

OmniSeal Expanding Plug Valve

Double Block/Double Isolation & Bleed

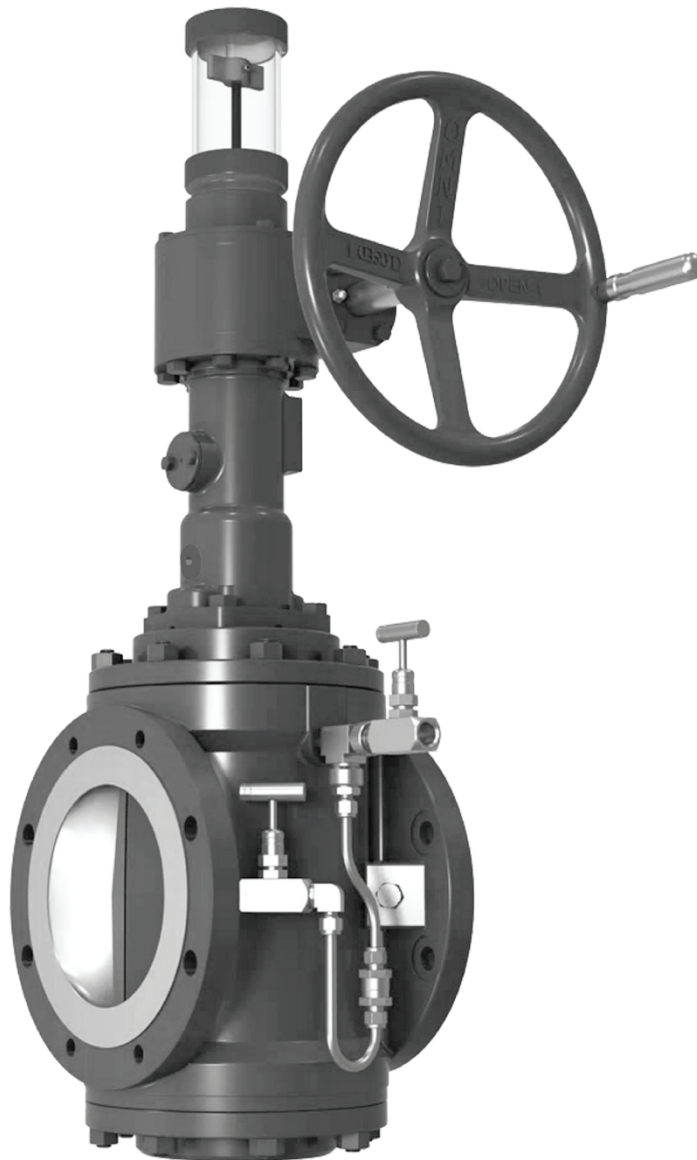




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Operation

The OmniSeal plug valve is a non-lubricated, resilient seal, plug-type valve which has a mechanical means of freeing the plug before it is rotated from the closed to the open position. In opening the valve, the plug is raised, thus retracting the seating segments or slips through their tapered dovetail connections. Only after the slips are fully retracted perpendicularly from the body seat is the plug rotated to the open position.

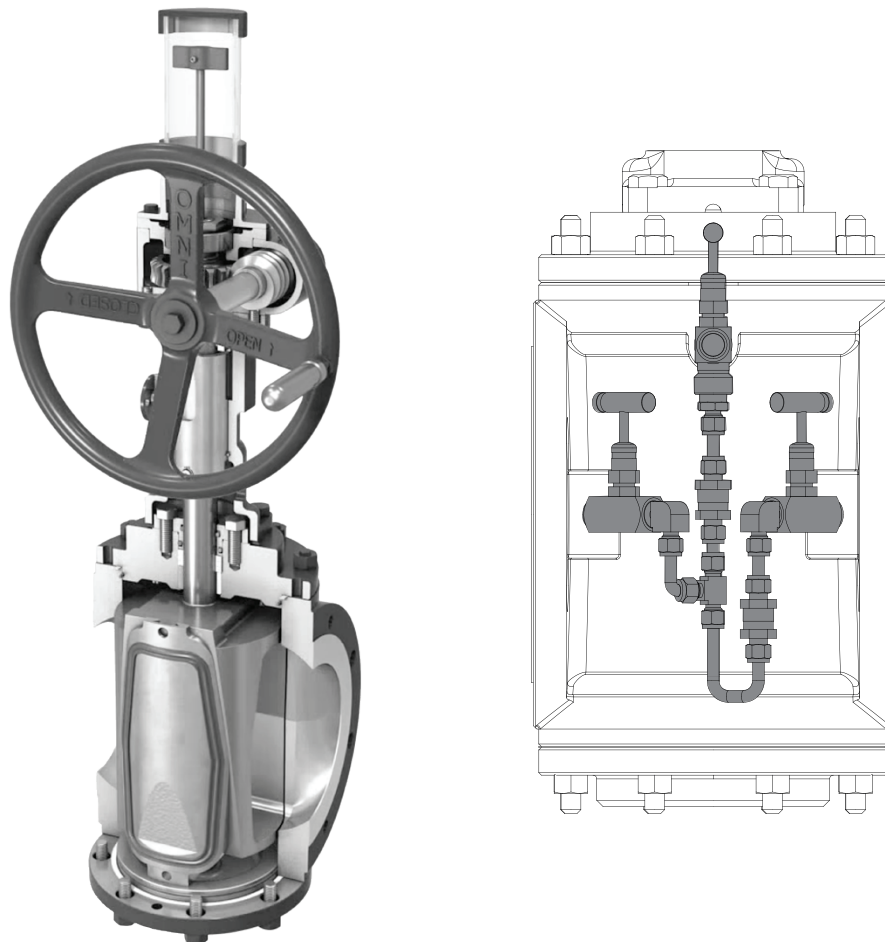
Conversely, in closing the valve, the plug and slips are rotated freely, with no seal-to-body contact, until the slips are positioned over the ports. Then the plug is driven down between the slips and the tapered surfaces wedge out the slips for a positive upstream as well as down-stream shut-off. For maximum upstream sealing.

Do not back off. Do not use cheaters.

The small OmniSeal plug valve are handwheel operated, and require up to 3 turns to open or close. Up to $2\frac{3}{4}$ turns expand or retract the slips, while $\frac{1}{4}$ turn rotates the plug. Large valves operate in a similar manner, except that they have enclosed weather-proof worm gearing.

At the top of the valve, a position indicator flag shows the exact plug position. It appears in line with the flow when the valve is open and perpendicular to the flow when the valve is closed.

Since OmniSeal valves hold bubble-tight, for ease of opening in liquid service, it is important to prevent trapped body pressure from exceeding the working pressure of the valve. Therefore, a relief system is required to prevent pressure buildup in the body cavity.





Installation

Orientation

OmniSeal DB&B expanding plug valve may be installed in any position.

Flow Direction

The OmniSeal plug valve design is symmetrical.

Flow shut-off is achieved equally on both sides of the plug in-dependent of flow direction.

Note: The use of a Differential Thermal Relief (DTR) as described on pages 6–7 does result in a preferred flow direction.

Clearance for Repair

For easy repair, space should be allowed below the valve for removal of the lower plate and withdrawal of the seating slips. See Table 1 for dimensions. Sufficient clear space is required above the OmniSeal plug valve, to allow free movement of the position indicator flag and for removal of the operator mechanism.

TABLE 1

Clearance required below standard ported valves for slip removal.

MINIMUM CLEARANCE			
VALVE SIZE	ASME CLASS 150	ASME CLASS 300	ASME CLASS 600
6"	10"	10"	10"
8"	14"	14"	12"
10"	16"	16"	14"
12"	26"	26"	22"
14"	28"	26"	25"
16"	30"	23"	25"
18"	30"	26"	-
20"	32"	29"	-
24"	32"	38"	-
26"	38"	-	-
28"	38"	-	-
30"	31"	41"	-
36"	41"	-	-

Note: Allowing more than the specified minimum amount of clearance will make servicing easier.

Flange Fasteners

Certain OmniSeal plug valve flange holes are drilled and tapped, when there is no possibility of fitting a hexagonal nut behind the flange. The quantity and size of these tapped holes is shown in Table 2. Hex head bolts or stud bolts may be used in these holes.

VALVE SIZE	ASME CLASS	FLANGE FASTENERS		STUD BOLTS LENGTH REQUIRED (IN.)	RECOM-MENDED BOLT TORQUE
		TAPPED HOLES PER FLANGE	THREAD UNC		
6"	150	4	3/4"-10	3.25	--
8"	150	4	3/4"-10	3.50	--
8"	300	4	7/8"- 9	4.75	--
10"	150	4	7/8"- 9	3.75	--
10"	300	4	1.0"- 8	5.25	--
12"	150	4	7/8"- 9	4.00	--
12"	300	8	1-1/8"-8	5.75	--
14"	150	4	1.0"- 8	4.25	--
14"	600	4	1-3/8"-8	8.00	--
16"	150	8	1.0"- 8	4.25	--
16"	300	8	1-1/4"-8	6.25	--
16"	600	8	1-1/2"-8	8.50	--
18"	300	12	1-1/4"-8	6.50	--
18"	600	8	1-5/8"-8	9.25	--
20"	150	4	1-1/8"-8	5.25	--
20"	300	12	1-1/4"-8	6.75	--
24"	150	8	1-1/4"-8	5.50	--
24"	600	8	1-7/8"-8	11.25	--
26"	150	16	1-1/4"-8	4.75	--
28"	150	12	1-1/4"-8	5.00	--
30"	150	12	1-1/4"-8	5.00	--



OmniSeal Plug Valve Operator Orientation Change

This section will detail the procedure to rotate an operator on an OmniSeal Expanding Plug Valve

- 1. Operate the valve to the fully open position.
- 2. Being careful to isolate the short bolt under the worm gear shaft, remove the bolts from the underside of the gearbox housing.

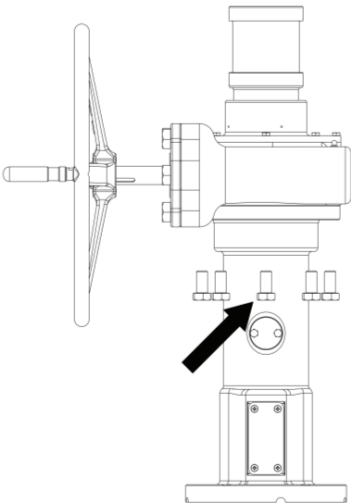


Figure 1: Short bolt location

- 3. Rotate the handwheel counterclockwise until the gearbox is in the desired orientation.
DO NOT ROTATE THE HANDWHEEL IN THE CLOCKWISE DIRECTION OR THE STEM SET WILL UNTHREAD.

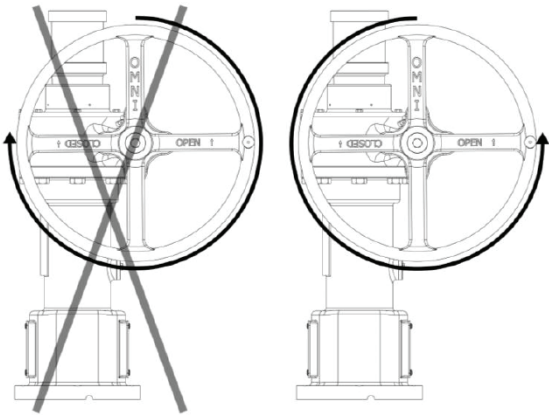


Figure 2: Handwheel rotation

- 4. Being careful to install the short bolt under the worm gear shaft, install and tighten the bolts into the underside of the gearbox housing.

Pressure Test

OmniSeal plug valve can be hydrostatically pressure-tested after installation, to full API 6D limits per Table 3 below.

TABLE 3

ASME CLASS		150	300	600	COMMENTS
Shell Test Pressure (Valve Open)	(psig) (kg/cm2)	450 32	1150 81	2250 158	No leakage permitted.
Seat Test Pressure (Valve Closed)	(psig) (kg/cm2)	319 22	825 58	1650 116	Test upstream & downstream seats.
Supplementary (API 598) Air Seat Test Pressure (Valve Closed)	(psig) (kg/cm2)	80 6	80 6	80 6	Test upstream & downstream seats. No leakage permitted



DTR - "Differential Thermal Relief" - Bleed System

Scope

This specification addresses the proper functioning, trouble shooting, and repair of the OmniSeal Plug Valve differential (pressure) thermal relief (DTR) bleed system.

Background

When the OmniSeal valve is seated and completely filled with a liquid, any slight variation in temperature due to the sun's rays or ambient thermal fluctuations will cause drastic changes in body cavity pressure resulting from thermal expansion.

Valves filled with 330 API fuel oil have exhibited a 75 psi increase in pressure with a temperature rise of only 1°F. Putting this into perspective, a normal daily 30°F swing in ambient temperature may cause an increase of body cavity pressure of 2250 psi.

While results vary under actual service conditions depending on media, pressure vessel rigidity, and presence of entrapped gas it is known that dangerously high pressures will build up in liquid filled positive shut-off valves. Therefore, the OmniSeal in liquid service requires a pressure relief device.

The differential (pressure) thermal relief (DTR) system is one such automatic "device" and should be included on every automated valve.

How it Works

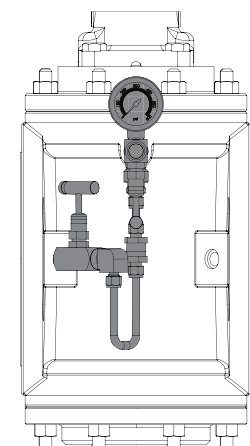
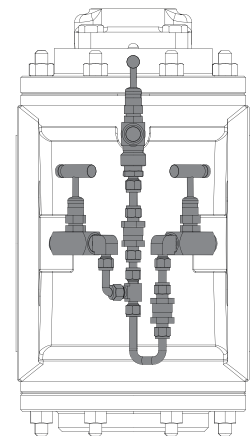
The differential (pressure) thermal relief (DTR) system is arranged as shown below. A variety of components are used in the DTR. The relief valve mounted in the center of the valve body pipes over pressure to upstream throat of the valve.

The standard relief valve is set to open at 25 psi on all valves regardless of working pressure. With the valve closed, the relief valve will open at 25 psi above upstream pressure. This system functions only when the valve is closed.

A manual body bleed valve is included on the OmniSeal as standard. This bleed valve installed in the relief system is opened after the OmniSeal is closed. Seal effectiveness can be immediately evaluated, after allowing a few seconds for stabilization of cavity volume due to entrained air or gas. The bleed valve must be closed before the OmniSeal is reopened.

An isolation valve installed in the upstream throat tap is also included on the standard DTR. It must be left open to permit relief system to relieve pressure upstream. The isolation valve will be used only for maintenance and troubleshooting which will be explained later. Valve is to be CLOSED ONLY FOR REPAIR. If closed during normal operation the automatic portion of the relief system (relief/check valve) will be defeated. (The outlet of the relief valve would close when closing the isolation valve).

The remaining components of the bleed system i.e., tube fittings, nipples, pipe fittings etc., are not functionally involved in "how it works" but may be involved in "why it doesn't work" which will be discussed later.





Manual Bleed with (DTR) System Discharged to Flow Line

Why it's Important on Motor Operated Valves

Electrically powered actuators or motor operators are configured normally to bypass or ignore the opening torque limiter as the valve just begins unseating.

If the motor operated OmniSeal has experienced any thermal expansion the pressure in the body cavity may have increased significantly above line pressure (see figure below) which would hydrostatically cause unseat load resistance. Worse yet, as these slips are pulled inwardly by the ascending plug the trapped body cavity volume is pressurized even more.

This pumps the body cavity pressure even higher adding directly to the thermal expansion pressure until something gives, such as...

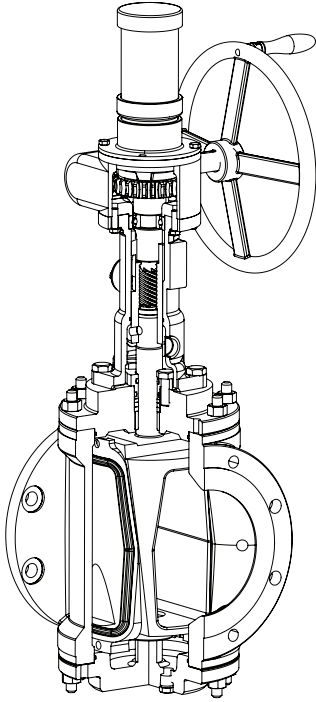
- | | |
|-------------------------------------|-------------------------------|
| 1) The slip seals retract or | 2) The motor stalls or |
| 3) Something breaks or | 4) The DTR relieves |

Since our slip seals are so dependably bubble tight and motor stall may be as high as 6 times maximum rated torque (remember the torque limiter is out of the unseat circuit) we see that electric motor operators **MUST** have **AUTOMATIC** pressure protection which is, as shown previously, exactly what the DTR does best. Torque switch settings on electric actuators should be set higher on the opening direction than the closing direction.

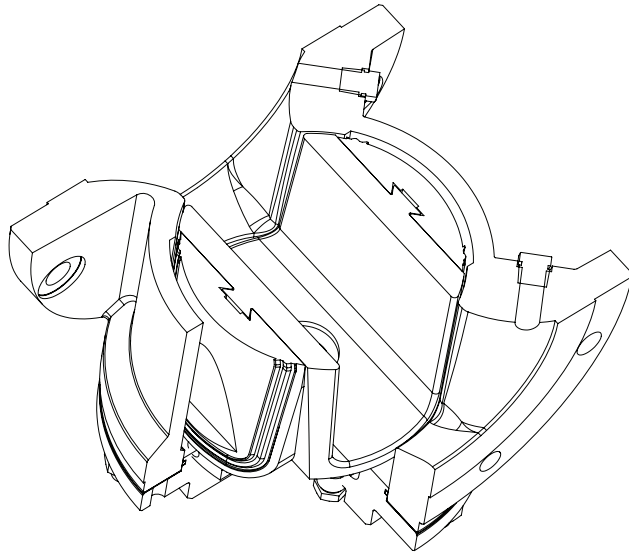


Valve Operation

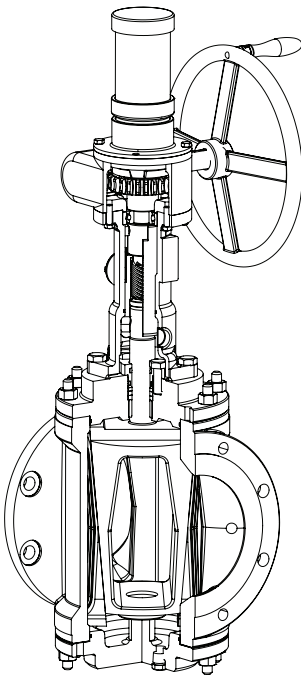
Full Open Position



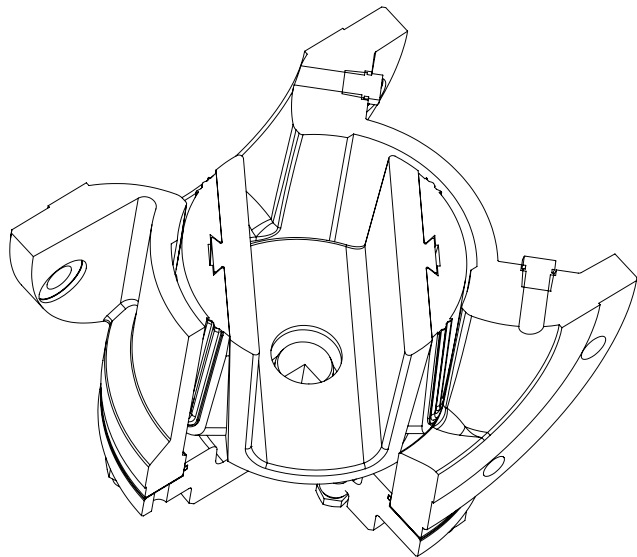
In the fully open position, the resilient seals are positioned out of the flow path and protected within the body of the valve itself.



Partially Closed Position



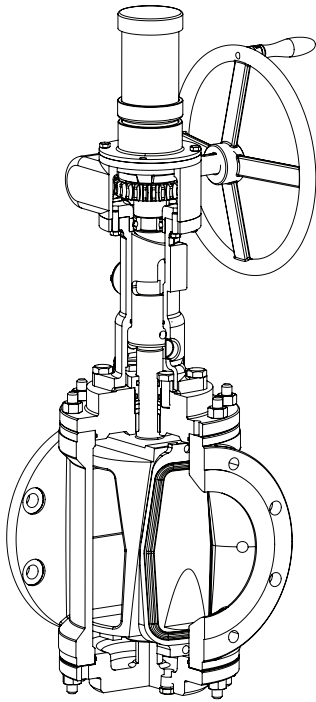
As the valve is cycled from the fully open to closed position, the plug begins a 90 degree rotation. During the entire rotation of the plug the resilient seals located on both slips are retracted away from the body. This ensures that there is no rubbing or scraping action on these resilient seals during rotation of the plug from the open to the closed position.



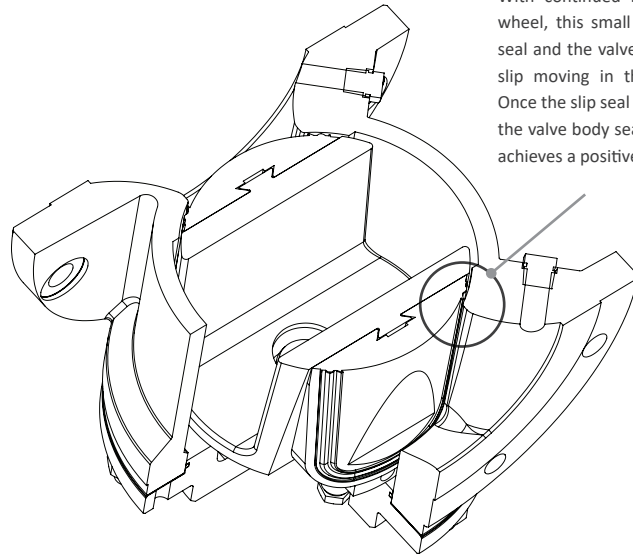


Valve Operation

Closed Position Prior to Sealing

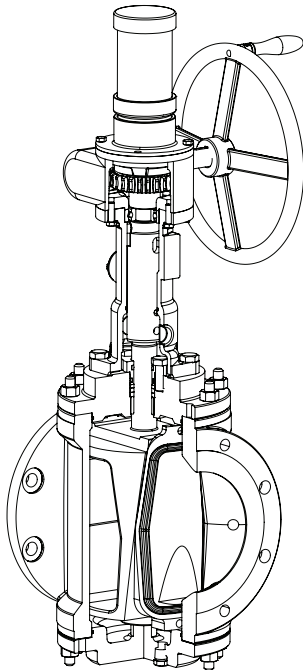


After the plug has been rotated 90 degrees from the fully open to fully closed position, the resilient seals on both slips have not yet been forced outward and into the seating position. This expansion only occurs with continued rotation of the handwheel or actuator.

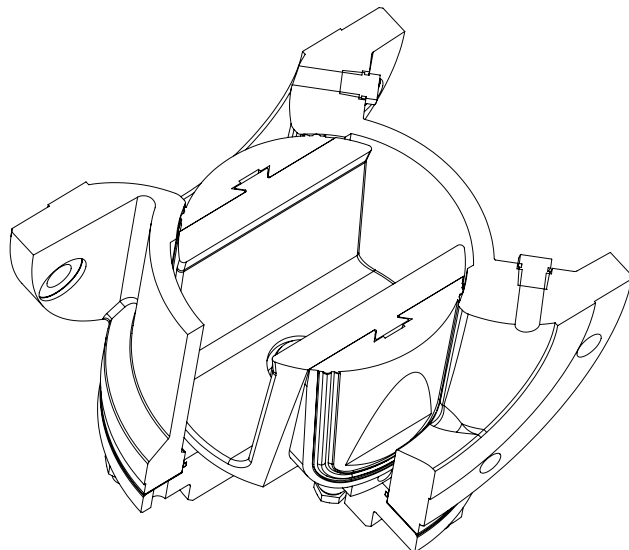


With continued rotation of the handwheel, this small gap between the slip seal and the valve body is closed by the slip moving in the outward direction. Once the slip seal is firmly seated against the valve body sealing surface, the valve achieves a positive, zero-leakage seal.

Fully Closed (Sealed) Position



To fully close the valve and provide positive shut-off, the slips are expanded outward with continued rotation of the handwheel or actuator. This outward expansion is achieved by the tapered plug moving downward which causes the resilient seals on the slips to seal against the valve body.





Concerns of Other Types of Actuators

Other remotely power operated valves, i.e. hydraulic, pneumatic, DC, etc., may display stall problems during unseat if no automatic pressure protection (DTR) is installed; therefore DTR is required in these applications also. But stall torque does not represent same damaging concern.

Manually Operated Valves

Manually operated valves (operated locally) allow access to their manual body bleed valves which may be vented slightly to relieve this pumping action as well as thermal build up. If this center cavity cannot be vented to the atmosphere for environmental or safety reasons, the DTR may be required. Optionally, a manual body bleed alone may be acceptable.

Symptom	Problem	Solution
Valve stalls as it unseats	Isolation valve closed Relief check valve installed backwards	Open isolation valve – close only to repair. Close isolation valve, bleed and drain valve, remove check/relief reverse reinstall close bleed open isolation valve
Tubing / piping leaking	Check valve plugged with foreign material Loose fittings/nipple damaged bleed	Same as above but replace or clean Close isolation valve, close valve bleed and drain valve, repair as required open isolation valve and close bleed

In order to check that the bleed system is properly working, install or observe a proper pressure gauge upstream of the valve. Seat the OmniSeal, verify integrity. Hook up a hand pump with - proper pressure gauging to the manual body bleed. With the hand pump reservoir full of compatible fluid open manual bleed valve, begin pumping slowly observing body cavity pressure.

NOTE: It should not exceed upstream pressure by more than 25 psi. If this is so, the DTR relief has been verified.



Torque & Turns Chart with Actuator Interface Information

	HANDWHEEL			GEAR OPERATOR								
	Size	Model	Torque (ft-lbs)	Turns	Model	Torque (ft-lbs)	MAST/SSFT	Turns	Wormshaft DIA. (in.) *	Key Size (in.)	Wormshaft EXT. (in.)	
CLASS ANSI 150	2	37H	29	2	37G	5	23	19	.865 / .870	.3125 x .25	1.54	
	3	37H	37	2	37G	5	23	19	.865 / .870	.3125 x .25	1.54	
	4	50H	44	3	55G		75	18	1.000 / 1.002	.25 X .25	2.60	
	6	50H	59	3	55G	19	75	20	1.000 / 1.002	.25 X .25	2.60	
	8				62G	41	113	21	1.245 / 1.247	.3125 X .25	2.60	
	10				62G	52	113	20	1.245 / 1.247	.3125 X .25	2.60	
	12				75G	69	225	26	1.245 / 1.247	.3125 X .25	2.60	
	14				75G	91	225	26	1.245 / 1.247	.3125 X .25	2.60	
	16				12G	104	338	28	1.245 / 1.247	.3125 X .25	3.66	
	16V				75G	104	225	50	1.245 / 1.247	.3125 X .25	2.60	
	18	NA			12G	125	338	50	1.245 / 1.247	.3125 X .25	3.66	
	18V				12G	125	338	50	1.245 / 1.247	.3125 X .25	3.66	
	20				12G	158	338	62	1.245 / 1.247	.3125 X .25	3.66	
	20V				12G	158	338	62	1.245 / 1.247	.3125 X .25	3.66	
	24				12G	167	338	45	1.245 / 1.247	.3125 X .25	3.66	
24V				12G	167	338	56	1.245 / 1.247	.3125 X .25	3.66		
26				14G	207	404	57	1.618 / 1.622	.375 X .3125	3.14		
28				14G	207	404	62	1.618 / 1.622	.375 X .3125	3.14		
30				15G	214	1,541	63	1.618 / 1.622	.375 X .3125	3.14		
36				15G	314	1,541	63	1.618 / 1.622	.375 X .3125	3.14		
CLASS ANSI 300	2	37H	37	2	37G	5	23	20	.865 / .870	.3125 x .25	2.60	
	3	37H	44	2	37G	7	23	20	.865 / .870	.3125 x .25	2.60	
	4	50H	74	3	55G	15	75	18	1.000 / 1.002	.25 X .25	2.60	
	6				62G	45	113	21	1.245 / 1.247	.3125 X .25	2.60	
	8				75G	97	225	26	1.245 / 1.247	.3125 X .25	2.60	
	10				75G	118	225	26	1.245 / 1.247	.3125 X .25	2.60	
	12				12G	155	338	51	1.245 / 1.247	.3125 X .25	3.66	
	14	NA			12G	162	338	51	1.245 / 1.247	.3125 X .25	3.66	
	16				12G	250	338	42	1.245 / 1.247	.3125 X .25	3.66	
	18				12G	252	338	57	1.245 / 1.247	.3125 X .25	3.66	
	20				14G	255	750	51	1.618 / 1.622	.375 X .3125	3.14	
	24				14G	265	750	50	1.618 / 1.622	.375 X .3125	3.14	
	30				15G	540	1,541	56	1.618 / 1.622	.375 X .3125	3.14	
	CLASS ANSI 600	2	50H	89	2	55G	18	75	13	1.000 / 1.002	.25 X .25	2.60
3		50H	172	2	55G	28	75	14	1.000 / 1.002	.25 X .25	2.60	
4					62G	38	113	11	1.245 / 1.247	.3125 X .25	2.60	
6					75G	97	225	31	1.245 / 1.247	.3125 X .25	2.60	
8					75G	123	225	31	1.245 / 1.247	.3125 X .25	2.60	
10					12G	184	338	54	1.245 / 1.247	.3125 X .25	3.66	
12		N/A			12G	188	338	57	1.245 / 1.247	.3125 X .25	3.66	
14					14G	323	750	51	1.618 / 1.622	.375 X .3125	3.14	
16					14G	323	750	51	1.618 / 1.622	.375 X .3125	3.14	
18					15G	476	1,541	52	1.618 / 1.622	.375 X .3125	3.14	
20					15G	562	1,541	55	1.618 / 1.622	.375 X .3125	3.14	
CLASS ANSI 900		3				62G	42	113	20	1.000 / 1.002	.25 X .25	2.60
		4				75G	49	225	22	1.245 / 1.247	.3125 X .25	2.60
		6				75G	63	225	22	1.245 / 1.247	.3125 X .25	2.60
	8	N/A			12G	75	338	51	1.245 / 1.247	.3125 X .25	2.60	
	10				12G	196	338	51	1.245 / 1.247	.3125 X .25	3.66	
	12				14G	276	750	48	1.245 / 1.247	.3125 X .25	3.66	
	14				14G	331	750	48	1.618 / 1.622	.375 X .3125	3.14	
	16				15G	575	1,541	54	1.618 / 1.622	.375 X .3125	3.14	
	18				15G	930	1,541	63	1.618 / 1.622	.375 X .3125	3.14	

* These are the dimensions of the worm shaft diameter itself.

Drive bushing bore should have between .004 and .006 clearance over shaft dimension.

NOTES

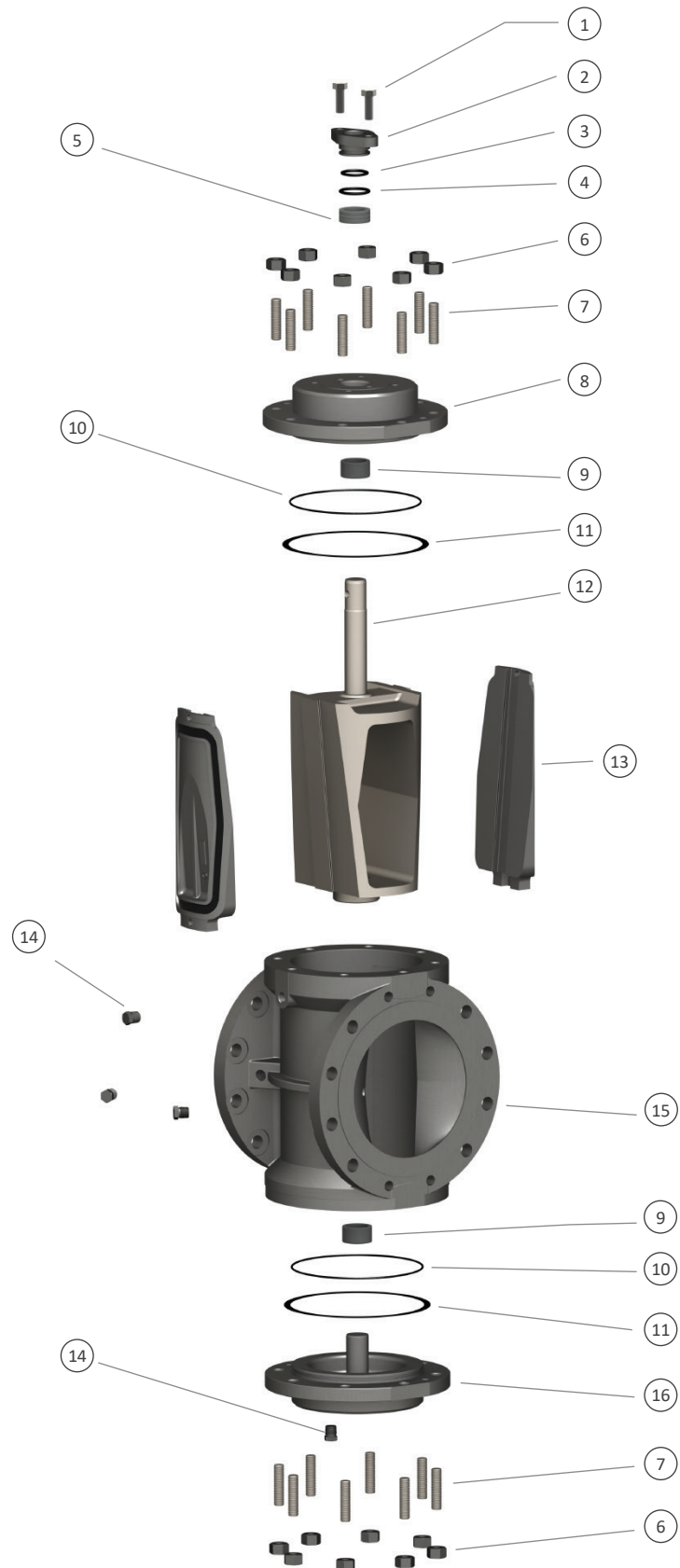
- (1) Torque value to unseat valve at maximum Δ P. Torque value is for valves with standard or reinforced Viton B slip elastomers. There is no safety factor built in by Omni. Please consult factory for torque values for valves with alternative slip elastomers.
- (2) The OmniSeal DBB is a "lift & turn" valve. The components that allow the plug valve to operate by lifting the stem before it rotates are built into the gear box. It will not function with other gear operators.
- (3) MAST (Maximum Allowable Stem Torque) / SSFT (Suggested Safety Factor Torque) values for each operator are the suggested maximum torques not to be exceeded in order to minimize possibility of damage to the operator or valve due to over-torque.



OmniSeal Plug Valve Assembly

NO.	DESCRIPTION
1	Hex Head Bolt
2	Packing Gland
3	O-Ring
4	O-Ring
5	Packing
6	Hex Nut
7	Stud
8	Upper Bonnet
9	Bushing
10	O-Ring
11	Gasket
12	Plug
13	Slip
14	NPT Plug
15	Body
16	Lower Bonnet

NS= Not Shown

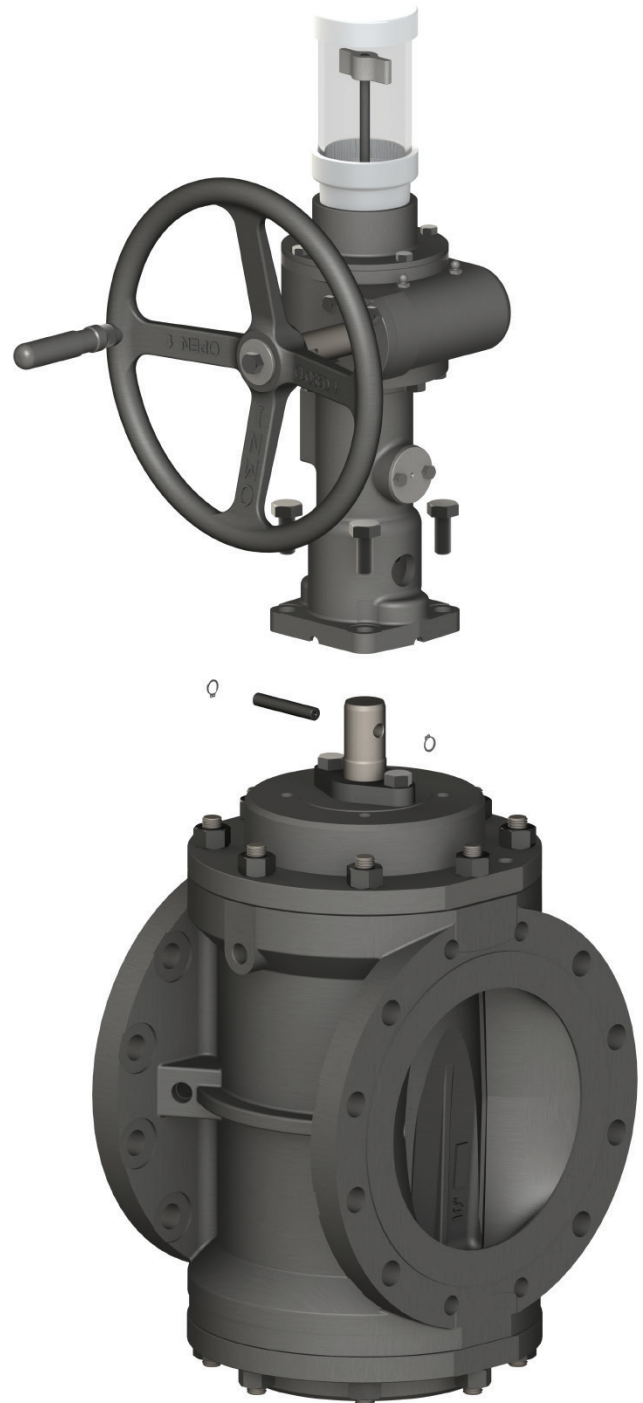




OmniSeal Plug Valve Assembly

Operator Removal

1. Ensure that there is zero pressure in the system Operate valve into the fully closed position This will give access to Pin and Retainer Rings.
2. Remove Retainer Ring from one side and drive Pin out using a punch.
3. Remove bolts or nuts from base of operator housing and lift operator assembly off of valve assembly.





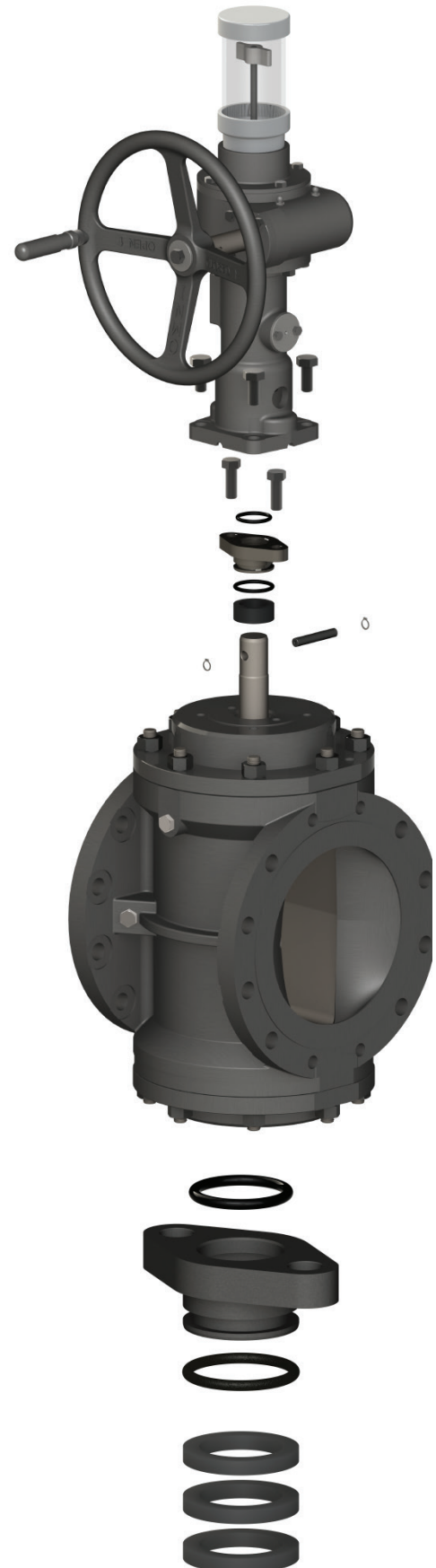
OmniSeal Plug Valve Assembly

Packing Removal & Replacement

1. Refer to the operator removal section of this manual to properly remove the operator prior to the following instructions.
2. Remove Bolts (1) from Packing Gland (2). Remove Packing Gland (2) from Upper Bonnet (8).
3. Replace O-Rings (3), (5) on Packing Gland (2).
4. Replace Packing (5) in Upper Bonnet (8).
Note: Three packing rings are required.
5. Replace Packing Gland (2) and bolts (1). Torque Bolts (1) to 20-25 ft-lbs.
6. Lower operator assembly on to valve assembly and install bolts in base of operator housing.
7. Re-install Pin and Retainer Ring.
8. Operate valve to insure proper operation.

Torque for Gland Packing Bolts

MODEL/PRESSURE CLASS	BOLT DIAMETER INCH	RECOMMENDED TORQUE FOR BOLT-FT-LB
2-150 /300	Stem Packing is fixed with circlip (no packing gland and clamping bolts)	
3-150/300		
4-150	0.5	9
6-150		
2-600		
3-600		
4-600		
8-150	0.625	14
10-150		
6-300		
4-600		
12-150	0.75	24
14-150		
16-150 Red. Weight		
8-300		
10-300		
6-600	0.875	34
8-600		
16-150		
18-150		
20-150		
12-300		
14-300	0.875	41
16-300		
18-300		
24-150		
26-150		
28-150		
20-300		
24-300		
10-600	0.75	71
12-600		
14-600		
16-600		
18-600		
30-150	0.75	71
36-150		
30-300		
20-600		





OmniSeal Plug Valve Assembly (Cont)

Slip Replacement from Top of Valve Assembly

1. Refer to the operator removal section of this manual to properly remove the operator prior to the following instructions.
2. Remove Nuts (6) from Upper Bonnet (8). The upper bonnet can be removed by lifting up on the Plug (12). A hoist is needed to perform this operation. Slips (13) will remain in valve body and can be removed individually after Upper Bonnet (8) and Plug (12) are removed.
3. Remove Upper Bonnet (8) from Plug (12).
4. Once Slips (13), Plug (12), and Upper Bonnet (8) are removed clean and inspect all parts for damage. Clean and inspect dovetails on the Plug (12). Remove O-Ring (10) from Upper Bonnet (8) and scrape any residual gasket material from face of bonnet and upper face of Valve Body (15).
5. If valve contains Upper Bushing (9) inspect for wear and replace as needed.
6. Remove and replace packing as stated in Packing Removal and Replacement section.
7. Install new O-Ring (10) and Gasket (11) on to Upper Bonnet (8).
8. Install new Slips (13) onto Plug (12). Lower assembly into Valve Body (15). Use care to ensure all parts install smoothly. The Slips (13) and Plug (12) should not be forced or catch anywhere.
9. Lower Upper Bonnet (8) onto valve assembly and reinstall Nuts (6). See table 4 for torque values.
10. Lower operator assembly on to valve assembly and install bolts in base of operator housing.
11. Reinstall Pin and Retainer Ring.
12. Operate valve to insure proper operation. Pressure test valve assembly for leakage.





OmniSeal Plug Valve Assembly (Cont)

Slip Replacement from Bottom of Valve Assembly

1. Ensure that there is zero pressure in the body with valve in the fully open position.
2. Remove Nuts (6) from Lower Bonnet (16). Using appropriate sized threaded bolt you can jack the bonnet off of the valve body by threading bolts into the two threaded holes in the lower bonnet plate.
3. Use caution with valve in vertical position. The Slips (13) rest on the Lower Bonnet (16) and can fall out while removing the lower bonnet. This can cause damage to the Lower Bonnet (16) and Slips (13) and or injury to personnel. The slips weights vary for size and pressure rating. (See Table 5)
4. Once Slips (13) and Lower Bonnet (16) are removed, clean and inspect all parts for damage. Clean and inspect dovetails on the Plug (12). Remove O-Ring (10) from Lower Bonnet (16) and scrape any residual gasket material from face of bonnet and lower face of Valve Body (15).
5. If valve contains Lower Bushing (9) inspect for wear and replace as needed.
6. Install new O-Ring (10) and Gasket (11) on to Lower Bonnet (16). Install new Slips (13) and install Lower Bonnet (16) on to Valve Body (15). Re-Install Nuts (6). See Table 4 for torque values.
7. Operate valve to insure proper operation. Pressure test valve assembly for leakage.

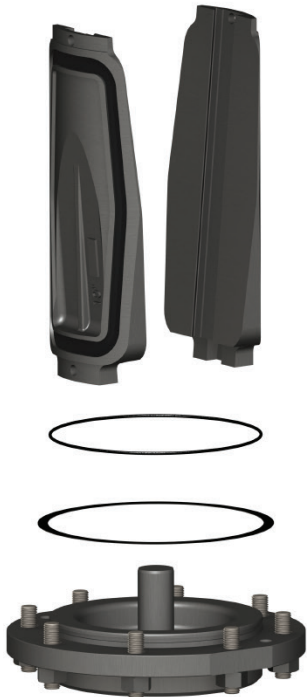
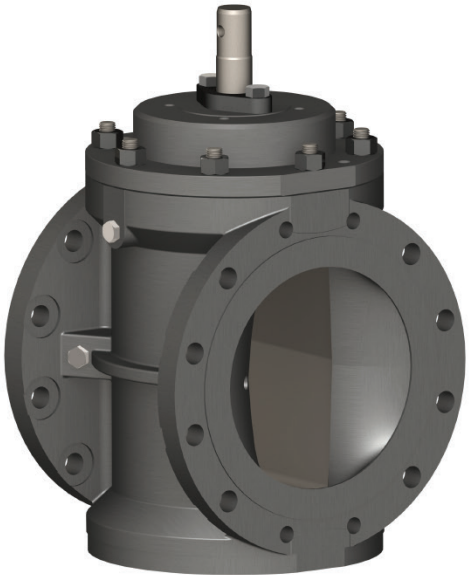


TABLE 4
Torque Values For Bonnet Nuts

THREADSIZE	TORQUE (ft-lbs)
0.500"-13	40
0.562"-12	55
0.625"-11	75
0.750"-10	135
0.875"-9	200
1.000"-8	350
1.125"-8	500
1.250"-8	675
1.375"-8	900
1.500"-8	1200
1.625"-8	1600
1.750"-8	2000
1.875"-8	2500
2.000"-8	3000
2.125"-8	3600
2.250"-8	4400
2.500"-8	6000

Note: Torque tolerances +/- 10%. Above torque tolerances are with the bolts lubricated.



OmniSeal Plug Valve Assembly Component Size & Weights

TABLE 5

Slip, Lower Bonnet, & Plug Weights

SIZE	CLASS	SLIP WT (LBS)	LOWER BONNET WT (LBS)	PLUG WT (LBS)
2	150	0.80	3.74	3.85
3	150	0.80	3.74	3.46
4	150	2.06	10.12	9.96
6	150	6.58	14.09	23.33
8	150	14.09	35.69	63.85
10	150	25.75	60.06	78.65
12	150	43.37	72.68	122.48
14	150	47.02	90.56	181.39
16	150	68.11	117.45	263.25
16V	150	47.02	91.55	181.39
18	150	82.19	116.85	266.10
18V	150	52.69	116.55	264.81
20	150	187.42	487.65	570.70
20V	150	133.44	374.26	575.49
24	150	275.46	1243.34	1213.41
24V	150	173.56	670.02	968.13
26	150	577.61	1330.27	2212.34
28	150	577.61	1330.27	2212.34
30	150	652.12	2247.16	3352.39
2	300	0.80	3.74	3.85
3	300	0.80	3.74	3.46
4	300	2.06	10.12	9.96
6	300	6.58	19.02	25.42
8	300	14.09	46.58	68.88
10	300	25.75	68.72	97.97
12	300	52.77	112.58	185.13
14	300	48.52	113.42	201.64
16	300	84.14	392.50	363.31
16F	300	164.68	934.06	927.00
18	300	164.36	715.62	684.16
20	300	184.18	595.02	855.49
24	300	299.01	1100.66	1410.01
30	300	634.93	3230.21	3344.41
2	600	0.80	5.79	5.23
3	600	1.40	7.79	6.29
4	600	2.06	13.77	11.96
6	600	11.06	67.96	60.58
8	600	18.18	123.67	81.44
10	600	36.23	201.36	188.12
12	600	55.86	321.09	275.31
14	600	114.64	571.91	513.53
16	600	114.64	571.91	513.53
18	600	138.90	809.10	580.48
20	600	180.80	1051.60	936.37
24	600	293.91	2037.55	1356.68



Maintenance

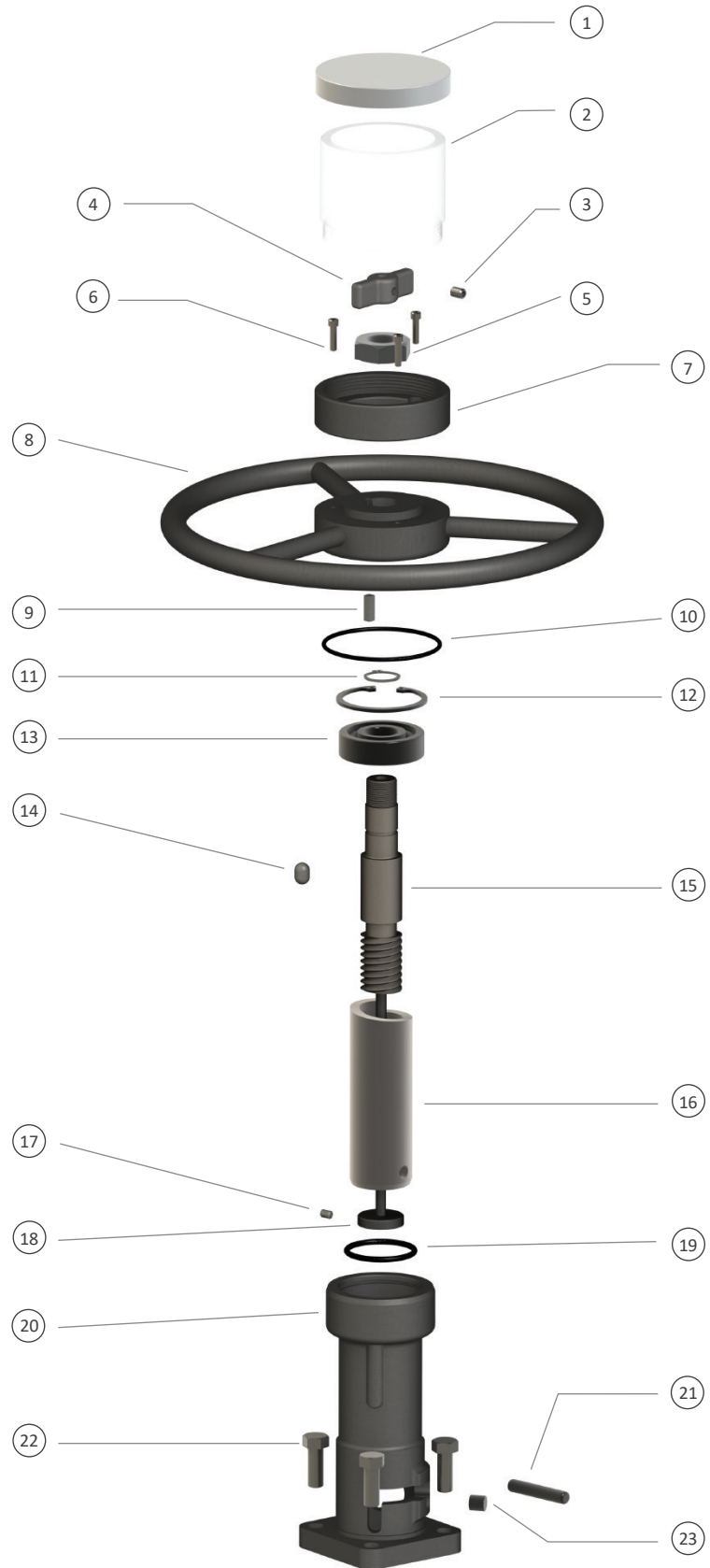
The OmniSeal plug valve requires no day-to-day maintenance; however, there are some services which may be needed occasionally.

1. Annually, drain plugs in the lower plate should be removed and the residue flushed and drained from the lower plate. In cold climates, before freezing weather sets in, any possible collection of water below valve plug or plug trunnion should be drained out through the lower plate drain plugs.
 - a. Keep the valve operator housing full of lubricant to displace and prevent moisture from accumulating and freezing. The operator is provided with a grease fitting. Lubricant should be injected with the OmniSeal plug valve in the open position only. Under ordinary conditions, a few pumps of the grease gun semi-annually is sufficient. Use lithium 12 hydroxy stearate or lithium base molydisulfide grease.
 - b. If applicable, temporarily remove guide pin. Liberally apply grease in this area semi-annually.
2. If at any time the body bleed should indicate a leak which cannot be stopped with ordinary force on handwheel (no cheaters necessary), this may be corrected by one of the following:
 - a) Operate valve through open-close cycle while fluid is flowing to flush out valve body. After several flushing attempts, close OmniSeal valve and check body bleed again. If body bleed still indicates valve leakage, proceed to step b).
 - b) If your valve is supplied with a DTR system, it is possible that the relief valve may be leaking. Check this by temporarily closing the line isolation valve. If the leak stops, repair or replace the relief valve. If this is not the case, the slips need inspection.
 - c) To inspect or replace slips the line must be drained. Then place OmniSeal valve in open position (check body bleed valve for zero line pressure) and remove lower plate (lower plate can be driven off by closing valve, inserting a wedge and then opening valve again). Slips can be removed from plug and inspected or replaced if damaged. Be sure to save the old slips for possible exchange credit from the distributor. It is recommended to replace the lower plate O-ring and gasket any time the lower plate is removed and slips are replaced. If lower plate is not accessible for replacing seating slips, the valve operator and bonnet can be removed (Check body bleed for zero line pressure before removing bonnet) and slips replaced from the top of the valve.



OmniSeal Model 37H - Parts List

NO.	DESCRIPTION	QTY
1	Indicator Protector Cap	1
2	Indicator Protector Tube	1
3	Socket Set Screw	1
4	Indicator Flag	1
5	Heavy Hex Nut	1
6	Button Head Socket Screw	3
7	Indicator Protector Base	1
8	Handwheel	1
9	Key	1
10	O-Ring	1
11	Retainer Ring	1
12	Retainer Ring	1
13	Ball Bearing	1
14	Roller Ball	1
15	Upper Stem	1
16	Lower Stem	1
17	Socket Set Screw	1
18	Indicator Shaft Assembly	1
19	O-Ring	1
20	Operator Housing	1
21	Roll Pin	1
22	Hex Head Bolt	4
23	Roll Pin	1





OmniSeal Model 37H

Operator Dis-Assembly

1. Unscrew Indicator protector assembly from indicator protector base (7) and remove.
2. Unscrew set screw (3) and remove indicator flag (4).
3. Remove the heavy hex nut (5), indicator protector base (7), handwheel (8), key (9) and o-ring (10).
4. Remove the retainer ring (12) and pull out the upper stem (15) with lower stem (16), ball bearing (13), roller (14) and indicator shaft sub-assembly (18) out through the top of the operator housing (20).
5. Remove set screw (17) from bottom of lower stem and push indicator shaft sub-assembly (18) out through the bottom of the lower stem.
6. Separate the stems and remove the retaining ring (11) and the bearing (13) from the upper stem.
7. Remove O-ring (19) from inside of operator housing (20).



OmniSeal MODEL 37H IS USED ON MODELS:

2"	150	3"	150
2"	300	3"	300

OmniSeal Model 37H

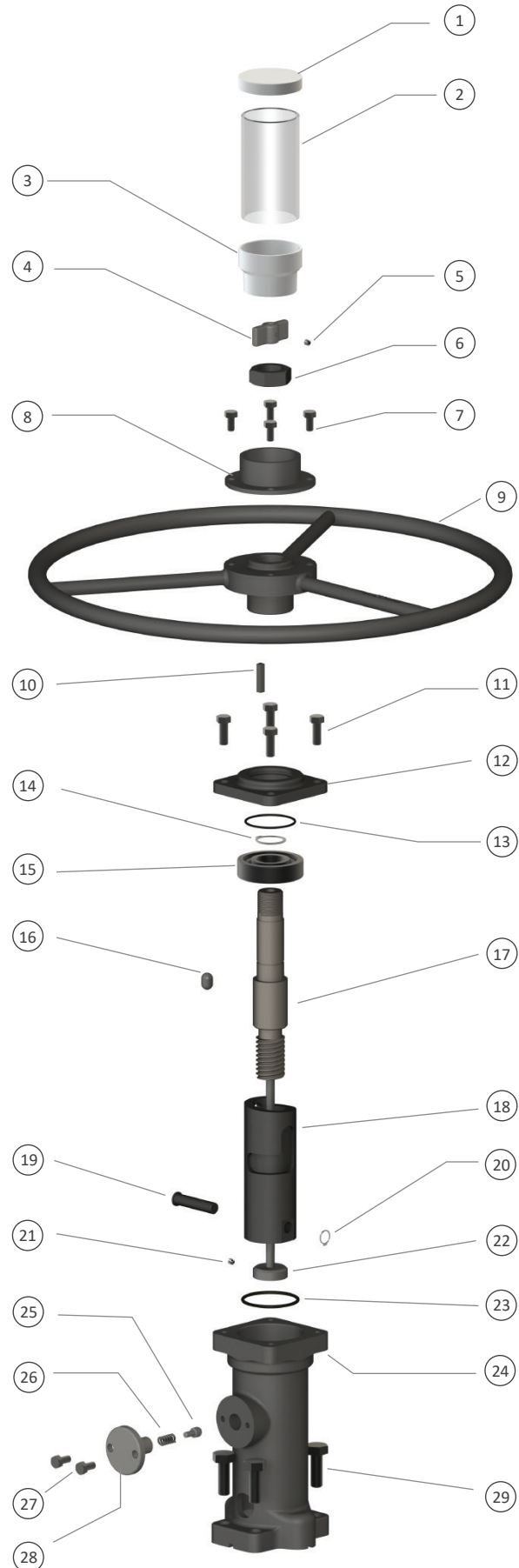
Operator Assembly

1. Install O-ring (19) in operator housing (20).
2. Place the bearing (13) on the top of the upper stem (15). Install retaining ring (11).
3. Apply a liberal coating of grease to all surfaces of upper stem (15) and inside and outside of lower stem (16).
4. Thread the upper stem and lower stem together such that the drive pin in the upper stem comes against the shoulder at the TOP of the lower stem (16) and the detent recess in the upper stem is exactly in line with roller opening in the lower stem.
NOTE: This operation may require several attempts as the threads are multiple start and do not always assemble correctly with the first try.
5. Install the indicator shaft sub-assembly (18) up through both stems. Align the detent hole in the indicator disc with the threaded hole in the lower stem and fasten with set screw (17). Set screw must be below the outside surface of the lower stem (16).
6. Place the roller (14) in the side opening of the lower stem. A liberal application of grease will hold the roller in position.
7. Place the stem assembly into the housing taking care that the roller is aligned with roller groove in housing. Push the entire assembly down until the bearing rests on the shoulder in the housing.
8. Install the retaining ring (12) in the top of the operator housing (20).
9. Install o-ring (10) in handwheel (8) and place handwheel and key (9) on upper stem (15). Install indicator protector base (7) to the handwheel with three button head socket screws (6). Screw the heavy hex nut (5) on the upper stem and tighten down on handwheel securely.
10. Install indicator flag (4) and secure with screw (3).
11. Install indicator protector assembly.



OmniSeal Model 50H & 62H - Parts List

NO.	DESCRIPTION	QTY
1	Indicator Protector Cap	1
2	Indicator Protector Tube	1
3	Indicator Protector Base	1
4	Indicator Flag	1
5	Socket Set Screw	1
6	Heavy Hex Nut	1
7	Hex Head Bolt	4
8	Indicator Protector Adapter	1
9	Handwheel	1
10	Key	1
11	Hex Head Bolt	4
12	Operator Housing Cap	1
13	O-Ring	1
14	Retainer Ring	1
15	Ball Bearing	1
16	Roller	1
17	Upper Stem	1
18	Lower Stem	1
19	Trunnion Pin	1
20	Retainer Ring	1
21	Socket Set Screw	1
22	Indicator Shaft Assembly	1
23	O-Ring	1
24	Operator Housing	1
25	Detent Pin	1
26	Detent Spring	1
27	Hex Head Bolt	2
28	Guide Pin	1
29	Hex Head Bolt	4





OmniSeal Model 50H & 62H

1. Unscrew Indicator protector assembly from indicator protector adapter (8) and remove.
2. Unscrew socket set screw (5) and remove indicator flag (4).
3. Remove heavy hex nut (6).
4. Remove the handwheel (9), indicator protector adapter (8) and key (10).
5. Unbolt the hex head bolts (11) and remove the operator housing cap (12) and o-ring (13).
6. Unbolt the hex head bolts (27) and remove the guide pin (28), with detent pin (25) and detent spring (26).
7. Pull the upper stem (17) with lower stem (18), roller (16), bearing (15) and indicator shaft (22) out through the top of the operator housing (24). If the bearing is snug in the housing, replace the handwheel and key. Turn the handwheel counter clockwise to raise the lower stem as far as possible. Insert a 3/8" diameter bar through the two holes in the bottom of the housing. Turn the handwheel clockwise and jack the bearing clear of the housing.
8. Remove the set screw (21) and push the indicator shaft sub-assembly (22) out through the bottom of the lower stem.
9. Remove the lower stem (18) from the upper stem (17).
10. Remove the retainer ring (14) and ball bearing (15) from the upper stem.
11. Remove the O-ring (23) from the inside of the housing.

OmniSeal MODEL 50H IS USED ON MODELS:

4"	150
6"	150
4"	300
2"	600
3"	600

OmniSeal MODEL 62H IS USED ON MODELS:

8"	150
6"	300
4"	600





OmniSeal Model 50H & 62H

Operator Assembly

1. Place the ball bearing (15) on the upper stem (17). Install a retainer ring (14) to lock bearing in place.
2. Apply a liberal coat of grease to all surfaces of upper stem (17) below the bearing, and to all surfaces of the lower stem (18). Thread the upper stem (17) into the lower stem (18) such that the drive pin in the upper stem comes against the shoulder at the TOP of the lower stem and the detent recess in upper stem is exactly in line with the roller opening in lower stem. This operation may require several attempts as the threads are multiple start and do not always assemble correctly with the first try.
3. Install the indicator shaft assembly (22) up through both stems. Align the detent hole in the indicator disc with the threaded hole in the lower stem (18) and fasten with set screw (21). Set screw must be below the outside surface of the lower stem.
4. Install O-ring (23) in the operator housing (24).
5. Place roller (16) in opening of lower stem. A liberal application of grease will hold it in position.
6. Place the stem assembly into the housing – making sure that the roller is aligned with roller groove in housing. Push entire assembly down until bearing rest on shoulder in housing.
7. Apply a smooth even coating of Permatex Number 3 to surface of guide pin boss (28) on operator housing (24).
8. Insert guide pin (28) with detent pin (25) and detent spring (26) to fully engage slot in lower stem and secure with hex head bolts (27).
9. Apply a smooth even coating of Permatex Number 3 to top surface of the operator housing (24).
10. Install O-ring (13) in operator housing cap (12) and secure to operator housing (24) with hex head bolts (11).
11. Install the handwheel (9) and key (10).
12. Install indicator protector adapter (8) to handwheel (9) with hex head bolts (7).
13. Install the heavy hex nut (6) and tighten securely.
14. Install indicator flag (4) and secure with screw (5).
15. Install indicator protector assembly.

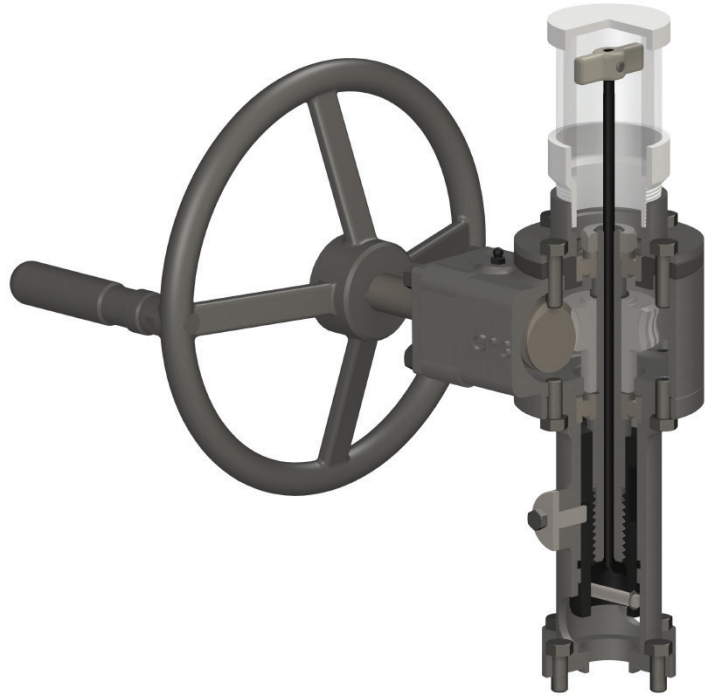
Operator Dis-Assembly

1. Unscrew Indicator protector assembly from indicator protector adapter (8) and remove.
2. Unscrew socket set screw (5) and remove indicator flag (4).
3. Remove heavy hex nut (6).
4. Remove the handwheel (9), indicator protector adapter (8) and key (10).
5. Unbolt the hex head bolts (11) and remove the operator housing cap (12) and o-ring (13).
6. Unbolt the hex head bolts (27) and remove the guide pin (28), with detent pin (25) and detent spring (26).
7. Pull the upper stem (17) with lower stem (18), roller (16), bearing (15) and indicator shaft (22) out through the top of the operator housing (24). If the bearing is snug in the housing, replace the handwheel and key. Turn the handwheel counter clockwise to raise the lower stem as far as possible. Insert a $\frac{3}{8}$ " diameter bar through the two holes in the bottom of the housing. Turn the handwheel clockwise and jack the bearing clear of the housing.
8. Remove the set screw (21) and push the indicator shaft sub-assembly (22) out through the bottom of the lower stem.
9. Remove the lower stem (18) from the upper stem (17).
10. Remove the retainer ring (14) and ball bearing (15) from the upper stem.
11. Remove the O-ring (23) from the inside of the housing.



OmniSeal Model 37G - Parts List

NO.	DESCRIPTION	QTY.
1	Indicator Protector Cap	1
2	Indicator Protector Tube	1
3	Indicator Protector Base	1
4	Socket Set Screw	1
5	Indicator Flag	1
6	Heavy Hex Nut	1
7	Hex Head Bolt	4
8	Indicator Protector Adapter	1
9	Ball Bearing	2
10	Bearing Carrier	1
11	Retainer Ring	1
12	Key	1
13	Worm Gear	1
14	Gear Housing	1
15	Grease Zert	2
16	Bearing	2
17	Worm Shaft	1
18	Half Moon Key	1
19	O-Ring	1
20	Bearing Cap	1
21	Hex Head Bolt	4
22	Handwheel	1
23	Washer	1
24	Hex Head Bolt	1
25	Retainer Ring	1
26	Upper Stem	1
27	Roller	1
28	Lower Stem	1
29	Retainer Ring	2
30	Socket Set Screw	1
31	Pin	1
32	Indicator Shaft Assembly	1
33	O-Ring	1
34	Hex Head Bolt	4
35	Guide Pin	1
36	Operator Housing	1
37	Hex Head Bolt	2
38	Hex Head Bolt	4

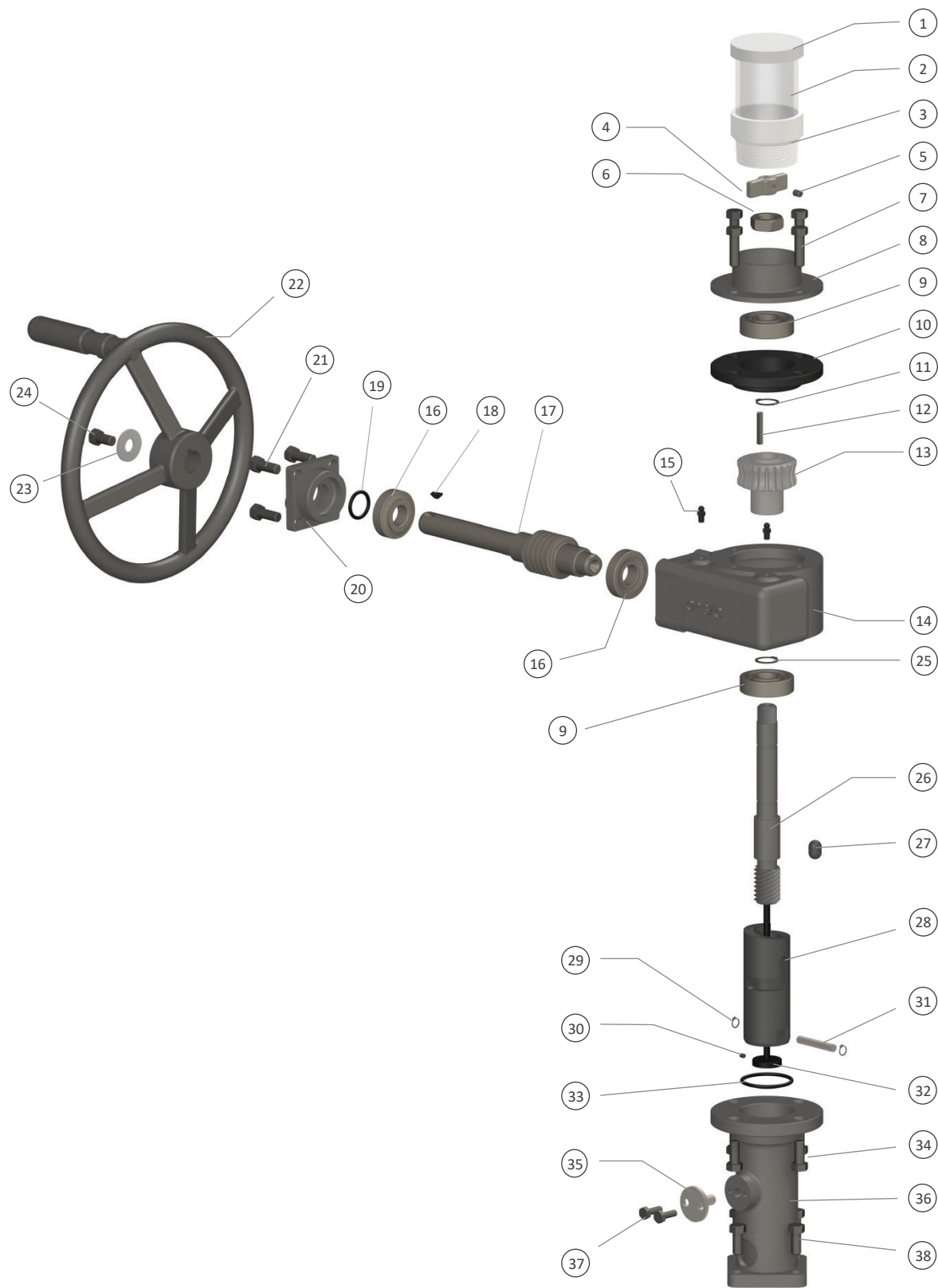


OmniSeal Model 37G is used on Models:

2" 150	2" 300
3" 150	3" 300



OmniSeal Model 37G - Parts List





OmniSeal Model 37G

Operator Dis-Assembly

1. Unscrew Indicator protector tube assembly (components 1, 2, & 3 comprise the indicator protector tube assembly) from indicator protector adapter (8) and remove.
2. Remove set screw (5) and indicator flag (4).
3. Unbolt hex head bolt (7) and remove indicator protector adapter (8).
4. Remove heavy hex nut (6).
5. Remove bearing carrier (10) and upper bearing (9).
6. Remove upper retaining ring (11).
7. Remove hex head bolt (24), washer (23), handwheel (22) and key (18).
8. Unbolt hex head bolts (21) and dismantle bearing cap (20) and remove O-ring (19) from bearing cap.
9. Screw out the worm shaft (17). Front bearing (16) will come out with the worm shaft. Rear bearing (16) can then be removed from operator gear housing (14).
10. Remove the worm gear (13) and key (12).
11. Unbolt hex head bolts (34) and remove the gear housing (14).
12. Unbolt hex head bolts (37) and remove the guide pin (35).
13. Pull the upper stem (26) with lower stem (28), roller (27), lower bearing (9) and indicator shaft assembly (32) out through the top of the operator housing (36). If the bearing is snug in the housing, install the worm gear with its key on the upper stem upside down (hub up). Turn the gear counter clockwise to raise the lower stem as far as possible. Insert a 1/2" diameter bar through the two holes in the bottom of the housing. Using a pipe wrench on the gear hub, turn clockwise and jack the bearing clear of the housing.
14. Remove the set screw (30) and push the indicator shaft assembly (32) out through the bottom of the lower stem.
15. Remove the lower stem (28) from the upper stem (26).
16. Remove the retaining ring (25) and lower bearing (9) from the upper stem.
17. Remove the O-ring (33) from the inside of the operator housing.

OmniSeal Model 37G

Operator Assembly

1. Place one of the two bearings (9) on upper stem (26). **NOTE:** This bearing is assembled such that the wide surface of the inner race seats on the upper stem shoulder. Install a retaining ring (25) to lock the bearing in place. **NOTE:** The retaining ring comes against narrow surface of inner race.
2. Apply liberal coat of grease to all surfaces of the upper stem below the bearing. Thread the upper stem (26) into the lower stem (28) such that stop pin in the upper stem comes against the shoulder at the TOP of the lower stem and the detent recess in upper stem is exactly in line with the roller opening in lower stem. This operation may require several attempts as the threads are multiple start and do not always assemble correctly with the first try.



OmniSeal Model 37G

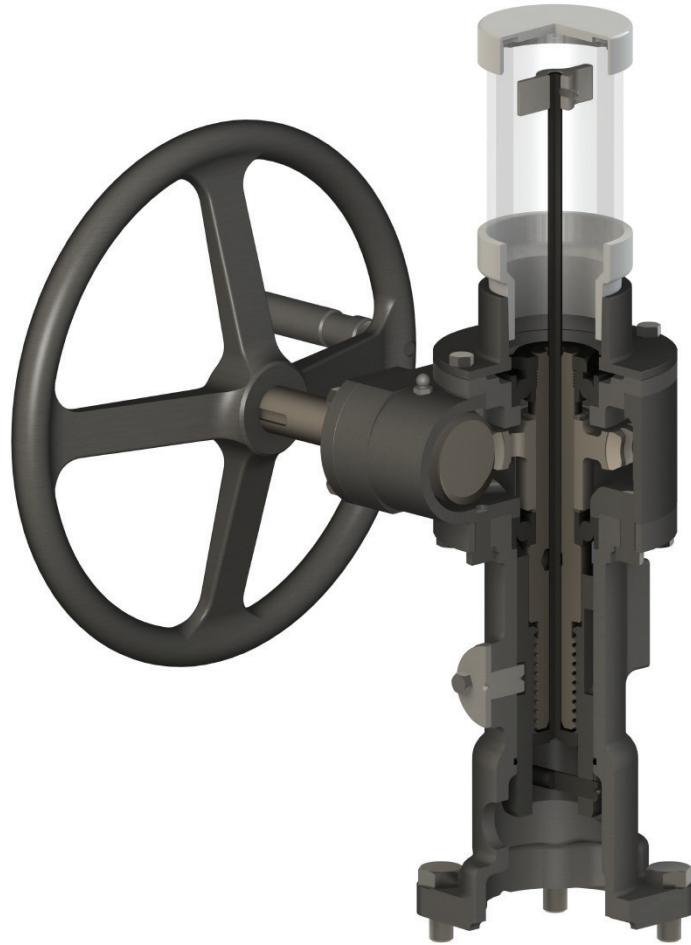
Operator Assembly (Cont)

3. Install the indicator shaft assembly (32) up through both stems. Align the detent hole in the indicator disc with the threaded hole in the lower stem and fasten with set screw (30). Set screw must be below the outside surface of the lower stem.
4. Install O-ring (33) in operator housing (36).
5. Place roller (27) in opening of lower stem. A liberal application of grease will hold it in position.
6. Place the stem assembly into the housing—taking care that roller is aligned with roller groove in housing. Push entire assembly down until bearing rests on shoulder in housing.
7. Apply a smooth even coating of Permatex Number 3 to surface of guide pin boss on operator housing (36).
8. Insert guide pin (35) to full engage slot in lower stem and secure with hex head bolts (37).
9. Place gear key (12) in key way of upper stem.
10. Install tapered roller bearing (16) in rear bearing recess of gear housing (36) with large diameter of taper facing out.
11. Install tapered roller bearing (16) on handwheel end of worm shaft (17). Place bearing on opposite end with large diameter of taper against shaft shoulder.
12. Install worm shaft in gear housing. Make certain that rear bearing cone has properly entered rear bearing cup.
13. Install O-ring (19) in bearing cap (20).
14. Apply a smooth even coating of Permatex Number 3 to bearing cover boss on gear housing. Fasten bearing cap (20) in place with hex head bolts (21).
15. Install worm gear (13) in gear housing (14) with hub down. (Toward smaller opening).
16. Apply Permatex Number 3 to top flange of operator housing (36). Place gear housing (14) with assembled parts on top of operator, guiding the worm gear keyway over key (12) in upper stem (26).
17. Install upper retaining ring (11) to secure worm gear (13).
18. Fasten gear housing (14) to operator housing (36) with hex head bolts (34). **CAUTION:** NOTE THAT THE SHORT HEX HEAD BOLT IS INSTALLED DIRECTLY UNDER THE CENTER OF THE WORM SHAFT.
19. Fill gear housing (14) with grease up to top of worm gear.
20. Install bearing (9) in bearing carrier (10). **NOTE:** The widest surface of the outer race goes against the shoulder in the bearing carrier.
21. Apply a smooth even coating of Permatex Number 3 over top surface of gear housing (14).
22. Place bearing carrier (10) on top of gear housing (14).
23. Install hex nut (6) on upper stem and tighten snug with a wrench.
24. Install Indicator protector base (3) with hex head bolts (7) to the bearing carrier.
25. Install indicator flag (4) and secure with socket head cap screw (5).
26. Install indicator protector assembly onto the indicator protector adapter (8).
27. Install handwheel (22) with half moon key (18), washer (23) and hex head bolt (24).



OmniSeal Model 55G/62G/75G - Parts List

NO.	DESCRIPTION	QTY
1	Indicator Protector Cap	1
2	Indicator Protector Tube	1
3	Indicator Protector Base	1
4	Indicator Flag	1
5	Socket Set Screw	1
6	Heavy Hex Nut	1
7	Hex Head Bolt	4
8	Indicator Protector Adapter	1
9	Ball Bearing	2
10	Bearing Carrier	1
11	Retainer Ring	1
12	Key	1
13	Worm Gear	1
14	Gear Housing	1
15	Grease Zert	2
16	Bearing	2
17	Worm Shaft	1
18	Half Moon Key	1
19	O-Ring	1
20	Bearing Cap	1
21	Hex Head Bolt	4
22	Handwheel	1
23	Washer	1
24	Hex Head Bolt	1
25	Retainer Ring	1
26	Upper Stem	1
27	Roller	1
28	Lower Stem	1
29	Retainer Ring	1
30	Socket Set Screw	1
31	Pin	1
32	Indicator Shaft Assembly	1
33	O-Ring	1
34	Hex Head Bolt	8
35	Guide Pin	1
36	Operator Housing	1
37	Hex Head Bolt	2
38	Socket Head Bolt	4



OmniSeal MODEL A55G IS USED ON MODELS:

2"	600
4"	150
6"	150
3"	600
4"	300

OmniSeal MODEL A62G IS USED ON MODELS:

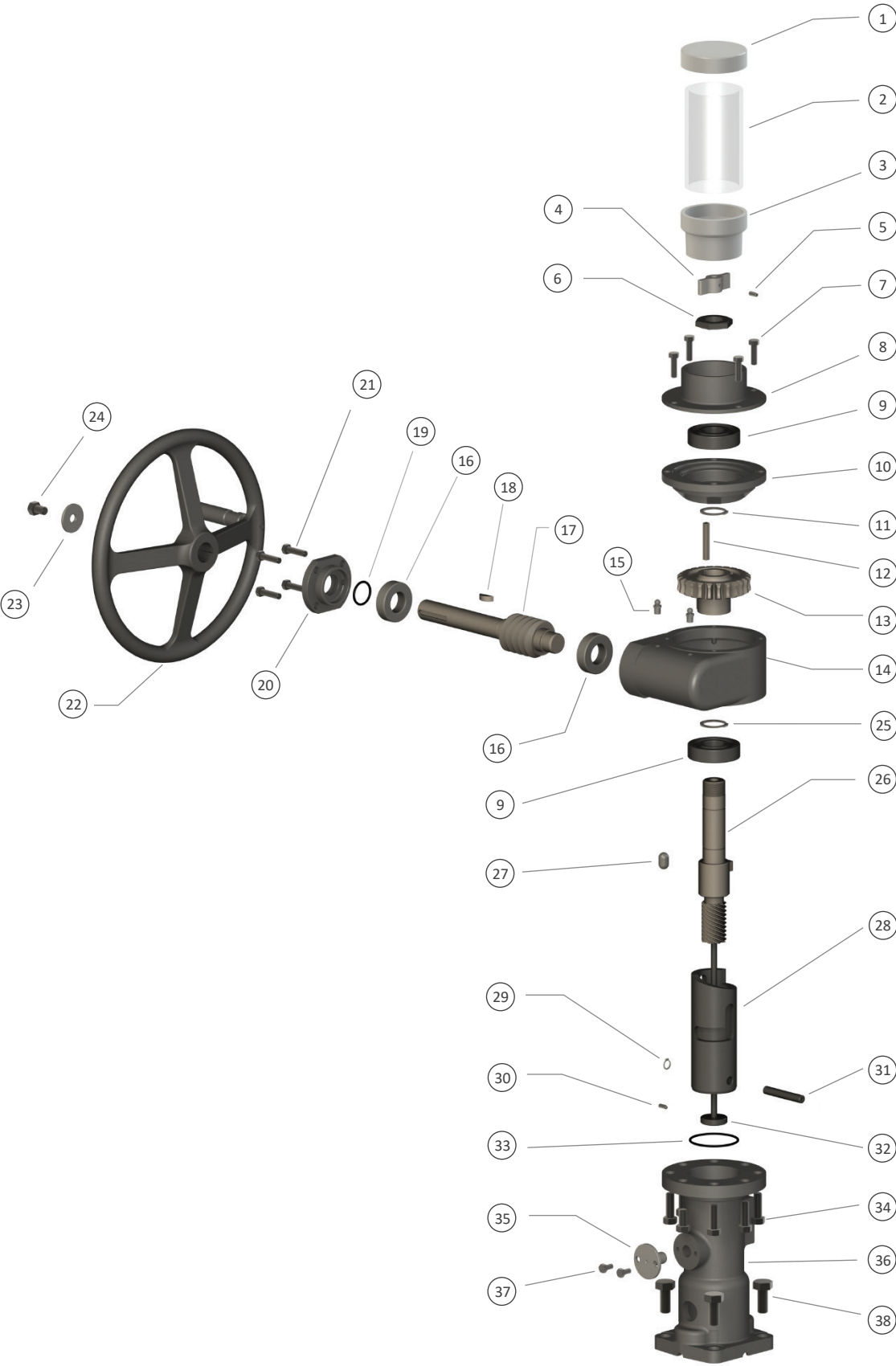
8"	600
10"	150
6"	300
4"	600

OmniSeal MODEL A75G IS USED ON MODELS:

12"	150
14"	150
16" V	150
8"	300
10"	300
6"	600
8"	600



OmniSeal Model 55G/62G/75G





OmniSeal Model 55G/62G/75G

Operator Dis-Assembly

1. Unscrew Indicator protector tube assembly from indicator protector adapter (8) and remove.
2. Remove set screw (5) and indicator flag (4).
3. Unbolt hex head bolt (7) and remove indicator protector adapter (8).
4. Remove heavy hex nut (6).
5. Remove bearing carrier (10) and upper bearing (9).
6. Remove upper retaining ring (11).
7. Remove hex head bolt (24), washer (23), handwheel (22) and key (18).
8. Unbolt hex head bolts (21) and dismantle bearing cap (20) and remove O-ring (19) from bearing cap.
9. Screw out the worm shaft (17). Front bearing (16) will come out with the worm shaft. Rear bearing (16) can then be removed from operator gear housing (14).
10. Remove the worm gear (13) and key (12).
11. Unbolt hex head bolts (34) and remove the gear housing (14).
12. Unbolt hex head bolts (37) and remove the guide pin (35).
13. Pull the upper stem (26) with lower stem (28), roller (27), lower bearing (9) and indicator shaft assembly (32) out through the top of the operator housing (36). If the bearing is snug in the housing, install the worm gear with its key on the upper stem upside down (hub up). Turn the gear counter clockwise to raise the lower stem as far as possible. Insert a $\frac{1}{2}$ " diameter bar through the two holes in the bottom of the housing. Using a pipe wrench on the gear hub, turn clockwise and jack the bearing clear of the housing.
14. Remove the set screw (30) and push the indicator shaft assembly (32) out through the bottom of the lower stem.
15. Remove the lower stem (28) from the upper stem (26).
16. Remove the retaining ring (25) and lower bearing (9) from the upper stem.
17. Remove the O-ring (33) from the inside of the operator housing.

OmniSeal Model 55G/62G/75G

Operator Assembly

1. Place one of the two bearings (9) on upper stem (26).
NOTE: This bearing is assembled such that the wide surface of the inner race seats on the upper stem shoulder. Install a retaining ring (25) to lock the bearing in place.
NOTE: The retaining ring comes against narrow surface of inner race.
2. Apply liberal coat of grease to all surfaces of the upper stem below the bearing. Thread the upper stem (26) into the lower stem (28) such that stop pin in the upper stem comes against the shoulder at the TOP of the lower stem and the detent recess in upper stem is exactly in line with the roller opening in lower stem. This operation may require several attempts as the threads are multiple start and do not always assemble correctly with the first try.



OmniSeal Model 55G/62G/75G (Cont)

Operator Assembly

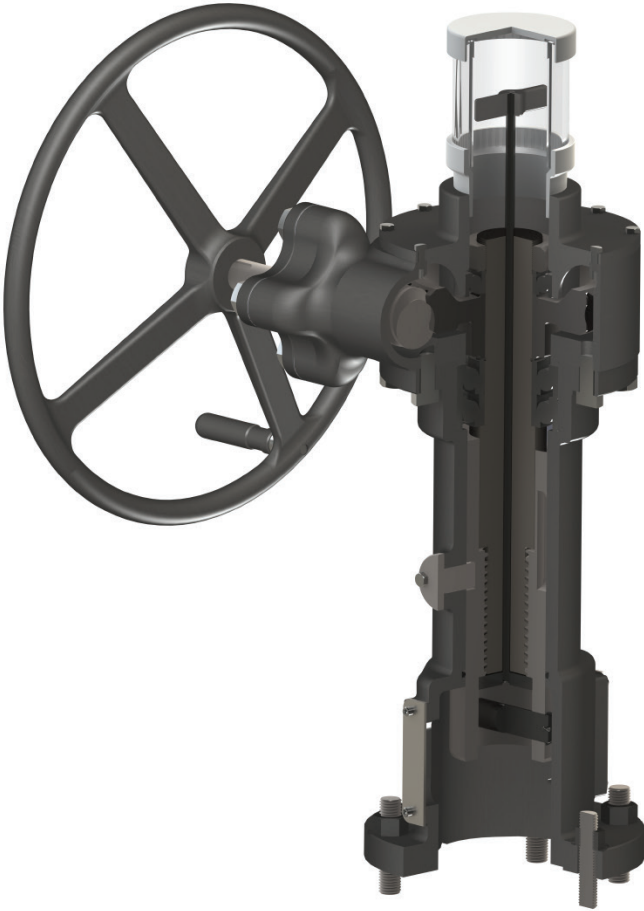
3. Install the indicator shaft assembly (32) up through both stems. Align the detent hole in the indicator disc with the threaded hole in the lower stem and fasten with set screw (30). Set screw must be below the outside surface of the lower stem.
4. Install O-ring (33) in operator housing (36).
5. Place roller (27) in opening of lower stem. A liberal application of grease will hold it in position.
6. Place the stem assembly into the housing—taking care that roller is aligned with roller groove in housing. Push entire assembly down until bearing rests on shoulder in housing.
7. Apply a smooth even coating of Permatex Number 3 to surface of guide pin boss on operator housing (36).
8. Insert guide pin (35) to full engage slot in lower stem and secure with hex head bolts (37).
9. Place gear key (12) in key way of upper stem.
10. Install tapered roller bearing (16) in rear bearing recess of gear housing (36) with large diameter of taper facing out.
11. Install tapered roller bearing (16) on handwheel end of worm shaft (17). Place bearing on opposite end with large diameter of taper against shaft shoulder.
12. Install worm shaft in gear housing. Make certain that rear bearing cone has properly entered rear bearing cup.
13. Install O-ring (19) in bearing cap (20).
14. Apply a smooth even coating of Permatex Number 3 to bearing cover boss on gear housing. Fasten bearing cap (20) in place with hex head bolts (21).
15. Install worm gear (13) in gear housing (14) with hub down. (Toward smaller opening).
16. Apply Permatex Number 3 to top flange of operator housing (36). Place gear housing (14) with assembled parts on top of operator guiding the worm gear keyway over key (12) in upper stem (26).
17. Install upper retaining ring (11) to secure worm gear (13).
18. Fasten gear housing (14) to operator housing (36) with hex head bolts (34). **CAUTION: NOTE THAT THE SHORT HEX HEAD BOLT IS INSTALLED DIRECTLY UNDER THE CENTER OF THE WORM SHAFT.**
19. Fill gear housing (14) with grease up to top of worm gear.
20. Install bearing (9) in bearing carrier (10).
NOTE: The widest surface of the outer race goes against the shoulder in the bearing carrier.
21. Apply a smooth even coating of Permatex Number 3 over top surface of gear housing (14).
22. Place bearing carrier (10) on top of gear housing (14).
23. Install hex nut (6) on upper stem and tighten snug with a wrench.
24. Install Indicator protector base (3) with hex head bolts (7) to the bearing carrier.
25. Install indicator flag (4) and secure with socket head cap screw (5).
26. Install indicator protector base (3), indicator protector tube (2), and indicator protector cap (1) onto the indicator protector adapter (8).
27. Install handwheel (22) with half moon key (18), washer (23) and hex head bolt (24).



OmniSeal Model 12G - Parts List

NO.	DESCRIPTION	QTY
1	Indicator Protector Cap	1
2	Indicator Protector Tube	1
3	Indicator Protector Base	1
4	Socket Set Screw	1
5	Indicator Flag	1
6	Heavy Hex Nut	1
7	Hex Head Bolt	8
8	Indicator Protector Adapter	1
9	Ball Bearing	1
10	Worm Gear	1
11	Key	1
12	Grease Zert	2
13	Gear Housing	1
14	Bearing Cup & Cone	2
15	Worm Shaft	1
16	Half Moon Key	1
17	O-Ring	1
18	Bearing Cap	1
19	Hex Head Bolt	4
20	Handwheel	1
21	Flat Washer	1
22	Hex Head Bolt	1
23	Retainer Ring	1
24	Ball Bearing	2
25	Upper Stem	1
26	Roller	1
27	Lower Stem	1
28	Retainer Ring	2
29	Socket Set Screw	1
30	Coupling Pin	1
31	Indicator Shaft Assembly	1
32	O-Ring	1
33	Operator Housing	1
34	Hex Head Bolt	8
35	Guide Pin	1
36	Hex Head Bolt	2
37	Hex Nut	6
38	Stud	6
39	Socket Head Cap Screw	8
40	Protector Plate	2

(NS) = Not Shown

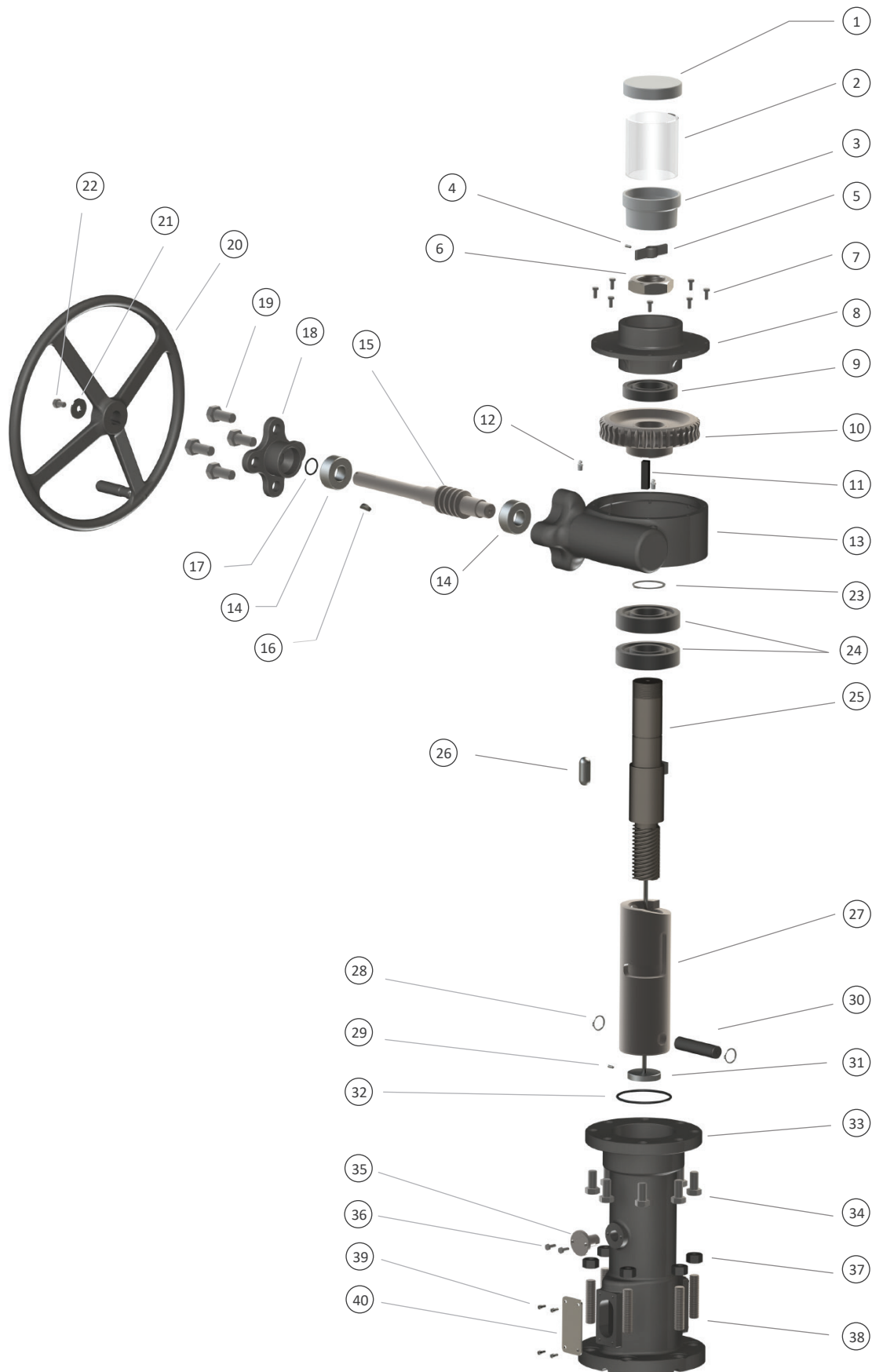


OmniSeal MODEL **12G** IS USED ON MODELS:

16"	150	12"	300
18"	150	14"	300
18"V	150	16"	300
20"	150	18"	300
20"V	150	10"	600
24"	150	12"	600
24"V	150		



OmniSeal Model 12G





OmniSeal Model 12G

Operator Dis-Assembly

1. Unscrew Indicator protector tube assembly from indicator protector adapter (8) and remove.
2. Unscrew set screw (4) and remove indicator flag (5).
3. Unbolt hex head bolts (7) and remove indicator protector adapter (8).
4. Remove heavy hex nut (6).
5. Remove upper ball bearing (9).
6. Remove hex head bolt (22), flat washer (21), and handwheel (20).
7. Unbolt hex head bolts (19) and dismantle bearing cap (18) and remove O-ring (17) from bearing cap.
8. Screw out worm shaft (15). Front bearing cone & cup (14) and rear bearing cone will come out with the worm shaft. Rear bearing cup can then be removed from gear housing.
9. Remove the worm gear (10) and key (11).
10. Unbolt hex head bolts (34) and remove the gear housing (13).
11. Remove the retaining ring (23).
12. Unbolt hex head bolts (36) and remove the guide pin (35).
13. Pull the upper stem (25) with the lower stem (27), roller (26), two bearings (24) and indicator shaft (31) out through the top of the operator housing (33). If the bearings are snug in the housing, install the worm gear (10) with its key (11) on the upper stem upside down (hub up). Turn the gear counter-clockwise to raise the lower stem as far as possible. Insert a 1^{1/2}" diameter bar through the two holes in the bottom of the housing. Using a pipe wrench on the gear hub, turn clockwise and jack the bearing clear of the housing.
14. Remove the set screw (29) and push the indicator shaft sub-assembly (31) out through the bottom on the lower stem (27).
15. Remove the lower stem (27) from the upper stem (25).
16. Remove the bearings (24) from the upper stem (25).
17. Remove the O-ring (32) from the inside of the operator housing.

OmniSeal Model 12G

Operator Assembly

1. Install the two bearings (24) at top of upper stem (25). NOTE: These are radial thrust bearings and must be installed such that the widest surfaces of the inner raceways are facing away from each other.
INCORRECT INSTALLATION WILL RESULT IN SERIOUS DAMAGE.
2. Install the bearing retaining ring (23).
3. Apply a liberal coating of grease to all surfaces of the upper stem (25).



OmniSeal Model 12G

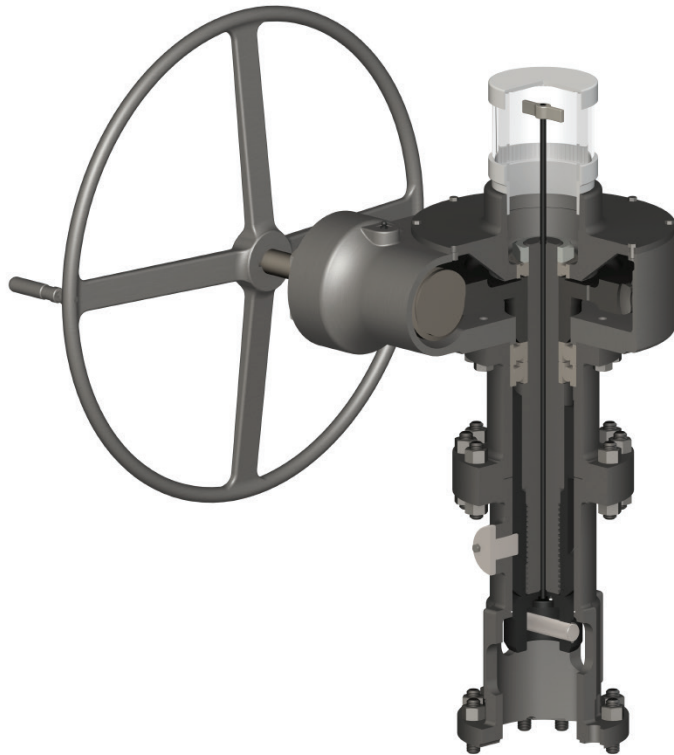
Operator Assembly (Cont)

4. Thread the upper stem (25) into the lower stem (27) such that the drive pin in the upper stem comes against the shoulder at the TOP of the lower stem and the detent recess in the upper stem is exactly in line with the roller opening in the lower stem. This operation may require several attempts as the threads are multiple start.
5. Install the indicator shaft sub-assembly (31) up through both stems. Attach using set screw (29).
6. Install O-ring (32) in operator housing (33).
7. Place the roller (26) in the side opening of the lower stem (27).
8. Place the stem assembly into the operator housing (33) taking care that the roller (26) is aligned with the roller groove in the housing. Push the assembly down until the lower bearing (24) rests on the shoulder in the housing.
9. Apply a smooth even coating of Permatex Number 3 to the surface of the guide pin boss on the operator housing (33).
10. Insert the guide pin (35) to full engage the slot in the lower stem (27) and fasten with hex head bolts (36).
11. Place gear key (11) in keyway of upper stem (25).
12. Install tapered roller bearing cup (14) in rear bearing recess of gear housing (13) with large diameter of taper facing out.
13. Install tapered roller bearing cup and cone (14) on handwheel end of worm shaft (15).
14. Install worm shaft (15) in gear housing (13). Make certain that rear bearing cone has properly entered the rear bearing cup (14).
15. Install O-ring (17) in bearing cap (18).
16. Apply a smooth coating of Permatex Number 3 to bearing cap boss on gear housing (13). Fasten bearing cap in place with hex head bolts (19).
17. Install worm gear (10) in gear housing (13) hub down (toward smallest opening).
18. Place the gear housing (13) with assembled parts on top of the operator housing guiding the worm gear keyway over key (11) in upper stem (25).
19. Install the ball bearing (9) on the upper stem (25) and secure with heavy hex nut (6).
20. Apply a smooth coating of Permatex Number 3 to top of operator housing.
21. Fasten the gear housing (13) to the operator housing with hex head bolts (34). **CAUTION: NOTE THAT THE SHORT HEX HEAD BOLT IS INSTALLED DIRECTLY UNDER THE CENTER OF THE WORM.**
22. Fill the gear housing (13) with grease up to the top of the worm gear (10).
23. Apply a smooth coating of Permatex Number 3 to top surface of gear housing (13).
24. Slide indicator protector adaptor (8) over indicator shaft (31) and ball bearing (9) and secure to top of gear housing (13) with hex head bolts (7). Install heavy hex head nut (6).
25. Install the indicator flag (5) and secure with screw (4).
26. Install indicator protector base (3), indicator protector tube (2), and indicator protector cap (1) onto the indicator protector adaptor (8).
27. Install handwheel (20) with half moon key (16), washer (21) and hex head bolt (22).



OmniSeal Model 14G - Parts List

NO.	Description	QTY.
1	Indicator Protector Cap	1
2	Indicator Protector Tube	1
3	Indicator Protector Base	1
4	Socket Set Screw	1
5	Indicator Flag	1
6	Heavy Hex Nut	1
7	Hex Head Bolt	8
8	Indicator Protector Adapter	1
9	Ball Bearing	1
10	Worm Gear	1
11	Key	1
12	Grease Zert	3
13	Gear Housing	1
14	Hex Head Bolt	12
15	Worm Shaft	1
16	Half Moon Key	1
17	Bearing Cup and Cone	2
18	O-Ring	1
19	Bearing Cap	2
20	Handwheel	1
21	Flat Washer	1
22	Hex Head Bolt	1
23	Ball Bearing	2
24	Upper Stem	1
25	Roller	1
26	Lower Stem	1
27	Coupling Pin	1
28	Retainer Ring	2
29	Socket Set Screw	1
30	Indicator Shaft Assembly	1
31	Hex Head Bolt	12
32	Hex Head Nut	12
33	Upper Housing	1
34	Stud	12
35	O-Ring	1
36	Dowel Pin	1
37	Hex Head Nut	12
38	Guide Pin	1
39	Hex Head Bolt	2
40	Lower Housing	1
41	Hex Head Nut	10
42	Hex Head Bolt	10

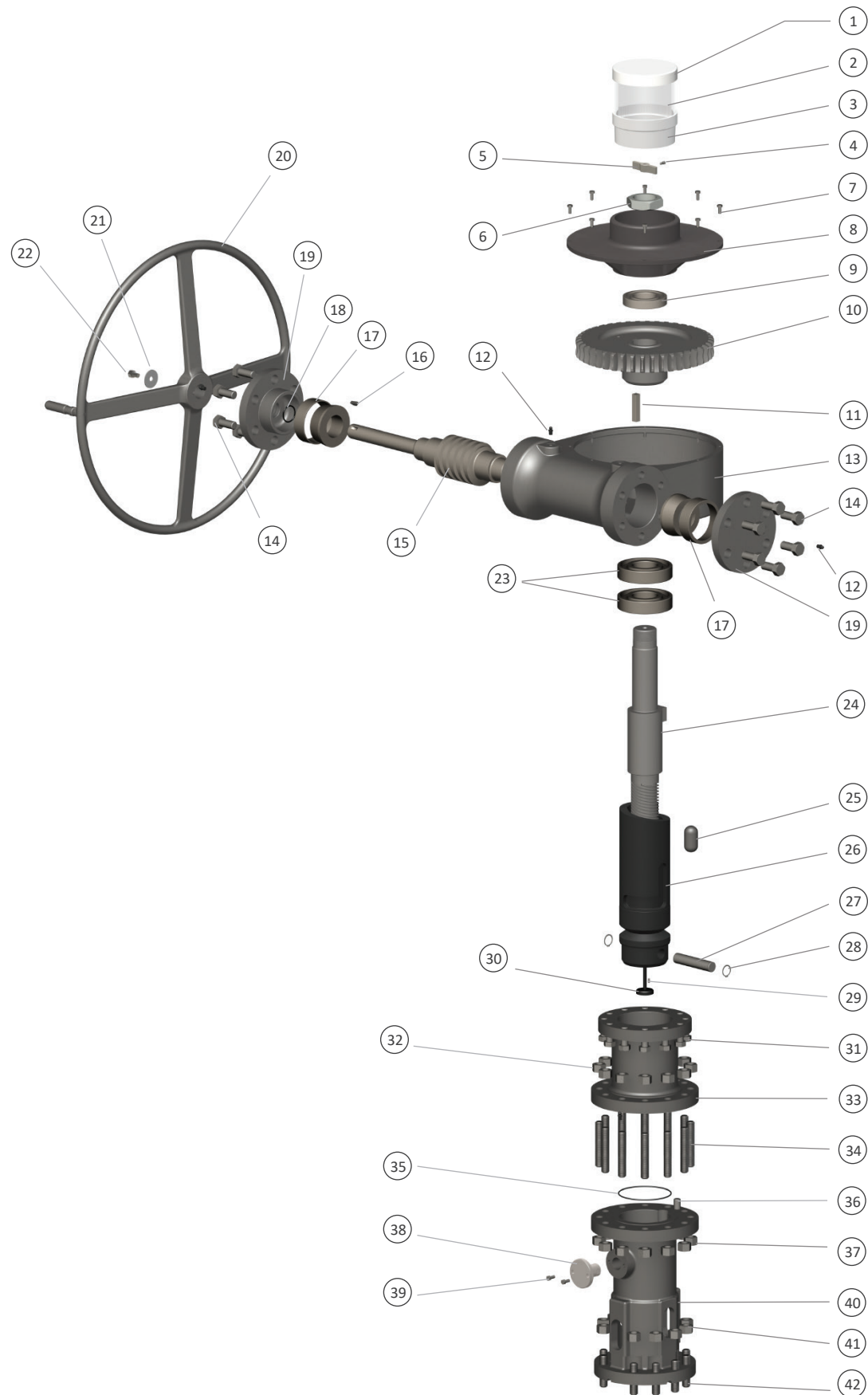


OmniSeal Model 14G is used on Models:

26"	150		24"	300
28"	150		14"	600
16F"	300		16"	600
20"	300			



OmniSeal Model 14G





OmniSeal Model 14G

Operator Dis-Assembly

1. Unscrew Indicator protector tube assembly (components 1, 2, & 3 comprise the indicator protector tube assembly) from indicator protector adapter (8) and remove.
2. Unscrew set screw (4) and remove indicator flag (5).
3. Unbolt hex head bolts (7) and remove indicator protector adapter (8).
4. Remove heavy hex nut (6).
5. Remove upper ball bearing (9).
6. Remove hex head bolt (22), flat washer (21), and handwheel (20).
7. Unbolt hex head bolts (14) and dismantle bearing cap (19) and remove O-ring (18) from bearing cap.
8. Screw out worm shaft (15). Front bearing cone & cup (17) will come out with the worm shaft. Rear bearing cup and cone (17) can be removed by removing the rear bearing cap (19) from gear housing (13).
9. Remove the worm gear (10) and key (11).
10. Unbolt hex head bolts (31) and remove the gear housing (13).
11. Unbolt hex head bolts (39) and remove the guide pin (38).
12. Pull the upper stem (24) with the lower stem (26), roller (25), two bearings (23) and indicator shaft (30) out through the top of the upper operator housing (33). If the bearings are snug in the housing, install the worm gear (10) with its key (11) on the upper stem upside down (hub up). Turn the gear counter-clockwise to raise the lower stem as far as possible. Insert a 1 1/2" diameter bar through the two holes in the bottom of the housing. Using a pipe wrench on the gear hub, turn clockwise and jack the bearing clear of the housing.
13. Remove the set screw (29) and push the indicator shaft sub-assembly (30) out through the bottom on the lower stem (26).
14. Remove the lower stem (26) from the upper stem (24).
15. Remove the bearings (23) from the upper stem (24).
16. Remove the upper housing (33) from the lower housing (40).
17. Remove the O-ring (35) from the inside of the lower operator housing (40).

OmniSeal Model 14G

Operator Assembly

1. Install the two bearings (23) at top of upper stem (24). NOTE: These are radial thrust bearings and must be installed such that the widest surfaces of the inner raceways are facing away from each other. INCORRECT INSTALLATION WILL RESULT IN SERIOUS DAMAGE.
2. Apply a liberal coating of grease to all surfaces of the upper stem (25).
3. Thread the upper stem (24) into the lower stem (26) such that the drive pin in the upper stem comes against the shoulder at the TOP of the lower stem and the detent recess in the upper stem is exactly in line with the roller opening in the lower stem. This operation may require several attempts as the threads are multiple start.
4. Install the indicator shaft sub-assembly (30) up through both stems. Attach using set screw (29).
5. Install O-ring (35) in lower operator housing (40).
6. Install the upper housing (33) onto the lower housing (40) by installing the dowel pin (36) into the appropriate hole on the lower operator housing (40) and align the upper operator housing (33) onto the lower housing and secure with studs (34) and heavy hex nuts (32).
7. Place the roller (25) in the side opening of the lower stem (26).



OmniSeal Model 14G

Operator Assembly (Cont)

8. Place the stem assembly into the operator housing assembly taking care that the roller (25) is aligned with the roller groove in the housing. Push the assembly down until the lower bearing (23) rests on the shoulder in the housing.
9. Apply a smooth even coating of Permatex Number 3 to the surface of the guide pin boss on the lower operator housing (40).
10. Insert the guide pin (38) to full engage the slot in the lower stem (26) and fasten with hex head bolts (39).
11. Place gear key (11) in keyway of upper stem (24).
12. Install tapered roller bearing cup (17) on both ends of the worm shaft (15) and install the worm shaft (15) into the gear housing (13) with large diameter of taper facing out.
13. Install bearing cone (17) through the back of the gear housing. Make certain that rear bearing cone has properly entered the rear bearing cup (17).
14. Apply a smooth coating of Permatex Number 3 to bearing cap (19) boss on gear housing (13). Fasten bearing cap (19) in place with hex head bolts (14).
15. Install tapered roller bearing cone (14) on handwheel end of worm shaft (15). Make certain that rear bearing cone has properly entered the rear bearing cup (14).
16. Install O-ring (18) in bearing cap (19).
17. Apply a smooth coating of Permatex Number 3 to bearing cap boss on gear housing (13). Fasten bearing cap in place with hex head bolts (14).
18. Coat worm gear (10) with grease and install in gear housing (13) hub down (toward smallest opening).
19. Place the gear housing (13) with assembled parts on top of the operator housing guiding the worm gear keyway over key (11) in upper stem (24).
20. Install the ball bearing (9) on the upper stem (24).
21. Apply a smooth coating of Permatex Number 3 to top of the upper operator housing (33).
22. Fasten the gear housing (13) to the upper operator housing (33) with hex head bolts (31). **CAUTION:** NOTE THAT THE SHORT HEX HEAD BOLT IS INSTALLED DIRECTLY UNDER THE CENTER OF THE WORM.
23. 24. Apply a smooth coating of Permatex Number 3 to top surface of gear housing (13).
25. Install heavy hex head nut (6) on to the upper stem (24).
26. Slide indicator protector adaptor (8) over indicator shaft (30) and ball bearing (9) and secure to top of gear housing (13) with hex head bolts (7).
27. Install the indicator flag (5) and secure with screw (4).
28. Install indicator protector assembly onto the indicator protector adapter (8).
29. Grease bearings via grease zerts with five pumps per each zert.
29. Install handwheel (20) with half moon key (16), washer (21) and hex head bolt (22).

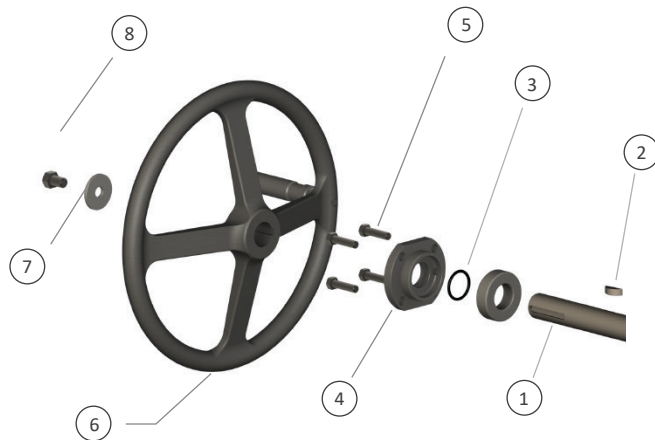


Customer Installation of MAK Sub-Assembly

Step 1: Unbox and lay out parts included with the MAK (Motor Adapter Kit)

- 1. The MAK kit will contain all parts needed to install it on an existing valve gear operator.
- 2. Kits for different MAK sizes (FA10, FA14, etc.) will contain slightly different parts.
- 3. However, all sizes have basically the same installation instructions.

Step 2: Remove existing handwheel



NO.	Description	QTY.
1	Worm Shaft	1
2	Half Moon Key	1
3	O-Ring	1
4	Bearing Cap	1
5	Hex Head Bolts	4
6	Handwheel	1
7	Flat Washer	1
8	Hex Head Bolt	1

- 1. Remove the hex head bolt (8), washer (7), and handwheel (6) from the worm shaft (1).
- 2. Remove the half-moon key (2) from the worm shaft.
- 3. Remove bolts (5) and remove the bearing cap (4) from the operator gear housing.

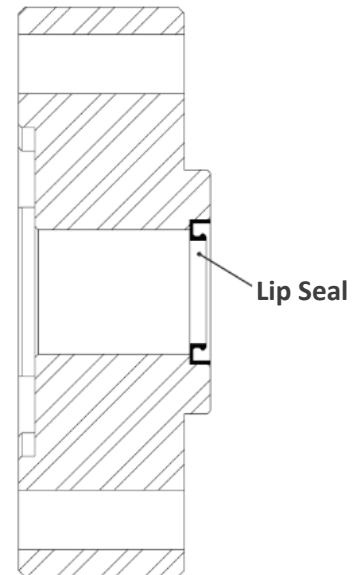


Customer Installation of MAK Sub-Assembly (Cont)

Step 3 (A): If the MAK has provisions for shaft (lip) seals:

Figure 1: Lip seal installation

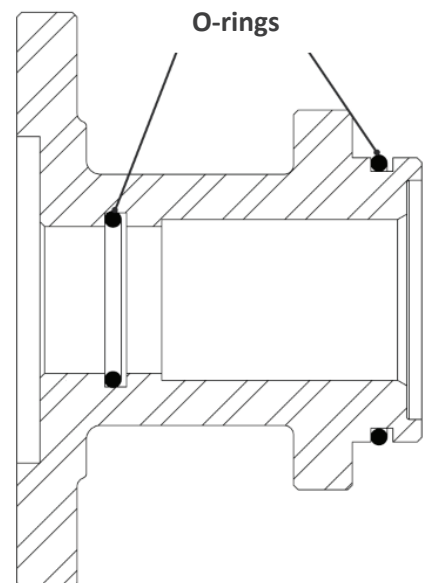
Install the shaft seal(s) with the lip facing inwards.



Step 3 (B): If the mak has provisions for o-ring seals:

Figure 2: O-ring installation

1. Lubricate the o-ring(s).
2. insert them into their respective grooves in the MAK.





Customer Installation of MAK Sub-Assembly (Cont)

Step 4: Install the MAK

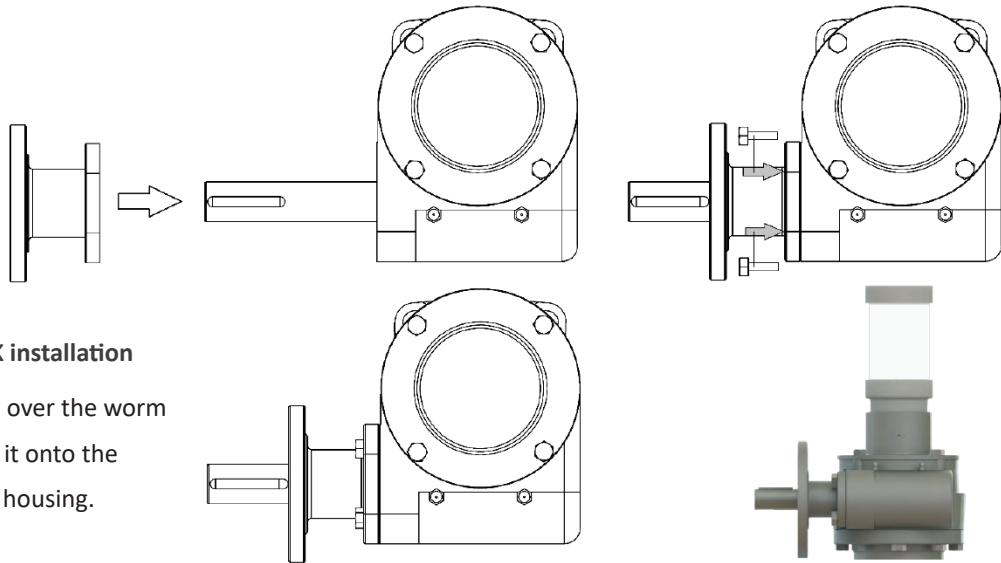


Figure 3: MAK installation

Slide the MAK over the worm shaft and bolt it onto the operator gear housing.

Installed - Top View

Installed - Side View

Step 4: Check the work shaft for sufficient axial movement (endplay)

The worm shaft should exhibit the ability to move axially through the MAK. This is also referred to as endplay. The ability of the worm shaft to do this is important because it ensures that the worm shaft and gearbox do not get in a bind due to rotation induced by the actuator. Axial movement of the worm shaft can be checked with a dial indicator and should be between:

Minimum: 0.0156 in. (0.3969 mm)

Maximum: 0.0312 in. (0.7925 mm)

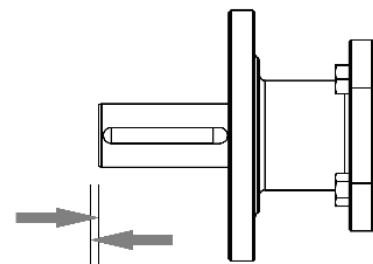


Figure 4: Axial Movement



Customer Installation of MAK Sub-Assembly (Cont)

Step 5: Correcting insufficient or excessive axial movement

Axial movement of the work shaft can be adjusted by adding or removing thin steel shims that are used to control the spacing of the MAK against the gear operator. These shims are included in each MAK kit.

1. If there is not enough endplay in the worm shaft, it can be corrected in two ways:
 - a. Add an external shim (1) between the MAK and the operator gear housing, or
 - b. Remove an internal shim (2) from between the MAK and bearing (or spacer if present).
2. If there is too much endplay in the worm shaft, it can be corrected in two ways:
 - a. Add an internal shim (2) between the MAK and the bearing, (or spacer if present), or
 - b. Remove an external shim (1) from between the MAK and the operator gear housing.

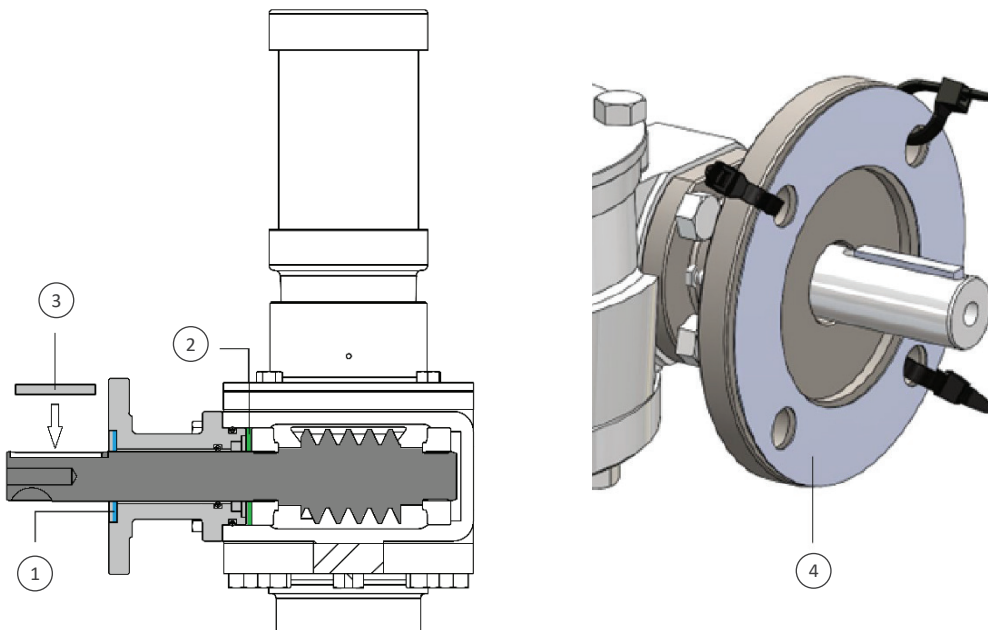


Figure 5: Shims, Shaft Key and MAK Gasket

3. A gasket (4) to be used between the MAK flange and actuator flange is included in the kit.
Remove the plastic ties securing the gasket to the MAK before installing the actuator.
4. Insert the shaft key (3) into the keyway on the worm shaft before installing the actuator.



Product Warranty & Contact Information

STANDARD PRODUCT WARRANTY

All products manufactured or sold by Omni are warranted against defects of material and workmanship for a period of twelve (12) months from the date of installation or eighteen (18) months from date of shipment, whichever period first expires, when all such products are used in the service and within the pressure range for which they were manufactured.

In the case of products or parts not wholly of Omni's manufacture, Omni's liability shall be limited to the extent of Omni's recovery from the original manufacturer of such products or parts under its warranty or liability to Omni.

Any repair work performed by Omni is warranted for one year from completion of such repairs and applies only to work performed. If, within these specified periods, Omni receives notice from Buyer of any alleged defect in or nonconformance of any product or repair and if in Omni's sole judgment the product or repair does not conform or is found to be defective in material or workmanship, then, Buyer shall, at Omni's request, return the part or product F.O.B. to Omni's designated plant or service location.

Omni has no liability for removal or reinstallation of products or equipment. Omni, at its option and expense, shall repair or replace the defective part or product, or repay to Buyer the full price paid by Buyer for such defective part, repair or product. Any repayment of purchase price shall be without interest.

Omni's warranty liability, including defects caused by Omni's negligence, shall be limited to such repair, replacement or refund, and shall not include claims for labor costs, expenses of Buyer resulting from such defects, recovery under general tort law or strict liability or for damages resulting from delays, loss of use, or other direct, indirect, incidental or consequential damages of any kind.

Omni will not be responsible for failures of products which have been in any way tampered with or altered by anyone other than an authorized representative of Omni, failures due to lack of compliance with recommended maintenance procedures or products which have been repaired or altered in such a way (in Omni's judgment) as to affect the products adversely.

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If you have questions regarding this warranty or if you would like information about other Omni products and services please contact us at the address and phone numbers below.



OmniSeal Engineering, Quality, Service and Distribution

4520 Chandler Rd. | Muskogee, OK 74403 | USA

📞 918.687.6100

📠 918.687.6105

✉️ quality@omnivalve.com

🔍 omnivalve.com



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