

42" and Larger Cam-Centric® Plug Valve

Operation, Maintenance and Installation Manual

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VAL-MATIC'S 42" CAM-CENTRIC PLUG VALVE OPERATION, MAINTENANCE AND INSTALLATION

INTRODUCTION

The Cam-Centric® Plug Valve has been designed to give years of trouble-free operation. This manual will provide you with the information to properly install and maintain the valve to ensure a long service life. The valve is an eccentric, resilient seated, quarter-turn plug valve capable of handling many types of fluids including fluids with suspended solids. The Size, Cold Working Pressure (CWP), Actuator Rating, and Model No. are stamped on the nameplate for reference.

CAUTION: Do not use valve for line testing at pressures higher than nameplate rating or leakage and damage to valve may occur.

The "Cold Working Pressure" is the non-shock pressure rating of the valve at 150°F. The valve is not intended as a block valve for line testing above the valve rating. The "Actuator Rating" is the pressure that was used to size the actuator for operating conditions and may be less than the "Cold Working Pressure". Because the valve is eccentric, the valve may have a different actuator rating for reverse and direct pressure. If the valve is operated at pressures higher than the actuator ratings, the valve may be difficult to operate or leak.

RECEIVING AND STORAGE

Inspect valves upon receipt for damage in shipment. Unload all valves carefully to the ground without dropping. Do not lift valves with slings or chains around the actuator or through the seat area.

Valves should remain crated, clean and dry until installed to prevent weather-related damage. For long term storage greater than six months, the valve must remain open and the rubber surfaces of the plug coated with a thin film of FDA approved grease such as Dow Corning # 7. Do not expose plug to sunlight or ozone for any extended period.

DESCRIPTION OF OPERATION

As shown in Figure 2, the valve consists of a body and a ¼ turn plug that is offset from the seat centerline. pushing the plug into the seat).

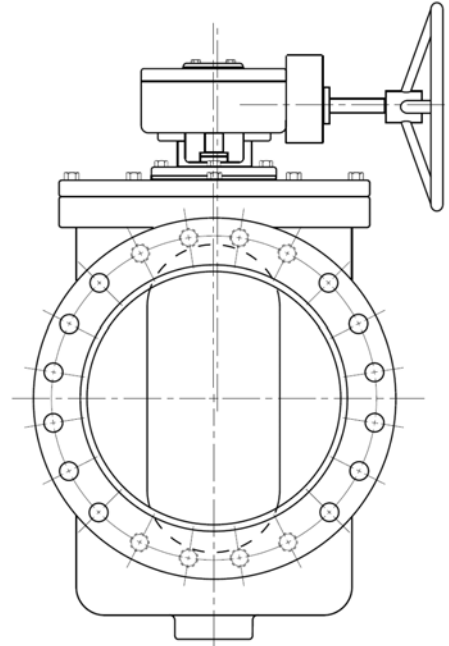


FIGURE 1. PLUG VALVE WITH GEAR ACTUATOR

The eccentric offset causes the plug to lift and rotate off the seat simultaneously to reduce seat friction and wear during operation. Direct Pressure pushes the plug into the seat and Reverse Pressure pushes the plug away from the seat. The gear actuator requires multi-turn input on a 2" square nut, handwheel, or chainwheel. The valve can also be automated with power actuators such as an electric motor or hydraulic cylinder.

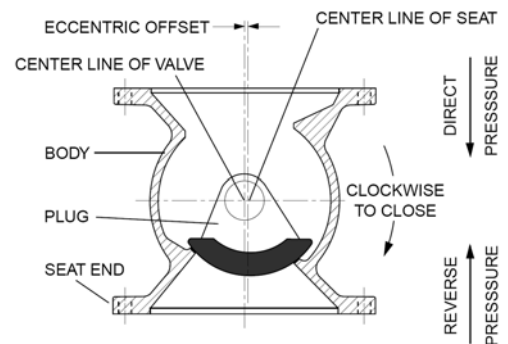


FIGURE 2. PLUG VALVE TERMS

VALVE CONSTRUCTION

The standard Cam-Centric® Plug Valve is constructed of rugged cast iron with a welded nickel seat and permanently lubricated bearings. See the specific Materials List submitted for the order if other than standard cast iron construction. The details of construction are illustrated in Figure 3.

The body (1) is available with flanged or mechanical joint ends for connection to the pipeline. The valve is designed to be serviced in-line by removing the cast cover (2). The ¼ turn plug (3) is guided by sleeve bearings (6) located in the cover and lower boss in the body. Leak-tight closure is made when the rubber coated plug (3) is rotated into the nickel seat on the "SEAT END" of the body.

ITEM	DESCRIPTION	MATERIAL
1	Body	Ductile Iron with Overlay Welded Nickel Seat
2	Cover	Ductile Iron
3	Plug*	Ductile Iron with Resilient Facing
6	Bearings*	316 Stainless Steel
7	V-Type Packing*	Buna-N
8	Cover Seal*	Buna-N
11	Packing Nut	Alloy Steel
12	Bot. Cover Seal*	Non-Asbestos Fiber
13	Bot. Cover	Cast Iron
14	Bot. Cover Bolt	Allot Steel
15	Cover Bolt	Alloy Steel, Gr 5
18	Packing Follower	Cast Iron
19	Follower Stud	Alloy Steel
22	Thrust Bearing*	Teflon
24	Key*	Carbon Steel

*RECOMMENDED SPARE PART

TABLE 1. STANDARD PLUG VALVE PARTS LIST

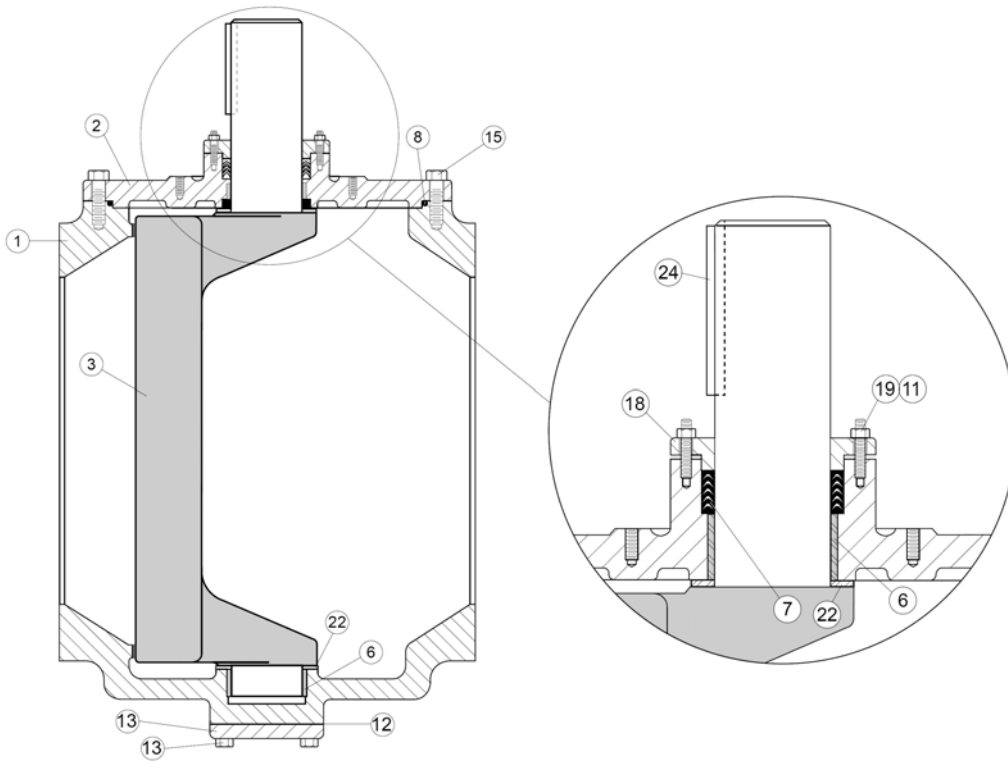


FIGURE 3. STANDARD PLUG VALVE CONSTRUCTION

INSTALLATION

The installation of the valve is important for its proper operation. The valve is capable of flow in either direction but the maximum operating pressure can vary with the location of the seat end. The words "SEAT END" are marked on the valve body. Actuators are available for pressures up to the full rating in both direct and reverse pressure orientations. Actuator ratings will be indicated on the nameplate. Higher operating pressures may require adjustment of the closed position stop or a larger actuator, consult the factory.

SUSPENDED SOLIDS SERVICE: For fluids containing suspended solids, special orientations are needed to prevent debris from collecting in the valve. For horizontal installations (Figure 4), the valve should be installed with the flow entering the seat end of the valve and the shaft in a horizontal position with the plug up when open. For vertical installations (Figure 5), the valve must be installed with the seat end up regardless of flow direction.

CLEAN SERVICE: For both horizontal and vertical installations, install in the direct pressure orientation (pressure opposite the seat end).

AIR AND GAS SERVICE: Install valve in the direct pressure orientation (pressure opposite the seat end). Lubricate plug face with FDA approved silicone grease such as Dow Corning #7 before installation.

PUMP DISCHARGE SERVICE: On all horizontal pump discharge applications (Figure 6), the seat end should be towards the pump.

BURIED SERVICE: The valve should be installed with the shaft horizontal and the actuator nut directed upwards. The valve box or extension pipe should be installed so that the actuator nut and extension stem turn freely.

NOTE: Adjust and test valve prior to backfill.

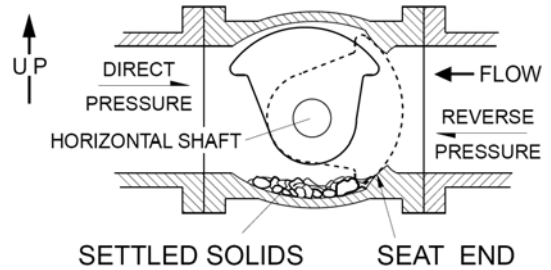


FIGURE 4. HORIZONTAL PIPE WITH SOLIDS

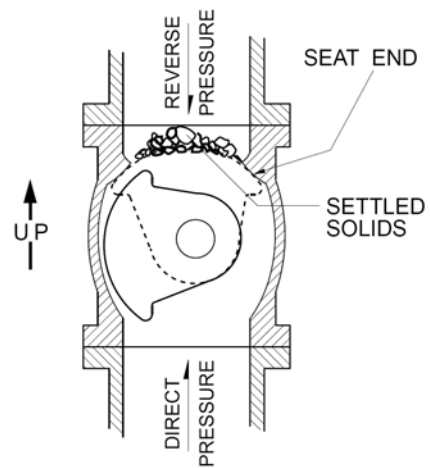


FIGURE 5. VERTICAL PIPE WITH SOLIDS

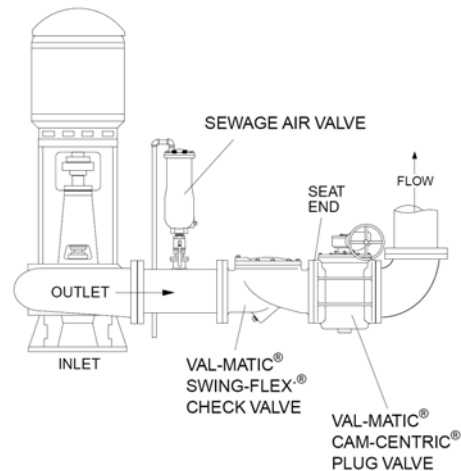


FIGURE 6. PUMP DISCHARGE SERVICE

FLANGED ENDS: Flanged valves should be mated with flat-faced pipe flanges equipped with resilient gaskets. When ring gaskets are used, the bolt material should be ASTM A307 Grade B or SAE Grade 2 Carbon Steel. Higher strength bolts may only be used with full-face gaskets.

The valve and adjacent piping must be supported and aligned to prevent cantilevered stress on the valve. Lower valve into line using slings or chains around the valve body. Lubricate the flange bolts or studs and insert them around the flange. Lightly turn bolts until gaps are eliminated.

BOLTING: The tightening of the bolts should then be done in graduated steps using the cross-over tightening method. If leakage occurs, allow gaskets to absorb fluid and check torque and leakage after 24 hours. Do not exceed bolt rating or crush gasket more than 50 per cent of its thickness.

MECHANICAL JOINT ENDS: Clean ends of mating pipe and valve sockets with soapy water (Figure 7). Place lubricated gasket and retainer gland over pipe end prior to installing valve. Install valve socket over pipe. Press gland and gasket toward valve until gasket is evenly set into valve socket.

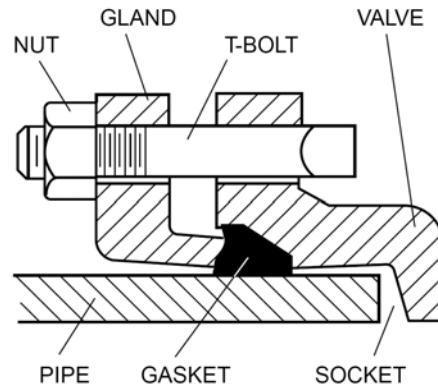


FIGURE 7. MECHANICAL JOINT INSTALLATION

INSERT T-Bolts in valve flange and hand tighten nuts. Torque nuts in four graduated steps using the cross-over tightening method. Maintain an equal gap between the gland and the face of the valve at all points around the socket. The T-Bolts for 42" and larger valves should be tightened to 120-150 ft-lbs.

OPERATION: An indicator on the top of the actuator housing indicates the position of the valve plug. The handwheel must be rotated through many turns (depending on model) to open or close the plug valve. 2" nuts should require no more than 150 ft-lbs to fully close the valve.

GEAR ACTUATOR ADJUSTMENT: The standard gear actuator is provided with factory-set open and closed position stops. If the valve does not shut off tight, the stop bolt can be adjusted allowing the plug to rotate further into the seat. Loosen the locknut, and turn the closed stop bolt CCW 1 turn at a time (Figure 8). If the valve continues to leak after all of the adjustment is taken verify the orientation of the valve during installation. If a tight shut-off can not be achieved, a larger gear actuator may be required for the system operating pressure; consult the factory.

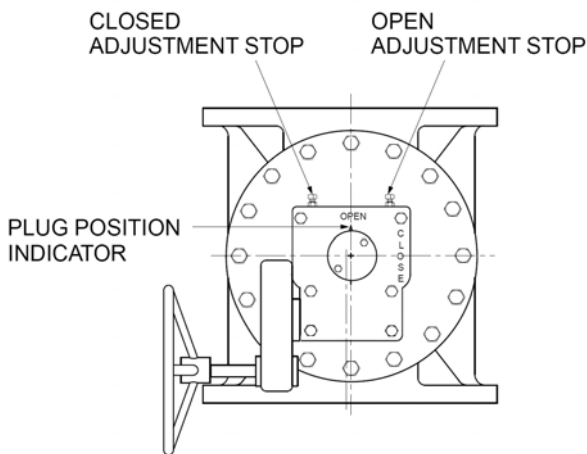


FIGURE 8. ACTUATOR ADJUSTMENTS

MAINTENANCE

The Cam Centric® Plug Valve requires no scheduled lubrication or maintenance other than regular exercising and occasional inspection of the plug. The exercising is achieved by fully opening and closing the valve to verify smooth operation. If operation is difficult, it may be necessary to flush sediment from the valve by opening and closing the valve several times under flowing conditions.

CAUTION: Opening and Closing of the valve should be done slowly to prevent water hammer.

The recommended interval for exercising is every six months or annually if the valve is regularly operated. Over the life of the valve, inspection and some regular adjustments may be needed as given below.

CLOSED POSITION ADJUSTMENT: The standard valve is factory-set to seal at the "Actuator Pressure Ratings" shown on the nameplate for direct and reverse pressure directions (see Figure 2). Higher pressure applications may require adjustment of the closed position stop or a larger actuator; consult the factory.

If the valve is found to leak in the closed position due to wear, the plug can be adjusted by loosening the closed position stop on the actuator and rotating the plug further into the seat. Because of the eccentric action of the valve, further rotation will provide additional interference between the rubber plug surface and the body seat. Valves that have been in service for several years may require inspection of the plug for damage or wear. See the Disassembly Instructions of this manual.

PACKING ADJUSTMENT: The top shaft is equipped with a set of V-shaped packing which is factory-set for drop-tight service. The packing is pressure assisted and does not normally require adjustment. However, depending on line media and wear, a small adjustment can be made. If a leak develops, tighten the follower bolts (19) to stop the leak.

PACKING REPLACEMENT: To replace the packing (7), it is recommended that the line be drained and the actuator removed. The valve can remain in the line. For power actuators, turn off and lock out electrical and hydraulic supplies before proceeding.

CAUTION: Drain Line before removing actuator. Take precautions against exposure to toxic or hazardous fluids in the line.

Remove small round cover on actuator to expose shaft and key. Remove actuator mounting bolts and lift actuator from valve taking care not to lose square key. Remove nuts (12) and lift follower (18) from valve shaft. Remove old packing (7) with packing hook. Lubricate new packing with FDA grease and set in place one ring at a time taking care not to bend over the lips of the packing rings. Reinstall follower bolts and place the actuator over valve and reinsert key (24). Finally, reinstall cover on actuator.

GEAR ACTUATOR MAINTENANCE: A typical gear actuator is shown in Figure 5 and consists of a worm (8) mounted on an input shaft (4). The worm engages a worm wheel (3). When the worm is turned, it drives the wheel through 90° of rotation. The rotation of the valve plug is displayed by the top indicator (5). The open and closed positions of the segment gear are controlled by an end position stop bolts. The stops can be adjusted by loosening the lock nut and rotating the bolts. The gears are lubricated with EP2 grease in a cast iron housing (1).

The gear box is factory lubricated and sealed. No regular maintenance is required. If difficult operation is observed, the cover can be removed and the unit inspected for wear. All moving parts should be coated with grease. The grease should have an even and smooth consistency. If needed, coat all moving parts with an lithium-based EP-2 grease such as Shell Alvania #2 or equal. Buried units should be packed 90% with grease.

GEAR ACTUATOR CONSTRUCTION

ITEM	DESCRIPTION	MATERIAL
1	Housing	Cast Iron
2	Plug	Plastic
3	Wormwheel	Ductile Iron
4	Shaft	Steel
5	Indicator	Cast Iron
6	Paint	Primer
7	Cover	Cast Iron
8	Worm	Hardened Steel
9	Bearing	Bronze
10	Bearing Race	Steel
11	Grease	EP-2
12	Worm Spacer	Steel
13	Gasket	Fiberflex
14	Pipe Plug	Steel
15	Expansion Plug	Steel
16	Jam Nut	Hardened Steel
17	Dowel Pin	Hardened Steel
18	Spirol Pin	Steel
19	1/4-20 Cap Screw	Steel
20	3/8-16 Cap Screw	Steel, Gr. 5
21	5/8-11 Set Screw	Steel
22	O-Ring	Buna-N
23	U-Cup Seal	Buna-N

TABLE 2. GEAR ACTUATOR PARTS LIST

TROUBLESHOOTING

Several problems and solutions are presented below to assist you in troubleshooting the valve assembly in an efficient manner.

- Leakage at Valve Shaft: Adjust or replace packing .
- Leakage at Flanges: Tighten flange bolts, replace gasket.
- Valve Leaks when Closed: Pressure should be in the direction of pushing the plug into the seat. Adjust plug position by rotating the handwheel. Inspect plug for damage and replace.
- Hard to Open: Flush debris from valve. Check interior of valve for grit buildup or debris. On buried valves, check alignment of operating stem.
- Leaking Oil: Tighten actuator cover bolts. If leak persists, remove actuator cover, inspect grease, and replace actuator gasket.

• Noisy Operation: Flow noise is normal. Loud flow noise similar to hammering may be cavitation from dropping high pressures across valve; review application of valve. For gear actuator noise, inspect grease; add new grease if there are uncoated moving parts or grease has broken down into oil.

DISASSEMBLY

Disassembly may be required to inspect the plug for wear or remove debris and deposits from the valve. Work on the valve should be performed by a skilled mechanic with proper tools and a power hoist for large valves. The valve can be disassembled without removing the valve from the pipeline. Refer to Figure 14 for valve construction and parts.

WARNING: Open valve and drain line before removing cover bolts or pressure may be released causing injury. Place plug in lowest position before removing actuator or plug may rotate suddenly and jam or damage plug surface.

1. Open valve and drain the pipeline. Close valve until plug just touches the seat. Remove the small cover on the actuator to expose the shaft key.
2. Remove the actuator mounting bolts and lift actuator from valve taking care not to lose key (24).
3. Remove cover bolts (15). Matchmark cover (2) and body. Screw eye-bolts into actuator mounting holes and use hoist to lift cover (2) and plug assembly from valve. Use caution to prevent plug from dropping while lifting cover. To remove plug (3) from valve, use sling around top portion of plug.
4. Inspection of the bearings (6) is done by measuring diameter of shaft and inside diameter of bearing. Check for a normal running clearance of .005". Bearings are permanently lubricated.
5. Thrust bearing assembly (23) and packing gland (18) can be removed by removing all of the hex nuts (12).

REASSEMBLY

All parts must be cleaned and gasket surfaces should be cleaned with a stiff wire brush in the direction of the serrations or machine marks. Worn parts, gaskets and seals should be replaced during reassembly.

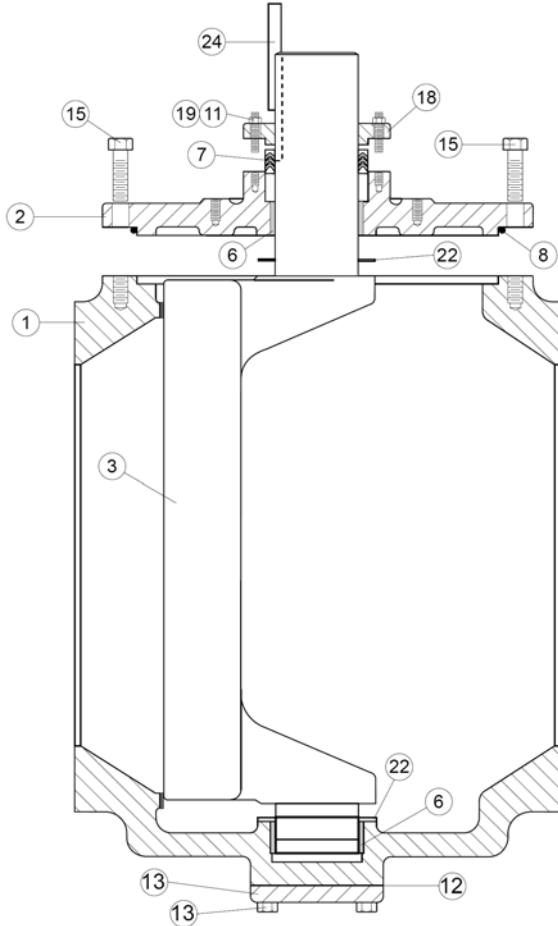


FIGURE 9. PLUG VALVE PARTS

one of the body seats and guide the bottom shaft into the bottom grit seal and bearing in the body. Do not force plug down into body seat.

4. Install cover (2) over plug shaft and into recess in body (the plug may need to be lifted so that the cover can be centered. Align match marks between body and cover (2). Torque cover bolts (15) per Table 6.
5. Lubricate ID and OD of packing set with FDA grease and install in packing bore one ring at a time taking care to keep lips pointing down toward plug. Reinstall follower, gland bolts, and 2 shims per bolt.
6. Install nuts (12) and first support plate over studs (13). Install Thrust bearing halves (22) into recess in support plate. Install second support plate and nuts.
7. Insert key (24) into shaft and place actuator over valve. Reinstall actuator mounting bolts and torque per Table 6. Install cover on actuator.
8. Apply power to actuator and cycle valve. Apply pressure to valve and check for cover and shaft leakage. Tighten bolts as necessary. Adjust packing if necessary.
9. If valve does not shut off tight, rotate the plug to the right and left to find the center of the seat. If the leak persists adjust the thrust bearing to lower the plug. Adjust the leveling nuts 1/2 turn at a time.

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1. Press new bearings (6) into cover and body with round, flat bar 1/4" below inside surfaces of body (1) and cover (2). Apply a 1/16" bead of 3M DP-190 2-Part Epoxy in the 1/4" recess above the sleeve bearings and press in Grit Seals (21) and allow to set for 1 hour.
2. Install cover seal (8) over cover lip.
3. Apply thin film of FDA silicone grease such as Dow Corning #7 to plug rubber surface. With the valve in the upright position, lower the plug into

PARTS AND SERVICE

Parts and service are available from your local representative or the factory. Make note of the valve Size, Series No, and Serial No. located on the valve nameplate and contact:

Val-Matic Valve and Mfg. Corp.
905 Riverside Drive
Elmhurst, IL 60126
PH: 630/941-7600
FAX: 630/941-8042

A sales representative will quote prices for parts or arrange for service as needed.

LIMITED WARRANTY

All products are warranted to be free of defects in material and workmanship for a period of one year from the date of shipment, subject to the limitations below.

If the purchaser believes a product is defective, the purchaser shall: (a) Notify the manufacturer, state the alleged defect and request permission to return the product; (b) if permission is given, return the product with transportation prepaid. If the product is accepted for return and found to be defective, the manufacturer will, at his discretion, either repair or replace the product, f.o.b. factory, within 60 days of receipt or refund the purchase price. Other than to repair, replace or refund as described above, purchaser agrees that manufacturer shall not be liable for any loss, costs, expenses or damages of any kind arising out of the product, its use, installation or replacement, labeling, instructions, information or technical data of any kind, description of product use, sample or model, warnings or lack of any of the foregoing. NO OTHER WARRANTIES, WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, ARE MADE OR AUTHORIZED. NO AFFIRMATION OF FACT, PROMISE, DESCRIPTION OF PRODUCT OF USE OR SAMPLE OR MODEL SHALL CREATE ANY WARRANTY FROM MANUFACTURER, UNLESS SIGNED BY THE PRESIDENT OF THE MANUFACTURER.

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