

Installation, Operation, Maintenance Instructions

VFlo Control Valves

CAUTION :

1. Use pressure relief valves for high pressure piping.
2. Use explosion proof valves/accessories for dangerous media piping.
3. Use fire safe valves for piping where chances of fire by external means.
4. Use seismic proof valves where chances of earthquake are frequent.
5. Check whether location of the valve mounting is of the same service/application as specified on the marking plate.

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GENERAL INFORMATION

The instructions presented below are for helping in un-packing, installing and performing maintenance as and when needed on Mascot VFlo ball valves. The manual should be thoroughly reviewed by Product users and maintenance personnel before performing any operation on the valve. Separate maintenance instructions cover additional features (such as actuators, special accessories, fail-safe systems, etc.).

For information on Mascot positioners, refer to the appropriate Mascot Installation, Operation and Maintenance instructions.

Please follow the procedures laid down to avoid possible injury to personnel or damage to valve parts. Any modification in this product, or using non-factory or inferior parts, employing maintenance procedures other than prescribed can affect performance adversely; moreover, it can be dangerous to personnel and equipment, and also void existing warranties.

WARNING : It is mandatory to follow standard industry safety practices. Personal protective and lifting devices must be used as specified.

Note : The onus of choosing the proper fastener material lies on the customer. The supplier cannot know what the valve service conditions or environment might exist. The standard body bolting material for Mascot's is B7/2H. For applications above 800° F and with stainless steel or alloy body valves B8 (stainless steel) is optional. It is up to the customer therefore to consider the material's resistance to general corrosion and stress corrosion cracking. Every mechanical equipment needs periodic inspection and maintenance. The details on fastener materials can be obtained from your local Mascot representative or factory.

Unpacking

1. First step is to check packing list against the materials received during the unpacking of the valve. Each shipping container has lists describing the valve and accessories.
2. For lifting the valve from the shipping container, lifting straps need to be positioned to avoid damage to tubing and mounted accessories. Where valves are provided with a lifting ring, please use the same for lifting. Valves up through 8-inch may be lifted by the actuator lifting ring. Larger valves can be lifted using lifting straps or hook through the yoke legs and outer end of the body.

WARNING : During lifting of a valve with lifting straps through the yoke legs, one must have in mind that the center of gravity may be above the lifting point and support must be given to prevent the valve from rotating. Serious injury to personnel or damage to nearby equipment can take place if proper attention is not paid to this factor.

3. On observation of damage in transit, shipper should be contacted immediately.
4. The Mascot representative is always at your service whenever needed.

Quick-Check

Before beginning, check the control valve as per the steps mentioned below:

1. By making the appropriate instrument signal change, verify for full stroke. The position indicator plate is mounted on the actuator transfer case for observation. Position of the indicator plate should change in a smooth, rotary fashion.

CAUTION : The full torque load of the actuator cannot be taken by the VFlo valve shaft. The shaft could twist and/or shear if the ball were to seize and full torque continued.

3. There should be no leaks in the air connections. Any leaky lines should be repaired by tightening or replacement.
4. Tighten of the packing nuts is to be done to slightly over finger-tight and evenly.

CAUTION : Over tightening of packing nuts can cause excessive packing wear and high shaft friction and shaft rotation will be adversely affected. Every short time valve has been in operation, check the packing nuts to ensure they are torqued properly. Do correction if necessary. Any leaking in the packing box should be corrected by tightening the packing nuts. The tightening should be only enough to stop leakage.

5. In case of air failure, for observing the valve failure mode, position the valve to mid-stroke and shut off the air supply to the actuator or disconnect the instrument signal to the positioner. The actuator indicator plate should move to either fail-open or closed position. If not, the "Reversing the Actuator Action" section in the actuator maintenance instructions needs to be referred.

Table 1 : Flange Bolting Specifications

Valve Size (Inches)	ANSI Class Rating	Bolt** Length (Inches)	Torque* (ft. Lbs.)	
			Low Strength	Intermediate Strength
1	150	2.5	23	61
	300	3.0	46	122
	600	3.5	46	122
1 1/2	150	2.75	23	61
	300	3.5	82	218
	600	4.25	82	218
2	150	3.25	46	122
	300	3.5	46	122
	600	4.25	46	122
3	150	3.5	46	122
	300	4.25	82	218
	600	5.0	82	218
4	150	3.5	46	122
	300	4.5	82	218
	600	5.75	132	353
6	150	4.0	82	218
	300	5.5	132	353
	600	6.75	199	531
8	150	4.25	82	218
	300	6.25	199	531
	600	7.5	296	789
10	150	4.5	132	353
	300	6.25	199	531
	600	8.5	420	1119
12	150	4.75	132	353
	300	6.75	296	789
	600	8.75	420	1119

*Torque values are recommended for low and intermediate strength bolting per ANSI B16.5 5.3.2. Higher torques may be used with high strength bolting (ANSI B16.5 5.3.1). For all cases the user must verify the selected bolting's ability to seat the joint under expected operating condition. Higher strength bolting and torque values are needed for long thru-bolting joints than shorter flanged bolting - depending on operating conditions. **Lengths are based on ANSI B16.5 stud bolts and raised face ends.

PREVENTATIVE MAINTENANCE

Twice yearly, operation should be checked for trouble free performance. For the preventative maintenance, follow the steps that are presented below:

These steps can be very well performed while the valve is in line and, in some cases, without interrupting service. Refer to the "Disassembly" and "Reassembly" section if an internal problem is suspected with the valve.

1. Tighten flange bolting if signs of gasket leakage through the body and line flanges are observed (See Table I for specifications.)
2. Observe whether any corrosive fumes or process drippings are damaging the valve.
3. Valve should be cleaned and areas of severe oxidation painted.
4. Packing nuts should be tightened as necessary to prevent stem leakage.

CAUTION : Over tightening of packing can cause excessive packing wear and high shaft friction, which may retard shaft rotation.

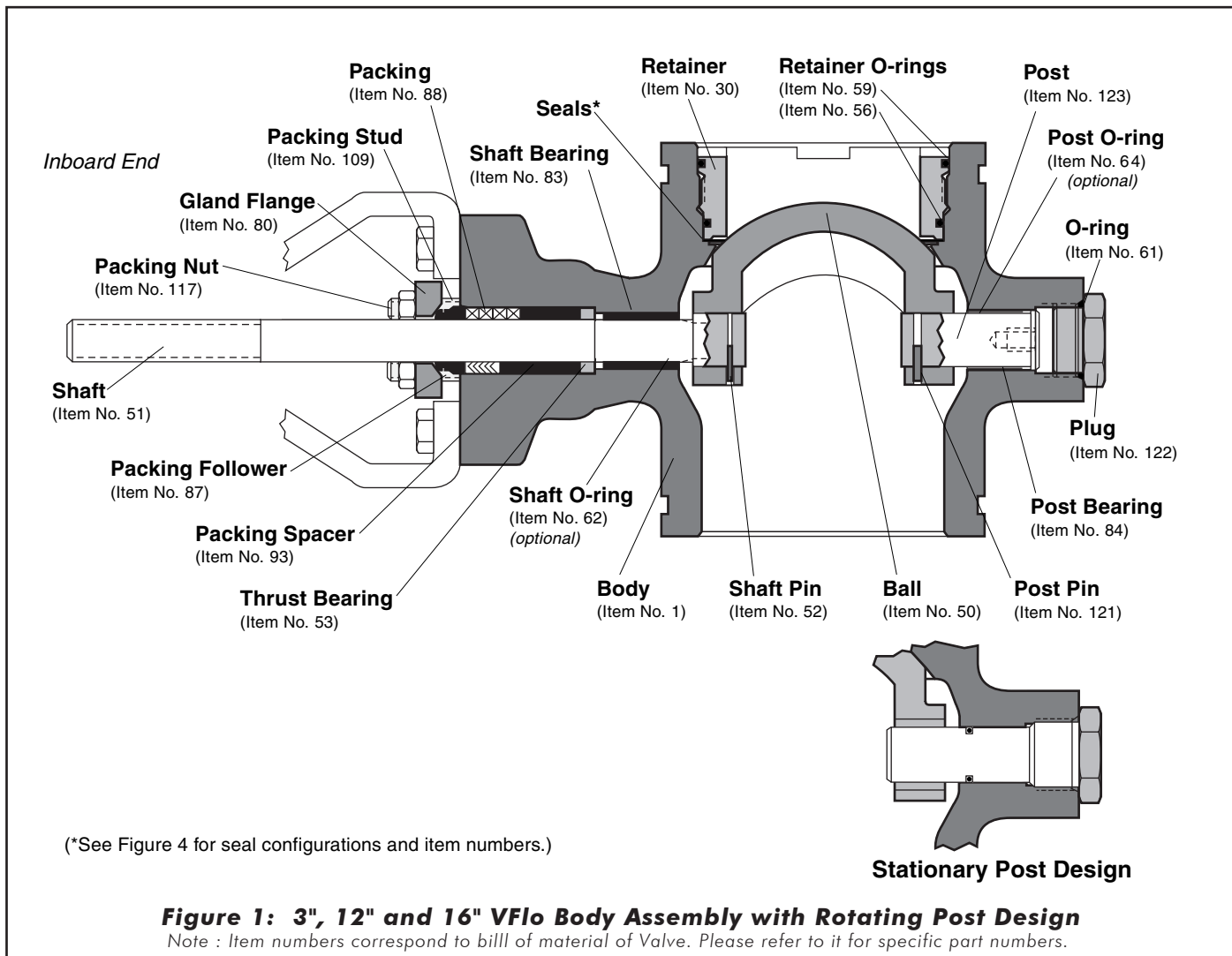
5. Where the valve is supplied with a lubricator, lubricant supply and level needs attention. Ensure proper supply and level of the lubricant.

6. Where possible, stroke valve and observe for smooth, full-stroke operation by looking at the position indicator plate mounted on the transfer case. An internal valve problem is indicated by unsteady movement of the plate.
7. In case of a positioner being present, its calibration needs to be checked by observing the actuator position indicator plate and gauges. The positioner needs calibration to the correct range.
8. In case an actuator is attached, the appropriate maintenance instructions for preventive maintenance need to be referred. Where possible, remove the air supply to observe the actuator stroke plate for correct fail-safe action.
9. Ensure fastening of all valve accessories, brackets and bolt-ing.
10. The ex-posed portion of the valve shaft must be free from dirt or foreign material.
11. In case an air filter is present, the cartridge needs to be checked and if necessary, replacement needs to be done.

Removing Valve From Line

To remove the valve from the line, in cases where an internal problem is suspected proceed as mentioned below:

WARNING : Line must be depressurized to atmospheric pressure. All process fluids should be drained. If caustic or hazardous materials are present, decontaminate the valve. This is very important as it will prevent any possible injury.



1. Support the valve with a hoist or some means.
2. Line bolting should be removed. Do not push or pull on the valve or actuator to pry line flanges apart.
3. Valve needs to be slid from the line, carefully. Do not twist the valve or it will cause damage to the gasket surfaces.
4. Slowly relieve air pressure from the actuator on complete removal of valve from the line.

Removing Actuator From Body

The design of the 3 to 12-inch VFlo valves permits disassembly without removing the Mascot actuator. However, it is advisable to remove the actuator. Follow the proper actuator installation, operation, maintenance instructions, and proceed as follows:

1. Before disconnecting it from the body assembly, support the actuator assembly.
2. The spring compression is to be released by loosening the actuator adjusting screw.
3. Remove the actuator transfer case cover bolts, carefully pry or slide the cover plate from the transfer case, then loosen the linkage bolt - On Mascot actuators.
4. The bolts connecting the yoke to the body subassembly need to be removed.
5. The entire actuator assembly should be slid off the shaft. To loosen it from the shaft splines, it may be required to wedge the splined lever arm apart.

DISASSEMBLY AND REASSEMBLY

Disassembling the Body

Although not necessary, it is advisable to remove the actuator from the body assembly to disassemble 3 to 12-inch bodies. It is necessary to loosen the valve shaft (On valves) from the actuator prior to body disassembly. Figures 1, 2 and 5 should be referred to and below mentioned procedure must be followed :

1. Seal retainer and seals removal

Screw-in style - Loosening the retainer by turning it counterclockwise and removing it from the body. (A special cross-wrench tool is available with the factory and can be ordered. Refer Table IV.) Remove the metal seals. The soft seal needs to be removed, if applicable.

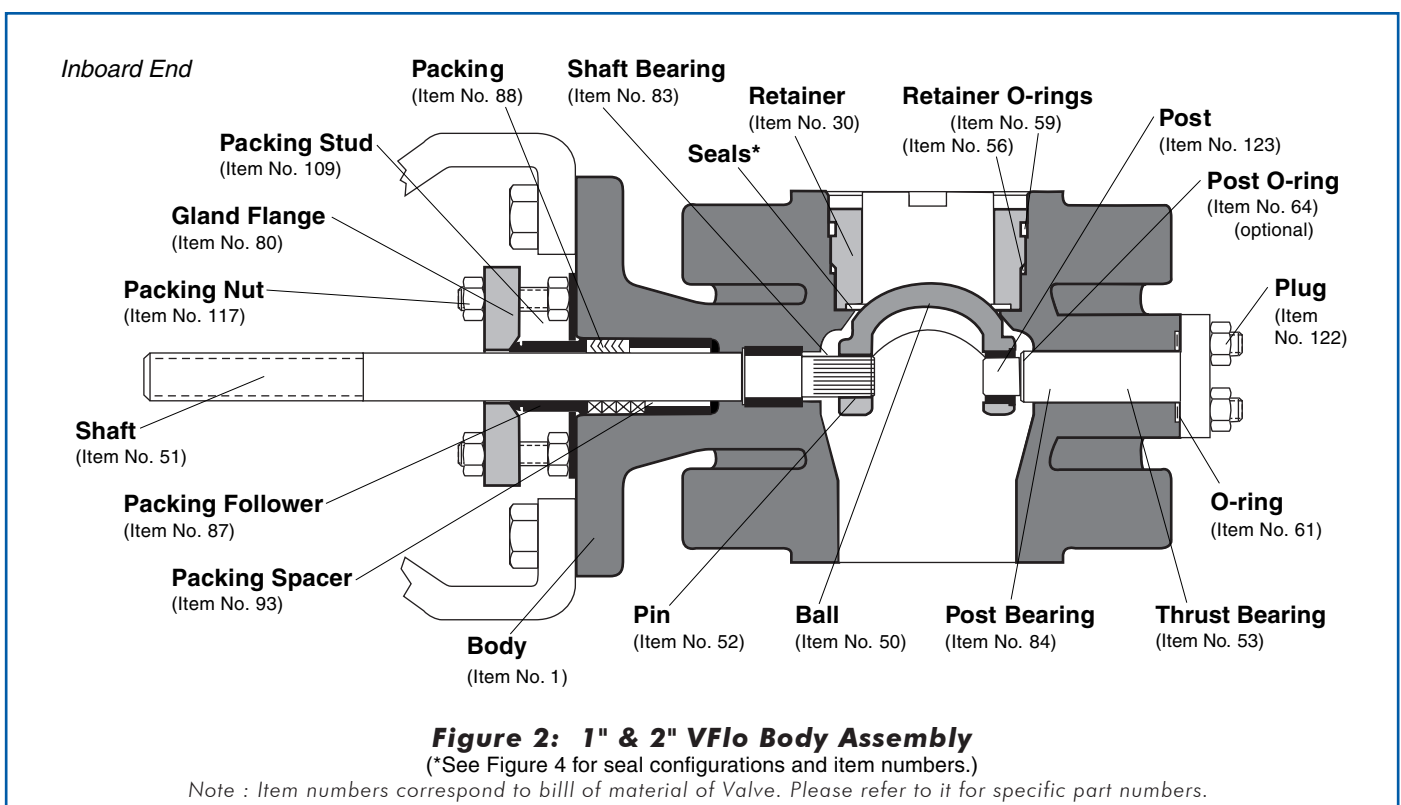
Lock-ring style - certain valve designs have a retaining ring held in with set screws. For removing it, the set screws in the lock ring need removal, then the re-taining ring is to be removed, lock ring and seal retainer finally. The retaining ring can be forced out using a flat-headed screwdriver and pliers - if the lock ring set screws do not loosen. Remove the seals.

2. By removing both packing nuts, remove the gland flange. Removing the studs is not necessary.
3. On rotating post designs, both the shaft and post pins need to be driven into the center of the shaft and posted until the outward end of the pin clears the ball. Care should be exercised not to damage the post or shaft. Pins must be then punched out of the shaft and posted when they are removed from the valve. Remove the shaft plug, O-ring and finally the rotating post. For removing the post, insert a bolt in the jack screw hole, tapped in the post.

On stationary post designs, drive the shaft pin into the center of the shaft until the outward end of the pin clears the ball splines. Care should be taken, not to damage the shaft. After the shaft is removed, the pin can then be punched out of the shaft. The anti-rotation clamp must be removed. The post and the post O-rings should be removed.

4. From 3 through 12-inch designs, for removal, the shaft needs to be pulled through the outboard end of the body. On 1 through 2-inch designs, removal of the shaft is by pulling it out through the inboard end of the body

CAUTION : Care must be taken during disassembly so that the splined end of valve shaft does not get damaged.



5. Rotate the ball inside the body in a way so that the non-splined end of the ball is toward the back port of the valve. Remove the ball straight out of the body. If needed, on stationary post designs remove the post bearing from the ball by pushing it out with a press.

CAUTION : The sealing surface of the ball should not be galled or scratched when re-moving it from body. Scratches lead to excessive leakage and wearing of the seal.

6. Employing a bronze dowel with the appropriate diameter, push the packing and bearings out of the body. The packing must be pushed out of the body from the center of the valve. (Refer Table IV for optional shaft/post bearing tool.)

Reassembling the Body

For the reassembling of the body subassembly, refer to Figures 1 or 2, 3, 4, and 5 and proceed as mentioned below :

1. All parts must be cleaned and all O-rings and soft seals must be replaced.
2. The ball sealing surface must be smooth and free of scratches and scoring.
CAUTION : Keep the seal surfaces clean and free of damage. Damaged or dirty surfaces cause excessive seat wear and high torque re-quirements.Prompt replacement of damaged balls should be done.
3. The shaft and post are to be inspected for galled surfaces or scratches. To achieve optimum performance, VFlo shafts and posts are given a very smooth finish. Replace the shaft or contact the factory representative if damage exists.

NOTE : Replacing the ball does not require replacing the shaft as ball and shaft are interchangeable.

4. We recommended the use of a press to install new bear-ings in the body and/or ball. (If needed, an optional post/bear-ing tool is available from the factory. Refer Table IV.) The ends of the body bear-ings should be flush with the inside of the body - an indication of correct installation.

5. The ball is to be position in the body by lowering it, splined hole first, into the back of the body. Rotate the ball surface toward the front of the body so that the splined hole is towards the packing box

CAUTION : Whilst, Replacing it in body be extremely careful not to scratch or gall the sealing surface of the ball. Scratches may cause excessive leakage and wearing of seal

6. For 3 through 12-inch designs, the shaft is to be inserted through the outboard end of the body and through the splined inch designs, insert the shaft through the inboard end of body and through the packing box into the splined hole of the ball. (For 1 -inch body designs, before installing the shaft, the thrust bearing, packing spacer, packing, and packing follower must be inserted.)
7. The positioning of the shaft is to be such that the pin hole in the shaft and ball are in alignment. (Certain shafts have a half circle mark and line on the end. Align the line mark with the pin and the half circle symbol with the ball.) The shaft pin needs to be installed and driven firmly into place so that half in the shaft and half is in the ball.
8. On rotating post designs, the post is to be inserted through the outboard end of the body and into the hole of the ball. (For 1 through 2-inch valves sizes, before installing post, insert thrust bearing.) The post must be positioned so that the pin hole in the post and ball are aligned. (For 6 through 12-inch valve sizes, make certain that the ball pin hole is aligned with the smallest diameter pin hole in the post. Some posts have a half circle mark on the end. This half circle mark needs to be aligned with the ball.) The post pin is to be installed and driven firmly into place so that half is in the post and half is in the ball. To torque the plug, refer Table II.

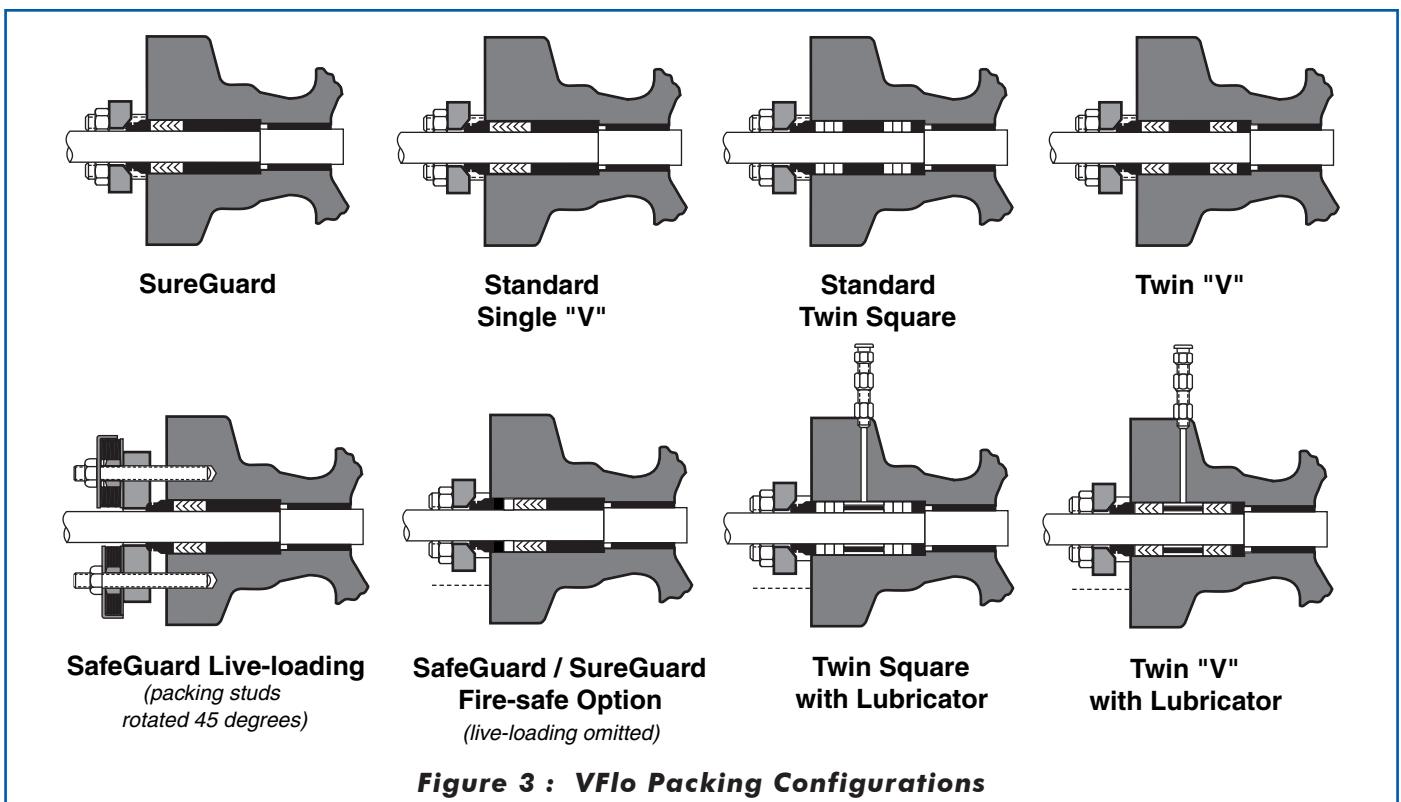


Figure 3 : VFlo Packing Configurations

Table II : Post/Shaft Plug Torques (Ft.-Lbs)

Valve Size (Inches)	Stationery Designs Post	Rotating Designs Shaft Plug
1, 1 1/2, 2	N/A	50
3, 4	175	85
6, 8	300	150
10, 12	500	250
	600	300

Table III : Screwed-in-Retainer Torques

Valve Size (Inches)	Torque Value (ft.-Lbs.)	Valves Size (Inches)	Torque Value (ft.-Lbs)
1, 1 1/2, 2	150-175	8, 10	650-700
3	250-300	12	900-950
4, 6	550-600	-	-

On stationary post designs, make sure that the lubrication of the post and post threads is proper and done with a high temperature bearing grease (or as required by the application) before installation. The post O-ring needs to be replaced and then reinstall the post. To torque the post, refer Table II. The anti-rotation clamp kit should be installed.

- Over the splined end of the shaft and into the body, slide the thrust bearing, packing spacer, Packing, and packing follower. Most packing configurations are presented in Figure 3. (1-inch designs refer to Step 6.)

NOTE : New packing is to be used whenever rebuilding the packing box.

CAUTION : The sealing on V-ring packing takes place at the feather edge, so it is necessary to avoid damage to that edge.

- The gland flange is and packing nuts are to be reinstalled and left loose.

CAUTION : Over tightening the packing can cause excessive packing wear and shaft friction, which may impede shaft rotation.

- The valve needs to be placed on a flat surface with the threaded (retainer) port facing up and the shaft is to be pulled toward the actuator until it is fully against the thrust bearing.

- For 3 through 12-inch designs, the ball surface must facing up and position the ball as close as possible in the center of the body's inside diameter. (The pinned connection between the ball and shaft is not a tight connection; the design includes a considerable amount of axial play between the ball and shaft.)

For 1 through 2-inch designs, make sure the ball surface is facing up and pull on the shaft until the post is fully against the thrust bearing. (The ball does not self center. There will be no axial play between the ball and shaft.)

- Replace the soft and/or metal seal rings, as applicable to the application. (Refer to Figure 4.)

In case of soft seal applications, insert the soft seal ring, followed by the two metal seal rings into the body.

In case of metal seal applications, insert the two metal seal rings into the body. (There is only one seal ring for 1" designs.)

- For screwed-in retainer designs, replace the O-rings in the retainer (except on high temperature valves, which do not use O-rings). Figure 1 or 2 should be referred. The retainer threads and rings are to be lubricated and reinstall the retainer in the front of the body. Torque the seal retainer according to Table III.

- For some 10 and 12-inch valves where the retainer is held in place with set screws, reinsert the lock ring into the body. The words "Ball Side" facing toward the ball. The lock ring has "Ball Side" and "Port Side" marked on it. Insert the retaining ring into the inner groove of the body. Make sure it is fully seated. The lock ring set screws need to be evenly tightened to a torque of 225 inch-pounds.

- Once the seal retainer is in tight, the packing nuts need to be tightened just over finger-tight. Packing nuts should be tightened sufficiently to prevent stem leakage.

CAUTION : Over tightening of packing causes excessive packing wear and high shaft friction, which may retard shaft rotation.

Remounting the Actuator

Prior to initiation of the mounting of a Mascot actuator on the valve body, verify that the ball rotation matches the actuator rotation and complies with the air failure requirements. Method for mounting the actuator is presented below :

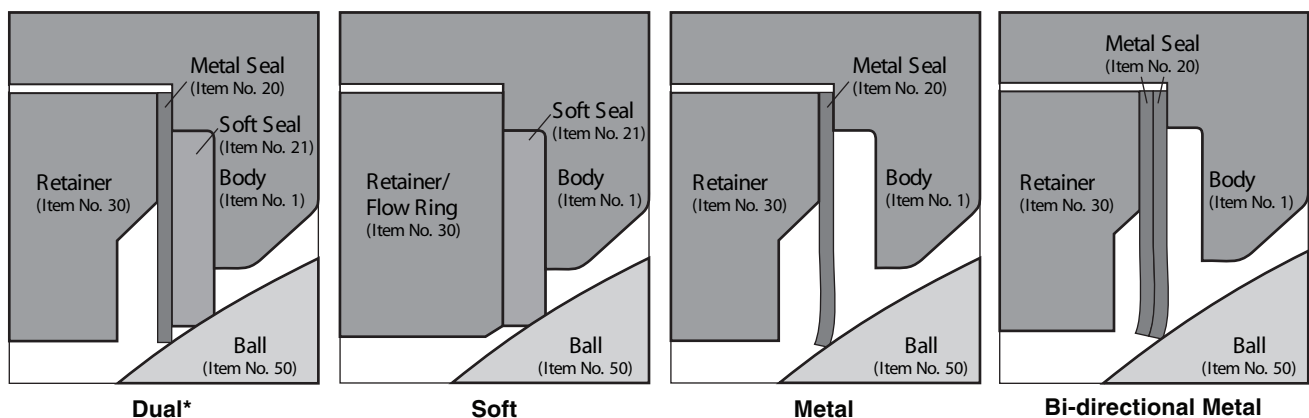


Figure 4: Seat Configurations

* Two metal seals required for shaft upstream

1. Entire actuator assembly is to be slid onto the shaft.
2. The yoke needs to be bolted to the valve body.
3. The actuator lever arm should be positioned on the shaft so the actuator stem is centered in the transfer case.
4. The linkage bolt should be firmly tightened. Bolt the transfer case cover plate into place.
5. Alignment of the stroke indicator plate to be done on the end of spline lever so that it accurately indicates position of ball.
CAUTION : Without the cover plate installed; never apply air to the actuator otherwise, the unsupported shaft is likely to sustain damage.
6. The valve is to be installed in the line as outlined in the "Installation" section.

Table IV: Optional VFlo Tools

Valve Size	Retainer Tool	Shaft/Post Bearing Tool
1	87377	76891
1 1/2	87530	76509
2	76112	76509
3	62295	75970
4	62294	75970
6	62296	81978 / 81974
8	62336	81978 / 81974
10	81775	76550 / 76551
12	81034	76550 / 76551

Troubleshooting VFlo Valve

Failure	Probable Cause	Corrective Action
<ul style="list-style-type: none"> <input type="checkbox"/> Valve moves to failure position, excessive air <input type="checkbox"/> bleeding from transfer case <input type="checkbox"/> Jerky shaft rotation <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Failure of actuator O-ring 2. <input type="checkbox"/> Failure of sliding seal assembly 1. <input type="checkbox"/> Overtightened packing 2. <input type="checkbox"/> Improper adjustment of lever arm on shaft causing arm to contact transfer case thus failing to convert torque. 3. <input type="checkbox"/> Cylinder wall not lubricated 4. <input type="checkbox"/> Worn piston O-ring allowing piston to gall on cylinder wall 5. <input type="checkbox"/> Worn actuator stem O-ring causing actuator stem to gall on stem collar 6. <input type="checkbox"/> Worn (or damaged) shaft bearings, shaft bearings or packing followers 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Replace actuator stem O-ring 2. <input type="checkbox"/> Repair or replace stem adapter / linkage assembly 1. <input type="checkbox"/> Retighten packing box nuts to slightly over finger-tight 2. <input type="checkbox"/> Readjust lever arm (see step 1 in the "Remounting Actuator" section) 3. <input type="checkbox"/> Lubricate cylinder wall with silicone lubricant 4. <input type="checkbox"/> Replace O-ring; if galling has occurred replace all damaged parts 5. <input type="checkbox"/> Replace O-ring; if actuator stem is galled replace it 6. <input type="checkbox"/> Disassemble and inspect parts; replace any worn or damaged parts
<ul style="list-style-type: none"> <input type="checkbox"/> Excessive leakage through seal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Improper adjustment of external stroke stops 2. <input type="checkbox"/> Worn or damaged seat 3. <input type="checkbox"/> Damaged ball seating surface 4. <input type="checkbox"/> Improper handwheel adjustment acting as limitstop 5. <input type="checkbox"/> Ball not centered in body I.D. 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> See "Adjusting External Stroke Stops" section 2. <input type="checkbox"/> Replace seat 3. <input type="checkbox"/> Replace disc and shaft 4. <input type="checkbox"/> Adjust handwheel until disc seats properly 5. <input type="checkbox"/> Center ball; replace damaged seals.
<ul style="list-style-type: none"> <input type="checkbox"/> Leakage through line flanges <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Dirty line gasket surfaces 2. <input type="checkbox"/> Improper torque on line flanges 3. <input type="checkbox"/> Flange or pipe misalignment 4. <input type="checkbox"/> Worn Gaskets 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Clean gasket surfaces and reinstall valve 2. <input type="checkbox"/> Tighten line flanges evenly and completely (see Table 1 for proper torque) 3. <input type="checkbox"/> Realign flanged ends with piping. 4. <input type="checkbox"/> Replace Gaskets
<ul style="list-style-type: none"> <input type="checkbox"/> Leakage through packing box <input type="checkbox"/> <input type="checkbox"/> 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Loose packing box nuts 2. <input type="checkbox"/> Worn or damaged packing 3. <input type="checkbox"/> Dirty or corroded packing 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Tighten packing box nuts to slightly over finger-tight 2. <input type="checkbox"/> Replace packing 3. <input type="checkbox"/> Clean body bore and stem, replace packing
<ul style="list-style-type: none"> <input type="checkbox"/> Valve slams, won't open, or causes severe water hammer 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Improper valve installation <input type="checkbox"/> <input type="checkbox"/> 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> See step 2 in "Installation" section and correct flow direction
<ul style="list-style-type: none"> <input type="checkbox"/> Shaft rotates, ball remains open or closed 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Broken shaft 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Replace shaft
<ul style="list-style-type: none"> <input type="checkbox"/> Actuator operates, shaft does not rotate 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Broken internal actuator parts 	<ul style="list-style-type: none"> 1. <input type="checkbox"/> Refer to appropriate actuator Maintenance Instructions

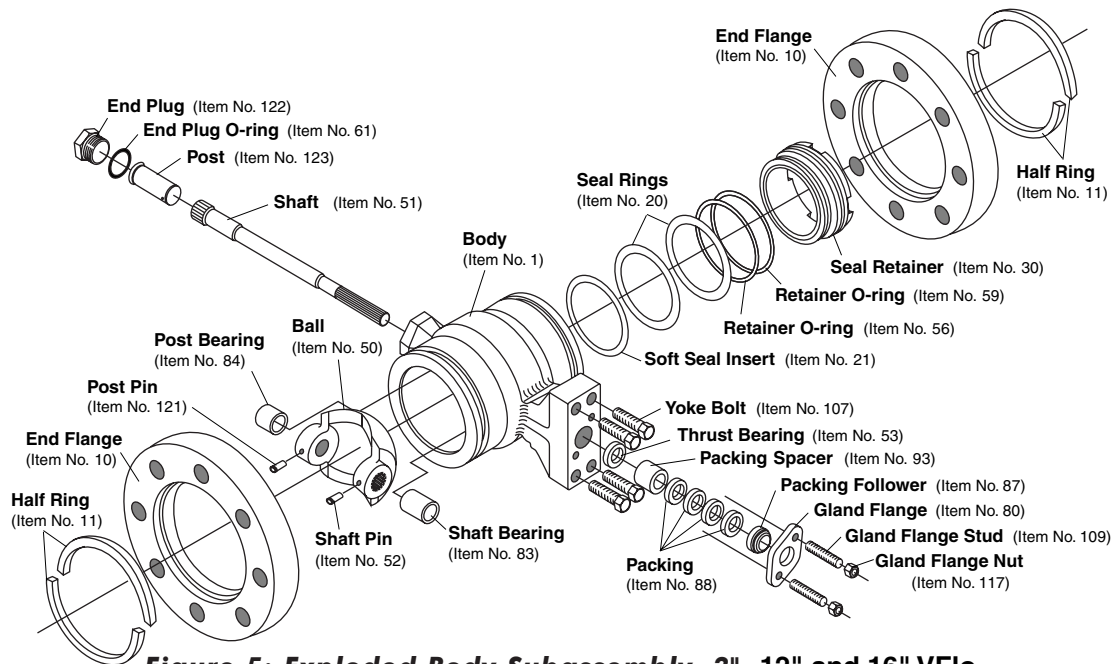


Figure 5: Exploded Body Subassembly, 3", 12" and 16" VFlo

Note : Item numbers correspond to bill of material of Valve. Please refer to it for specific part numbers.



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