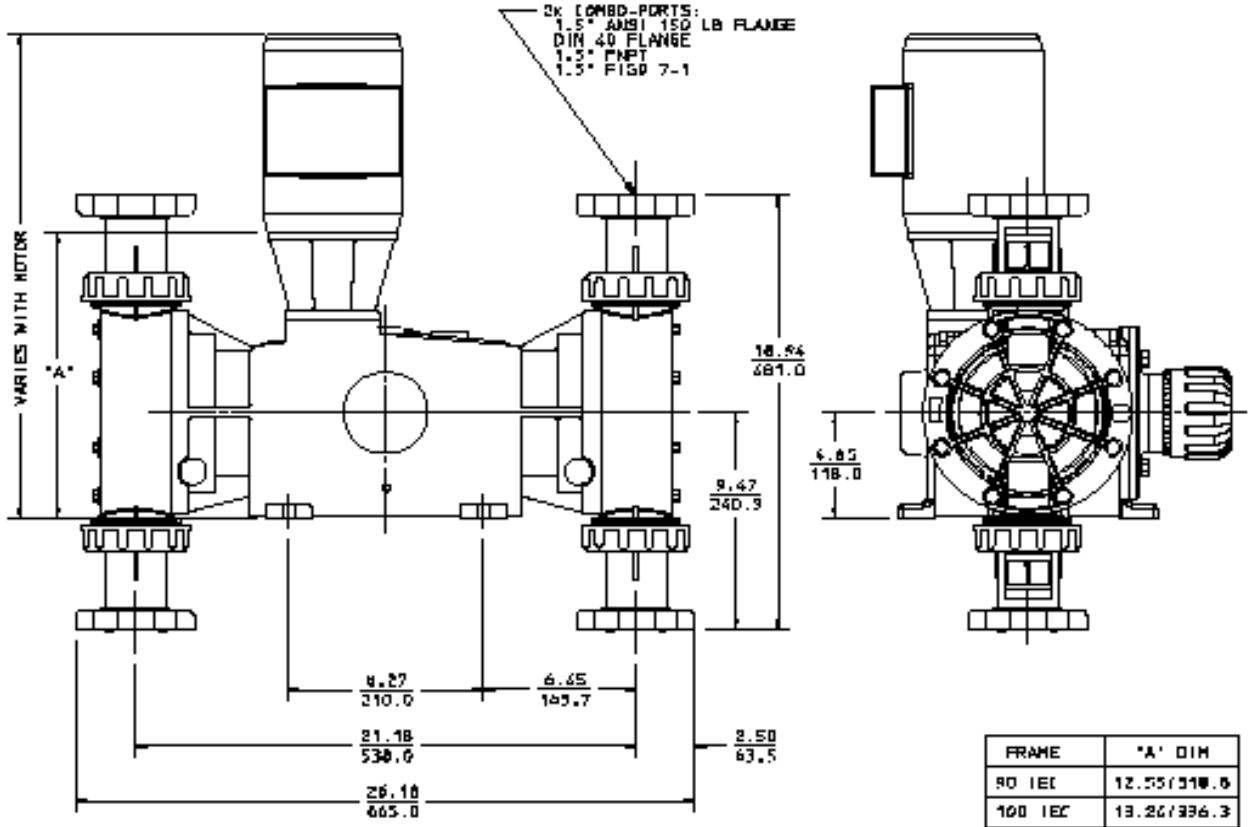
REV	REVISION UPDATE	DATE

SECTION/PAGE	OMNI
EFFECTIVE	12/15/06
SUPERSEDES	NEW

DWN BY: JRY
DATE: 12/15/06

23964-000





FRAME	"A" DIM
90 IEC	12.55/318.8
100 IEC	13.22/336.3
56C NEMA	13.18/334.8
143/145TC	13.18/334.8

ALL DIMENSIONS ARE IN INCHES/MM

DMNI | PULSAFEEDER — A unit of IDEX Corporation

DC7 DUPLEX HEAD
DIMENSIONAL DRAWING

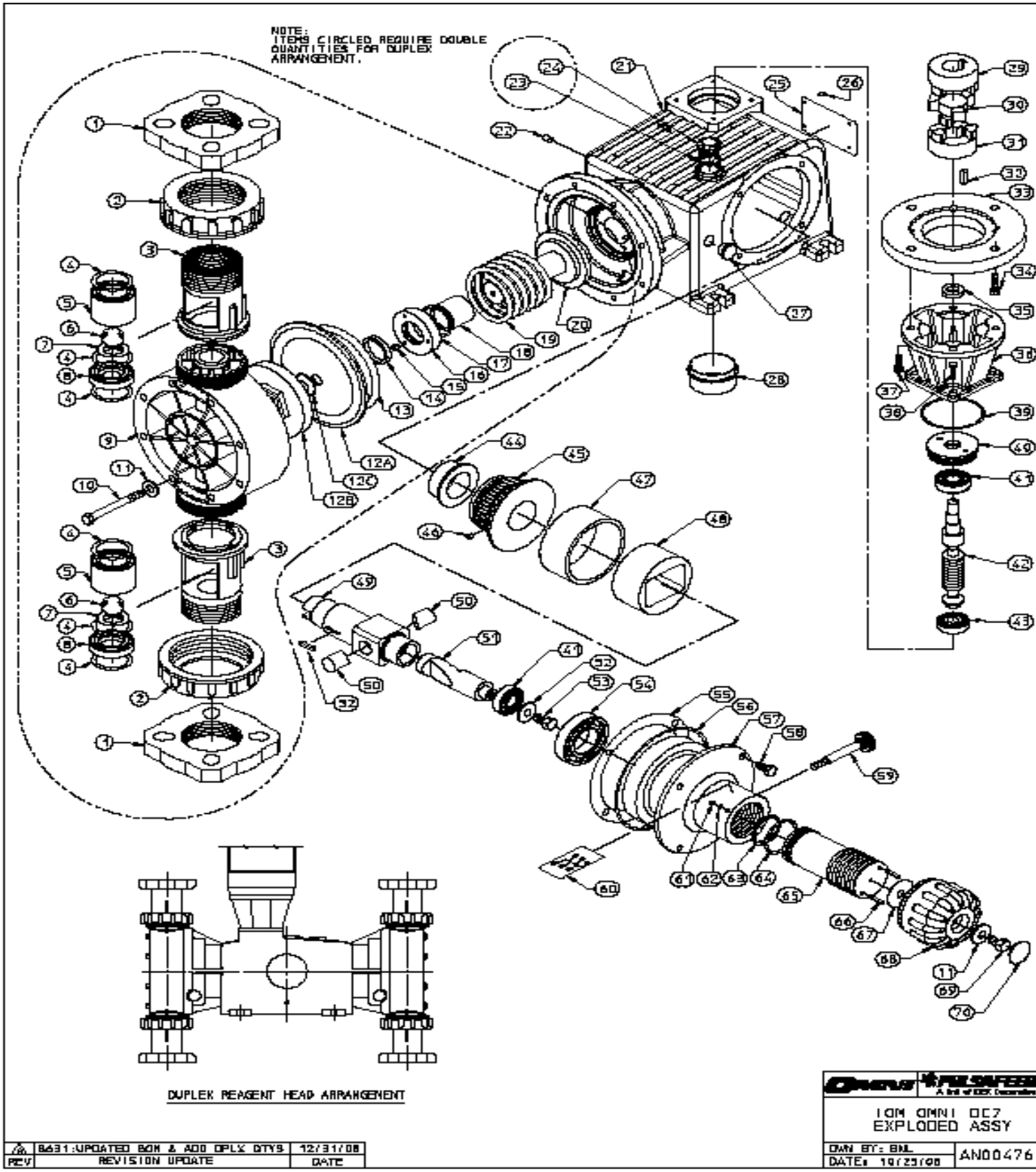
REV	REVISION UPDATE	DATE

SECTION/PAGE	DMNI
EFFECTIVE	09/12/08
SUPERSEDES	NEW

DWN BY: KLM
DATE: 09/12/08

24902-000

14. Parts Diagrams and Parts Lists



ITEM	DESCRIPTION	DUP QTY	SPX QTY	PART NUMBER
1	Flange Adaptor	4	2	NP300248-PPL
2	Union Nut	4	2	NP999107-PPL
3	Valve Adaptor	4	2	NP320019-PPL
4	Check Valve O-Ring	12	6	NP440129-TFE
5	Valve Guide	4	2	NP310048-PPL
6	Valve Ball	4	2	NP340036
7	Seat O-ring	4	2	NP440317-VTA
8	Valve Seat	4	2	NP330095-PPL
9	Reagent Head	2	1	NP160078-PPL
10	Reagent Head Screw	16	8	NP999091-188
11	Washer	18	9	NP991019-188
12A	Diaphragm	2	1	NP170040-TFE
12B	Front Knob Assy	2	1	NP260017-PVD
12C	Gasket, O-Ring	2	1	NP440122-VTN
13	Deflection Plate	2	1	NP140082-STL
14	Pushrod Seal	2	1	NP450031-URE
15	Pushrod Seal Retainer Screw	6	3	NP999097-STL
16	Pushrod Seal Retainer	2	1	NP999101-STL
17	Seal Retainer O-ring	2	1	NP440132-NTR
18	Pushrod Bearing	2	1	NP400059-OLT
19	Compression Spring	2	1	NP430040-000
20	Pushrod	2	1	NP100057-STL
21	Gearbox	1	---	NP010026-ALU
21	Gearbox	---	1	NP010025-ALU
22	Drain Plug	1	1	NP992485-STL
23	Oil Cap Gasket	2	1	W200781-NTR
24	Oil Fill Cap	2	1	W203180-000
25	Nameplate	1	1	NP550130-000
26	Nameplate Screws	4	4	W771000-188
27	Oil Level Indicator	1	1	NP560026-000
28	Bearing Cap	1	1	NP250052-000
29	Motor Coupling IEC 90	1	1	NP410090-IRN
	Motor Coupling IEC 100			NP410093-001
	Motor Coupling NEMA 56C			NP410093-002
	Motor Coupling NEMA 145TC			NP410093-003
30	Coupling Spider	1	1	NP410094-NTR
31	Pump Coupling	1	1	NP410095-IRN
32	Square Key	2	2	NP420002-000
33	Motor Adaptor Plate 100 IEC	1*	1*	NP490034-ALU
	Motor Adaptor Plate NEMA 56C,145TC			NP490033-ALU
34	Motor Bolt IEC 100	4*	4*	W770534-188
	Motor Bolt NEMA 56c,145TC			W770424-188
35	Oil Seal	1	1	NP450001-NTR
36	Motor Adaptor	1	1	NP490032-ALU
37	Motor Adaptor Top Screw	4	4	W770534-188
38	Motor Adaptor Bottom Screw	4	4	W770541-188
39	Motor Adaptor O-ring	1	1	NP440147-NTR
40	Input Shaft Adjustment Nut	1	1	NP410089-STL
41	Bearing	2	2	NP400002-000

ITEM	DESCRIPTION	DUP QTY	SPX QTY	PART NUMBER
42	Worm 8:1	1	1	NP060041-008
	Worm 10:1			NP060041-010
	Worm 12.5:1			NP060041-125
	Worm 20:1			NP060041-020
43	Worm Bottom Bearing	1	1	NP400058-000
44	Gear Bearing	1	1	NP400055-BRS
45	Gear 8:1	1	1	NP060040-003
	Gear 10:1			NP060040-000
	Gear 12.5:1			NP060040-001
	Gear 20:1			NP060040-002
46	Gear Set Screw	1	1	NP991004-014
47	Eccentric Rider Bearing	1	1	NP400056-000
48	Cam	1	1	NP200028-IRN
49	Outer Shaft	1	1	NP410091-STL
50	Plunger	2	2	NP070024-STL
51	Inner Shaft	1	1	NP410088-STL
52	Washer	1	1	NP999099-STL
53	Bearing Retention Screw	1	1	NP999098-STL
54	Eccentric Shaft Bearing	1	1	NP400057-000
55	Side Cover Shim	**	**	NP470061
56	Side Cover O-ring	1	1	NP440255-NTR
57	Side Cover	1	1	NP250093-IRN
58	Side Cover Bolt	4	4	NP990448-188
59	Stroke Adj. Lock Assy.	1	1	NP999108-001
60	Side Cover Label	1	1	NP550138-000
61	Detent Ball	1	1	NP999095-STL
62	Detent O-ring	1	1	NP440005-NTR
63	Bearing Snap Ring	1	1	NP999032-STL
64	Stroke Adj. Shaft O-ring	1	1	NP440227-NTR
65	Stroke Adj. Shaft	1	1	NP410092-STL
66	Roll Pin	2	2	NP999105-STL
67	Knob Shim	**	**	NP470062
68	Stroke Adj. Knob	1	1	NP260013-GPC
69	Knob Screw	1	1	NP999104-STL
70	Knob Cover	1	1	NP999092-NYL

Note:

* - Not required when using an IEC 90 frame motor.
** - Use as needed to maintain proper fit per assembly instructions.

REV	REVISION UPDATE	DATE
A	B631: Updated BOM & added qty's for duplex arrangement	12/31/08

OMNI — PRISMATECH, A Unit of IDEX Corporation

IOM OMNI DC6
BILL OF MATERIALS

DRAWN BY:	BNL		AN00476
DATE:	10/23/06		

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