

Severe service metal seated Neles™ ball valve Series S6

Installation, maintenance and
operating instructions

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READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the valve.

If you require additional assistance, please contact the manufacturer or manufacturer's representative.

SAVE THESE INSTRUCTIONS!

Addresses and phone numbers are printed on the back cover.

1. GENERAL

1.1 SCOPE OF THE MANUAL

This installation, operation, and maintenance manual provides essential information on S6-series ball valves. The actuators and instrumentation to be used with S6-series valves are also discussed briefly. Refer to the separate actuator and control equipment instruction manuals for further information.

NOTE:

SELECTION AND USE OF THE VALVE IN A SPECIFIC APPLICATION REQUIRES CLOSE CONSIDERATION OF DETAILED ASPECTS. DUE TO THE NATURE OF THE PRODUCT, THIS MANUAL CANNOT COVER ALL THE INDIVIDUAL SITUATIONS THAT MAY OCCUR WHEN INSTALLING, USING, OR SERVICING THE VALVE. IF YOU ARE UNCERTAIN ABOUT USE OF THE VALVE OR ITS SUITABILITY FOR YOUR INTENDED PURPOSE, PLEASE CONTACT VALMET FOR MORE INFORMATION. FOR VALVES IN OXYGEN SERVICE, PLEASE SEE ALSO THE SEPARATE INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS FOR OXYGEN SERVICE (SEE VALMET DOCUMENT ID:10O270EN.PDF)

1.2 VALVE DESCRIPTION

Seat supported S6-series valves are flanged full bore ball valves. The valve body is in two parts, fastened together by bodyjoint bolting, and fixed with spring pins. The ball and shaft are separate. Shaft blow-out is prevented by a shoulder machined on the shaft and body.

The valve is metal seated. Tightness is provided by a pressure differential which forces the ball up against the downstream seat, and also by springs located behind the seats.

The valve is 1-way (unidirectional) or 2-way (bidirectional) tight depending on the seat construction.

Construction details of individual valves are included in the type code shown on the valve identification plate. To interpret the type code, please refer to the type coding key contained in the product bulletin (Valmet document ID: 1S620EN.pdf).

S6-series valves are specially designed for moderate control and tight shut-off applications involving abrasive and/or corrosive media and extremely high or low temperatures and pressures.

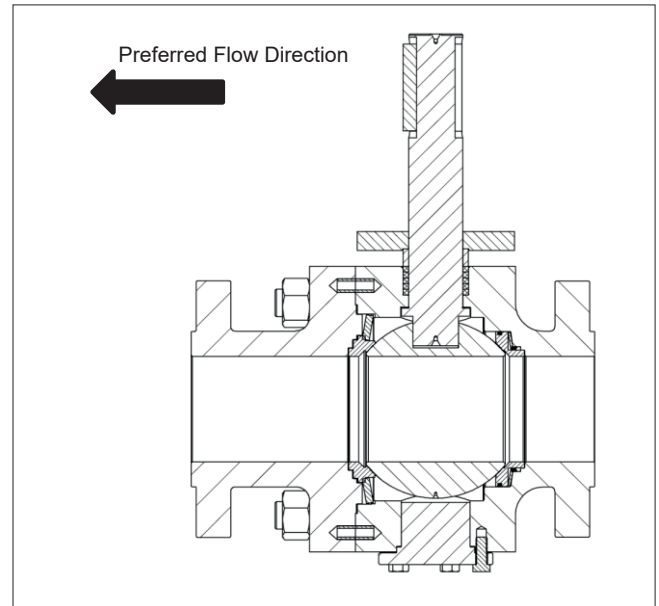


Figure 1. Construction of S6-Series Valve

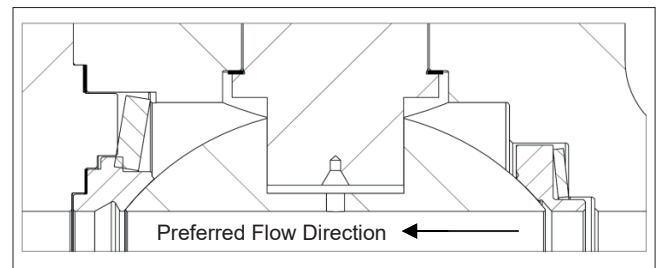


Figure 2. Seat Construction, Unidirectional

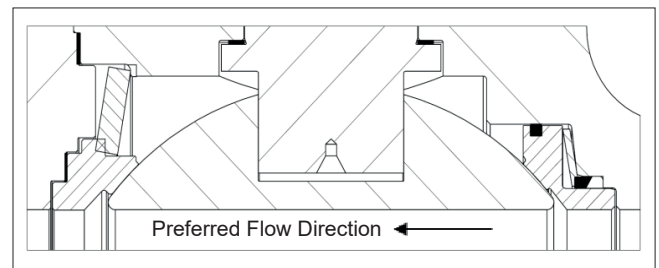


Figure 3. Seat Construction, Bidirectional

1.3 MARKINGS

Body markings are stamped on the body (see Fig. 4).

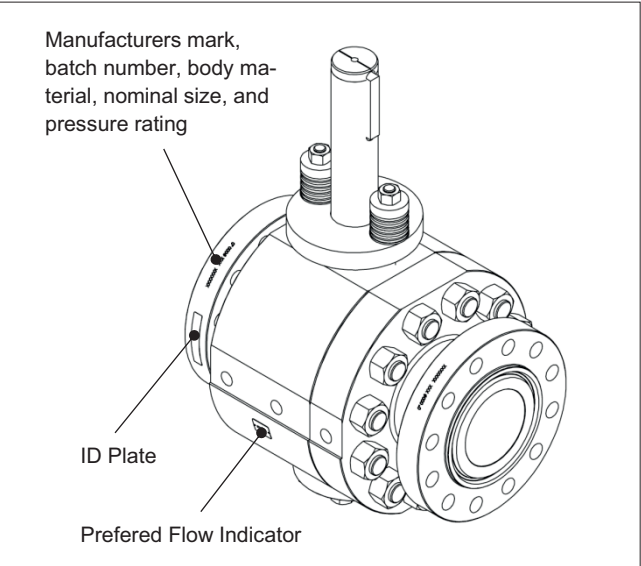


Figure 4. Valve Markings

The identification plate (Fig. 5) is attached to the flange. Identification plate markings are:

- 1. Body Material
- 2. Shaft Material
- 3. Trim Material
- 4. Seat Material
- 5. Max and Min Operating Temperature
- 6. Max Shut-Off Differential Pressure Preferred Direction
- 7. Max Shut-Off Differential Pressure Non-preferred Direction (Bidirectional Only)
- 8. Pressure Class
- 9. Type Designation
- 10. Valve Manufacturing Parts List Number

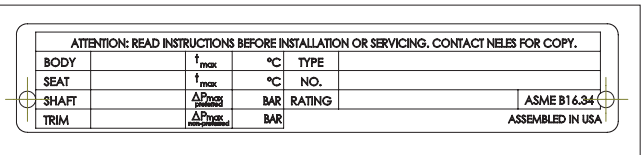


Figure 5. Identification Plate

1.4 SPECIFICATIONS

Face-to-Face: ASME B16.10 long pattern

Pressure Rating: ASME Class 600-2500

Flow Direction: Various (body is preferred inlet)

Tightness: FCI 70-2 Class V (standard)

Specific temperature/pressure curves, along with general dimension/weight metrics, and also valve type-code break down for the full S6 size range may be retrieved from the product bulletin.

1.5 VALVE APPROVALS

S6 series severe service valves are designed to meet a range of industrial approvals. A list of relevant approvals can be found in the product bulletin.

1.6 RECYCLING AND DISPOSAL

Most valve parts can be recycled if sorted according to material. Most parts have material marking. A material list is supplied with the valve. In addition, separate recycling and disposal instructions are available from the manufacturer. A valve can also be returned to the manufacturer for re-cycling and disposal against a fee.

1.7 SAFETY PRECAUTIONS

CAUTION:
DO NOT EXCEED THE VALVE PERFORMANCE LIMITATIONS! EXCEEDING THE LIMITATIONS MARKED ON THE VALVE MAY CAUSE DAMAGE AND LEAD TO UNCONTROLLED PRESSURE RELEASE. DAMAGE OR PERSONAL INJURY MAY RESULT.

CAUTION:
DO NOT DISMANTLE THE VALVE OR REMOVE IT FROM THE PIPELINE WHILE THE VALVE IS PRESSURIZED!
DISMANTLING OR REMOVING A PRESSURIZED VALVE WILL RESULT IN UNCONTROLLED PRESSURE RELEASE. ALWAYS ISOLATE THE RELEVANT PART OF THE PIPELINE, RELEASE THE PRESSURE FROM THE VALVE AND REMOVE THE MEDIUM BEFORE DISMANTLING THE VALVE. BE AWARE OF THE TYPE OF MEDIUM INVOLVED. PROTECT PEOPLE AND THE ENVIRONMENT FROM ANY HARMFUL OR POISONOUS SUBSTANCES. MAKE SURE THAT NO MEDIUM CAN ENTER THE PIPELINE DURING VALVE MAINTENANCE. FAILURE TO DO THIS MAY RESULT IN DAMAGE OR PERSONAL INJURY.

CAUTION:
BEWARE OF THE BALL CUTTING MOVEMENT!
KEEP HANDS, OTHER PARTS OF THE BODY, TOOLS AND OTHER OBJECTS OUT OF THE OPEN FLOW PORT. LEAVE NO FOREIGN OBJECTS INSIDE THE PIPELINE. WHEN THE VALVE IS ACTUATED, THE BALL FUNCTIONS AS A CUTTING DEVICE. CLOSE AND DETACH THE ACTUATOR PRESSURE SUPPLY PIPELINE FOR VALVE MAINTENANCE. FAILURE TO DO THIS MAY RESULT IN DAMAGE OR PERSONAL INJURY.

CAUTION:
BEWARE OF NOISE EMISSION!
THE VALVE MAY PRODUCE NOISE IN THE PIPELINE. THE NOISE LEVEL DEPENDS ON THE APPLICATION. IT CAN BE MEASURED OR CALCULATED USING THE NELES NELPROF COMPUTER PROGRAM. OBSERVE THE RELEVANT WORK ENVIRONMENT REGULATIONS ON NOISE EMISSION.

CAUTION:

BEWARE OF EXTREME TEMPERATURES!

THE VALVE BODY MAY BE VERY HOT OR VERY COLD DURING USE. PROTECT PEOPLE AGAINST COLD INJURIES OR BURNS.

CAUTION:

WHEN HANDLING THE VALVE OR THE VALVE PACKAGE, BEAR IN MIND ITS WEIGHT!

NEVER LIFT THE VALVE OR VALVE PACKAGE BY THE ACTUATOR, POSITIONER, LIMIT SWITCH OR THEIR PIPING.

PLACE THE LIFTING ROPES SECURELY AROUND THE VALVE BODY (SEE FIG. 7).

DAMAGE OR PERSONAL INJURY MAY RESULT FROM FALLING PARTS.

REFERENCE THE APPLICABLE TECHNICAL BULLETIN FOR VALVE WEIGHTS.

CAUTION:

FOLLOW THE PROPER PROCEDURES WHEN HANDLING AND SERVICING OXYGEN VALVES.

2. TRANSPORTATION, RECEPTION AND STORAGE

Check the valve and the accompanying device for any damage that may have occurred during transport.

Store the valve carefully. We recommend storing indoors in a dry place.

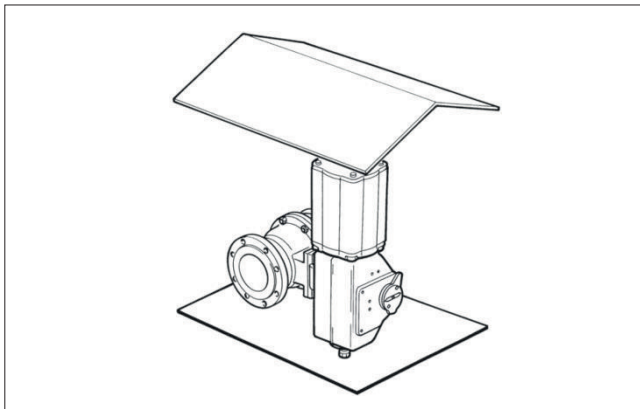


Figure 6. Storing the Valve

Do not remove the flow port protectors until installing the valve. It is recommended to move the valve to its intended location just before installation. Generally, the valve is delivered in the open position.

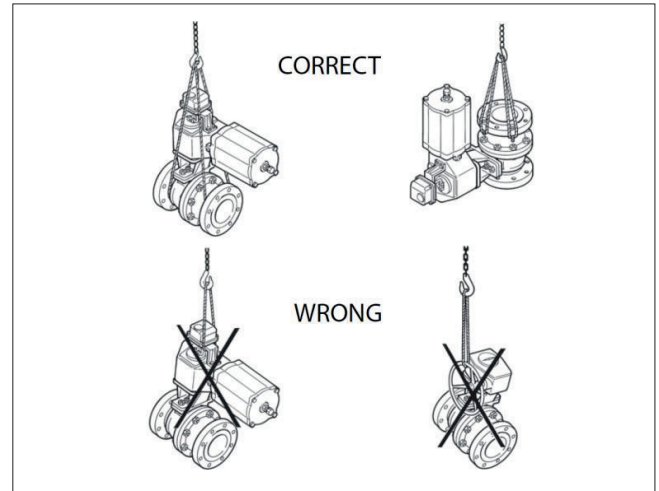


Figure 7. Lifting the Valve

3. INSTALLATION AND USE

3.1 GENERAL

Remove the flow bore protectors and check that the valve is clean inside. Clean the valve if necessary.

3.2 MOUNTING THE VALVE IN THE PIPELINE

CAUTION:

WHEN HANDLING THE VALVE OR THE VALVE PACKAGE AS A WHOLE, BEAR IN MIND THE WEIGHT OF THE VALVE OR THE ENTIRE PACKAGE!

NOTE:

FLUSH THE PIPELINE CAREFULLY BEFORE INSTALLING THE VALVE. MAKE SURE THE VALVE IS ENTIRELY OPEN WHEN FLUSHING. FOREIGN PARTICLES, SUCH AS SAND OR PIECES OF WELDING ELECTRODE, WILL DAMAGE THE BALL AND SEATS.

WARNING:

THE VALVE SHOULD BE TIGHTENED BETWEEN FLANGES USING APPROPRIATE GASKETS AND FASTENERS COMPATIBLE WITH THE APPLICATION, AND IN COMPLIANCE WITH APPLICABLE PIPING CODES AND STANDARDS. CENTER THE FLANGE GASKETS CAREFULLY WHEN FITTING THE VALVE BETWEEN FLANGES. DO NOT ATTEMPT TO CORRECT PIPELINE MISALIGNMENT BY MEANS OF FLANGE BOLTING!

It is not recommended to install the valve with the actuator on the underneath side because dirt in the pipeline may then enter the body cavity and damage the gland packing. The position to be avoided is shown in Fig. 8.

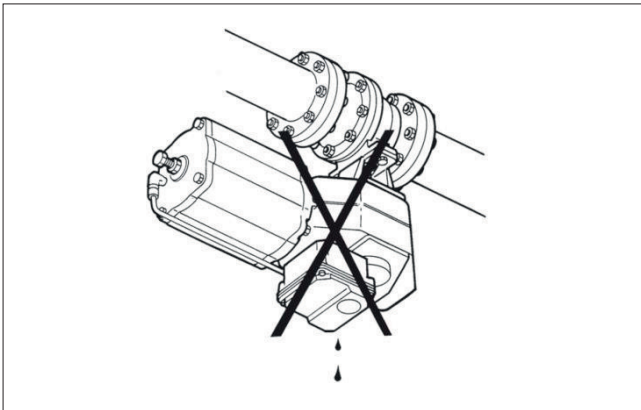


Figure 8. Avoid This Mounting Position

It may be necessary to firmly support the pipeline in order to protect the valve from excess stress. Sufficient support will also reduce pipeline vibration and thus ensures proper functioning of the positioner. To facilitate servicing, it is preferable that the valve be supported by the body, using pipe clamps and supports. Do not fasten supports to the flange bolting or to the actuator, see Fig. 9.

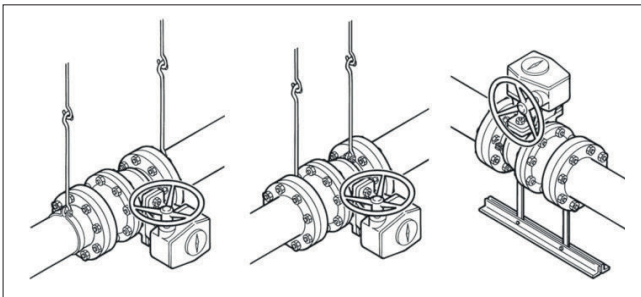


Figure 9. Supporting the Valve

VALVE INSULATION

If necessary, the valve may be insulated. Insulation must not continue above the upper level of the valve body, see Fig. 10.

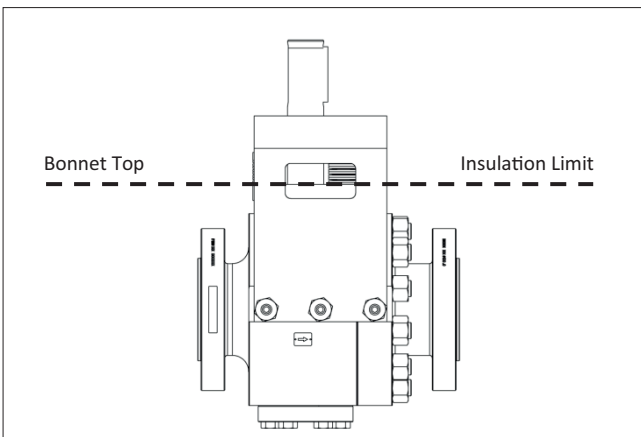


Figure 10. Insulation of the Valve

3.3 ACTUATOR

NOTE:

WHEN INSTALLING THE ACTUATOR ON THE VALVE, MAKE SURE THAT THE VALVE PACKAGE FUNCTIONS PROPERLY. DETAILED INFORMATION ON ACTUATOR INSTALLATION IS GIVEN IN SECTION 6 OR IN THE SEPARATE ACTUATOR INSTRUCTIONS.

The valve open/closed position is indicated as follows:

- by an indicator on the actuator
- or
- by a groove at the end of the ball shaft (parallel to the ball flow opening).

If there is any uncertainty about the indicator, check the ball position by the groove.

The actuator should be installed in a manner that allows plenty of room for its removal.

The upright position is recommended for the actuator cylinder.

The actuator must not touch the pipeline, because pipeline vibration may interfere with its operation.

In certain cases it may be considered advantageous to provide additional support to the actuator. These cases will normally be associated with large actuators, extended shafts, or where severe vibration is present. Please contact Valmet for advice.

3.4 COMMISSIONING

Ensure that there is no dirt or foreign objects left inside the valve or pipeline. Flush the pipeline carefully. Make sure that the valve is entirely open when flushing.

Ensure that all nuts, pipings and cables are properly fastened.

Check that the actuator, positioner and switch are correctly adjusted. Actuator adjustment is explained in Section 6. To adjust the accompanying devices refer to the separate control equipment instruction manuals.

4. MAINTENANCE

CAUTION:

OBSERVE THE SAFETY PRECAUTIONS MENTIONED IN SECTION 1.7 BEFORE MAINTENANCE!

CAUTION:

WHEN HANDLING THE VALVE OR THE VALVE PACKAGE AS A WHOLE, BEAR IN MIND THE WEIGHT OF THE VALVE OR THE ENTIRE PACKAGE!

4.1 MAINTENANCE GENERAL

Although Neles™ valves are designed to work under severe conditions, proper preventative maintenance can significantly help to prevent unplanned downtime and in real terms reduce the total cost of ownership. Valmet recommends inspecting the valves at least every five (5) years. The inspection and maintenance interval depends on the actual application and process condition. The inspection and maintenance intervals can be specified together with your local Valmet experts. During this periodic inspection the parts detailed in the Spare Part Set should be replaced. Time in storage should be included in the inspection interval.

Maintenance can be performed as presented below. For maintenance assistance, please contact your local Valmet office. The part numbers in the text refer to the exploded view and to the parts list in Section 10, unless otherwise stated.

WARNING:

FOR YOUR SAFETY IT IS IMPORTANT THE FOLLOWING PRECAUTIONS BE TAKEN PRIOR TO REMOVAL OF THE VALVE FROM THE PIPELINE OR BEFORE ANY DISASSEMBLY:

1. WEAR ANY PROTECTIVE CLOTHING OR EQUIPMENT NORMALLY REQUIRED WHEN WORKING WITH THE FLUID INVOLVED.
2. DEPRESSURIZE THE PIPELINE AND CYCLE THE VALVE AS FOLLOWS:
 - A. PLACE THE VALVE IN THE OPEN POSITION AND DRAIN THE PIPELINE.
 - B. CYCLE THE VALVE TO RELIEVE RESIDUAL PRESSURE IN THE BODY CAVITY BEFORE REMOVAL FROM THE PIPELINE.
 - C. AFTER REMOVAL AND BEFORE ANY DISASSEMBLY, CYCLE THE VALVE AGAIN SEVERAL TIMES.

NOTE:

IN ORDER TO ENSURE SAFE AND EFFECTIVE OPERATION, ALWAYS USE ORIGINAL SPARE PARTS TO MAKE SURE THAT THE VALVE FUNCTIONS AS INTENDED.

NOTE:

FOR SAFETY REASONS, REPLACE PRESSURE RETAINING BOLTING IF THE THREADS ARE DAMAGED, HAVE BEEN HEATED, STRETCHED OR CORRODED.

4.2 MAINTENANCE OF VALVE PACKING

CAUTION:

DO NOT DISMANTLE THE VALVE OR REMOVE IT FROM THE PIPELINE WHILE THE VALVE IS PRESSURIZED!

The packing around the shaft requires no regular tightening. Packing tightness is provided by the pipeline pressure and ensured by contact between the compression ring (10) and the packing (16) itself.

The packing (16) must be changed if leakage occurs even after the hex nuts (14) have been tightened. The packing must be tightened with care because excess force may damage the rings.

Make sure that the valve is not pressurized.

- Detach the actuator and bracket according to the instructions in Section 4.4.
- Remove the key (30).
- Remove the hexagon nuts (14), disc spring set (25, 26, 27), compression plate (9), and compression ring (10). (Some valves may have pre-assembled spring set (25), see Figure 12).
- Remove the packing rings (16) from around the shaft using a packing removal tool. Make sure that there is no damage to the shaft or the counterbore. Please note that the thrust bearings (11) may come off as you remove the packing. They should be placed back in position before installing the new packing.
- Clean the packing ring counterbore.
- There are two general packing constructions available, identify which is used (A or B, Figure 11).
- Place the new packing rings (16) over the shaft (3). Do not damage packing rings with the shaft keyway. If installing an all woven packing, make sure that the seams are staggered at least 90° apart. This should create two 180° zones between adjacent seals with only one seam each. Figure 11.

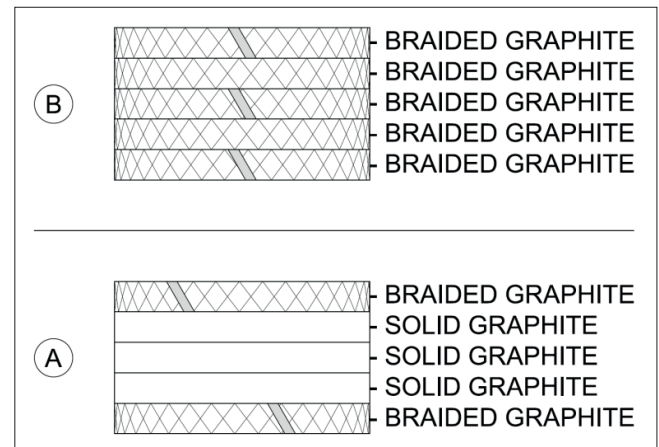


Figure 11. Packing Constructions

- The compression ring (10) and compression plate (9) may now be used for pushing the rings into the counterbore. See Fig. 12.
- Place the disc spring set (25, 26, 27) on the compression studs. Tighten the nuts (14) to the torque described by Equation 1. (Some valves may have pre-assembled spring set (25), see Figure 12).

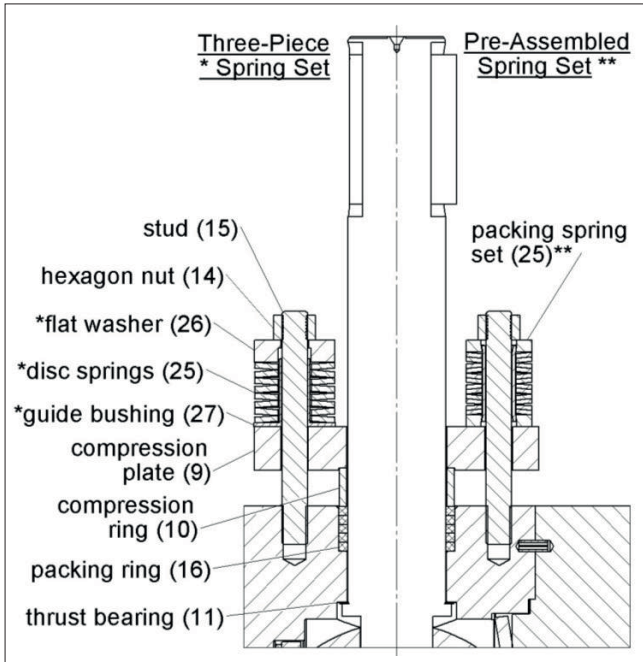


Figure 12. Packing Detail

Equation 1 Packing Nut Torque Calculation

$$T = \frac{(3500) (0.2) (\pi) (D_o^2 - D_i^2) (D_s)}{4N}$$

Where...

T = Torque on nuts (14) [in-lbs per nut]
3500 = Force required to seal graphite [psi]
0.2 = Friction coefficient of lubricated st. st'l
D_o = Outer diameter of packing (16) [inch]
D_i = Inner diameter of packing (16) [inch]
D_s = Nominal diameter of stud (15) [inch]
N = Number of packing nuts (14)

- Spray the stem seal area with leak testing compound. Evaluate seal quality. If bubble tight seal is present, continue to the next step. If the seal is compromised, increase the nut torque by 10% of the value calculated in the previous step, and then repeat this step.
- Lock the nuts (14) with locking compound e.g. Loctite 221. See Fig. 13.

4.3 REPAIR OF A JAMMED OR STUCK VALVE WHILE IT IS IN THE PIPELINE

Jamming may be due to the ball (4) and seats (5) becoming clogged with flow medium. They may be cleaned by turning the ball to the partly open position and flushing the pipeline. If this does not help, follow the instructions in the following sections.

4.4 DETACHING THE ACTUATOR

CAUTION:

WHEN HANDLING THE VALVE OR THE VALVE PACKAGE AS A WHOLE, BEAR IN MIND THE WEIGHT OF THE VALVE OR THE ENTIRE PACKAGE!

WARNING:

ALWAYS DISCONNECT THE ACTUATOR FROM ITS POWER SOURCE, PNEUMATIC, HYDRAULIC OR ELECTRICAL. BEFORE ATTEMPTING TO REMOVE IT FROM THE VALVE!

WARNING:

DO NOT REMOVE A SPRING-RETURN ACTUATOR UNLESS A STOP-SCREW IS CARRYING THE SPRING FORCE!

NOTE:

BEFORE DISMANTLING, CAREFULLY OBSERVE THE POSITION OF THE VALVE WITH RESPECT TO THE ACTUATOR AND POSITIONER/LIMIT SWITCH SO AS TO MAKE SURE THAT THE PACKAGE CAN BE PROPERLY RE-ASSEMBLED.

It is generally most convenient to detach the actuator before removing the valve from the pipeline. If the valve is small or if it is difficult to access, it may be more practical to remove the entire package at the same time.

Note that the seats can be replaced without detaching the actuator.

- Close and detach the actuator pressure supply pipeline and remove control cables.
- Unscrew the bracket screws.
- Detach the actuator. The actuator can be removed by hand or with a special tool made for this purpose. The tool can be ordered from the manufacturer (see Section "Tools").
- Remove the bracket and coupling.

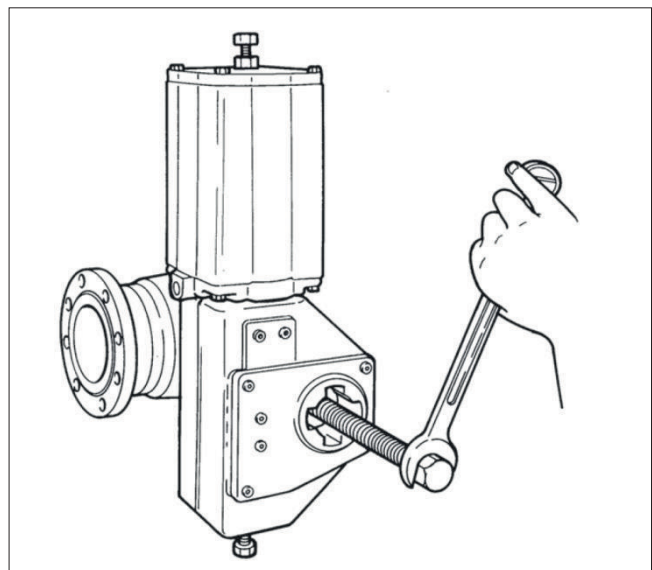


Figure 13. Removing the Actuator with an Extractor

4.5 REMOVING THE VALVE FROM THE PIPELINE

CAUTION:

DO NOT DISMANTLE THE VALVE OR REMOVE IT FROM THE PIPELINE WHILE THE VALVE IS PRESSURIZED!

- Make sure that the valve is not pressurized and that the pipeline is empty. Make sure that the medium cannot flow into the section where servicing is to take place.
- Support the valve carefully with a hoist. Place ropes carefully and unscrew the pipe flange bolts. See that the ropes are positioned correctly, see Fig. 7.

4.6 DISMANTLING THE VALVE

- Place the valve in a standing position on the pipe flange end. Use a level surface that will not scratch the flanges.
- See that the body stud nuts (12) are facing upward.
- Mark the body halves for correct orientation during re-assembly.
- Turn the ball to the closed position.
- Remove the key (30).
- Remove the bottom plug (24) by removing the screws (23).
- Remove the nuts (12) that fasten the body cap (2) to the body (1).
- Remove the body cap (2). If the seat, disc spring, seals, and spring pins are not lying on the body (1), prevent them from falling from the body cap and detach them later. Don't leave your fingers between the body cap and the surface! Stand the removed body cap on its pipe flange. (Disc springs and seals not required for all seat constructions). See Fig. 14.
- Remove the seat, disc spring, seals, and spring pins from body or cap. (Disc springs and seals not required for all seat constructions)
- Lift the ball (4) from the body (1) by gripping by the flow bore (small sizes) or by passing a rope through the flow bore and turning it at the same time around the flow bore axis. Handle the ball carefully and place it on a soft surface. (Fig. 15).
- Remove the hexagon nuts (14), disc spring set (25, 26, 27), compression plate (9), and compression ring (10). (Some valves may have pre-assembled spring set (25), see Figure 12).
- Remove the shaft (3) and thrust bearings (11) by sliding the shaft down through the stuffing box and out of the body through the bottom plug hole.
- Carefully remove the packing rings (16) from the counterbore using a packing removal tool.
- Remove the remaining seat, disc spring, and seals from the body. (Disc springs and seals not required for all seat constructions)

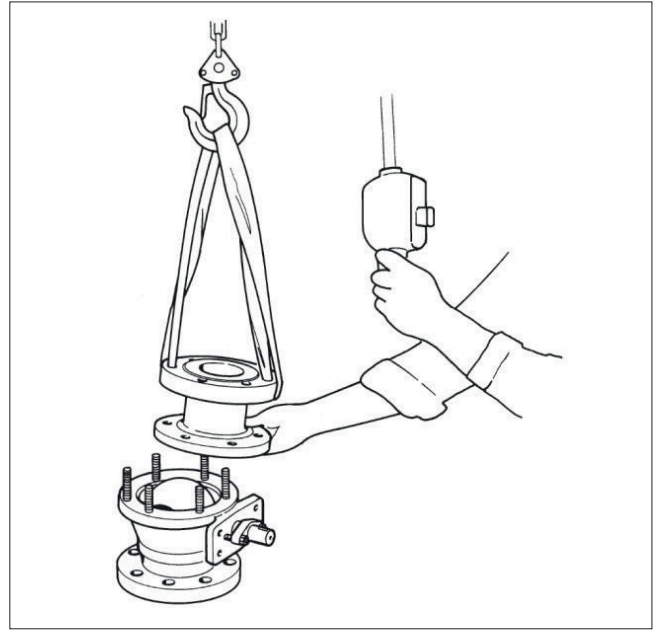


Figure 14. Lifting the Body Cap

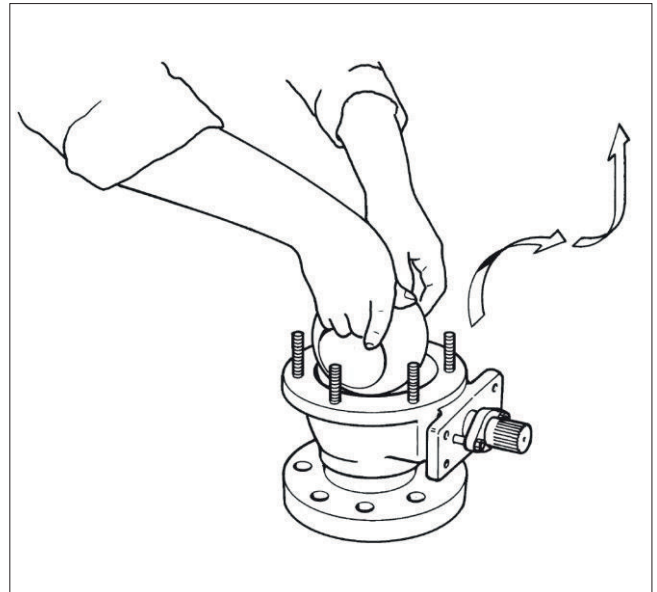


Figure 15. Removing the Ball

4.7 INSPECTION AND MAINTENANCE OF REMOVED PARTS

- Clean all parts carefully using a suitable solvent as necessary.
- Inspect the ball, seat sealing surfaces, and shaft packing area for damage. Look for minor scratches on the sealing surfaces. If any of the parts require polishing they can be smoothed with a fine emery paper (600 grit). Do not create flat spots on the ball! Do not polish the shaft by rubbing lengthwise!
- For soft material parts, see Section "Replacing Parts".
- After cleaning and inspection, keep all parts well protected until re-assembling. If damage to the valve components too severe for manual repair the valve should be re-assembled, packed to prevent further damage, and sent to a Valmet authorized service center for repair.

4.8 REPLACING PARTS

We recommend that soft material parts be replaced whenever the valve is dismantled for servicing. Other parts may be replaced if necessary. Always use genuine spare parts to ensure proper functioning of the valve (see Section "Ordering Spare Parts").

4.9 ASSEMBLY

- Place the valve body (1) in a standing position on its pipe flange. Use a level surface that does not scratch the flanges.
- If removed prior, coat body studs with anti-galling compound and screw them into the body until they bottom out in the holes.

Unidirectional Seats:

- Place the disc spring (8) all the way into the body counter bore, minding its orientation and slide the seat (5) down over it. See Figure 16.

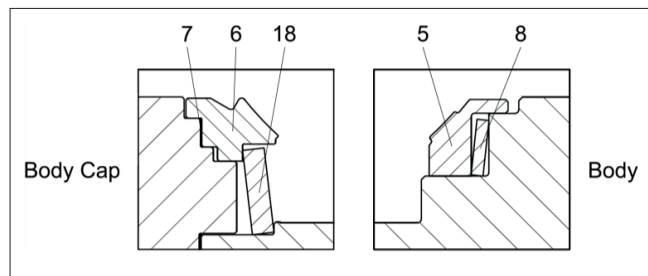


Figure 16. Unidirectional Seat Assembly

Bidirectional Seats:

- Place the back seal (19) and supporting ring (20) all the way into the body counter bore. Slide the disc spring (8) down over this, minding its orientation. If your valve comes with a square braided dust seal (21) assemble it into the seat (5) now. Slide the seat into the bore and over the other seating components. See Figure 17.

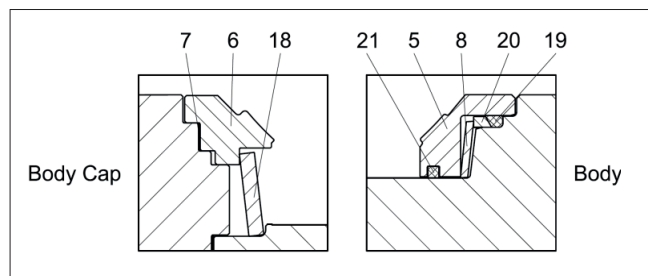


Figure 17. Bidirectional Seat Assembly

Table 1 Proper Torque for Body Fastening Nuts [Ft-Lb (Nm)]

Fastener Size	A193 B7	A193 B8	Fastener Material K Monel	A193 B7M	A193 B8M
1/4"	7-13 (9-18)	6-12 (8-16)	7-13 (9-18)	5-11 (7-15)	5-11 (7-15)
5/16"	17-23 (23-31)	14-20 (19-27)	17-23 (23-31)	13-19 (18-26)	12-18 (16-24)
3/8"	30-40 (41-54)	24-34 (32-46)	30-40 (41-54)	22-32 (30-43)	21-30 (28-41)
1/2"	75-85 (102-115)	70-85 (95-115)	65-75 (88-102)	5-65 (75-88)	60-75 (81-102)
9/16"	110-115 (149-160)	95-110 (129-149)	85-100 (115-136)	75-90 (102-122)	85-100 (115-136)
5/8"	160-190 (217-258)	155-180 (210-244)	140-160 (190-217)	125-145 (169-197)	135-160 (183-217)
3/4"	250-290 (339-393)	235-275 (319-373)	210-245 (285-332)	190-220 (258-298)	205-240 (278-325)
7/8"	380-445 (515-603)	290-340 (393-461)	325-380 (441-515)	290-340 (393-461)	250-295 (339-400)
1	575-630 (780-854)	435-510 (590-692)	495-540 (671-732)	435-510 (590-692)	375-445 (508-603)
1-1/8"	850-1000 (1153-1356)	526-615 (713-834)	690-805 (936-1092)	650-760 (881-1031)	475-555 (644-753)
1-1/4"	1160-1360 (1573-1844)	715-840 (970-1139)	940-1100 (1275-1492)	885-1030 (1200-1397)	645-755 (875-1024)
1-3/8"	1625-1900 (2203-2576)	770-900 (1044-1220)	1310-1540 (1776-2088)	1240-1450 (1681-1966)	695-810 (942-1098)
1-1/2"	2000-2360 (2712-3200)	1030-1120 (1397-1519)	1630-1910 (2210-2590)	1530-1800 (2075-2441)	930-1000 (1261-1356)
1-5/8"	2600-2900 (3526-3932)	1200-1400 (1627-1898)	2200-2400 (2983-3254)	2100-2300 (2848-3119)	—
1-3/4"	3170-3450 (4298-4678)	1510-1770 (2048-2400)	2570-3000 (3485-4068)	2420-2825 (3282-3831)	—
2	4700-5530 (6373-7498)	2245-2635 (3044-3573)	3820-4480 (5180-6075)	3590-4200 (4868-5695)	—

All Versions:

- Assemble the shaft (3) and thrust bearings (11) and insert the assembly through the bottom of the body and all the way into the shaft bore.
- Assemble the bottom plug (24) and plug gasket (23). Place the plug into position then fasten it to the body (1) by tightening the hex head screws (22) in a crisscross fashion, around the plug.
- Place the ball (4) into the body and onto the installed seat so that the slot faces the shaft entrance opening. Push the shaft (3) into the valve from outside. Make sure that the end of the shaft fits into the ball slot.

Uni/Bidirectional Seats:

- Place the disc spring (18) into its bore so that it is tapered towards you with its larger diameter sitting towards or on the ball. (Figures 17, 18).
- Set the seat (6) into the spring (18) resting it on the ball (4).

All Versions:

- Verify that the body seal groove is free of contaminate, then place a new body seal (17) into the groove.
- Press the two body spring pins (28) into their respective slots at the top and bottom of the body (1) using a mallet as necessary to drive the pins fully into the blind holes. Use anti-galling compound as needed.
- Place the end cap over the body studs and pins being careful not to damage the seat or pinch the body gasket. Make sure that the seat and spring stay centered atop the ball. Don't leave your fingers between the body cap and the surface!
- Coat the bearing surfaces of the body stud nuts with anti-galling compound and screw them on the body studs using a criss-cross tightening sequence. Torque the nuts to the value shown in Table 1.
- Replace the packing and live loading by referencing the details in Section 4.2 (beginning with the 5th bullet point).
- Mount the key (30) by pressing it into its grove on the shaft (3).
- Recheck the valve packing for leaks with the valve pressurized to assure that it will function as expected in the pipeline.
- Install the valve in the pipeline as carefully and accurately as when you removed it. Note the instructions in Section 3.

5. TESTING THE VALVE

WARNING:

WHEN PRESSURE TESTING, EXERCISE CAUTION AND MAKE SURE ALL EQUIPMENT USED IS IN GOOD WORKING CONDITION AND IS APPROPRIATE FOR THE INTENDED PRESSURE.

WARNING:

WHEN PERFORMING ANY TESTS, NEVER EXCEED THE MAXIMUM OPERATING PRESSURE OR MAXIMUM SHUT-OFF PRESSURE LISTED ON THE IDENTIFICATION PLATE!

We recommend that the valve body be pressure tested after the valve has been assembled.

The test should be carried out in accordance with an applicable standard using the pressure rating required by the pressure class or flange drilling of the valve. The valve must be in a half-open position during test.

If you also want to test the tightness of the closure member, contact the manufacturer.

6. INSTALLING THE ACTUATOR

6.1 GENERAL

Different Valmet actuators can be mounted using suitable brackets and couplings. The valve can be actuated by an M-series handwheel operator or B1-series actuators.

WARNING:

FOR YOUR SAFETY IT IS IMPORTANT THAT THE FOLLOWING PRECAUTIONS BE TAKEN!
BEFORE INSTALLING THE VALVE AND ACTUATOR. BE SURE THE INDICATOR POINTER ON TOP OF THE ACTUATOR IS CORRECTLY INDICATING THE VALVE'S POSITION. FAILURE TO ASSEMBLE THESE TO INDICATE THE CORRECT VALVE POSITION COULD RESULT IN DAMAGE OR PERSONAL INJURY!

WHEN INSTALLING A LINKAGE KIT OR SERVICING THE VALVE/ACTUATOR ASSEMBLY, THE BEST PRACTICE IS TO REMOVE THE ENTIRE ASSEMBLY FROM SERVICE! AN ACTUATOR SHOULD BE REMOUNTED ON THE SAME VALVE FROM WHICH IT WAS REMOVED. THE ACTUATOR MUST BE ADJUSTED FOR THE PROPER "OPEN" AND "CLOSE" POSITIONS EACH TIME IT IS REMOVED!

THE LINKAGE KITS HAVE BEEN DESIGNED TO SUPPORT THE WEIGHT OF THE VALMET ACTUATOR AND RECOMMENDED ACCESSORIES. USE OF THE LINKAGE TO SUPPORT ADDITIONAL EQUIPMENT OR ADDITIONAL WEIGHT SUCH AS PEOPLE, LADDERS, ETC., MAY RESULT IN THE FAILURE OF THE LINKAGE, VALVE, OR ACTUATOR; AND MAY CAUSE DAMAGE OR PERSONAL INJURY!

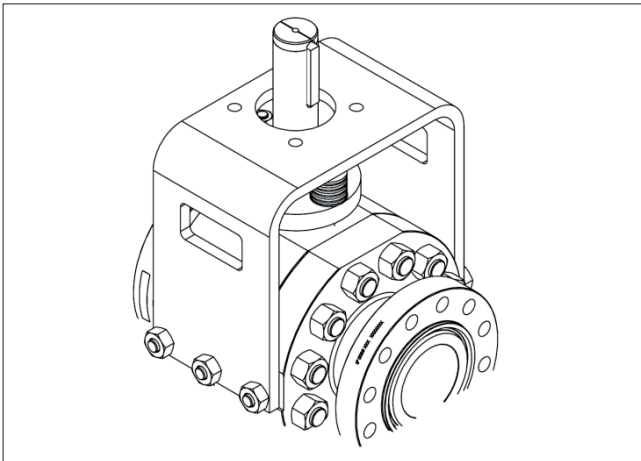


Figure 18. Bracket Mounted on Valve

6.2 INSTALLING THE M-SERIES HANDWHEEL

- The mark at the end of the shaft indicates the direction of the ball flow bore. Turn the valve to the closed position.
- Lubricate the operator shaft bore and the shaft. Place the bracket on the valve and turn the lubricated screws a few times.
- Turn the actuator to the closed position and push it carefully onto the valve shaft. Please note the marks on the handwheel and the shaft.
- Lubricate the operator screws. Tighten all screws.

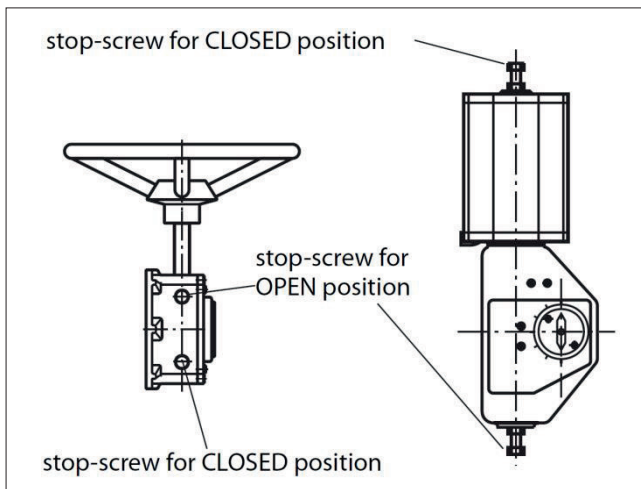


Figure 19. Open and Closed Positions of the Actuator

- Adjust the circular movement of the ball with the hexagon screws located at the side of the housing (see Figure 22). The stop-screw for the open position is nearest to the handwheel on the side of the housing and the screw for the closed position is at the opposite end. The turning directions for the handwheel are marked on the wheel.
- Check the handwheel by turning the valve to the extreme positions. The yellow arrow should indicate the direction of the ball flow bore.

6.3 INSTALLING THE B1C-SERIES ACTUATOR

CAUTION:
BEWARE OF BALL CUTTING MOVEMENT!

- Turn the valve to the closed position and drive actuator piston to the extreme outward position.
- File off any burrs and clean the shaft bore.
- Note the correct position. The line at the end of the shaft indicates the direction of the ball flow bore.
- Lubricate the valve shaft and shaft bore. Fasten the bracket loosely to the valve.
- Slip the actuator carefully onto the shaft. Avoid forcing it since this may damage the ball and seats. We recommend mounting the actuator so that the cylinder is pointing upwards.
- Position the actuator parallel or vertical to the pipeline as accurately as possible. Lubricate the actuator mounting screws and then fasten all screws.
- If re-installing an actuator on the same valve, stop screw adjustment should not be necessary. If installing on a new valve or the alignment is off, adjust the ball open and closed positions by means of the actuator stop screws located at both ends (see Fig. 22).
An accurate open position can be seen in the body flow bore. Check that the yellow arrow on the actuator indicates the ball flow opening position. Keep fingers out of the flow bore!
- Check the stop screw thread tightness. An O-ring is used for sealing.
- Check that the actuator is functioning correctly. Drive the actuator piston to both cylinder ends and check the ball position and its movement with respect to the actuator (close: clockwise; open: counterclockwise). The valve should be closed when the piston is in the extreme outward position.
- If necessary, change the position of the actuator pointing cover to correctly indicate the valve open/closed position.

6.4 INSTALLING THE B1J-SERIES ACTUATOR

Spring-return actuators are used in applications where valve opening or closing movement is needed in case the air supply is interrupted.

The B1J type is used for spring-to-close operation; the spring pushes the piston towards the cylinder end, the extreme outward position. In turn, the B1JA type is used for spring-to-open operation; the spring pushes the piston towards the housing.

Spring-return actuators are installed in a manner similar to B1C-series actuators, taking into account the following.

B1J-TYPE

- Install the actuator so that the piston is in the extreme outward position. The cylinder must not be pressurized and air supply connections must be open. The valve must be in the closed position.

B1JA-TYPE

- Install the actuator so that the piston is in the cylinder end position at housing side. The cylinder must not be pressurized and air supply connections must be open. The valve must be in the open position.

The rest of the installation procedure is the same as in Section 6.3.

6.5 INSTALLING OTHER MAKES OF ACTUATORS

NOTE:

VALMET ACCEPTS NO RESPONSIBILITY FOR COMPATIBILITY OF ACTUATORS NOT INSTALLED BY VALMET.

Other actuators can be installed only if they have an ISO 5211 actuator connection.

7. MALFUNCTIONS

The following Table 2 lists malfunctions that might occur after prolonged use.

Table 2 Possible Malfunctions

Symptom	Possible Fault	Actions
Leakage through a closed valve	Wrong stop screw adjustment of the actuator	Adjust the stop screw for closed position
	Damaged ball surface	Turn the ball by 180°
	Damaged seat(s)	Replace seat(s)
	Ball cannot move freely	Clean the inside of the valve
Irregular valve movement	Impurities between the ball and seats	Flush the valve from the inside
		Clean the sealing surfaces and seats mechanically
Leakage through gland packing	Loose packing	Tighten the nuts
	Worn-out or damaged packing	Replace the gland packing

8. TOOLS

In addition to standard tools, the following special tools might be needed for removal of the actuator:

Extractor Tools (Actuator Series B1C/B1J)	
Product:	ID:
B1C/B1J 6	303821
B1C 8-11 / B1J 8-10	8546-1
B1C 12-17 / B1J 12-16	8546-2
B1C/B1J 20	8546-3
B1C/B1J 25	8546-4

9. SERVICE / SPARE PARTS

We recommend that valves be directed to our service centers for maintenance. The service centers are equipped to provide rapid turn-around at a reasonable cost and offer new valve warranty with all reconditioned valves.

NOTE: When sending goods to the service center for repair, do not disassemble them. Clean the valve carefully and flush the valve internals. Include the material safety datasheet(s) (MSDS) for all media flowing through the valve. Valves sent to the service center without MSDS datasheet(s) will not be accepted. Send valves to the service center in the half open position.

For further information on spare parts and service or assistance visit our website at www.valmet.com/flowcontrol/valves.

When ordering spare parts, always include the following information:

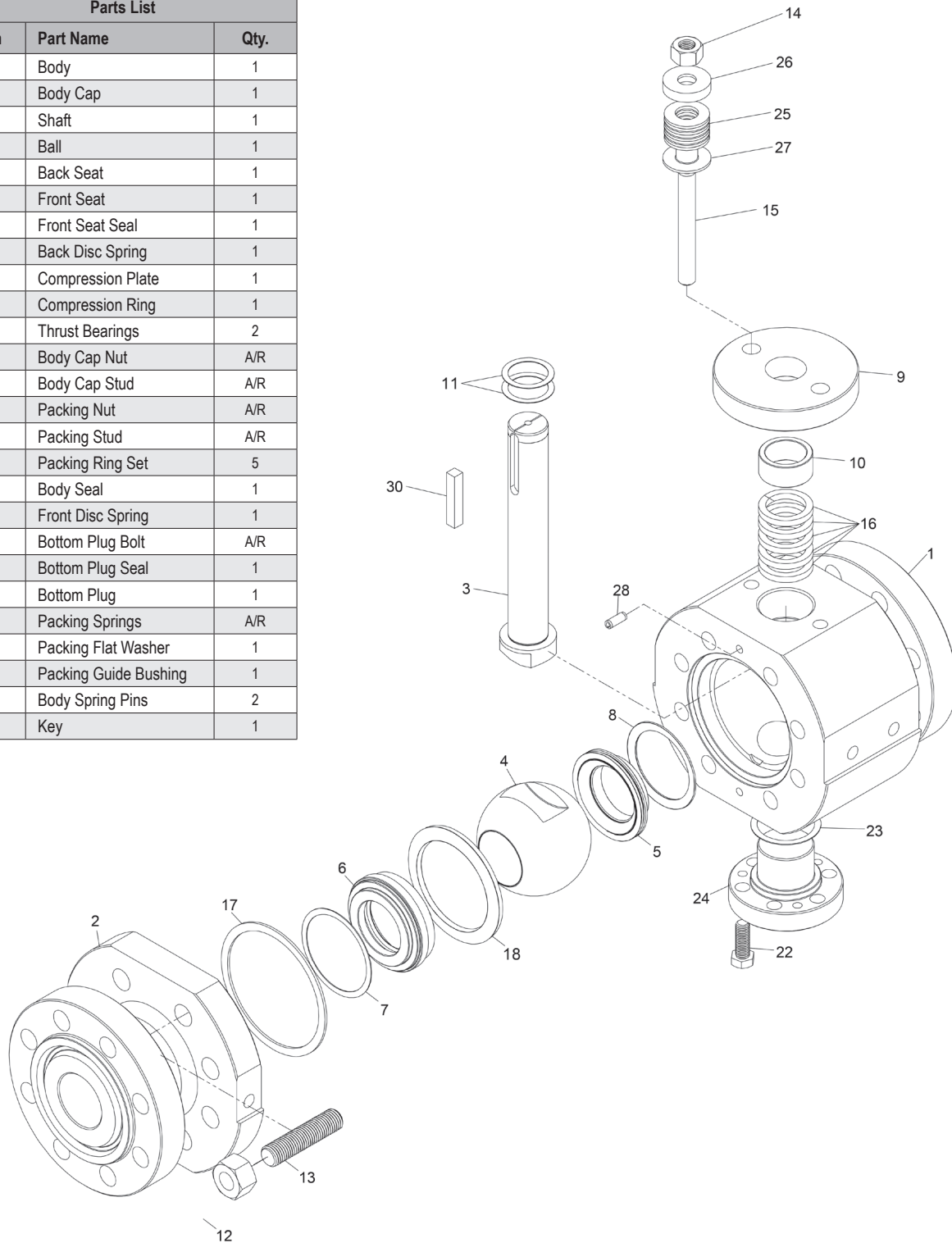
This information can be found from the identification plate or documents.

- Name of the Part
- Quantity Required
- Part Number
- Parts List Number
- Valve Type Code
- Serial Number (stamped on valve)
- Sales Order Number

10. EXPLODED VIEWS AND PARTS LISTS

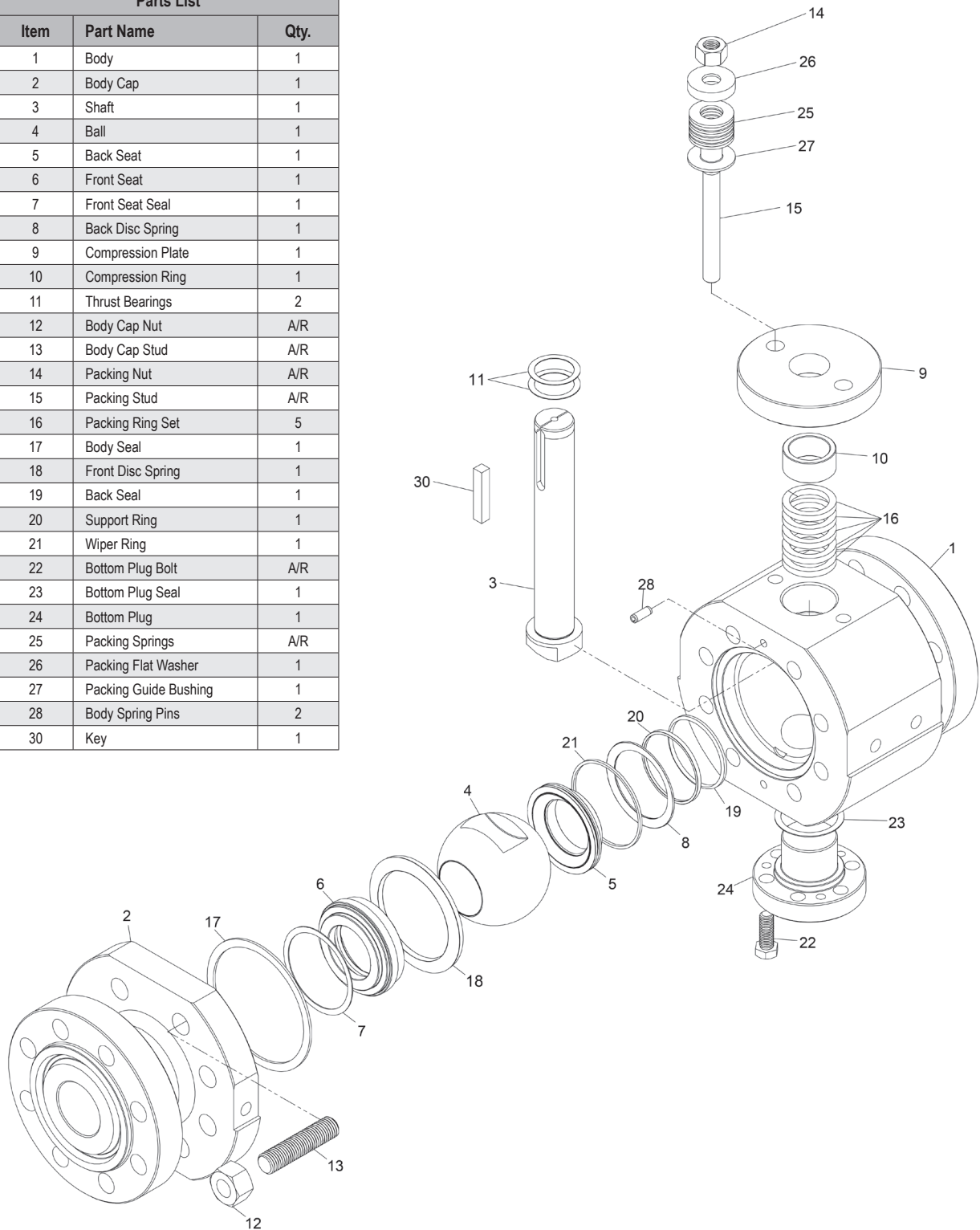
10.1 UNIDIRECTIONAL CONSTRUCTION

Parts List		
Item	Part Name	Qty.
1	Body	1
2	Body Cap	1
3	Shaft	1
4	Ball	1
5	Back Seat	1
6	Front Seat	1
7	Front Seat Seal	1
8	Back Disc Spring	1
9	Compression Plate	1
10	Compression Ring	1
11	Thrust Bearings	2
12	Body Cap Nut	A/R
13	Body Cap Stud	A/R
14	Packing Nut	A/R
15	Packing Stud	A/R
16	Packing Ring Set	5
17	Body Seal	1
18	Front Disc Spring	1
22	Bottom Plug Bolt	A/R
23	Bottom Plug Seal	1
24	Bottom Plug	1
25	Packing Springs	A/R
26	Packing Flat Washer	1
27	Packing Guide Bushing	1
28	Body Spring Pins	2
30	Key	1



10.2 BIDIRECTIONAL SOLIDS PROOF CONSTRUCTION

Parts List		
Item	Part Name	Qty.
1	Body	1
2	Body Cap	1
3	Shaft	1
4	Ball	1
5	Back Seat	1
6	Front Seat	1
7	Front Seat Seal	1
8	Back Disc Spring	1
9	Compression Plate	1
10	Compression Ring	1
11	Thrust Bearings	2
12	Body Cap Nut	A/R
13	Body Cap Stud	A/R
14	Packing Nut	A/R
15	Packing Stud	A/R
16	Packing Ring Set	5
17	Body Seal	1
18	Front Disc Spring	1
19	Back Seal	1
20	Support Ring	1
21	Wiper Ring	1
22	Bottom Plug Bolt	A/R
23	Bottom Plug Seal	1
24	Bottom Plug	1
25	Packing Springs	A/R
26	Packing Flat Washer	1
27	Packing Guide Bushing	1
28	Body Spring Pins	2
30	Key	1



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