

Flanged full bore Neles™ ball valve Series XU ASME Class 600 version

Installation, maintenance and
operating instructions

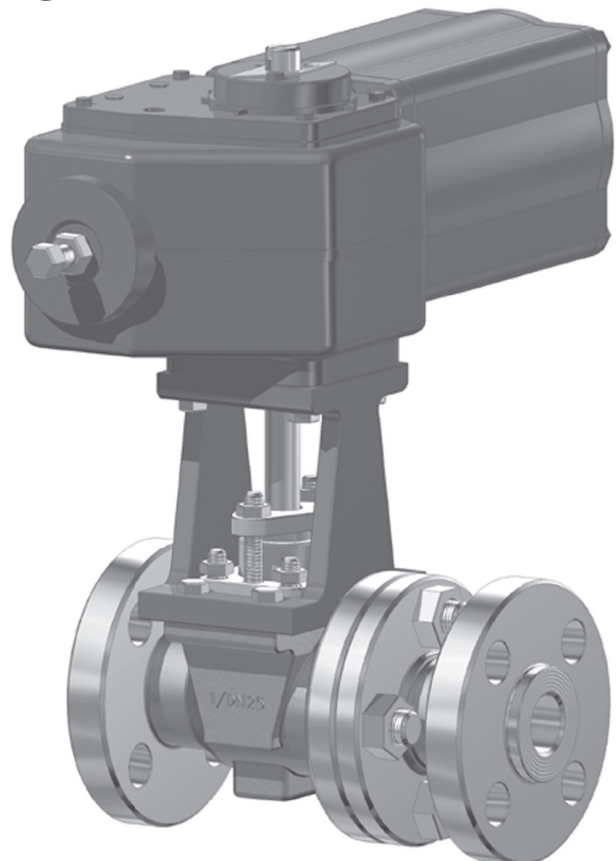


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Subject to change without notice.

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This product meets the requirements set by the Customs Union of the Republic of Belarus, the Republic of Kazakhstan and the Russian Federation.

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 XU series ball valves. The actuators and instrumentation to be used with XU 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 Neles document id:10O270EN.pdf)

1.2 Valve description

Neles™ XU series valves are flanged full bore ball valves. The valve body is in two parts, fastened together by body-joint bolting. The ball and shaft are separate. Shaft blow-out is prevented by a shoulder machined on the shaft.

The valve is either soft or metal seated. In size 2" shaft torque is transmitted to the ball through a spline driver installed in a groove on the ball surface. In other sizes the shaft is installed straight into a groove on the ball surface.

The valve is tight in both flow directions. Tightness is provided by a pressure differential which forces the ball up against the downstream seat.

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 in this manual.

XU-series valves are specially designed for demanding shut-off applications involving high operation cycles. They can also be used in flow control applications.

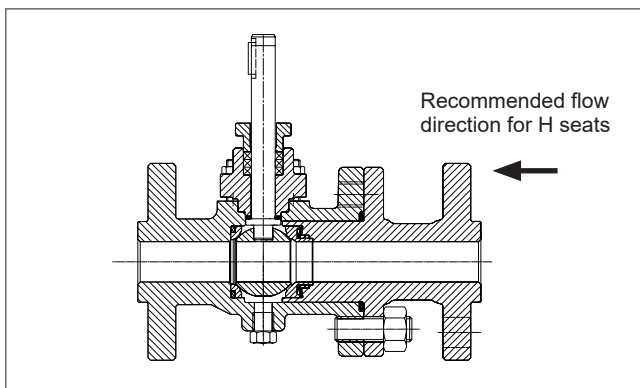


Fig. 1 Construction of XU series valve, sizes 1" and 1 1/2"

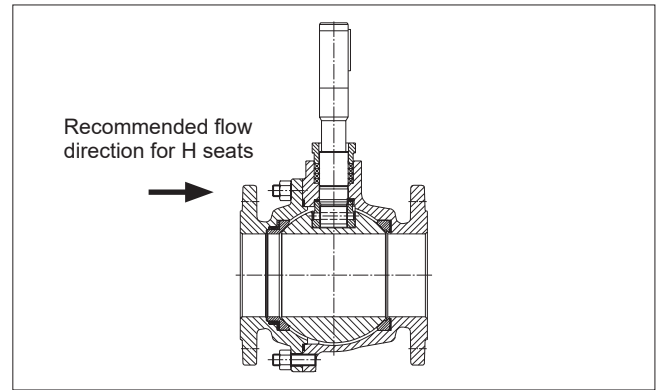


Fig. 2 Construction of XU series, size 2"

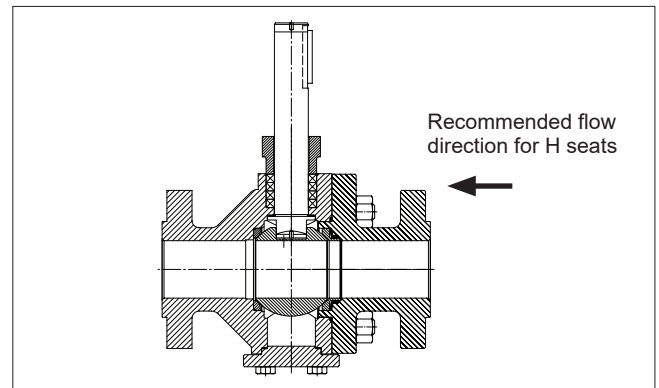


Fig. 3 Construction of XU series, sizes 3" and 4"

1.3 Markings

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

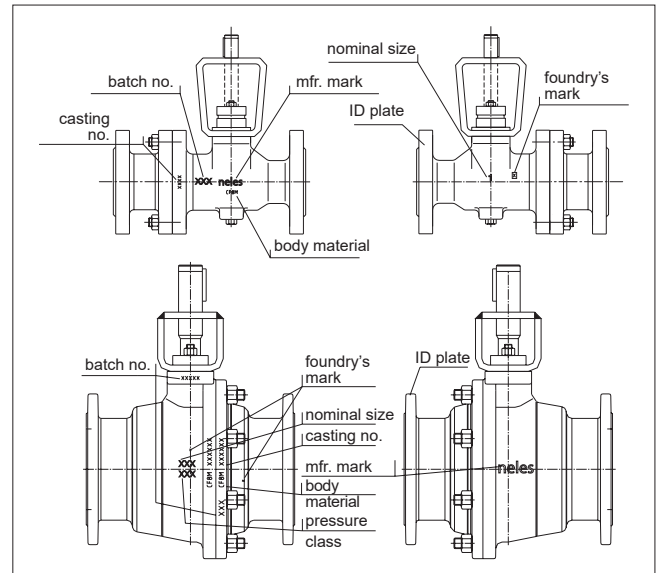


Fig. 4 Valve markings

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 pressure differential / temperature
7. Pressure class
8. Type designation
9. Valve manufacturing parts list no.
10. Model
11. Certification and approvals, eg. CE, ATEX etc.

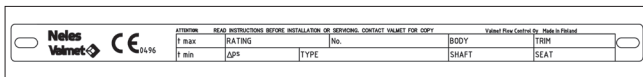


Fig. 5 Identification plate

1.4 Technical specification

Product type

Full bore, seat supported ball valve.
Separate ball and shaft.
Split body design.
Flanged.

Pressure ratings

ASME Class 600.
PN63, 100.

Size range

DN 25, 40, 50, 80, 100 / 1", 1 1/2", 2", 3", 4".

Standard temperature range

-50 °C ... +450 °C (+600 °C) / -58 °F ... +840 °F (+1140 °F).

Design standard

Valve body	ASME B16.34.
Valve flanges	ASME B16.5.
Face-to-face	ASME B16.10 long pattern.
Actuator mounting	ISO 5211.

Standard materials

Body halves:	ASTM A216 gr. WCB, ASTM A351 gr. CF8M 1.4408/1.0619
Ball:	ASTM A351 gr. CF8M/AISI 316 (1.4408) + Hard chrome or other special coating with metal seats.
Bearings:	PTFE or cobalt based alloy.
Seats:	stainless steel + cobalt based alloy
Seals/gaskets:	PTFE or Graphite.
Body gaskets:	Spiral wound with PTFE or graphite filler.
Gland packing:	PTFE (V-rings), graphite

Bolting

B8/8 (A2-70) with stainless steel body.
L7M/2HM (21 CrMoV 57 / 24 CrMo 5) with carbon steel body.

Certification

EN10204-3.1 material certificates for body and bonnet.
Tightness test certificate.

Standard options

Oxygen construction for gaseous oxygen service.
Cobalt based alloy or NiBo ball coating.
Shaft extension.
Fire tested acc. to API 607.
NACE MR 0103 and MR 0175 available on request.
Anti-static.
Cryogenic version (temperatures below -50 °C / -60 °F)

Valve testing

Each valve is tested for body integrity and seat tightness.

The body test pressure is 1,5 x pressure class. The seat test pressure for metal seated valves is 1.1 x PN. The test medium is inhibited water. Air test upon request.

Valve tightness

Metal seats:
ISO 5208 Rate C, standard.
ANSI FCI Class V.
Other tightness rates upon request.

1.5 CE and Atex marking

The valve meets the requirements of the European Directive 2014/68/EU relating to pressure equipment, and has been marked according to the Directive.

When applicable, the valve meets the requirements of the European Directive 2014/34/EU relating to equipment and protective systems intended for use in potentially explosive atmospheres, and has been marked according to the Directive.

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 recycling 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. Damage or personal injury may result from falling parts. The weights are shown on pages 19–22.

CAUTION:

Follow the proper procedures when handling and servicing oxygen valves.

ATEX/Ex Safety

CAUTION!

Potential electrostatic hazard, ensure the protection (grounding, etc.) in the process.

CAUTION!

The actual surface temperature of valve is depended on the process temperature. The protection from high or low temperature must be considered by the end user before valve is put into service.

CAUTION!

Ensure the general process and worker protection from static electricity in the facilities.

Note! Within series there is possibility to Category 2, Category 3 and non-ATEX valve.

1.8 Welding notes

WARNING:

Welding and/or grinding stainless steel and other alloys containing chromium metal may cause the release of hexavalent chromium. Hexavalent chromium(VI) or Cr(VI), is known to cause cancer. Be sure to use all appropriate personal protective equipment (PPE) when welding metals containing chromium.

NOTE:

A qualified welder must do the installation welding. The welder and welding procedure should be qualified in accordance with the ASME Boiler and Pressure Vessel Code Section IX or other applicable regulation.

CAUTION:

To prevent damage to the seat and seals, do not allow the temperature of the seat and body seal area to exceed 94 °C (200 °F).

It is recommended that thermal chinks be used to check the temperature in these areas during welding.

CAUTION:

Ensure that any weld splatter does not fall onto the valve closing members eg. ball or seats. This may damage critical seating surfaces and cause leaks.

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.

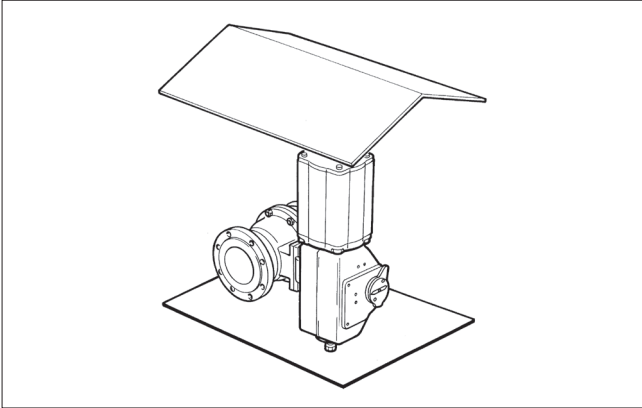


Fig. 6 Storing the valve

Do not remove the flow port protectors until installing the valve.

Move the valve to its intended location just before installation.

The valve is usually delivered in the open position.

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. Please consult separate document: Instructions for lifting Neles products. (See Neles document id: 10LIFT70en.pdf)

3.2 Installing in the pipeline

CAUTION:

When handling the valve or the valve/actuator assembly, bear in mind the weight of the valve or valve/actuator assembly.

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.

NOTE:

Use screws, nuts, bolts and gaskets equivalent to the fastenings used elsewhere in the pipeline. Center the flange gaskets carefully when fitting the valve between flanges.

NOTE:

Do not attempt to correct pipeline misalignment by means of flange bolting.

The valve may be installed in any position and offers tightness in both directions. However we do not recommend installing 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. 7.

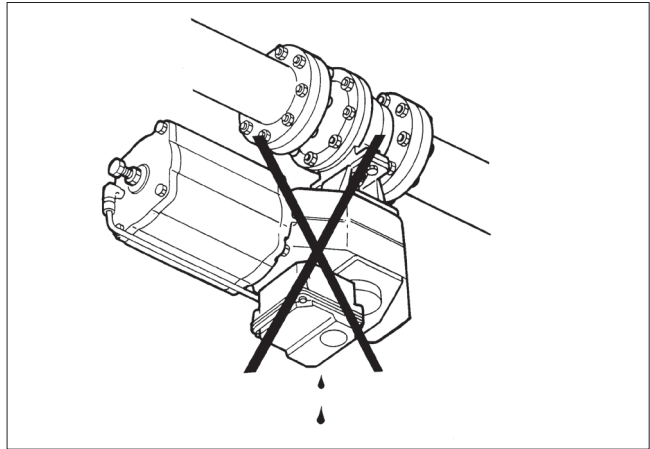


Fig. 7 Avoid this mounting position

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. 8.

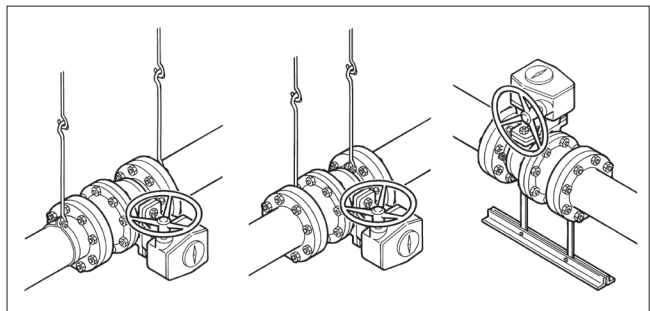


Fig. 8 Supporting the valve

Valve insulation

If necessary, the valve may be insulated. Insulation must not continue above the upper level of the valve body, see Figure 9.

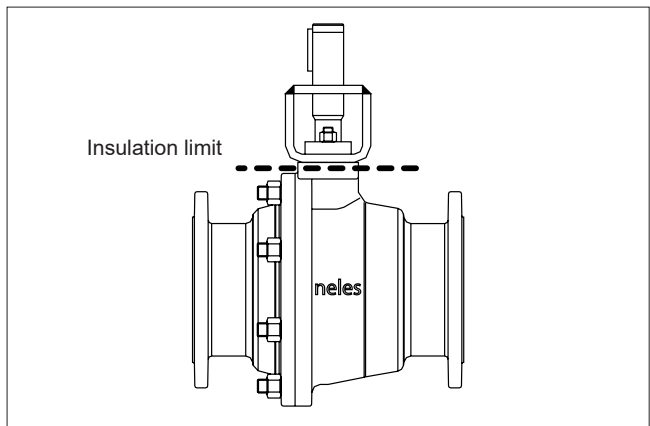


Fig. 9 Insulation of the valve

3.3 Actuator

NOTE:

When installing the actuator on the valve, make sure that the valve/actuator assembly functions properly. Detailed information on actuator installation is given in Section 5 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 5. To adjust the accompanying device 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 9, unless otherwise stated.

NOTE:

When sending goods to the manufacturer for repair, do not disassemble them. Clean the valve carefully and flush the valve internals. For safety reasons, inform the manufacturer of the type of medium used in the valve (include material safety datasheets (MSDS)).

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 Replacing the gland packing while the valve is in the pipeline

CAUTION:

Do not dismantle the valve or remove it from the pipeline while the valve is pressurized!

CAUTION:

For safety reasons the retainer plates (42) MUST always be installed (size 2") as shown in 9.2



The V-ring gland packing requires no regular tightening. The gland packing tightness is provided by the pipeline pressure together with gland pressure against the packing rings. In graphite gland packings, tightness is ensured by contact between the gland (9) and the packing rings.

The gland packing (69) must be changed if leakage occurs even after the hex nuts (18) have been tightened. The V-ring gland packing must be tightened with care because excess force may damage the V-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 (10).
- Remove the hexagon nuts (18), disc spring sets (150), one stud (14) and retainer plates (42, size 2" only) and gland (9).
- Remove the packing rings (69) from around the shaft using a knife or other pointed instrument. Make sure that there is no damage to the shaft or the counterbore. Please note that the thrust ring (67) may come off as you remove the packing. It should be placed back in its position before installing the new packing.
- Clean the packing ring counterbore.
- Place the new packing rings (69) over the shaft (5). The gland (9) may be used for pushing the rings into the counterbore. Do not damage packing rings in the shaft keyway. See Fig. 11. Screw down the removed stud.

- Deform the packing rings first by tightening the gland nuts without disc springs to the torque Tt, see the value from Tables 1 and 2.
- Remove the gland nuts and one stud, mount the retainer plates (42, size 2" only) and the removed stud and place the disc spring sets (150) on the gland studs. Tighten the nuts (18) so that the disc springs are compressed to the height H2, see Table 1 and 2. Lock the nuts with locking compound e.g. Loctite 221. See Fig. 11.
- Check for leakage when the valve is pressurized.

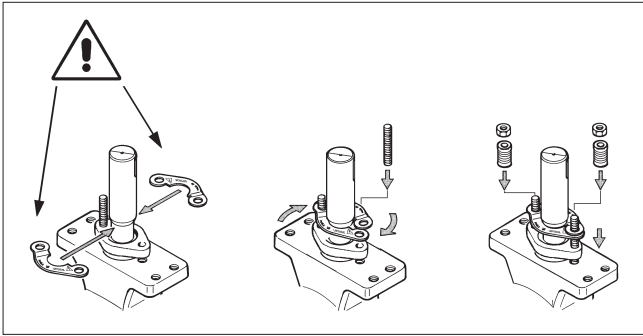


Fig. 10 Installing the retainer plates

Table 1 Tightening of the gland packing with stainless steel disc spring sets (*)

Valve size		Shaft dia (mm)	Spring dimensions		PTFE V-ring		Graphite		ID code of disc spring set
DN	NPS		A (mm)	H1 (mm)	H2 (mm)	Tt (Nm)	H2 (mm)	Tt (Nm)	
25	01"	15	20	24	23.3	3	22.6	6	H148583
40	1 1/2"	20	20	24	23.1	4	22.3	8	H148583
50	02"	25	25	33.4	32.4	8	31.4	15	H148584
80	03"	45	40	48.5	46.9	27	45.2	53	H161163
100	04"	55	40	48.5	46.5	32	44.6	63	H161163

(*) Disc spring set material change has been done in mid 2019

Table 2 Tightening of the gland packing with carbon steel+ENP coated disc spring sets

Valve size		Shaft dia (mm)	Spring dimensions		PTFE V-ring		Graphite		ID code of disc spring set
DN	NPS		A (mm)	H1 (mm)	H2 (mm)	Tt (Nm)	H2 (mm)	Tt (Nm)	
25	01"	15	20	22	21.0	3	20.0	6	979540
40	1 1/2"	20	20	22	20.7	4	20.0	8	979540
50	02"	25	25	30.5	29.2	8	28.0	15	979560
80	03"	45	40	45.5	43.4	27	41.4	53	979600
100	04"	55	40	45.5	43.0	32	41.4	63	979600

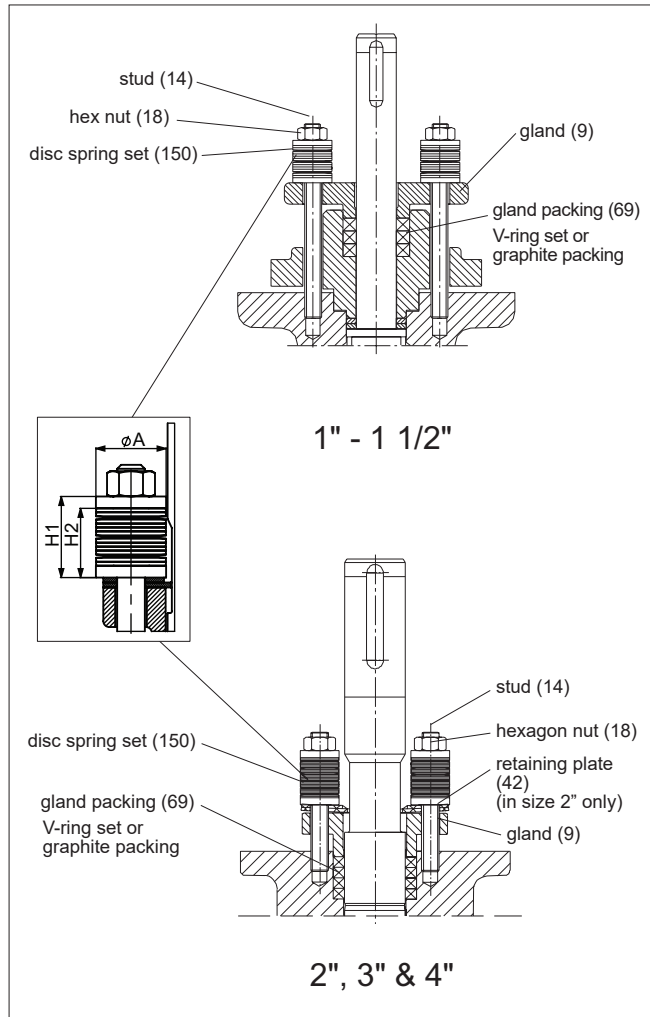


Fig. 11 Gland packing

4.3 Repair of a jammed or stuck valve while it is in the pipeline

Jamming may be due to the ball (3) and seats (7) 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!

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.

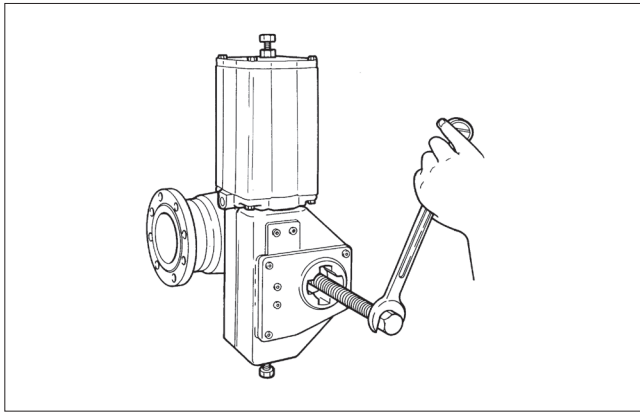


Fig. 12 Removing the actuator with an extractor

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 lifting slings carefully and unscrew the pipe flange bolts. See that the slings are positioned correctly. Make sure that you lift the valve correctly.

4.6 Dismantling the valve

Sizes 1" - 1 1/2"

- Place the valve in a standing position on the pipe flange end so that the body cap points upwards. Use a level surface that will not scratch the pipe flanges.
- Mark the body halves for correct orientation during re-assembly.
- Remove the key (10).
- Unfasten the gland nuts (18). Remove the disc springs (150), the gland (9) and the packing rings (69).
- Unfasten the bolts of the bonnet (8). Remove the bonnet, the gasket (66), the shaft (5) and the thrust bearings (70, 71).
- Unscrew the body stud nuts (16).

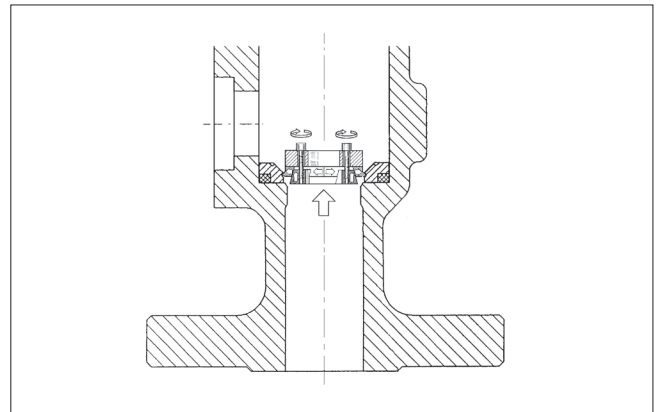


Fig. 13 Removing the locked seat

- Remove the body cap (2). If the seat (7) is not lying on the ball (3), prevent the seat from falling from the body cap and detach it later. **Don't leave your fingers between the body cap and the surface!**
Stand the removed body cap on its pipe flange
- Remove the locked seat (7) using a outpulling tool, see Fig. 13. See also Section 7 'Tools'.

Size 2"

- 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 (16) are facing upward.
- Mark the body halves for correct orientation during re-assembly.
- Turn the ball to the closed position.
- Remove the key (10).
- Unscrew the body stud nuts (16).
- Remove the body cap (2). If the seat (7) is not lying on the ball (3), prevent the seat from falling from the body cap and detach it later. **Don't leave your fingers between the body cap and the surface!**
- Stand the removed body cap on its pipe flange. See Fig. 14.

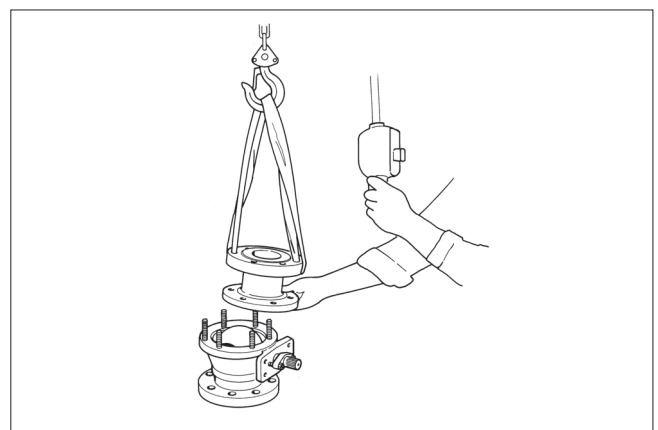


Fig. 14 Lifting the body cap

- Remove the seat from body cap if it is still in place. If the seat is locked, it must be removed using a special tool. See Fig. 15 and Section "Tools".

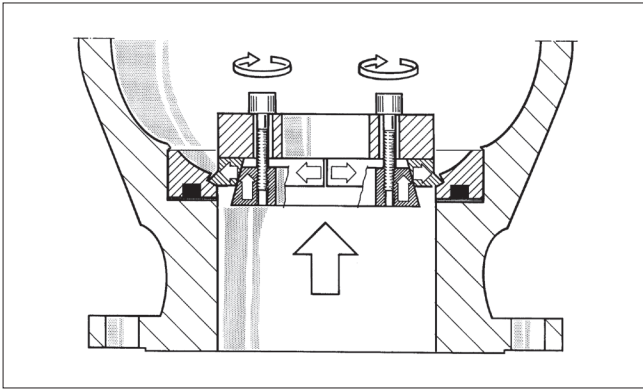


Fig. 15 Removing the locked seat

- Lift the ball (3) 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. See Fig. 16.

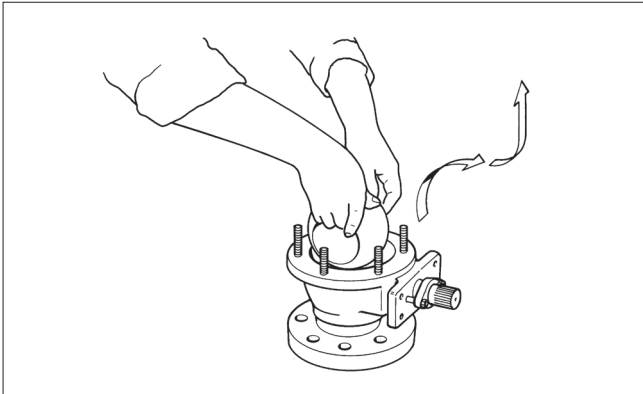


Fig. 16 Removing the ball

- Pull the spline driver (4) from the shaft (5) and remove the seat (7) from the lower body half (1).
- Remove the nuts (18), disc springs, the retaining plates and the gland (9).
- Push the shaft into the body and remove it.
- Remove thrust bearing(s) (70), secondary shaft seal (71), packing rings (69) and body gasket (65). Also remove back seals (63) in ball seats.

Sizes 3" - 4"

- 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 (16) are facing upward.
- Mark the body halves for correct orientation during re-assembly.
- Turn the ball to the closed position.
- Remove the key (10).
- Remove the gland studs nuts (18) and the gland (9).
- Remove the bottom flange (78) by removing the screws (13). (Bottom flange not required on all sizes).
- Remove the nuts (16) that fasten the body cap to the body.
- Lift the body cap (2) off the body studs being careful not to damage the seat (7) that is locked into the cap.
- Remove the ball by turning the shaft (5) so that the slot in the ball is in line with the body waterway, and rotate the ball (3) out of the body.

- Remove the shaft (5) and thrust washers (70, 71) by sliding the shaft down through the stuffing box and out of the body.
- Remove the shaft packing (69) from the stuffing box by means of a hooked wire or special tool.
- Remove the seat (7) and seat spring (62) from the seat recess in the body.
- Remove the seat locked in the body cap (2) by carefully grinding or chiselling off the locking points.
- Remove the seat by turning the body cap over allowing the seat to fall from the seat cavity into your hand or onto a soft object.

4.7 Inspection of removed parts

- Clean removed parts.
- See if the shaft (5) or thrust bearings (70, 71) are damaged.
- See if the ball (3) or seats (7) are damaged (scratched) by examining them under bright light. The ball and the seat can be replaced if necessary.
- See if the body joint flanges are damaged.

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

4.9.1 Sizes 1" and 1 1/2"

- Place the valve body (1) in a standing position on the pipe flange end. Use a level surface that will not scratch the flanges.

H seats:

- Place the back seal (63) into the seat (7), see Fig. 17, and then both parts all the way into the body counterbore.

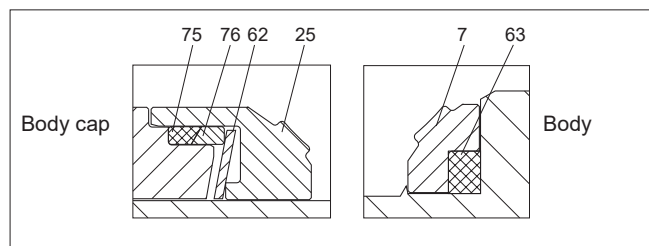


Fig. 17 H seat

- Lock the seat into the body using a special tool that can be ordered from the manufacturer. The tool is accompanied by operating instructions.
- Place the ball on the locked seat so that the slot faces the shaft entrance opening. Push the shaft (5) into the valve from outside. Make sure that the end of the shaft fits into the ball slot.
- Assemble the seat (25), spring (62), back seal (75) and back-up ring (76), see Fig. 20, and place the assembly in the body cap (2).

G seats:

- Place the back seal (63) into the seat (7), see Fig. 18, and then both parts all the way into the body (1) counterbore.

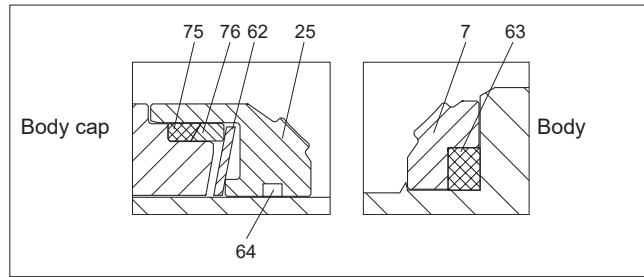


Fig. 18 G seat

- Lock the seat into the body using a special tool that can be ordered from the manufacturer. The tool is accompanied by operating instructions.
- Place the ball on the locked seat so that the slot faces the shaft entrance opening. Push the shaft (5) into the valve from outside. Make sure that the end of the shaft fits into the ball slot.
- Assemble the seat (25) with back seal (64), spring (62), back seal (75) and back-up ring (76), see Fig. 18, and place the assembly in the body cap (2).

J seats:

- Install back seals (63) as per Table 2 to both body halves. The seal on top of stack shall always be 1 mm thick and the others are either 1 mm or 0.4 mm.

Table 3 Seal thicknesses according to construction TU / T1 / T2 (See typecode sign 5).

Size	TU		T1		T2	
	1 mm	0.4 mm	1 mm	0.4 mm	1 mm	0.4 mm
1"	2 pcs	3 pcs	2 pcs	4 pcs	2 pcs	5 pcs
1H"	5 pcs	3 pcs	5 pcs	5 pcs	6 pcs	4 pcs
2"	7 pcs	5 pcs	9 pcs	3 pcs	10 pcs	2 pcs
3"	12 pcs	5 pcs	14 pcs	2 pcs	16 pcs	2 pcs
4"	16 pcs	1 pcs	18 pcs	2 pcs	19 pcs	2 pcs

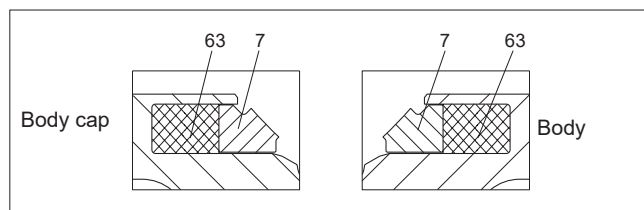


Fig. 19 J seat

- Set back seal pressing tool on top of seal stack as seen in Fig. 20.

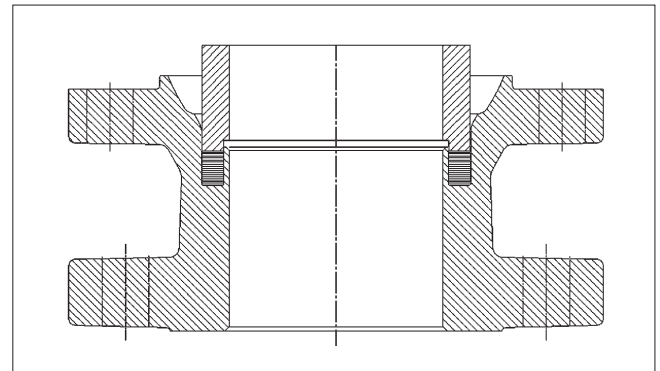


Fig. 20 Compressing the J seat

- Compress back seal stack with pressing tool using forces found on the Table 4. Avoid damaging sealing faces of the flange during compression. Let the compression of the back seal stack effect about 5 minutes. Repeat same procedure to the other body half.

Table 4 Compression force, according to construction TU / T1 / T2 (See typecode sign 5).

Valve size	Tool ID	Force (kN / lbf·ft)		
		TU	T1	T2
1"	H087299	8 / 1800	16 / 3600	25 / 5620
1H"	H087298	17 / 3822	35 / 7870	50 / 11240
2"	H087297	20 / 4497	39 / 8770	60 / 13500
3"	H097570	35 / 7869	70 / 15740	100 / 22480
4"	H087295	50 / 11241	105 / 23600	150 / 33720

- Set body seat to its cavity.
- Add bearings, spline driver, locking pin, shaft and key.
- Install the ball.
- Set the other seat on top of the ball.
- Add body gasket.
- Lift the body cap on top of body and smoothly attach body halves.
- Tighten at least 2 body flange joint nut at opposite sides.
- Lift the valve under the clamp and compress body flanges together (metal to metal contact).
- Operate the valve and if the torque is reasonable (operable with hand lever), tighten all body flange nuts. Use V-ring set during operation.
- Measure the torque and compare it to values in Table 5.

Table 5 Operating torque

Size	Torque (Nm / lbf·ft)		
	TU	T1	T2
1"	10 ± 2 / 8 ± 2	15 ± 2 / 12 ± 2	20 ± 2 / 16 ± 2
1H"	20 ± 4 / 15 ± 3	30 ± 4 / 22 ± 3	40 ± 4 / 30 ± 3
2"	30 ± 7 / 23 ± 6	45 ± 7 / 34 ± 6	60 ± 7 / 46 ± 6
3"	70 ± 14 / 52 ± 11	100 ± 14 / 78 ± 11	140 ± 14 / 104 ± 11
4"	150 ± 20 / 111 ± 15	220 ± 20 / 166 ± 15	300 ± 20 / 222 ± 15

- If the measured torque meets the value given in the table, finish the assembly (see below). If the measured torque exceeds these limits, dismantle body flange joint and lift body cap on the table (do not drop seat).

- Remove from body cap back seal stack one 0.4 mm thick shim. Repeat the assembly as described earlier (up from item 11). If the torque is still too high remove one 0.4 mm shim from body back seal stack. Continue until appropriate torque is achieved. Accordingly, if the torque is too low, add one 0.4 mm shim.
- Finish the assembly, see below. Do not forget to change the V-ring set back to graphite rings.
- Tightness requirement meets ISO 5208 Rate D. Test pressure is 6 bar with air. If the valve leak exceeds the allowable limits, relap seats, check the torque and measure tightness again. (NOTE: Torque values on Table 3 do not include torque caused by graphite packing).

All versions:

- Slip the thrust bearings (70) onto the shaft and push them against the shaft shoulder. Put the bonnet gasket (66) in its groove, replace the bonnet (8) and tighten the studs (13). Tighten the nuts (18) of the studs (13) evenly to achieve uniform compression of the gasket (66).
- Place the body gasket (65) into the body, on the shoulder at the foot of the threads.
- Mount the body cap and seat assembly onto the body. Fasten the body nuts (16). Tighten the nuts gradually, always switching to other side of the valve after every nut. The recommended torques are given in Table 6.

Table 6 Recommended tightening torques of body joint bolting


Thread	ASTM A320 gr. L7M	ASTM A193 gr. B8M cl. 1	Thread	ASTM A320 gr. L7M	ASTM A193 gr. B8M cl. 1
	Tightening torque (Nm)	Tightening torque (Nm)		Tightening torque (Nm)	Tightening torque (Nm)
M16	210	95	5/8UNC	200	88
M20	420	190	3/4UNC	350	160
M24	720	320	7/8UNC	560	250
M27	1100	480	1 UNC	840	380

NOTE: Check the correct bolt material from valve bill of materials. If material is not shown above table, please consult the manufacturer.
NOTE: Threads must be well lubricated

- Push the packing rings (69) into their place in the bonnet (8). Tighten the studs (14). Place the gland (9) on the packing (69). See section 4.2 for packing assembly instructions.
- Mount the key (10).
- Check the gland packing for leakage when the valve is pressurized.
- Install the valve in the pipeline, as carefully and accurately as when removed it. Note the instructions in Section 3.

4.9.2 Size 2"

CAUTION:
For safety reasons the retainer plates (42) MUST always be installed as shown in 9.2.



Place the valve body on its pipe flange. Use a surface that does not damage the pipe flanges.

S seats:

- Place the back seal (63) in the ball seat (7); see Fig. 21. Place the seat in the body (1).

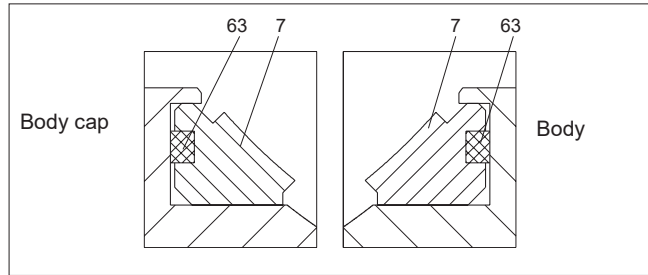


Fig. 21 S seat (2")

K seats:

- Place the back seal (63) into the body counterbore. Then place the seat (7) into the body counterbore, see Fig. 22.
- Lock the seat into the body using a special tool. See Section 4.9.4 for instructions.
- Place the back seal (63) in the ball seat (7); see Fig. 22. Place the seat in the body cap (2). Lock the seat with a special tool. See Section 4.9.4 for instructions.

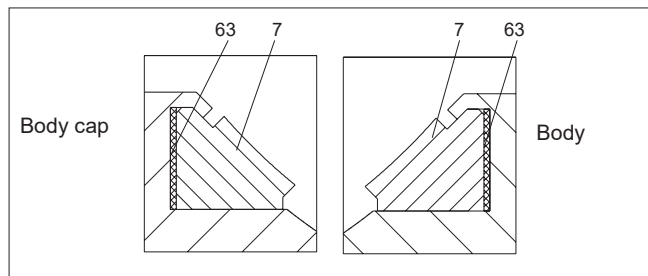


Fig. 22 K seat (2")

H seats:

- Place the back seal (63) into the body counterbore. Then place the seat (7) into the body counterbore, see Fig. 23.
- Lock the seat into the body using a special tool. See Section 4.9.4 for instructions.
- Place the back seal (75), back-up ring (76), spring (62) and the seat (25) into body cap, Fig. 23.

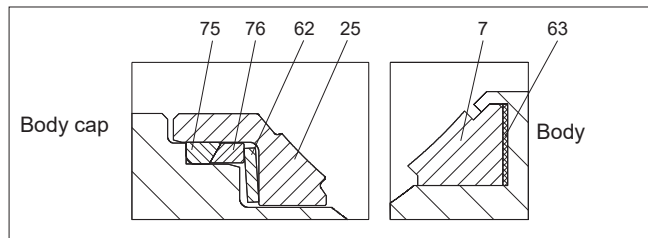


Fig. 23 H seat (2")

G seats:

- Place the back seal (63) into the body counterbore. Then place the seat (7) into the body counterbore, see Fig. 24.
- Lock the seat into the body using a special tool. See Section 4.9.4 for instructions.
- Place the back seal (75), back-up ring (76), spring (62) and the seat (25) with back seal (64) into body cap, see Fig. 24.

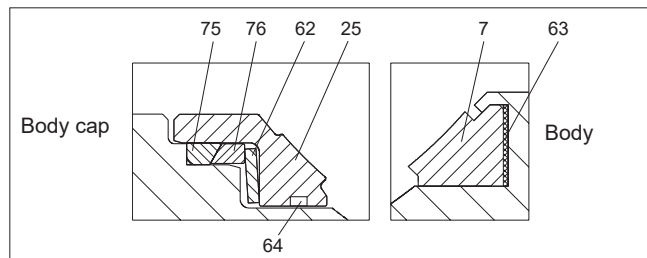


Fig. 24 G seat (2")

J seats:

See 4.9.1 for details.

All versions:

- Place the shaft partly inside the body from above and place the thrust bearings (70) on the shaft from inside the body. Place the spline driver (4) on the shaft spline and lock it with a pin (50).
- Put the ball (3) in its position so that the spline driver is in the ball slot. Pull the shaft to make sure that the pin locks the spline driver properly to the shaft.
- Place the packing (69), the studs (14) and the gland (9) in their position. Place the nuts (18) on the studs (14) and screw down them gently.
- Place the body gasket (65) in the body groove.

S seats:

- Place the seat on the ball.

All versions:

- Carefully place the body cap (2) on the body. Make sure that the marks made during dismantling are aligned. Do not drop the H seat from the body cap!
- Fasten the body nuts (16). Tighten the nuts gradually, always switching to other side of the valve after every nut. The recommended torques are given in Table 6. The flange faces must be in even contact with each other.
- Mount the key (10).
- To make sure that the ball lies properly between the seats, turn the shaft slowly in both directions two or three times.
- Assemble, deform and adjust the packing as shown in Section 4.2.
- Check the gland packing for leakage when the valve is pressurized.
- Install the valve in the pipeline, as carefully and accurately as when removed it. Note the instructions in Section 3.

4.9.3 Size 3"-4"

- Place the valve body on its pipe flange. Use a surface that does not damage the pipe flanges.

H seats:

See 4.9.1 for details.

G seats:

See 4.9.1 for details.

J seats:

See 4.9.1 for details.

All versions:

- Place the thrust bearings (70, 71) onto the shaft and insert into the pocket of the valve. (NOTE: the thrust bearings may not fit through the bottom of the valve in all sizes and therefore have to be inserted through the side of the valve and onto the shaft).
- Pull the shaft through the stuffing box until the thrust washer fits into the mating recess in the body.
- If required, replace the bottom flange (78) using a new gasket (79). Coat the screws (13) with anti-galling compound, replace and torque them to the proper value as shown in Table 7.

Table 7 Recommended tightening torques of bottom flange bolting

Thread	ASTM A320 gr. L7M	ASTM A193 gr. B8M cl. 1	Thread	ASTM A320 gr. L7M	ASTM A193 gr. B8M cl. 1
	Tightening torque (Nm)	Tightening torque (Nm)		Tightening torque (Nm)	Tightening torque (Nm)
M12	85	38	1/2UNC	99	44
M16	210	95	5/8UNC	200	88

NOTE: Check the correct bolt material from valve bill of materials. If material is not shown above table, please consult the manufacturer.

NOTE: Threads must be well lubricated

- Turn the shaft so that the blade is in line with the bore of the valve, then insert the ball into the body by rotating the slot in the ball onto the blade.
- If removed prior, coat body studs (12) with anti-galling compound and screw them into the body until they bottom out in the holes.
- Verify that the body gasket groove is free of contaminate, then place a new body gasket (65) in the groove.
- Place the body cap (2) over the body studs being careful not to damage the seat or pinch the body gasket.
- 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 6.
- Install new packing (69) in the stuffing box.
- If removed prior, coat the gland studs (14) with anti-galling compound and screw them into the body until they bottom out in the holes.
- To make sure that the ball lies properly between the seats, turn the shaft slowly in both directions two or three times.
- Assemble, deform and adjust the packing as shown in Section 4.2.
- Check the gland packing for leakage when the valve is pressurized.
- Install the valve in the pipeline, as carefully and accurately as when removed it.
- Note the instructions in Section 3.

4.9.4 Locking of the seat

A seat locking tool (can be ordered from the manufacturer) and a hydraulic press with suitable capacity are needed for locking.

- Mount the seat with the back seal as described in the earlier sections.
- Mount the locking tool carefully over the seat, see Fig. 25.
- Place the valve body/body cap on the bed of the press. The bed surface must be level and non-scratching.
- Use forces from the Table 8.

Table 8 Pressing forces for seat locking

Valve size	Force (N)
02"	70 000
03"	140 000
04"	160 000

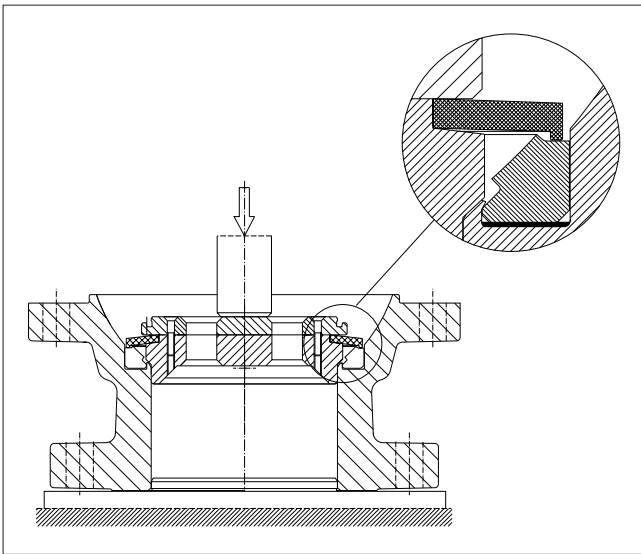


Fig. 25 Locking of the seat

5. INSTALLING THE ACTUATOR

5.1 General

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

Table 9 Tightening torques for bracket bolting (for lubricated screws) (Nm)

Screw / Material	M8	M12	M16	M20
A2/A4	70	70	170	340
B8M Cl.1	38	38	95	190
Gr.660	91	91	230	440

Please use tightening torques given in table 9 when bolting the bracket on to valve.

5.2 Installing the M-series handwheel operator

- 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.

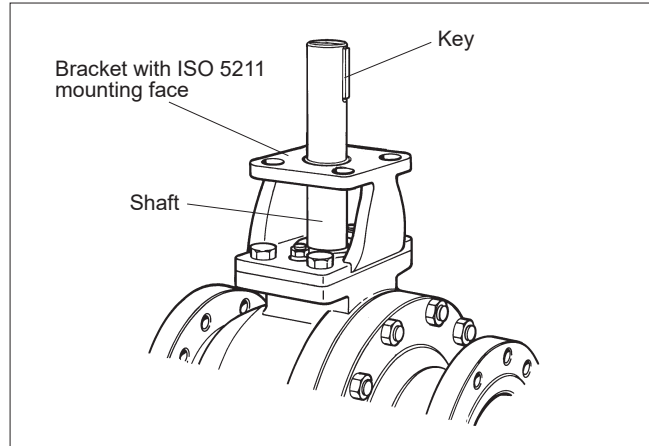


Fig. 26 Bracket mounted on valve

- 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.
- Adjust the circular movement of the ball with the hexagon screws located at the side of the housing (see Fig. 27). 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.

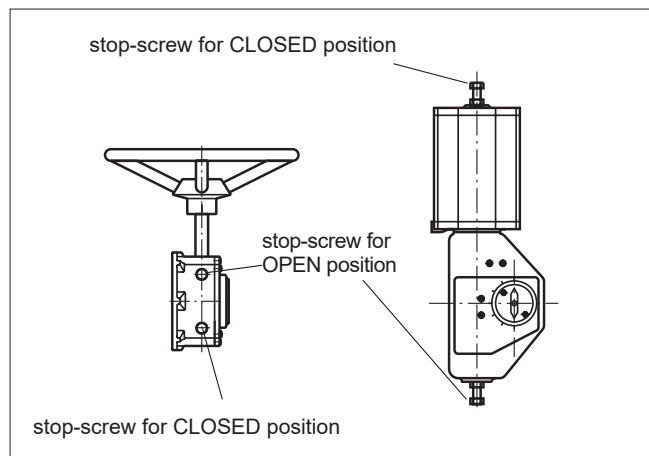


Fig. 27 Open and closed positions of the actuator

5.3 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.
- Adjust the ball open and closed positions by means of the actuator stop screws located at both ends (see Fig. 27).
- 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!**

There is no need for stop screw adjustment if the actuator is reinstalled in the same valve. Drive actuator piston to the housing end (open position). Turn the actuator by hand until the valve is in the open position. Fasten the actuator in this position as explained above.

- 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.

5.4 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 5.3.

5.5 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.

6. TROUBLE SHOOTING TABLE

The following Table 10 lists malfunctions that might occur after prolonged use.

Table 10 Trouble shooting

Symptom	Possible fault	Recommended action
Leakage through a closed valve	Wrong stop screw adjustment of the actuator	Adjust the stop screw for closed position
	Faulty zero setting of the positioner	Adjust the positioner
	Damaged seat	Replace seat
	Damaged closing member	Replace the closing member
	Closing member in a wrong position relative to the actuator	Select the correct keyway in the actuator
Leakage through body joint	Damaged gasket	Replace the gasket
	Loose body joint	Tighten the nuts or screws
Irregular valve movements	Actuator or positioner malfunction	Check the operation of the actuator and positioner
	Process medium accumulated on the sealing surface	Clean the sealing surfaces
	Closing member or seat damaged	Replace the closing member or seat
	Crystallizing medium has entered the bearing spaces	Flush the bearing spaces
Gland packing leaking	Gland packing worn or damaged	Replace the gland packing
	Loose packing	Tighten the packing nuts

7. 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

- For removal of the locked seats:

Seat removal tools	
Product:	ID:
DN 25 (1")	270073
DN 40 (1½")	270075
DN 50 (2")	270076
DN 80 (3")	270078
DN 100 (4")	270079

- For locking of the seats:

Seat locking tools	
Size:	ID:
DN25 (1")	279389
DN40 (1 1/2")	279411
DN50 (2")	H046569
DN80 (3")	H046570
DN100 (4")	H046571

These tools can be ordered from the manufacturer. Always give the valve type designation when ordering.

8. ORDERING SPARE PARTS

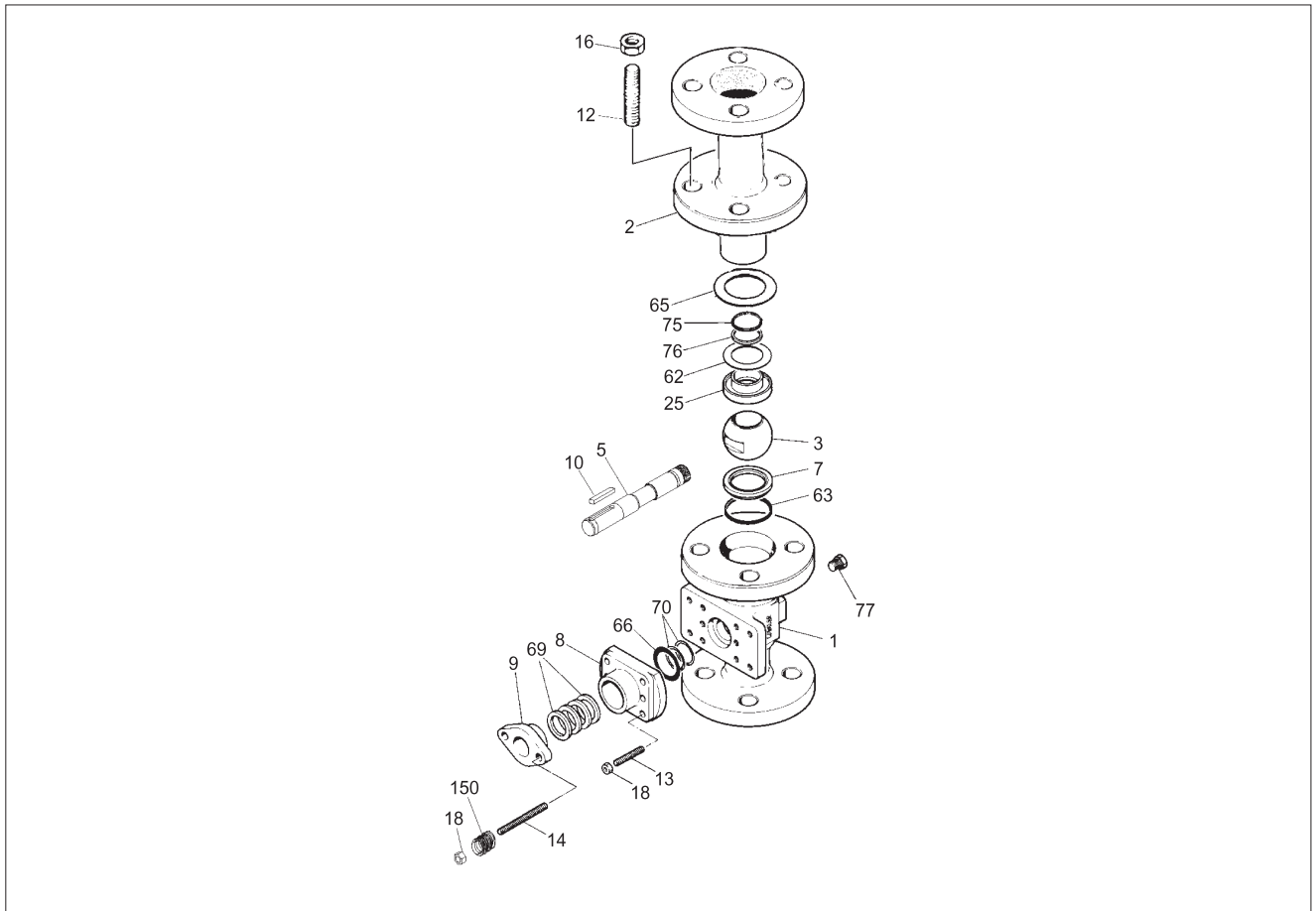
When ordering spare parts, always include the following information:

- type code, sales order number, serial number (stamped on a valve body)
- number of the parts list, part number, name of the part and quantity required

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

9. EXPLODED VIEWS AND PARTS LISTS

9.1 Sizes 1" - 1 1/2"



Item	Qty	Description	Spare part category
1	1	Body	
2	1	Body cap	
3	1	Ball	3
5	1	Shaft	3
7	1	Seat	2
		Seat (H)	2
8	1	Bonnet	
9	1	Gland	
10	1	Key	3
12		Stud	
13		Stud	
14		Stud	
16		Hexagon nut	
17		Hexagon nut	
18		Hexagon nut	
25	1	Seat	2
62	1	Seat spring	2
63	1	Back seal (H, G)	1
	2	Back seal (J)	1
65	1	Body gasket	1
66	1	Gasket	1
69	1	Packing	1
70	2	Thrust bearing	3
75	1	Back seal	1
76	1	Back-up ring	2
77	1	Plug	
150	2	Disc spring set	

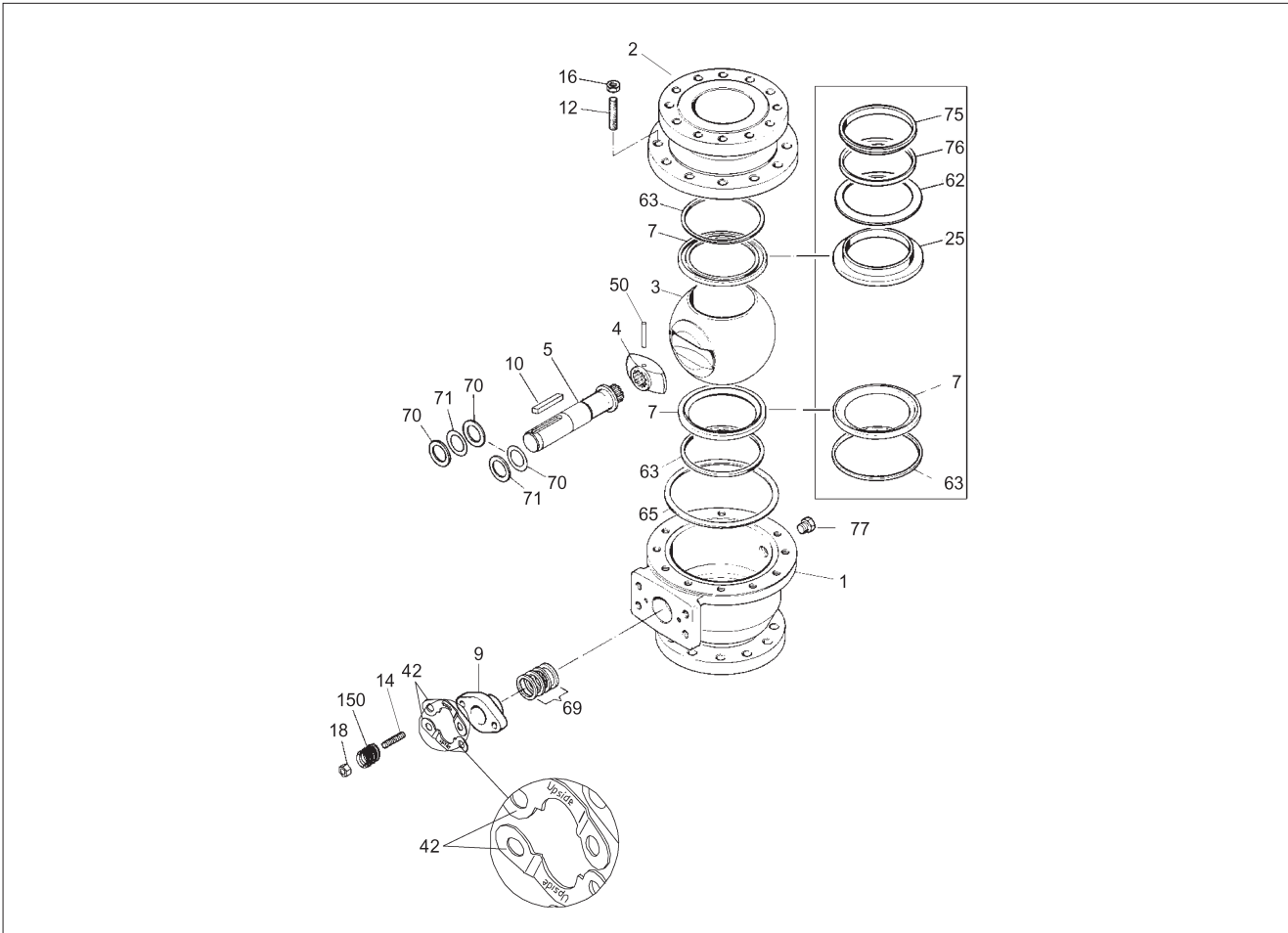
Spare part category 1: (Spare Part Set): Recommended soft parts, always needed for the repair. Delivered as a set.

Spare part category 2: Parts for replacing of the seat. Available also as a set.

Spare part category 3: Parts for replacing of the closing element.

Spares for the full overhaul: All parts from the categories 1, 2 and 3.

9.2 Size 2"



Item	Qty	Description	Spare part category
1	1	Body	
2	1	Body cap	
3	1	Ball	3
4	1	Spline driver	3
5	1	Shaft	3
7	2	Seat (S, K)	2
	1	Seat (H, G)	2
	2	Seat (J)	2
9	1	Gland	
10	1	Key	3
12		Stud	
14		Stud	
16		Hexagon nut	
18		Hexagon nut	
25	1	Seat	2
42	2	Retaining plate	
50	1	Locking pin	
62	1	Spring (H, G)	2
63	2	Back seal (S, K)	1
	1	Back seal (H, G)	1
	2	Back seal (J)	1
65	1	Body gasket	1
69	1	Packing / V-ring set	1
70	1	Thrust bearing	3
71	1	Thrust bearing	3
75	1	Back seal (H, G)	1
76	1	Back-up ring (H, G)	2
77	1	Plug	
150	2	Disc spring set	

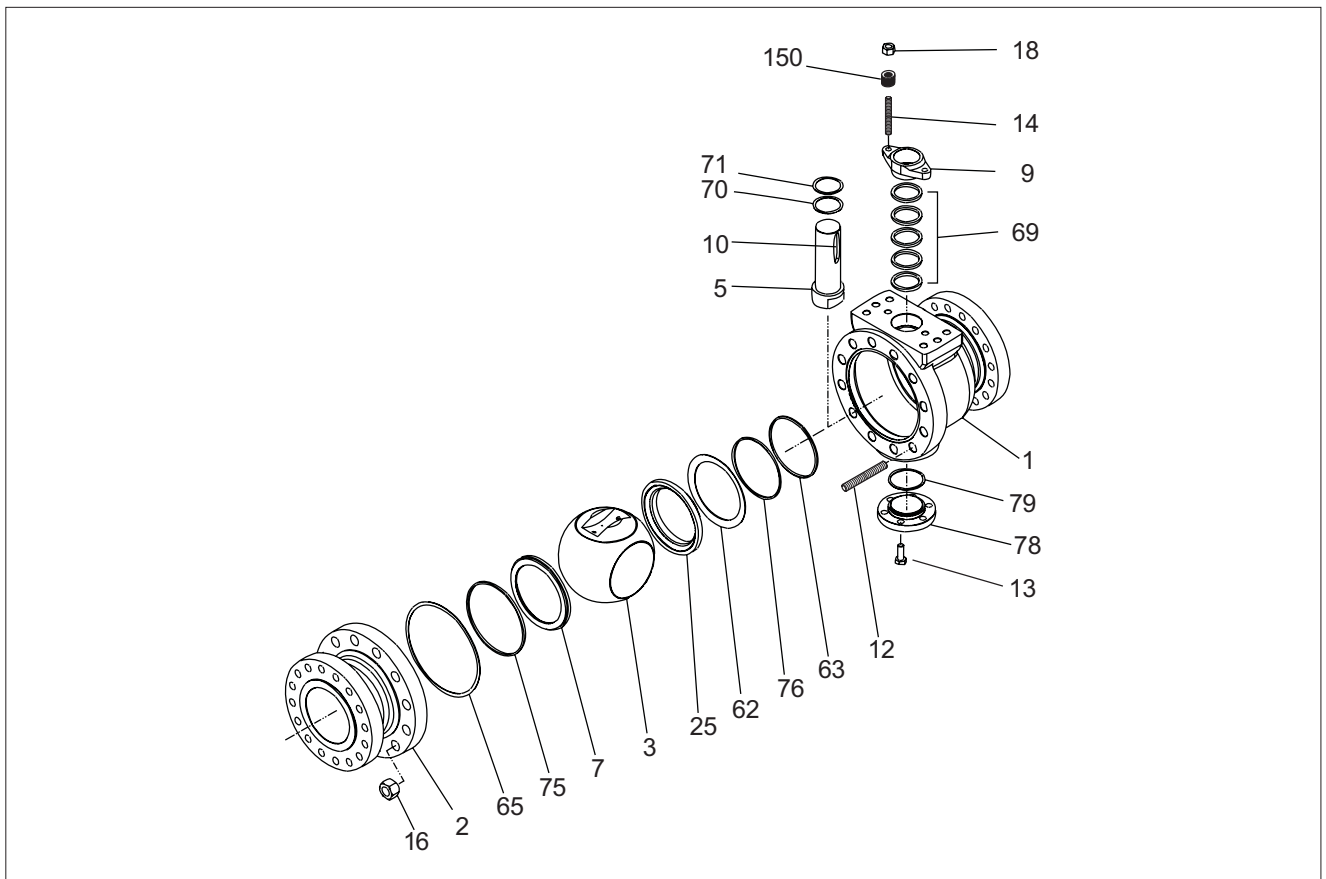
Spare part category 1: (Spare Part Set): Recommended soft parts, always needed for the repair. Delivered as a set.

Spare part category 2: Parts for replacing of the seat. Available also as a set.

Spare part category 3: Parts for replacing of the closing element.

Spares for the full overhaul: All parts from the categories 1, 2 and 3.

9.3 Sizes 3” and 4”



Item	Qty	Description	Spare part category
1	1	Body	3
2	1	Body cap	
3	1	Ball	
5	1	Shaft	3
7	1	Seat	2
9	1	Gland	
10	1	Key	3
12		Stud	
13		Screw	
14		Stud	
16		Hexagon nut	
18		Hexagon nut	
25	1	Seat	2
62		Spring	2
63	1	Back seal	1
65	1	Body gasket	1
69	5	Packing ring	1
70	1	Thrust bearing	3
71	1	Thrust bearing	3
75	1	Back seal (H, G)	1
76	1	Back-up ring (H, G)	2
78	1	Bottom flange	
79	1	Gasket	1
150	2	Disc spring set	

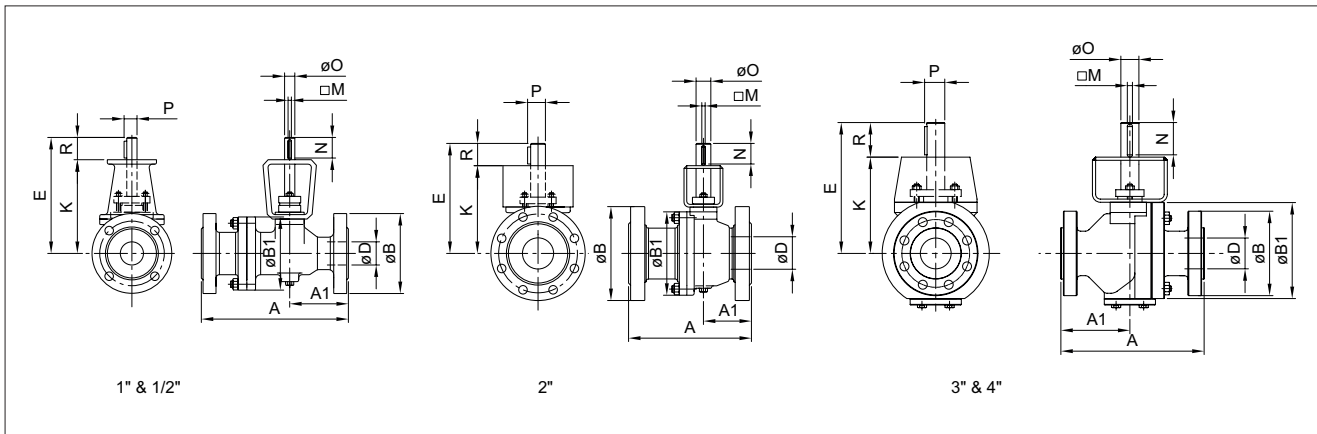
Spare part category 1: (Spare Part Set): Recommended soft parts, always needed for the repair. Delivered as a set.

Spare part category 2: Parts for replacing of the seat. Available also as a set.

Spare part category 3: Parts for replacing of the closing element.

Spares for the full overhaul: All parts from the categories 1, 2 and 3.

10. DIMENSIONS AND WEIGHTS



TYPE	SIZE	ISO FLANGE	Dimensions in mm												NPTF U1	kg
			A	A1	ØB	ØB1	ØD	E	K	M	N	ØO	P	R		
XU_F	1	F07	216	79	125	119	25.4	170	145	4.76	25	15	17	25	1/4	17
	1 1/2	F07, F10	241	86	155	148	38.1	202	172	4.76	35	20	22.2	30	1/4	26
	2	F07, F10, F12, F14	292	98	165	153	50.8	215	168	6.35	46	25	27.8	47	1/2	35
	3	F14, F16	356	172	210	239	76.2	327	246	12.70	80	45	50.4	81	-	64
	4	F14, F16, F25	432	213	275	294	101.6	383	292	12.70	90	55	60.6	91	-	141

TYPE	SIZE	ISO FLANGE	Dimensions in inch												NPTF U1	lbs
			A	A1	ØB	ØB1	ØD	E	K	M	N	ØO	P	R		
XU_F	1	F07	8.50	3.11	4.88	4.69	1	6.69	5.71	0.19	0.98	0.59	0.67	0.98	1/4	37
	1 1/2	F07, F10	9.49	3.39	6.12	5.83	1.5	7.95	6.77	0.19	1.38	0.79	0.87	1.18	1/4	57
	2	F07, F10, F12, F14	11.50	3.86	6.50	6.02	2	8.46	6.61	0.25	1.81	0.98	1.09	1.85	1/2	77
	3	F14, F16	14.02	6.77	8.25	9.41	3	12.87	9.69	0.5	3.15	1.77	1.98	3.19	-	141
	4	F14, F16, F25	17.01	8.39	10.75	11.57	4	15.08	11.50	0.5	3.54	2.16	2.39	3.58	-	311

11. TYPE CODE

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
XU	02	F	W	TA	S6	SJ	S	A	A	D

1.	Valve series & style, face-to-face length
XU	Full bore, seat supported, face-to-face length according to ASME B16.10, Table 4, long pattern, ASME 600.

2.	Size		2.
	DIN	ASME	
025	25 mm	1"	01
040	40 mm	1 1/2"	1H
050	50 mm	2"	02
080	80 mm	3"	03
100	100 mm	4"	04

3.	Pressure rating, flanges, flange drilling
F	ASME Class 600
N	PN 64
P	PN 100

4.	End connection style
W	raised face, ASME B 16.5, "smooth finish" (Ra 3.2-6.3), standard
C	PN 63and PN 100 rated valves ; EN 1092-1 Type B2 (Ra 0,8 - 3.2)

5.	Application and/or construction
TA	Standard construction. Live loaded packing
TU	Special solids proof seat design, pressure area 0 - <10 bar (ambient)
T1	Special solids proof seat design, pressure area 10 - <20 bar (ambient)
T2	Special solids proof seat design, pressure area 20 - 30 bar (ambient)
TZ	BAM tested non-metallic parts, for oxygen service. Double seated. Metal bearings. Live loaded graphite packing. Temperature range -50 ... +200 °C. Oxygen cleaning acc. to Neles internal procedure T-2115 included.

XU series does not comply to API 608 currently and is not covered with ISO 15848-1 certifications.

6.	Body material and body related parts material		
	Body and body cap	Bonnet	Gland
S6	CF8M	CF8M	CF8M
J2	WCB	WCB	CF8M
J5	C5	C5	CF8M

NOTE! Bonnet is used only in sizes 1" and 1 1/2"

7.	Ball / coating and shaft material
	Standard
SJ	316SS / Hard Chrome & XM-19
RX	316SS / Chrome carbide & XM-19
RR	316SS / WC-CO & XM-19
SL	316SS / NiBo & XM-19

8.	Seat type, back seal and spring material		
	Seat type	Back seal	Spring
S	Metal, S	PTFE	-
K	Metal, K (locked)	PTFE	-
H	Metal, H	Graphite	Incoloy 825
G	Metal, H	Graphite	Incoloy 825
J	Metal	Graphite	-

9.	Seat and coating material	
	Seat material	Coating
A	316 Stainless steel	Cobalt based hard facing
B	316 Stainless steel	CrC + LF
R	316 Stainless steel	Tungsten carbide, WC-CO

10.	Gasket and packing material		
	Body gasket	Packing	Thrust bearing
A	PTFE	PTFE V-rings	Filled PTFE
B	Graphite	Graphite	Filled PTFE
C	PTFE	PTFE V-rings	Cobalt based alloy and stainless steel
D	Graphite	Graphite	Cobalt based alloy and stainless steel

11.	Bolting materials				
	Pressure retaining		Packing gland bolting		
	Studs	Nuts	Studs	Nuts	Temp range
E*	B8M	8M	gr. 660	gr. 660	-200°C...+538°C
T**	L7M	2HM	B7	2H	-40°C...+538°C
S**	L7M	2HM	gr. 660	gr. 660	-46°C...+538°C
U	UNS S31803	UNS S31803	UNS S31803	UNS S31803	-46°C...+315°C

*) with stainless steel body

***) with carbon steel body

General safety warnings

Lifting

1. Always use a lifting plan created by a qualified person to lift this equipment. Lifting guidance is provided in this IMO (Installation, Maintenance and Operation manual) to assist in lifting plan development. Think about the center of gravity (CG) of the equipment being lifted. Make sure the CG is always under the central lifting point.
 2. Valves may be equipped with lifting threads on the body or on the flanges. These are intended to be used with the lifting plan.
 3. Use only correct and approved lifting devices. Ensure that lifting devices and straps are securely attached to the equipment prior to lifting.
 4. Check, that lifting devices are not damaged and in good condition with a valid check stamp prior to use.
 5. Workers must be trained for lifting and handling valves.
 6. Never lift an assembly by the instrumentation (solenoid, positioner, limit switch, etc.) or by the instrumentation piping. Straps and lifting devices should be fitted to prevent damage to instrumentation and instrumentation piping. Failure to follow the lifting guidance provided may result in damage and personal injury from falling objects.
3. Store valves and equipment in a dry and protected area until the equipment is installed.
 4. Do not exceed the maximum storage temperatures given in the IMO (installation, maintenance, and operating instructions).
 5. Keep the original packaging on the valve as long as possible to avoid environmental contamination by dust, water, dirt, etc.
 6. Remove the valve endcaps just before mounting into the pipeline.
 7. FOR YOUR SAFETY IT IS IMPORTANT TO FOLLOW THESE PRECAUTIONS BEFORE REMOVAL OF THE VALVE FROM THE PIPELINE OR ANY DISASSEMBLY:
 - Be sure you know what flow medium is in the pipeline. If there is any doubt, confirm with the proper supervisor.
 - Wear any personal protective equipment (PPE) required for working with the flow medium involved in addition to any other PPE normally required.
 - Depressurize the pipeline, bring to ambient temperature, and drain the pipeline flow medium.
 - Cycle the valve to relieve any residual pressure in the body cavity.
 - After removal but before disassembly, cycle the valve again until no evidence of trapped pressure remains.
 - The valves with offset shaft (Butterfly, eccentric rotary plug) have greater trim area on one side of the shaft. This will cause the valve to open when pressurized from the preferred direction without a locking handle or an actuator installed.
 - **WARNING: DO NOT PRESSURIZE THE ECCENTRIC VALVE WITHOUT A HANDLE OR AN ACTUATOR MOUNTED ON IT!**
 - **WARNING: DO NOT REMOVE A HANDLE OR AN ACTUATOR FROM AN ECCENTRIC VALVE WHILE PRESSURIZED!**
 - Before installing the eccentric valve in or remove it from the pipeline, cycle the valve closed. Eccentric valves must be in the closed position to bring the trim within the face to face of the valve. Failure to follow these instructions will cause damage to the valve and may result in personal injury.

Work activities on the valve

1. Wear your personal safety equipment. Personal safety equipment includes but is not limited to protective shoes, protective clothing, safety glasses, helmet, hearing protection and working gloves.
2. Always follow the local safety instructions in addition to the Valmet instructions. If Valmet instructions conflict with local safety instructions, stop work and contact Valmet for more information.
3. Before beginning service on the equipment, make sure that the actuator is disconnected from any kind of power source (pneumatic, hydraulic, and/or electric), and no stored energy is applied on the actuator (compressed spring, compressed air volumes, etc.). Do not attempt to remove a spring return actuator unless the stop screw is carrying the spring force.
4. Make sure that there is a LOTOTO (Lock Out / Tag Out / Try Out) procedure in place for the system in which the valve is installed and strictly follow it.
5. Always make sure that the pipeline is depressurized and in ambient temperature condition before maintenance work is started.
6. Keep hands and other body parts out of the flow port when the valve is being serviced and the actuator is connected to the valve. There is a high risk of serious injury to hands and/or fingers due to malfunction if the valve suddenly starts to operate.
7. Beware of Trim (Disc, Ball or Plug) movement even when the valve is disassembled. Trim may move simply due to the weight of the part or change in position of the valve. Keep hands or other body parts away from locations where they may be injured by movement of the trim. Do not leave objects near or in the valve port which may fall in and need to be retrieved.

General disclaimers

Receiving, handling and unpacking.

1. Respect the safety warnings above!
 2. Valves are critical components for pipelines to control high pressure fluids and must therefore be handled with care.
8. The identification plate (ID-plate, type plate, nameplate, or engraved markings) on the valve gives the information of max. process conditions to the valve.
 9. (For soft seats) The practical and safe use of this product is determined by both the temperature and pressure ratings of the seat and body. Read the identification plate and check both ratings. This product is available with a variety of seat materials. Some seat materials have pressure ratings that are lower than the body ratings. All body and seat ratings are dependent on the valve type, size and material of the body and seat. Never exceed the marked rating.
 10. Temperatures and pressures must never exceed values marked on the valve. Exceeding these values may cause uncontrolled release of pressure and process medium. Damage or personal injury may result.
 11. The operating torque of the valve may rise over time due to wear, particles or other damage of the seat. Never exceed the actuator torque preset values (air supply, position). Application of excessive torque may cause damage to the valve.
 12. Valmet valves typically are designed to be used in atmospheric conditions. Do not use valves under external pressurized conditions unless specifically designed and explicitly marked for this service.

13. Avoid Pressure shocks or water hammer. Systems with high pressure valves should be equipped with a bypass to reduce the differential pressure before opening the valve to avoid pressure shock.
14. Avoid thermal shock. High temperature, Low temperature and cryogenic valves should be operated in a way that limits the rate of increase or decrease in temperature. The valve should be thermally stabilized before being pressurized.
15. Materials of the valve are carefully selected for the process conditions. Changes to the process media can have a major impact on function and safety of the valve. Always confirm the materials are suitable for the service prior to installation.
16. As the use of the valve is application specific, several factors should be considered when selecting a valve for a given application. Therefore, some situations in which the valves are used are outside the scope of this manual.
17. 10. It is the end user's responsibility to confirm compatibility of the valve materials with the intended service, however if you have questions concerning the use, application, or compatibility of the valve for the intended service, contact Valmet for more information.
18. Never use a valve with enriched or pure oxygen if the valve is not explicitly designed and cleaned for oxygen. Selected materials and design have a major impact on the safety to operate the valve with oxygen.
19. Valves intended for use in or with explosive atmospheres must be equipped with a grounding device and marked according ATEX (or equivalent international standards).
20. Manual handles are available for specific butterfly valve sizes and maximum line pressures. Do not operate a valve with a handle or wrench outside the size and pressure limits stated in the IMO. High line pressure may create a large enough force to pull the handle from the operator's hands. Damage or personal injury may result.

Maintenance

21. Respect the safety warnings above!
22. Plan service and maintenance actions, that spare parts, lifting devices and service personnel is available.
23. Maintain the valve within the recommended minimum maintenance intervals or within the recommended maximum operating cycles.
24. Always make sure that the valve and the pipeline is depressurized before starting any kind of maintenance work at a valve.
25. Always check the position of the valve before starting maintenance work. Follow the Lock out /tag out (LOTO) rules at the site before starting any maintenance activity.
 - See IMO for the correct stem position.
 - Consider that the positioner may give the wrong signals.
26. Sealing materials (soft sealing parts) should be changed when the valve is in maintenance. Always use original equipment manufacturers (OEM) spare parts to ensure proper performance of the repaired valve.
27. All pressure containing parts must be inspected visually for damage or corrosion. Damaged parts must be replaced.
28. Valve pressure retaining parts and all internals must be inspected for corrosion or erosion which may result in reduced wall thickness on pressure retaining parts. Damaged pressure retaining parts must be replaced with original equipment manufacturer's (OEM) replacement parts or repaired to factory specifications by an authorized Valmet service partner in order to maintain the warranty.
29. Do not use sharp tools, grinding machines, or files to work on functional surfaces such as sealing, seating or bearing surfaces as this can damage these surfaces.
30. Check the condition of sealing surfaces on the seats, trim (disc, ball, plug, etc.), body and body cap. Replace parts if there are significant wear, scratches, or damage.
31. Check the wear of bearings and bearing contact surfaces on the shaft and replace damaged parts if necessary.
32. Do not weld on pressure retaining parts without an ASME and PED qualified procedure and personnel.
33. Pressure retaining parts of valves in high temperature applications must be carefully examined for the effects of material creep and fatigue.
34. Make sure that the valve is positioned in the correct flow direction into the pipeline.
35. If the valves are marked to be suitable for explosive atmospheres, the correct function of the discharging device must be tested before returning to service.
36. Always work in a clean environment. Avoid getting particles inside the valve due to machining, grinding, or welding nearby.
37. Never store a valve in maintenance without flow port protection.
38. When pressure testing valve seats, never exceed the maximum operating pressure of the system or the maximum shut-off pressure marked on the valve identification plate.
39. Actuator mounting and unmounting:
 - Before installing the actuator on to the valve, be sure the actuator is properly indicating the valve position. Failure to assemble these to indicate correct valve position may result in damage or personal injury.
 - When installing or removing a linkage kit, best practice is to remove the entire linkage assembly, including couplings which may fall off the valve during lifting or when position changes.
 - Mounting sets have been designed to support the weight of the Valmet actuator and recommended accessories either as is or with additional actuator support. Use of the linkage to support additional equipment or additional weight such as people, ladders, etc. may result in equipment damage or personal injury.
40. The valve should be installed between flanges using appropriate gaskets and fasteners that are compatible with the application, and in compliance with applicable piping codes and standards. Center the gaskets carefully when fitting the valve between the flanges. Do not attempt to correct pipeline misalignment by means of the flange bolting.
41. Repairs on valves for special service like Oxygen, Chlorine, and Peroxide, have special requirements.
 - Parts must be cleaned appropriate to the service and protected from contamination prior to assembly.
 - Assembly areas and tools must be clean and dry to prevent contamination of the parts during assembly.
 - Test equipment must be clean and dry to prevent contamination during testing. This includes the test equipment internals that may allow particles or other contamination into the test medium during the test.
 - Lubrication shall be used only if specifically required in the instructions. Where lubrication is required, the lubricant must be approved for the service by the end user.

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