

PMDS Self-Cleaning Rotary Valve

Service & Maintenance Manual



Size: _____
S/N: _____
Temperature: _____
Rotation: CW / CCW

Congratulations!

You have purchased the most rugged and durable rotary valve on the market, and you should experience long, reliable service from the Precision PMDS Rotary Valve.

Please carefully review all of the material in this Service & Maintenance Manual. It contains important information about the start-up and run-in of the PMDS, descriptions of simple maintenance procedures, and information on ordering replacement parts.

By fully understanding how your valve is constructed, assembled, and operated, you will be able to properly install and maintain it for long and trouble-free service.

We stand ready to answer any questions and assist you as necessary to help you get the optimum performance from your PMDS Rotary Valve. Please contact our office in Eugene, Oregon USA at (541) 484-9841.

If there is anything further that we can do to assist you, please contact us. Your feedback is important to us.

Thanks for your business!

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Safety

Safety is a primary concern at Precision Machine and Manufacturing, Inc. and we encourage our customers to make it their top priority also.

State and local rules vary from location to location, and it is the user's responsibility to follow those standards. These procedures are a must for the safe operation and maintenance of the Precision PMDS Rotary Valve:

- Personal Protection Equipment must be worn while working on the valve.
- All guards and safety devices must be in place while the valve is in operation.
- If maintenance is performed with the valve in place, all appropriate lockout and tag-out devices must be in place to prevent power to the valve.
- Normal operation of the valve may create burrs and sharp edges. Caution must be taken when handling the valve and its components.
- The valve and many of the components are very heavy. Sufficient manpower and/or hoists must be used when they are moved.

The safety decals, shields, and other protective features designed into the PMDS Rotary Valve and furnished with it, or recommended for it, are there for your protection.

The operation and maintenance of the PMDS should be restricted to only those personnel trained in its use.

The various precautions and recommendations detailed in this Manual are not necessarily all inclusive. This manual is designed to provide general safety and operational guidance relating to typical installations with which we are familiar.

If you have any safety or operational questions pertaining to the design, operation, or application of your PMDS Rotary Valve, we encourage you to contact Precision for assistance.

Warnings

1. Lockouts required for this equipment should be installed prior to initial start-up and operation.

→ *These lockouts are **not** the responsibility of Precision Machine & Manufacturing, Inc.*

2. Rotary valves can cause severe physical injury if proper safety procedures are not observed during the course of operation, maintenance, inspection, or clearing of an equipment jam.

→ *The drive motor must be locked out before inspection or service of this equipment.*

3. Welding or burning on any part of the rotary valve is not recommended. Any distortion of the valve caused by welding or burning could cause the rotor to seize in the housing.
4. Power and control wiring should be installed by a licensed and experienced electrician to assure safe and productive operation of the PMDS rotary valve.

Introduction

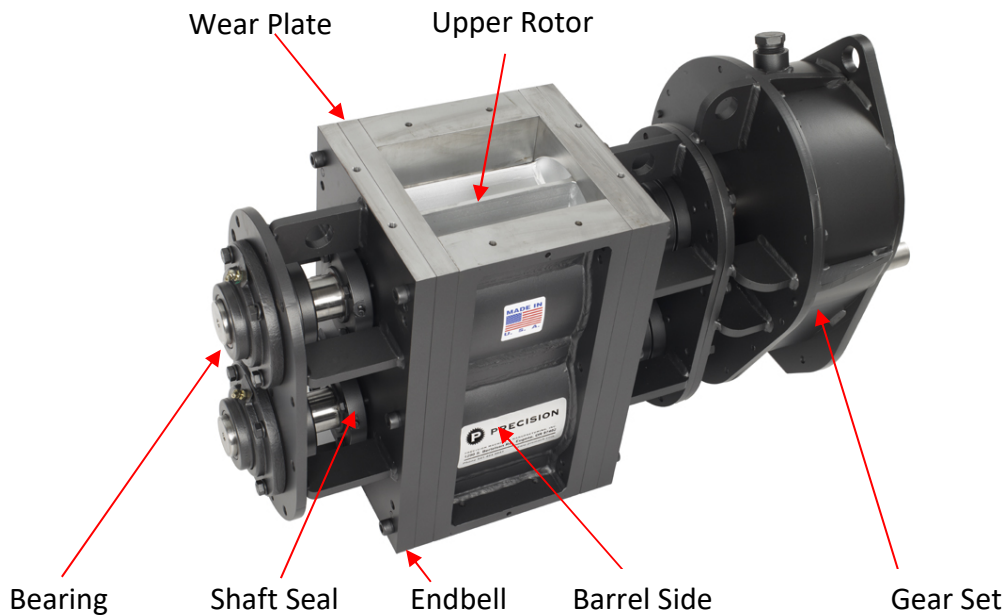
Precision's PMDS valves are the world's only self-cleaning rotary valves. The innovative double-rotor design handles high-moisture or sticky materials with minimal build-up in the rotor pockets and without expensive plant downtime to clean-out the rotary valve. The modular design of the PMDS, which is based on our PMV Rotary Valve, allows for quick and simple replacement of worn parts.

The Precision PMDS Rotary Valve is designed for a long service life and ease of operation with low maintenance. Familiarization with the valve and its function is a must along with a routine maintenance plan. A rigorous maintenance schedule will optimize the efficiency and life of the valve.

The system operator should fully understand the function of the PMDS Rotary Valve to know its proper operation. The unit serves primarily as a feeder, to feed a bulk product into an air stream, or as an airlock to segregate differential pressures above and below the rotary valve.

Due to its modular design, the Precision PMDS may be unfamiliar to plant personnel who may be used to a rotary valve built from a casting. The PMDS design is meant to be simple to operate and repair if required.

Precision's terminology for the various PMDS components is as follows:



- A. The two **endbells** are identical to one another and can be interchanged end-to-end if the need arises.
- B. The two **wear plates** are also identical and can be swapped end-to-end if needed.
- C. Most importantly, the two **barrel sides** are identical to one another and can be swapped side-to-side. PMDS-8 rotary valves are manufactured with one-piece barrel sides (as shown above.) For PMDS-10 and larger rotary valves, the barrel sides are a two-piece design (see below.)



- D. The standard **upper rotor** on PMDS rotary valves is a six-vane, closed-end design with rounded pockets; open vane or open end rotors are not available in a PMDS Rotary Valve.

Precision's sizing system for the PMDS Rotary Valve refers to the rotor diameter. A PMDS-10, for example, refers to a rotary valve with a 10" diameter upper rotor. Other rotary valve manufacturers commonly refer to the inlet dimension or some other dimension in their terminology. Care should be exercised in sizing and specifying rotary valves to assure that like capacities are being described.

The PMDS is offered in several configurations that utilize different combinations of materials and surface treatments.

	Rotor	Wear plates	Barrel sides	Endbells
Severe Duty	Tri-Braze steel	Mild steel with an industrial hard chrome.	Tri-Braze steel with an industrial hard chrome.	Mild steel
Ultra Duty	Tri-Braze steel with ion-nitriding surface treatment	Mild steel with ion-nitriding surface treatment	Tri-Braze steel with ion-nitriding surface treatment	Mild steel

In addition, PMDS rotary valves may be constructed of 304, 316, or 2205 duplex stainless steel.

Dimensions and capacities of the PMDS Rotary Valves are as follows:

	CFR	Height	Width	Inlet Opening
PMDS-8	0.13	17.0"	11.0"	6.5" x 8.0"
PMDS-10	0.29	18.0"	12.0"	7.0" x 10.0"
PMDS-12	0.51	21.0"	15.0"	9.0" x 12.0"
PMDS-14	0.90	24.0"	18.0"	9.6" x 14.0"
PMDS-16	1.32	28.0"	21.75"	12.0" x 16.0"
PMDS-18	1.94	32.5"	24.0"	18.0" x 18.0"
PMDS-20	2.75	36.0"	26.0"	20.4" x 20.0"

AN IMPORTANT ADVISORY ABOUT OPERATING A PMDS

Due to the nature of the applications where a PMDS Self-Cleaning rotary valve is used, with sticky, hard-to-handle materials, it is **critical** that the valve be run until it is fully emptied before the valve is shut down.

If sticky material is left in the rotor(s) of the PMDS and allowed to set-up, it is highly likely that high amperage will be experienced at start-up and/or damage to one or both rotors may occur.

Installation and Startup

NOTE: BEFORE ANY INSPECTION OR MAINTENANCE, YOU MUST FOLLOW STANDARD 'LOCK-OUT/TAG-OUT' PROCEDURES FOR ALL POWER SOURCES AS DEFINED BY OSHA. SEE WARNINGS ON PAGE 5.

- A. Rotation** – The PMDS can be wired and controlled to rotate in either direction based on the necessary application.
- B. Clearances** – The clearance between the rotor and the barrel sides is set at Precision's factory and no field adjustment is possible.

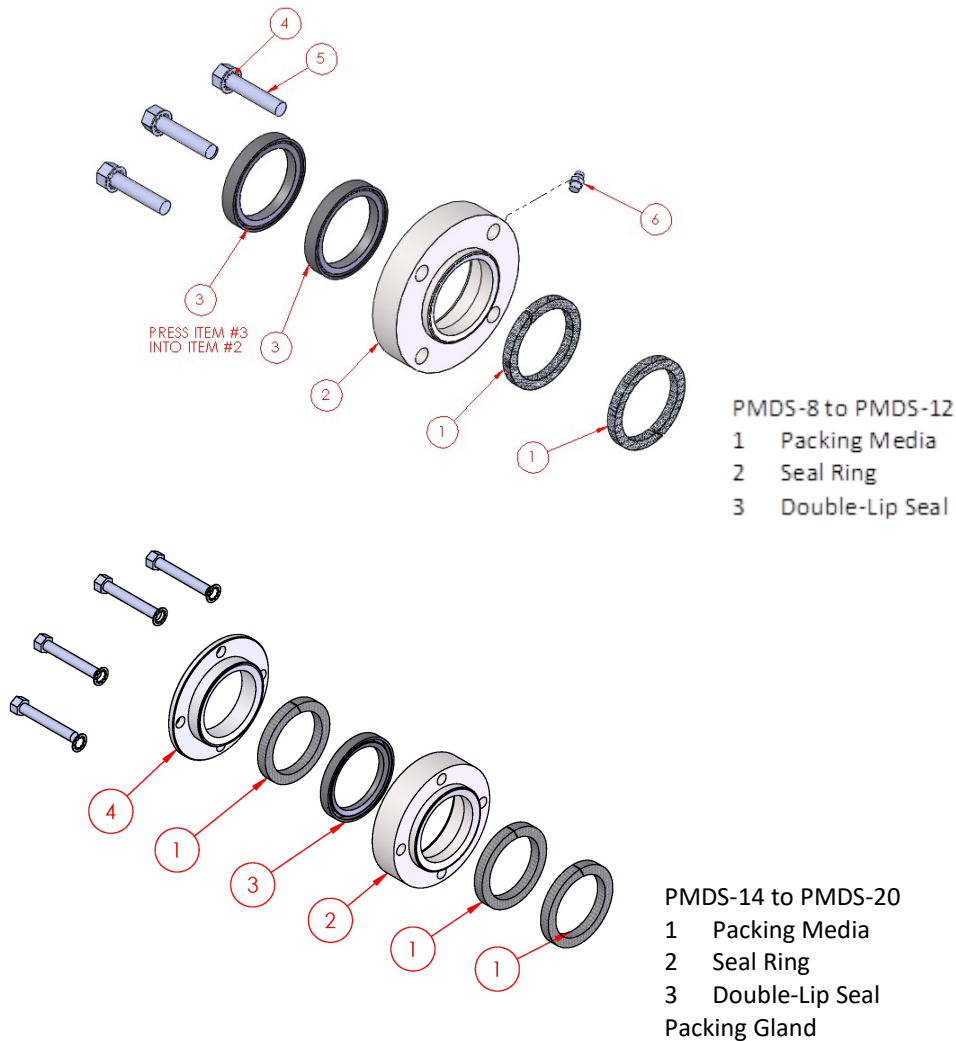
The clearance between the rotor ends and the wear plates is also set at Precision's factory. Shipping and/or installation may cause the rotor to shift side-to-side. A rubbing noise or binding of the rotor may be an indication that the rotor has shifted and is contacting one of the wear plates. The clearance can be adjusted in the field by loosening the set screws on the bearing collars and repositioning the rotor to center it in the inlet opening and then re-tightening the set screws in their proper position.

- C. Lubrication** – Each PMDS ships from Precision's factory pre-lubricated.
- D. Wiring** – Power and control wiring of the PMDS Rotary Valve should be completed by a qualified electrician with careful attention paid to the rotation direction.
- E. Air Purge Kit** – A PMDS valve ordered with a factory-installed Air Purge Kit must be connected to a plant air source; contact Precision for details on plumbing. For a field-installed Air Purge Kit, contact Precision for installation and plumbing instructions.
- F. Temperature** – When an order is placed with Precision for a PMDS Rotary Valve, the customer must specify a temperature for the material that will be passing through the valve. Most commonly, this is "ambient" meaning that material will be at roughly the same temperature as the valve's surroundings. However, if the material is to arrive at the valve in an elevated temperature then that should be noted at the time the order is placed.

Precision will machine the upper rotor to a known diameter for a specified material temperature as part of the manufacturing process. This is to allow for thermal expansion in operation so that the rotor does not contact the barrel sides.

If the temperature was not correctly specified, it is possible that a rotor-to-barrel contact can take place and this will often show up within the first few hours of operation. The most common symptom will be a regular scraping or ticking sound as the rotor turns. In more serious cases where the temperature is considerably different, it can result in the valve locking up.

G. Shaft Packing & Seal Run-In – All sizes of PMDS Rotary Valves have two wraps of a square, graphite-impregnated packing installed inside the end bell and held in place by a seal ring. At Precision’s factory, this seal ring is tightened so that the in-board lip on the seal ring just disappears inside the end bell.



The PMDS-8 to PMDS-12 rotary valves have two nitrile double-lip seals pressed into the outboard side of the seal ring. The PMDS-14 and larger rotary valves have a single nitrile double-lip seal and a wrap of a square, graphite-impregnated packing pressed into the outboard side of the seal ring and held in place by a packing gland.

After an initial 4-8 hours of operation, it is highly recommended that the four bolts holding the seal ring (and the packing gland on larger size PMDS valves) be checked to make sure that they are tight and have not worked loose.

Even if the four bolts are tight after an initial run-in, Precision recommends that the bolts be tightened approximately $\frac{1}{4}$ to $\frac{1}{2}$ turn in order to firmly seat the packing and seals.

Inspection and Preventive Maintenance

NOTE: BEFORE ANY INSPECTION OR MAINTENANCE, YOU MUST FOLLOW STANDARD 'LOCK-OUT/TAG-OUT' PROCEDURES FOR ALL POWER SOURCES AS DEFINED BY OSHA. SEE WARNINGS ON PAGE 5

- A. Daily Inspection** – A short visual inspection of the PMDS Rotary Valve each day will result in the early detection of any possible maintenance or operational issues so that the user will experience reliable, trouble-free performance for a long time.

The daily inspection should include:

- 1) Inspection for any evidence of material or air escaping around the shafts
- 2) Inspection for any evidence of material or air escaping around the inlet or discharge flanges of the rotary valve
- 3) Inspection for any evidence of increasing temperature in the valve, for example discolored paint or areas that are hot to the touch
- 4) Any indication that grease is required

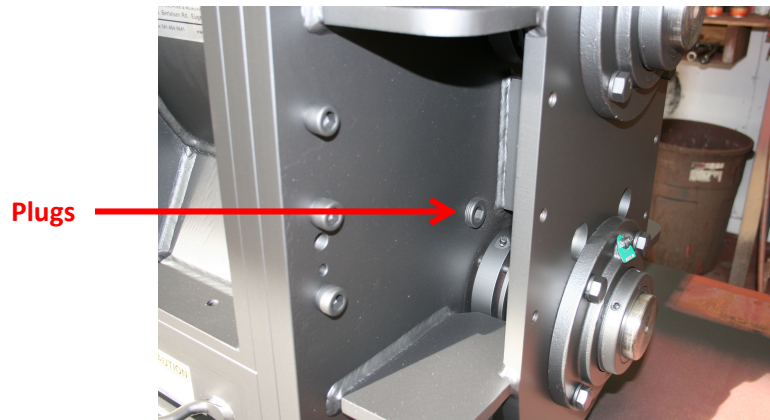
A number of issues may also be detected by listening carefully to the valve while it is operating. Scraping or regular ticking may be an indication that the rotor has shifted. Listen carefully to the valve in operation; if the sound of metal-on-metal scraping or knocking is heard, discontinue operation, lock-out the drive, and visually inspect all components for wear or misalignment.

- B. Lubrication** - Precision recommends the use of a good-quality, all-purpose grease for lubricating the rotor bearings. The grease should be appropriate for the temperature conditions where the rotary valve is installed. Too much grease will damage bearing seals and should be avoided.

Precision recommends that the lubrication of the PMDS bearings be checked bi-monthly. More frequent re-lubrication is generally not necessary but will depend on the operating conditions in the customer's plant and the duty cycle for the PMDS Rotary Valve.

In addition to lubricating the bearings, it is recommended that the lubrication of the shaft seal ring be checked on the same schedule and that the same grease be used.

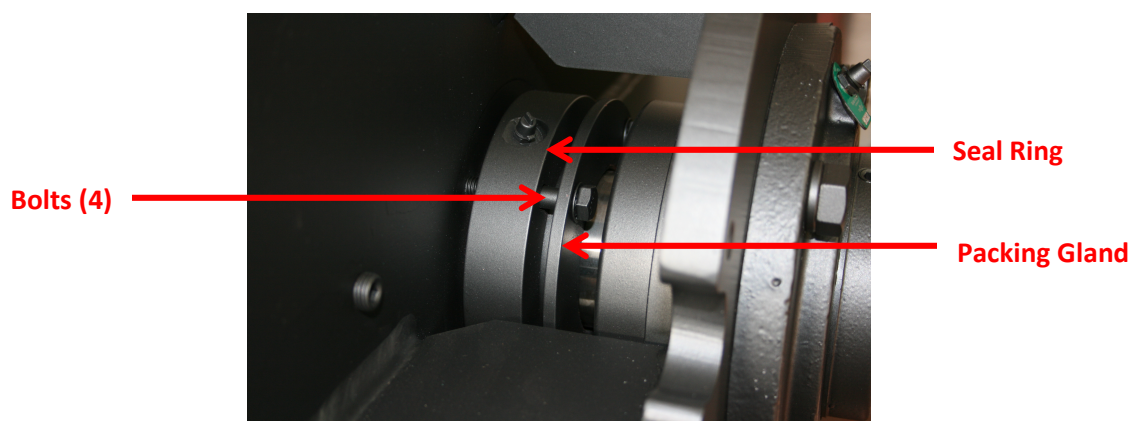
- C. End Bell Clean-Out Ports** – Both end bells on a PMDS are equipped with two threaded ports below the upper rotor shaft. The ports are capped with an Allen head plug.



It is a good practice to regularly remove the plugs and blow compressed air into the ports to loosen and remove any material that may have built up between the rotor ends and the wear plates. Allowing material to build up in this space will increase the wear on the PMDS components. The frequency with which this operation should be done is dependent on operating conditions in the plant.

D. Shaft Packing & Seal Adjustment -

Over time, the shaft packing and seals on the PMDS Rotary Valve will begin to lose their effectiveness due to the rotational movement of the shaft. The most obvious way to detect a loss of effectiveness is to look for visual evidence that air or the material (dust or small particles) is escaping around the shaft.



It is not possible for Precision to recommend a fixed period of time between adjustments as operating conditions can vary greatly.

If evidence is found that indicates that air or material is escaping around the shaft, it is recommended that the four bolts holding the seal ring (and packing gland on larger PMDS's) be tightened approximately ½ turn to compress the packing. This process can then be repeated as necessary until no further adjustment is possible and the packing must be replaced.

Maintenance Procedures

NOTE: BEFORE ANY INSPECTION OR MAINTENANCE, YOU MUST FOLLOW STANDARD 'LOCK-OUT/TAG-OUT' PROCEDURES FOR ALL POWER SOURCES AS DEFINED BY OSHA. SEE WARNINGS ON PAGE 5

A. Shaft Packing & Seal Replacement - When the packing no longer responds to adjustment as described above or no longer provides an effective seal around the shaft, the shaft packing should be replaced. The steps in this procedure are as follows:

1. Wipe any excess grease or other surface contaminants off the shaft outboard of the shaft seal assembly; this will make it easier to slide the shaft seal assembly away from the end bell and to slide it back into place.
2. Loosen and remove the bolts holding the seal ring (and packing gland, if equipped); slide the shaft seal assembly out and up against the bearing.
3. Remove the remnants of the old graphite packing material and clean out the packing gland area of the end bell.
4. Install two wraps of square, graphite-impregnated packing into the end bell; see the parts diagrams in this Manual for part numbers for this material.
5. Reposition the seal ring (and packing gland, if equipped) up against the end bell, and sequentially tighten the bolts until the inboard lip on the seal ring just disappears evenly inside the end bell. **Do not over tighten.**
6. For PMDS-8 to PMDS-12 models, check to make sure that the double-lip seals which are pressed into the outboard side of the seal ring are in still in place and have not become hung up along the shaft.

B. Bearing Replacement – The Dodge Type E piloted flange bearings that are used on the Precision PMDS are very reliable and should provide years of dependable service. In the event that a bearing replacement is necessary, the steps in the procedure are as follows:

1. Loosen the set screw(s) on the bearing collar
2. Remove the four bolts that hold the bearing into the end bell bearing boss and slide the bearing off the shaft
3. Slide the new bearing onto the shaft and push it up into end bell bearing boss; align the bolt holes and re-install the four bolts. The bearing will center the shaft and rotor once the bearing is firmly re-seated in the end bell bearing boss
4. Align the set screw hole with the dimple in the shaft by rotating the bearing collar.
Note: Precision dimples the shaft on only one side of the rotary valve so it is possible that there is no dimple
5. Firmly tighten the set screw after aligning with the dimple in the shaft. If there is no dimple on the shaft where the bearing is being replaced, simply tighten the set screw at any point.

C. PMDS Disassembly and Reassembly – The modular design of the PMDS facilitates simple disassembly and reassembly either where it is installed in the plant or in a workshop.

Complete or partial disassembly may be necessary to replace an individual PMDS component, to clear a jammed rotor, or to clean out material build-up in the rotor pockets.

Precision normally recommends that the PMDS valve be disassembled “one end at a time” rather than trying to simultaneously disassemble both ends.

The steps in the procedure are as follows:

1. Loosen and remove the set screws in the bearing collar. If the disassembly is being done where the valve is installed, carefully note the distance from one end of the shaft to the bearing – this information will be necessary to center the rotor in the last step of re-assembly.

Depending on the condition of the drive shaft, it may be necessary to remove all bearings so that the end bells and wear plates can be slid off the shafts with minimal difficulty.

2. In most cases, it is not necessary to loosen and remove the bolts holding the shaft seal assembly in place on the end bell in order to disassemble the PMDS. However, if it

seems that the shaft seal assembly is binding or is overly tight on the shaft it may be an advantage to loosen and remove the four bolts holding the assembly in place and slide the assembly out and up against the bearing.

3. Using a hammer or mallet and a punch, drive out the 6 alignment pins on each end bell (see below.)
4. Using an Allen wrench, loosen and remove the bolts in each end bell (see below.) These bolts fasten the end bell, wear plate, and barrel sides together.
5. On each end bell, there are 6 jack bolt holes (see below) which can be used to separate the end bell from the wear plate if the two are bound together. Insert six of the Allen head bolts into the six threaded holes. They should contact the outboard side of the wear plate; then sequentially tighten the six bolts so that they push the end bell away from the wear plate.

The jack bolt holes can also be used to help free the bearing if it is hung up the shaft. Simply continue tightening the bolts in the jack bolt holes until the end bell moves enough to push the bearing on the shaft. It may be necessary to use longer bolts than the Allen head bolts supplied with the PMDS.

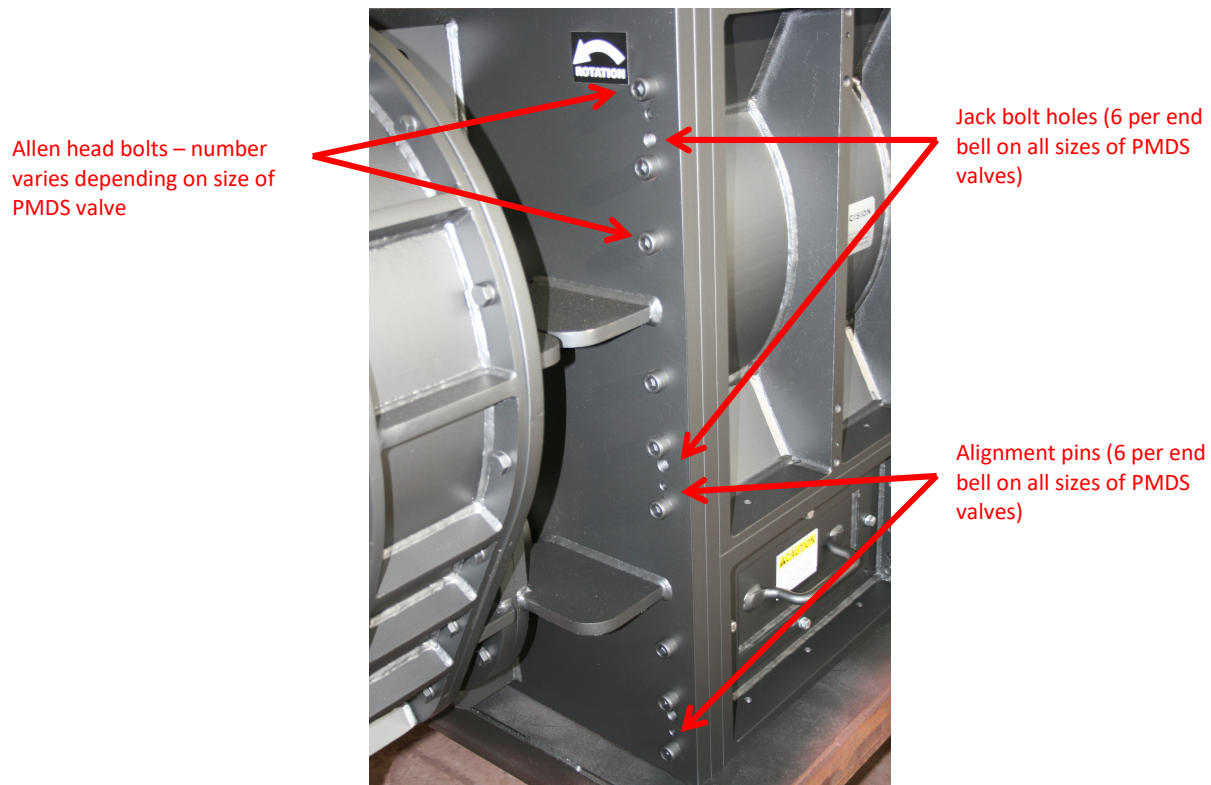


Figure 4

6. With the valve completely disassembled, individual components can be replaced as needed.
7. Reassembly begins with lining up the end bell and wear plate – make sure that the clean-out ports on both components are aligned with one another and the counter-bored side of the wear plate is facing away from the end bell.
8. Tap in the six alignment pins so that they just protrude from the in-board side of the wear plate
9. Align the six alignment pins with the corresponding holes in the barrel sides
10. Once all the components are properly aligned, insert the Allen bolts into the holes in each end bell and sequentially tighten all the bolts.
11. The last step is to center the rotor in the valve and tighten the bearing set screws. If the re-assembly is taking place in a workshop where there is access through the inlet at the top of the PMDS, using your hands or a gentle tap on the end of the shaft to align the rotor so that it is centered between the wear plates. Tighten the bearing set screws on all four shafts
12. If the re-assembly is being done in the valve's installed location, locate the rotor shaft end at the same distance from the bearing as the measurement that was taken in Step #1. Tighten both bearing set screws

D. Wear Plate Replacement – Disassemble the PMDS as described above through Step #6 and then re-assemble the valve with the new wear plates, beginning from Step #7

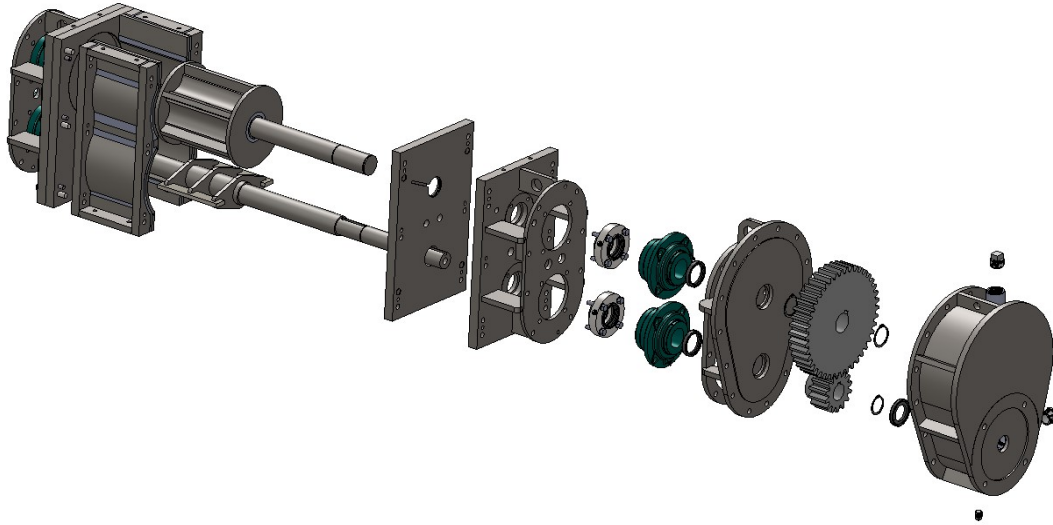
E. Swapping & Reversing Barrel Sides – As mentioned in the Introduction, the one-piece barrel sides are identical to one another for PMDS-8 Rotary Valves and therefore can be interchanged side-to-side with one another.

The two-piece barrel sides in the PMDS-10 and larger valves can be similarly interchanged. The upper barrel sides (see page 6) can be interchanged side-to-side with one another. In addition, the upper barrel sides are also symmetrical so that a barrel side can be “rolled over” with the top becoming the bottom. Contact Precision for more details.

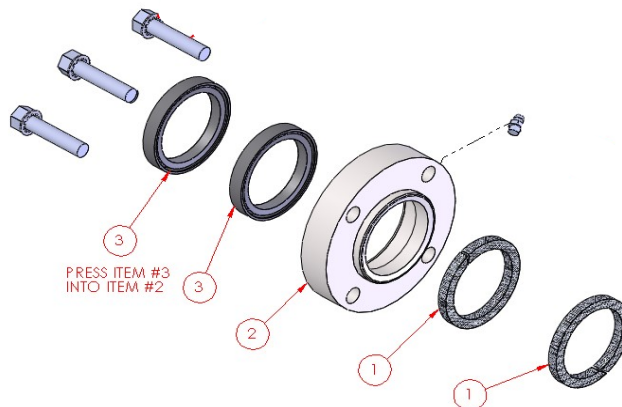
It has been Precision's experience that the greatest wear on the barrel sides occurs on the top edge and on the barrel side that the rotor is turning towards. Precision refers to this as the “leading edge.” As the leading edge begins to wear and the rotor-to-barrel side clearance increases, material or air flow may be able to escape which will decrease the valve's efficiency and increase wear on all components.

Whether the plan is to swap the barrel sides or to reverse the barrel side on the leading edge, the PMDS should be disassembled as described above and once the barrel sides are free the swap or reversal is easily accomplished.

PMDS-8 Severe Duty Self-Cleaning Rotary Valve – Parts List

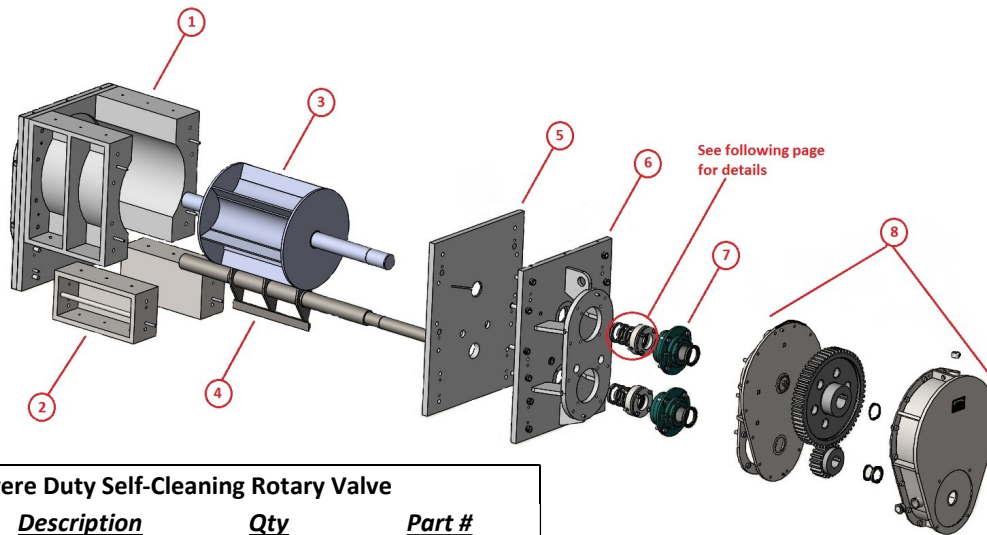


PMDS-8 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	One-Piece Barrel Side	2	3011003002
3	Rotor	1	3011003202
4	Scraper Rotor	1	3011003302
5	Wear plate	2	3021008002
6	End Bell	2	3011003102
7	Bearing	2	5011000102
8	Gear Guard	1	3011003502

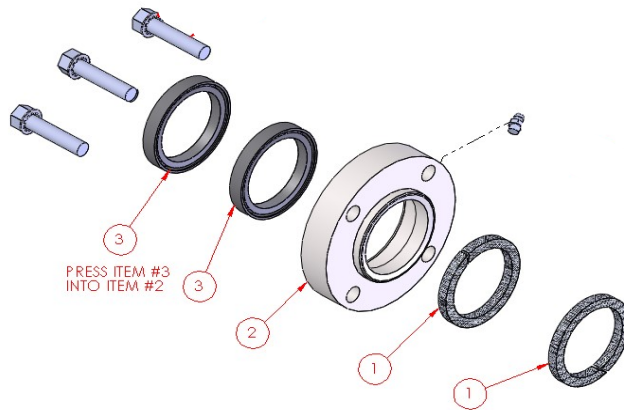


PMDS-8 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Packing Media	4	5011001301
2	Seal Ring	2	3021000101
3	Double-Lip Seal	4	5011003901

PMDS-10 Severe Duty Self-Cleaning Rotary Valve – Parts List

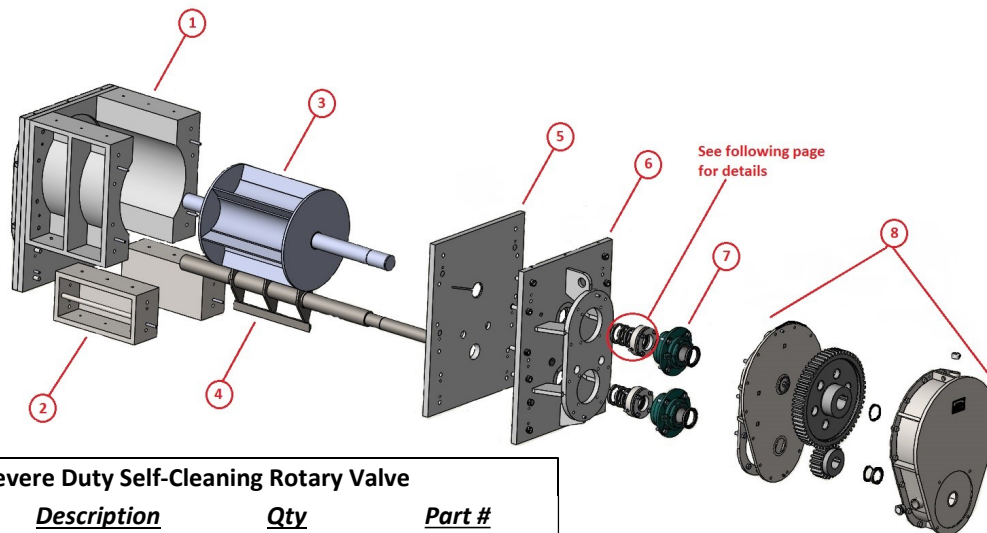


PMDS-10 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Upper Barrel Side	2	3011003003
2	Lower Barrel Side	2	3011003603
3	Rotor	1	3011003203
4	Scraper Rotor	1	3011003303
5	Wear plate	2	3021008003
6	End Bell	2	3011003103
7	Bearing	2	5011000102
8	Gear Guard	1	3011003503

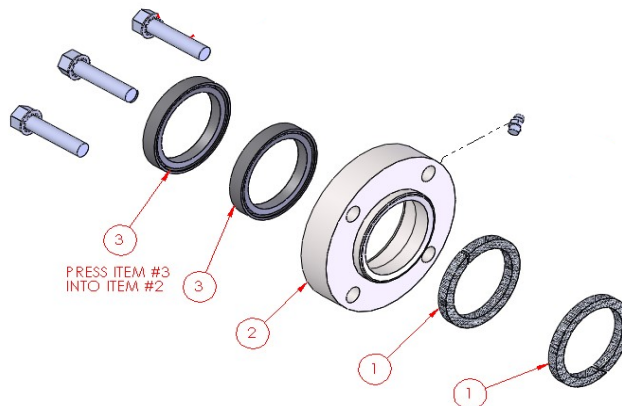


PMDS-10 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Packing Media	4	5011001301
2	Seal Ring	2	3021000101
3	Double-Lip Seal	4	5011003901

PMDS-12 Severe Duty Self-Cleaning Rotary Valve – Parts List

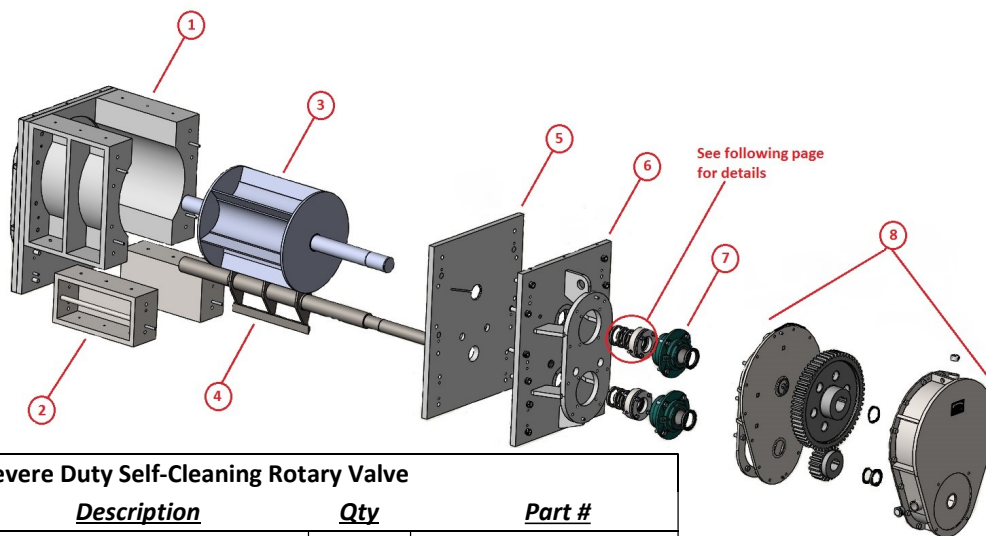


PMDS-12 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Upper Barrel Side	2	3011003004
2	Lower Barrel Side	2	3011003604
3	Rotor	1	3011003204
4	Scraper Rotor	1	3011003304
5	Wear plate	2	3021008004
6	End Bell	2	3011003104
7	Bearing	2	5011000102
8	Gear Guard	1	3011003504

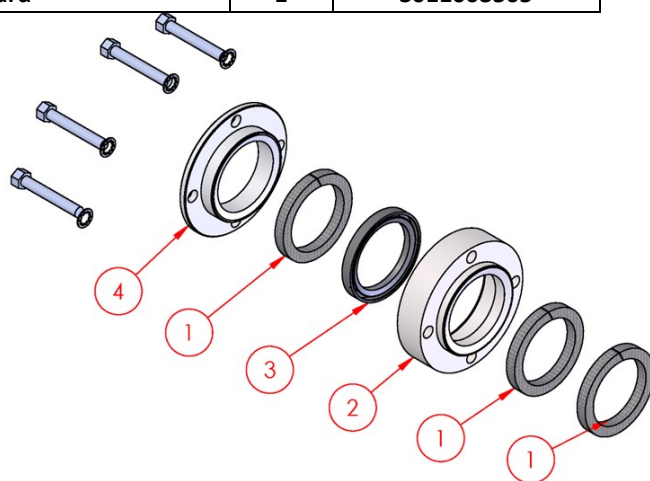


PMDS-12 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Packing Media	4	5011001301
2	Seal Ring	2	3021000101
3	Double-Lip Seal	4	5011003901

PMDS-14 Severe Duty Self-Cleaning Rotary Valve – Parts List

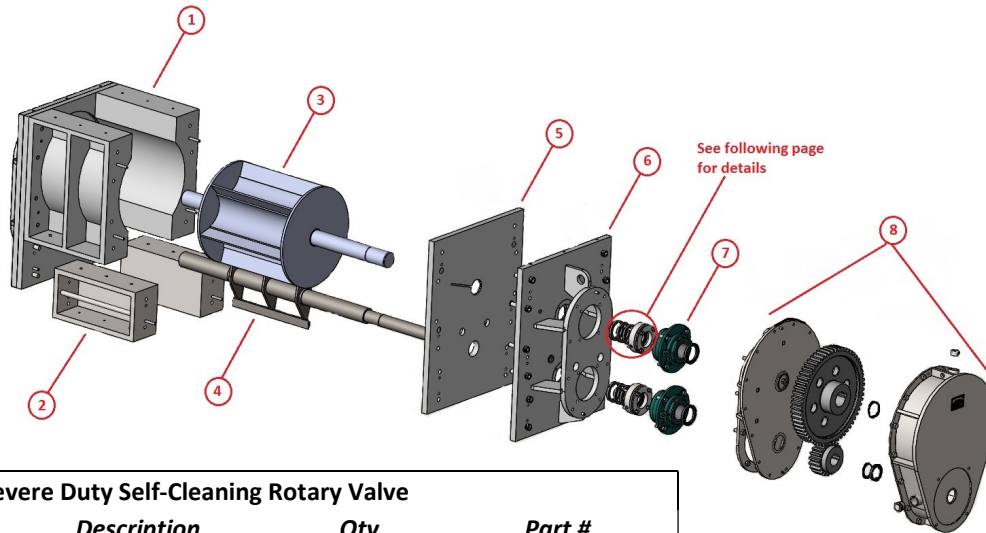


PMDS-14 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Upper Barrel Side	2	3011003005
2	Lower Barrel Side	2	3011003605
3	Rotor	1	3011003205
4	Scraper Rotor	1	3011003305
5	Wear plate	2	3021008005
6	End Bell	2	3011003105
7	Bearing	2	5011000102
8	Gear Guard	1	3011003505

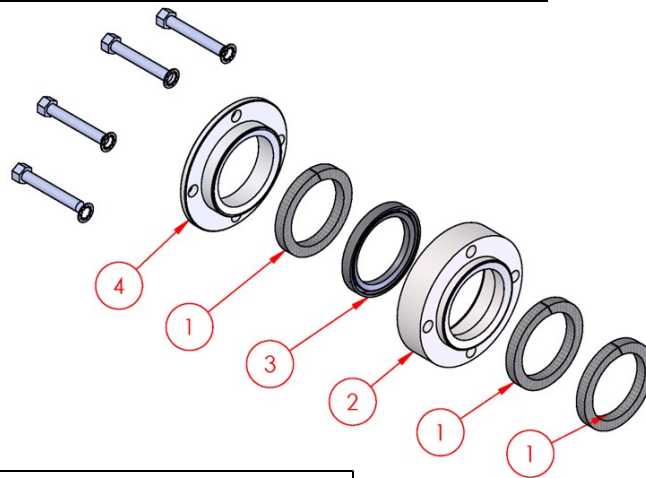


PMDS-14 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Packing Media	6	5011002502
2	Seal Ring	2	3021000102
3	Double-Lip Seal	2	5011003902
4	Packing Gland	2	3021000121

PMDS-16 Severe Duty Self-Cleaning Rotary Valve – Parts List

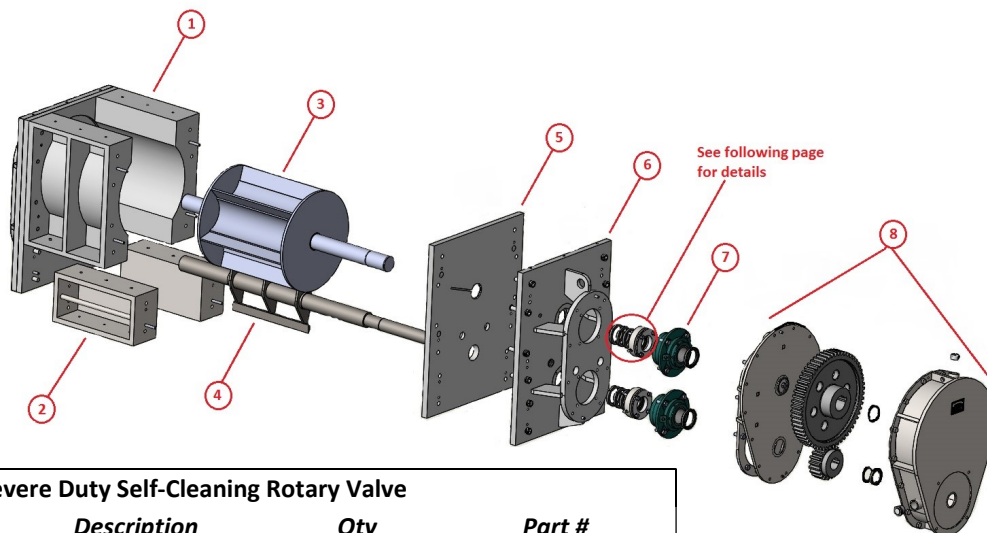


PMDS-16 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Upper Barrel Side	2	3011003006
2	Lower Barrel Side	2	3011003606
3	Rotor	1	3011003206
4	Scraper Rotor	1	3011003306
5	Wear plate	2	3021008006
6	End Bell	2	3011003106
7	Bearing	2	5011000102
8	Gear Guard	1	3011003506

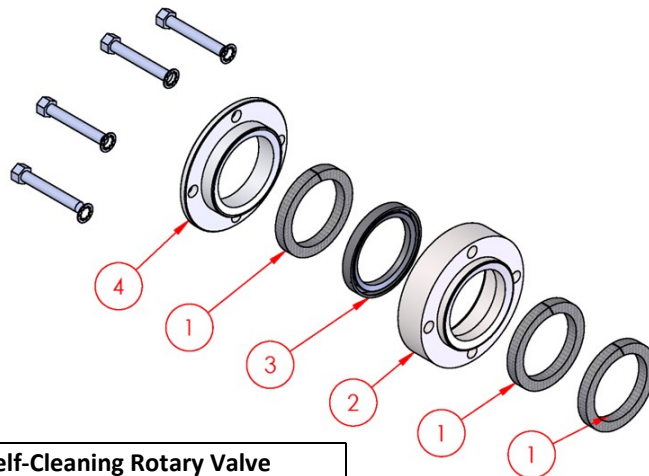


PMDS-16 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Packing Media	6	5011002502
2	Seal Ring	2	3021000102
3	Double-Lip Seal	2	5011003902
4	Packing Gland	2	3021000121

PMDS-18 Severe Duty Self-Cleaning Rotary Valve – Parts List

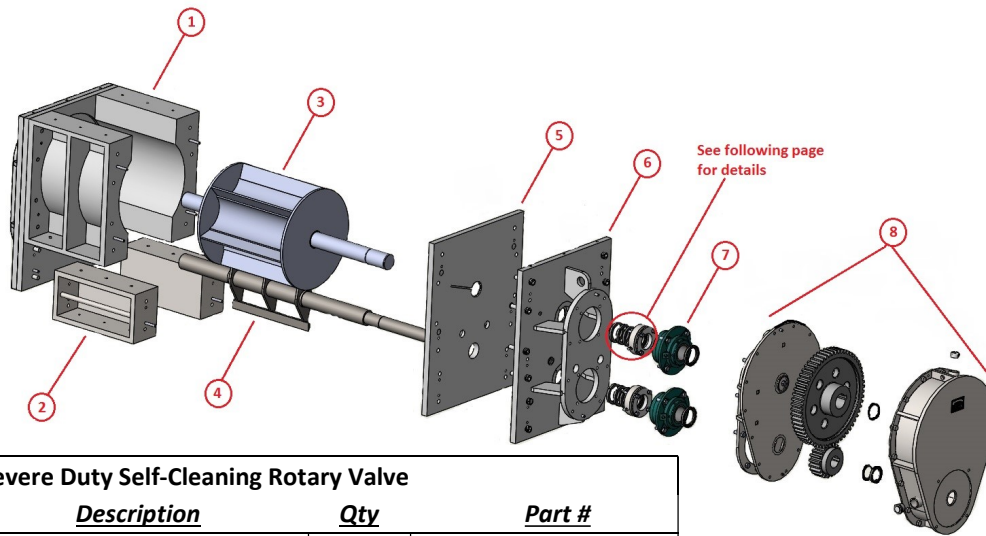


PMDS-18 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Upper Barrel Side	2	3011003007
2	Lower Barrel Side	2	3011003607
3	Rotor	1	3011003207
4	Scraper Rotor	1	3011003307
5	Wear plate	2	3021008007
6	End Bell	2	3011003107
7	Bearing	2	5011000102
8	Gear Guard	1	3011003507

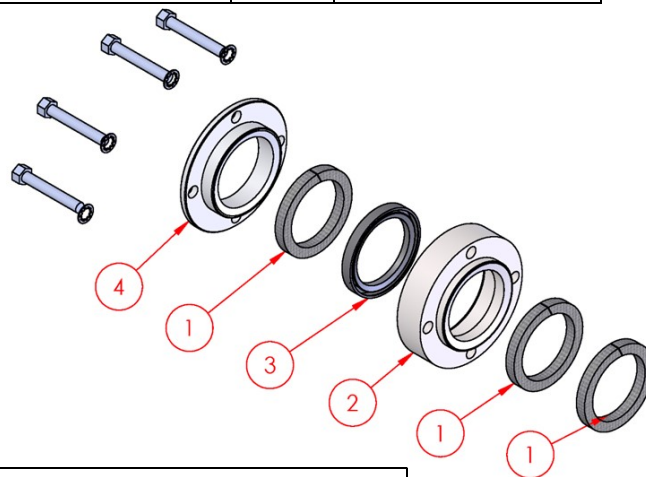


PMDS-18 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Packing Media	6	5011002503
2	Seal Ring	2	3021000103
3	Double-Lip Seal	2	5011003903
4	Packing Gland	2	3021000122

PMDS-20 Severe Duty Self-Cleaning Rotary Valve – Parts List



PMDS-20 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Upper Barrel Side	2	3011003008
2	Lower Barrel Side	2	3011003608
3	Rotor	1	3011003208
4	Scraper Rotor	1	3011003308
5	Wear plate	2	3021008008
6	End Bell	2	3011003108
7	Bearing	2	5011000102
8	Gear Guard	1	3011003508



PMDS-20 Severe Duty Self-Cleaning Rotary Valve			
<u>Item</u>	<u>Description</u>	<u>Qty</u>	<u>Part #</u>
1	Packing Media	6	5011002503
2	Seal Ring	2	3021000103
3	Double-Lip Seal	2	5011003903
4	Packing Gland	2	3021000122

Precision Machine & Mfg, Inc. Standard Warranty

WARRANTY

Precision Machine and Manufacturing, Inc. warrants products of its manufacture to be free from defects in material and workmanship if properly installed, maintained, and operated under normal conditions with competent supervision.

No person, agent, representative or dealer is authorized to give any warranties on behalf of Precision Machine and Manufacturing, Inc. nor to assume for Precision Machine and Manufacturing, Inc. any other liability in connection with any of Precision Machine and Manufacturing, Inc. products.

This warranty shall extend for one (1) year from date of installation provided this equipment has been put into service within ninety (90) days after shipment from Precision Machine and Manufacturing, Inc. factory. If repairs or replacements are made by the Purchaser without Precision Machine and Manufacturing, Inc. prior written consent, Precision Machine and Manufacturing, Inc. warranty shall cease to be in effect. No allowance will be granted for any repairs or alterations made by the Purchaser without Precision Machine and Manufacturing, Inc. prior written consent.

Machinery, equipment and accessories furnished by Precision Machine and Manufacturing, Inc. but manufactured by others, are warranted only to the extent of the original manufacturer's warranty to Precision Machine and Manufacturing, Inc.

Precision Machine and Manufacturing, Inc. agrees at its option to repair at the point of shipment or to replace without charge f.o.b. point of shipment, any part or parts of products of Precision Machine and Manufacturing, Inc. manufacture, which within the specified warranty period shall be proved to Precision Machine and Manufacturing, Inc. satisfaction to have been defective when shipped, provided the Purchaser promptly notified Precision Machine and Manufacturing, Inc., in writing, of such alleged defect.

Precision Machine and Manufacturing, Inc. liability to Purchaser, whether in contract or in tort arising out of warranties, representations, instructions, or defects from any cause shall be limited to repairing or replacing of the defective part or parts as aforesaid, f.o.b. point of shipment.

No liability whatsoever shall attach to Precision Machine and Manufacturing, Inc. until said products have been paid for.

EXCEPT AS STATED IN THIS SECTION AND IN THE PRECEDING SECTION TITLED "WARRANTY" AND EXCEPT AS TO TITLE, THERE ARE NO GUARANTEES OR WARRANTIES OF MERCHANTABILITY, FITNESS, PERFORMANCE OR OTHERWISE, EXPRESS, IMPLIED OR STATUTORY, AND PRECISION MACHINE AND MANUFACTURING, INC. SHALL HAVE NO LIABILITY FOR CONSEQUENTIAL, INCIDENTAL OR OTHER DAMAGES, HOWSOEVER CAUSED.

DATE INSTALLED _____

MODEL _____

SERIAL # _____