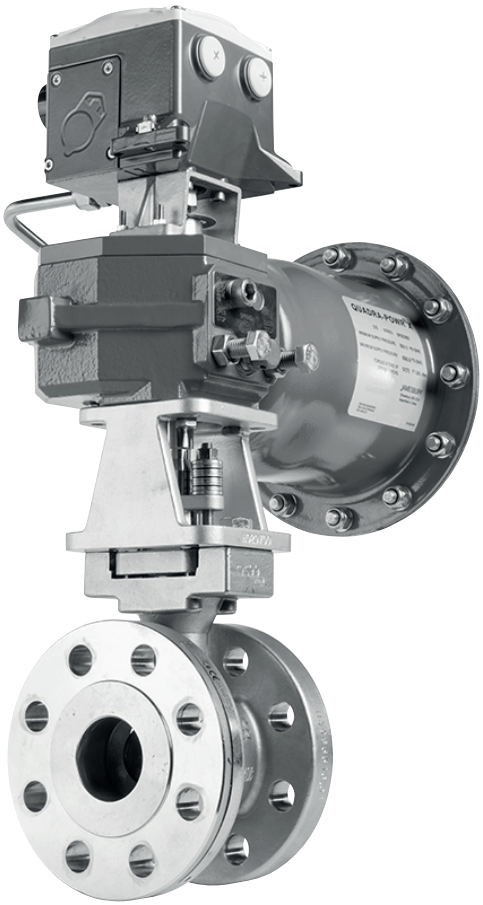
Neles™ Finetrol™ Eccentric rotary plug control valve

Installation, maintenance and operating instructions



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EAC 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 manual provides essential information for users of Finetrol® eccentric rotary plug control valves. If you need further information on actuators and other accessories, please refer to the individual manuals on their installation, operation and maintenance.

NOTE:
Selection and use of the valve in a specific application requires close consideration of many different aspects. Due to the nature of the product, this manual cannot cover all the individual situations that may occur when the valve is used.
If you are uncertain about use of the valve or its suitability for your intended purpose, please contact Valmet for more information.

1.2 Valve construction

The Finetrol eccentric rotary plug control valve is flanged (ASME 150-600, PN 10-100). The valve has one-piece body. The plug's seat is attached to the port using a flat-thread fitting which has some play; this is also used to adjust the seat. The valve is tight in both flow directions. The tightness derives from surface pressure between the plug and seat; pressure arises when the offset plug rotates against the seat. The valve is metal or soft seated. Stem blow-out is prevented by a shoulder machined on the stem and resting on the bonnet. The low capacity version has it's own, a different construction.

The valve is designed for control applications requiring high precision.

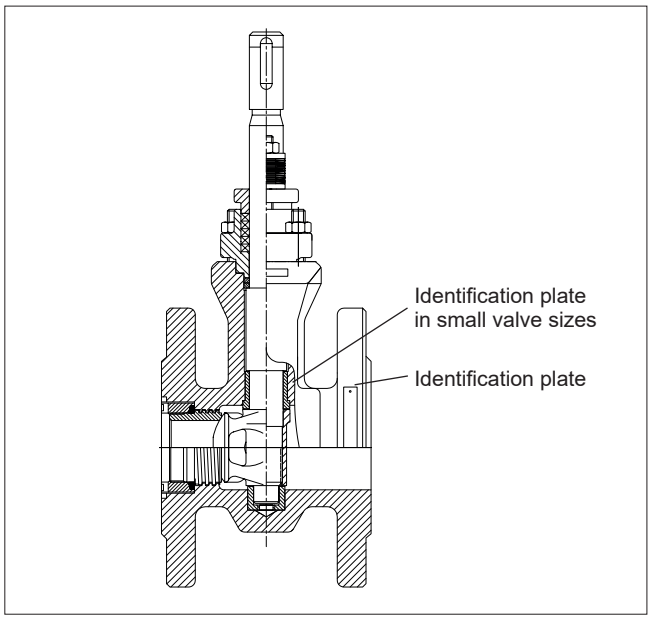


Fig. 1 Finetrol FC and FG series

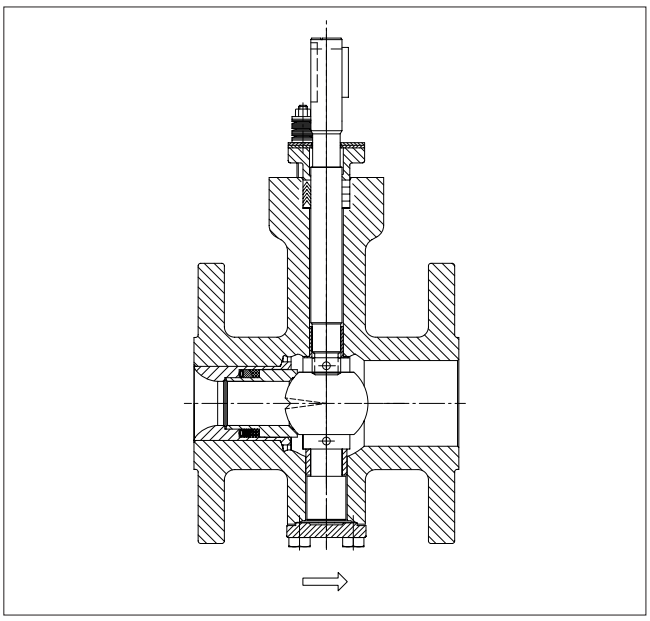


Fig. 2 Finetrol FL assembly

1.3 Valve markings

The valve has an identification plate.

A manufacturing number specific to each valve has been stamped on the side of the actuator plane.

The identification plate is normally located in the spherical area (outer diameter) of the pipe flange on the stem side, opposite to the seat. When using a small identification plate with a small size valve, the plate is installed to the valve body neck.

Identification plate markings:

1. Body material
2. Stem material / Shaft material
3. Plug material
4. Seat material
5. Maximum and minimum operating temperatures
6. Maximum differential shut-off pressure/temperature
7. Pressure class
8. Type designation
9. Valve manufacturing parts list no.
10. Model
11. Certification and approvals, eg. CE, Atex etc.

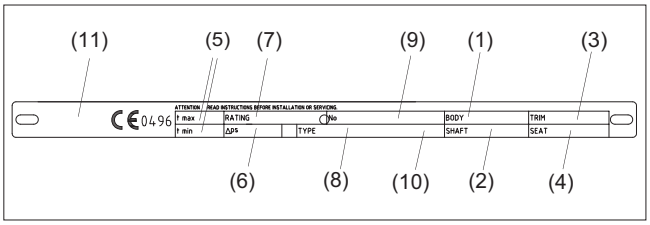


Fig. 3 Identification plate

1.4 Technical specifications

Face-to-face length:	ASME/ISA S75.04 ASME/ISA S75.03, IEC/EN 534-3-2 or ISO 5752 basic ser. 1
Body rating:	flanged up to ASME 600, PN 100 flangeless up to ASME 600, PN 100
Max. pressure differential:	according to ASME/EN body/flange rating or acc to Fig. 8-11, whichever is lower.
Temperature range:	graphite (PTFE lubricated) packing is recommended for temperatures exceeding 250 °C / 482 °F
	WCC/WCB body -29 to +425 °C -20 to +797 °F
	CF8M body -80 to +425 °C -112 to +797 °F
	1.0619 body -29 to +425 °C -20 to +797 °F
	1.4408 body -80 to +425 °C -112 to +797 °F
Flow direction:	Indicated by the arrow FTO = flow to open. Flow through seat ring and past the plug. Standard flow direction FTC = flow to close. Flow past the plug and through the seat ring. Recommended for erosive and flashing services.
Tightness:	IEC 60534-4 class IV/ FCI 70.2 Cl IV
Mediums:	Restrictions determined by material properties
Dimensions:	see Section 11

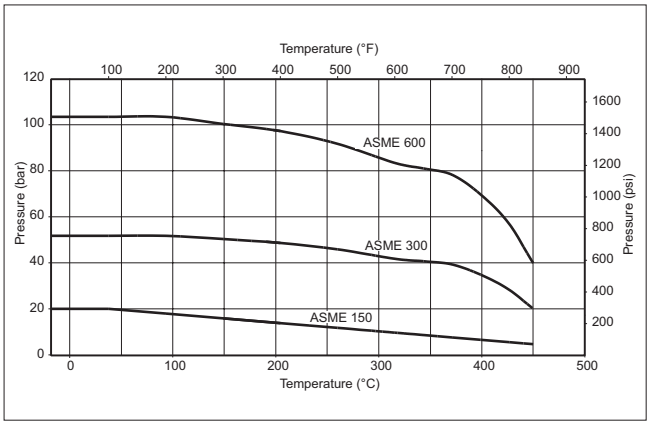


Fig. 4 Maximum pressure/temperature rating, A 216 Gr. WCC

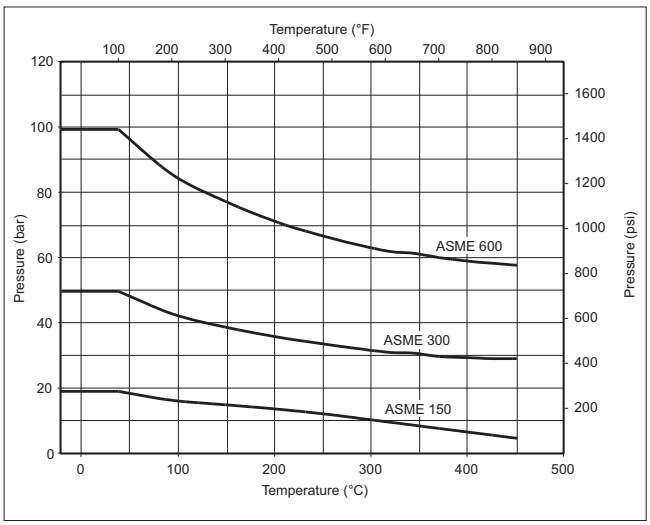


Fig. 5 Maximum pressure/temperature rating, A 351 Gr. CF8M

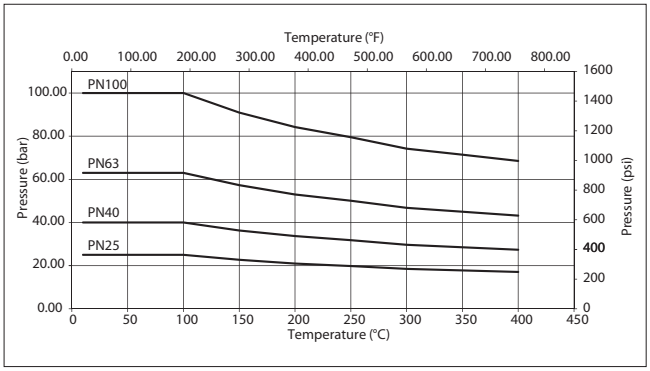


Fig. 6 Maximum pressure/temperature rating, 1.0619

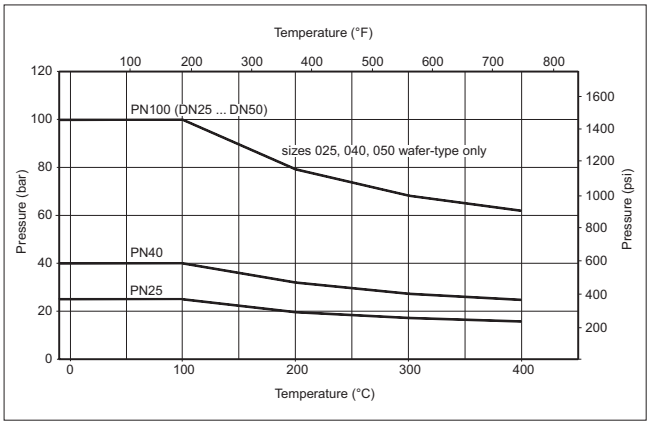


Fig. 7 Maximum pressure/temperature rating, 1.4408

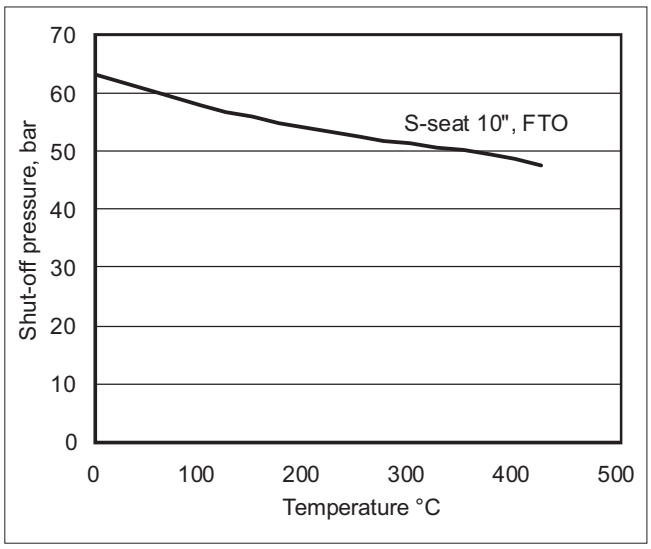


Fig. 8 17-4PH shaft in Flow-to-Open direction

Other sizes as per valve body pressure rating

FTO = Flow to open

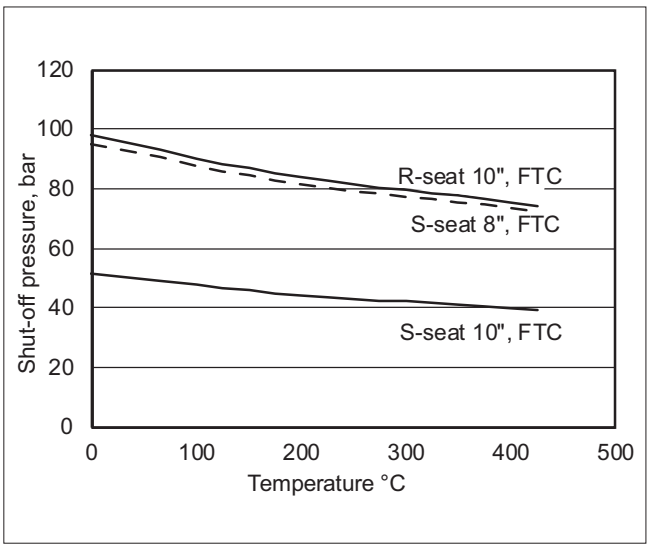


Fig. 10 17-4PH shaft in Flow-to-Close direction

Other sizes as per valve body pressure rating

FTC = Flow to close

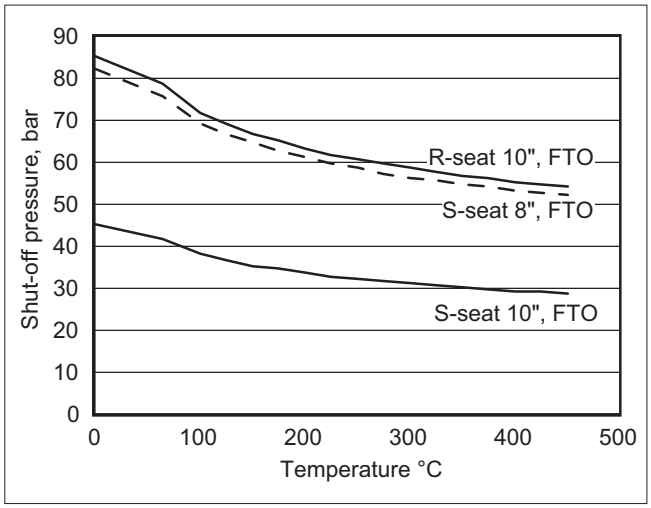


Fig. 9 XM-19 shaft in Flow-to-Open direction

Other sizes as per valve body pressure rating

FTO = Flow to open

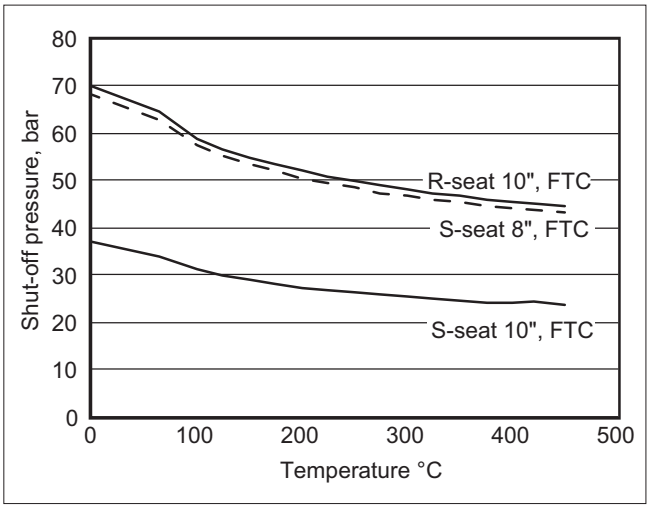


Fig. 11 XM-19 shaft in Flow-to-Close direction

Other sizes as per valve body pressure rating

FTC = Flow to close

1.5 Valve approvals

Valve design is based on requirements by EN and ASME standards.

Fire safety characteristics are defined according to API 607 and BS 6775.

A patent has been issued for the structure of the valve.

ATEX-classification: ATEX II 2G c.

1.6 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.

1.7 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.

1.8 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 yourself 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 plug 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 plug functions as a cutting device. The plug position may also change when the valve is moved. Close and detach the actuator pressure supply pipeline for valve maintenance. Failure to do this may result in damage or personal injury.

CAUTION:

Protect yourself from noise!

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 software. Observe the relevant work environment regulations on noise emission.

CAUTION:

Beware of a very cold or hot valve!

The valve body may be very cold or very hot during use. Protect yourself against cold injuries or burns.

CAUTION:

When handling the valve or the valve package, take its weight into account!

Never lift the valve or valve package by the actuator, positioner, limit switch or their piping.

More detailed information see Instructions for lifting Neles products 10LIFT70en.

NOTE:

A pipeline equipped with a Finetrol valve may not be cleaned with a pig!

This causes damage to the valve and the pig.

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.

1.9 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 chalks 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 devices for any damage that may have occurred during transport. Store the valve carefully before installation, preferably indoors in a dry place. Do not take the valve to the intended location and do not remove the flow port protectors until the valve is installed. The valve is delivered in the open position, with the exception of valve packages in which the actuator spring closes the valve.

3. INSTALLATION AND COMMISSIONING

3.1 General

Remove the flow port protectors and check that the valve is undamaged and clean inside.

CAUTION:
When handling the valve or the valve package, bear in mind its weight!

3.2 Installing in the pipeline

Flush or blow the pipeline carefully before installing the valve. Foreign particles, such as sand or pieces of welding electrode, will damage the plug sealing surface and seats.

The flow direction and mounting position do not place any restrictions on operation of the valve. You should, however, avoid installing the valve so that the stem points downwards because impurities travelling in the pipeline may then enter the space between the stem and the body and damage the packing.

Choose flange gaskets to suit the operating conditions.

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

Stress caused in the valve by pipeline vibration can be reduced by supporting the pipeline properly. Reduced vibration also helps ensure correct functioning of the positioner.

The flange type of a flanged model is given on the identification plate.

Servicing is facilitated if the valve needs no support. If necessary, you can support the valve by the body, using regular pipe clamps and supports. Do not fasten supports to the flange bolting or the actuator (see Fig. 12).

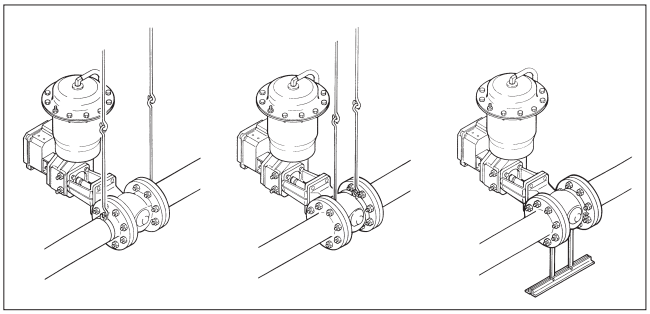


Fig. 12 Supporting the valve

Valve insulation

If necessary, the valve may be insulated. Insulation must not continue above the upper level of the valve body (see Fig. 13-15).

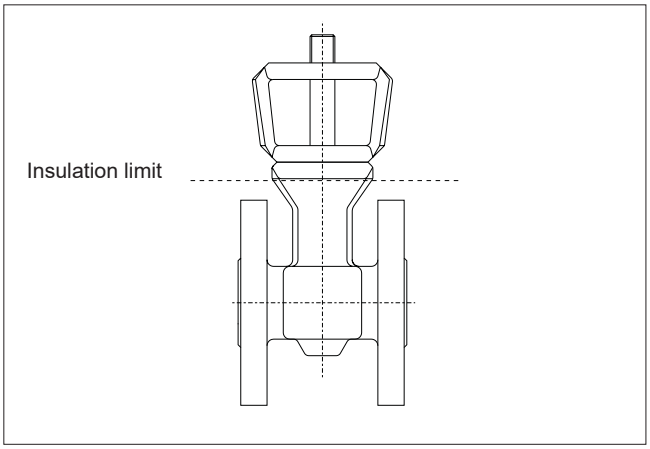


Fig. 13 Insulation of the high temperature valves

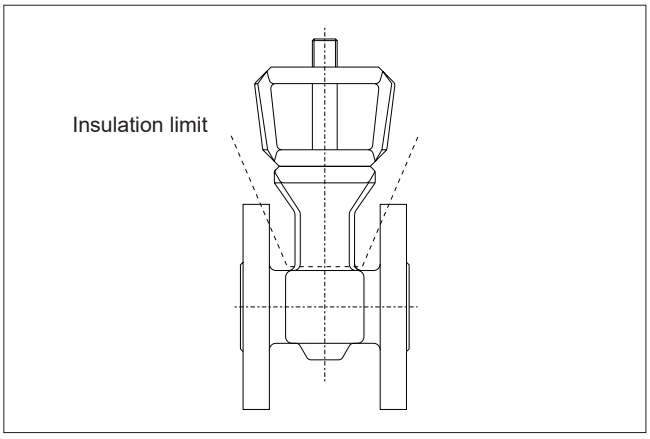


Fig. 14 Insulation of the low temperature valves without bonnet extension

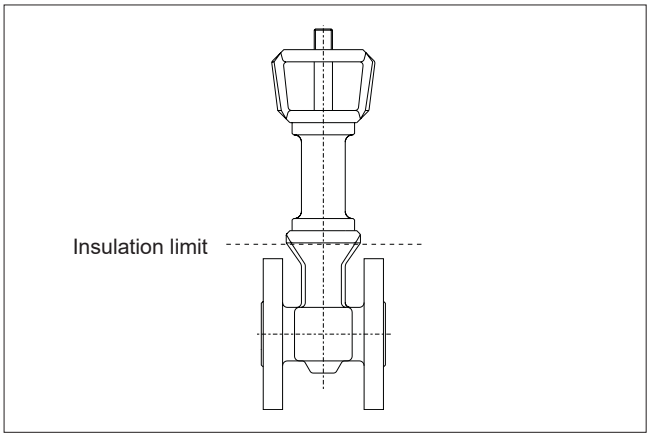


Fig. 15 Insulation of the cryogenic valves with extended bonnet

3.3 Actuator

NOTE:
When installing the actuator, make sure that the valve-actuator combination functions properly. Detailed information on actuator installation is given in Section 6 or in separate actuator instructions.

The plug position is indicated as follows:

- by a marking on the positioner and
- by a groove at the end of the valve stem and markings on side of the stem.

These are aligned with the plug. If there is any uncertainty about the marking on the positioner, check the plug position by the groove at the end of the stem or by markings on side of the stem.

If possible, install the valve so that the actuator can be disconnected without removing the valve from the piping.

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

In some cases, for instance when the actuator is exceptionally large or when there is lot of piping vibration, it may be advisable to support the actuator. Contact Valmet for more instructions.

3.4 Commissioning

Ensure that no dirt or foreign objects are left inside the valve or pipeline. Flush the pipeline carefully. Keep the valve entirely open during flushing.

Check all joints, pipings and cables.

Check that the actuator, positioner and limit switches are correctly adjusted. To adjust the devices, refer to their installation, operation and service manuals.

4. MAINTENANCE

CAUTION:
Observe the safety precautions mentioned in Section 1.8 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.

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 Repair of a jammed or stuck valve

Partial jamming may be due to accumulated flow medium between the plug and seats or in the bearing spaces. The plug and seats can be cleaned without removing the valve from the pipeline by turning the plug to the partly open position and flushing the pipeline. If this does not help, follow the instructions below.

4.3 Changing the packing

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

FC and FG series

The packings (69) can be replaced without removing the valve from the pipeline.

The packings must be changed if leakage occurs even after the nuts of the gland follower have been tightened. Packing rings/V-rings must be tightened with care. Excessive force will damage the packings.

Proceed as follows:

- Detach the actuator, see Section 4.4. Take care not to hit the end of the stem.
- Unfasten the screws (30) and detach the bracket (29).

- Unfasten the nuts (18), remove the disc springs (150) and lift the gland follower (9) from the stem. The studs (14) need not be detached.
- Remove the packing rings (69) from around the stem using a pointed instrument or a detaching tool. Do not damage the surfaces of the stem and the packing ring counterbore.
- Place the new packing rings (69) over the stem. Do not damage the sealing lips of the V-rings in the stem splines. Use the gland follower (9) as a tool for pushing the packing rings all the way in.
- Deform the packing rings first by tightening the gland nuts (18) without disc springs to the torque Tt, see the value from Table 2.
- Remove the gland nuts 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 Hc, see Table 2. Lock the nuts with locking compound e.g. Loctite 221. See Fig. 16
- Put the bracket (29) back, lubricate the screws (30) and tighten them. See Table 1.
- Insert the key (10) in the drive shaft (5) keyway.
- Re-install the actuator.
- Check leakage when the valve is pressurized

Table 1 Screw torques, Nm (for lubricated screws)

Material	M6	M8, UNC 5/16	M10, UNC 3/8	M12, UNC 1/2	M16, UNC 5/8	M20	M24
B8M Cl.1	4.7	10	18	38	88	190	320
L7M	10	23	41	85	200	420	720
A2/A4	8.6	18	33	70	160	340	590

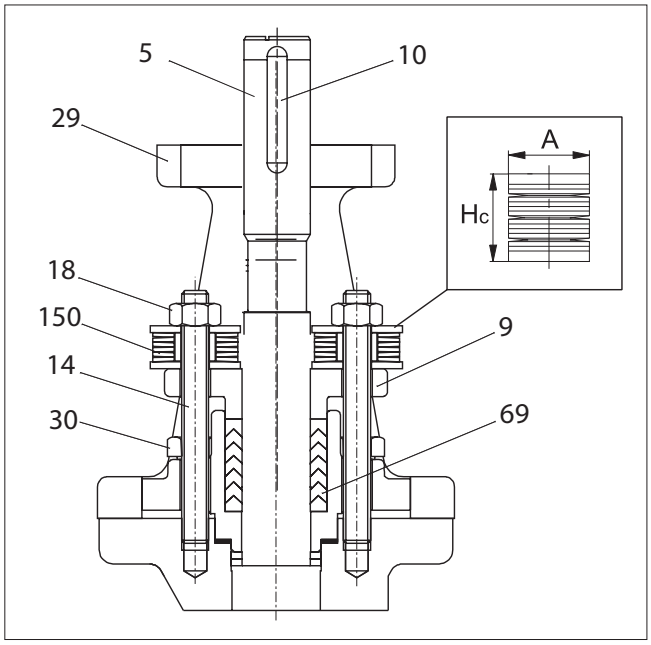


Fig. 16 Spring-loaded packing

Table 2 Tightening of the gland packing

Valve size		Shaft dia	Spring dimensions (free)		PTFE		Graphite	
					Disc spring	Nut	Disc spring	Nut
DN	NPS	mm	A, mm	H, mm	Hc, mm	Tt, Nm	Hc, mm	Tt, Nm
25	1	15	20	22	21	3	20.2	6
40	1.5	15	20	22	21	3	20.2	6
50	2	20	20	22	21	3	20	6
80	3	25	25	23.3	22.2	8	2	14
100	4	35	31.5	35.2	34.4	20	21.9	34
150	6	35	31.5	35.2	34.4	20	32	34
200	8	45	40	48.5	46.3	40	32	70
250	10	45	40	48.5	46.3	40	44.25	70
300	12	70	40	48.5	46.3	40	44.25	70

FL series

In gland packings, tightness is ensured by the contact between the gland follower and the packing rings. See Fig. 17.

The gland packing (20) must be replaced if leakage occurs even after the hexagon nuts (25) have been tightened.

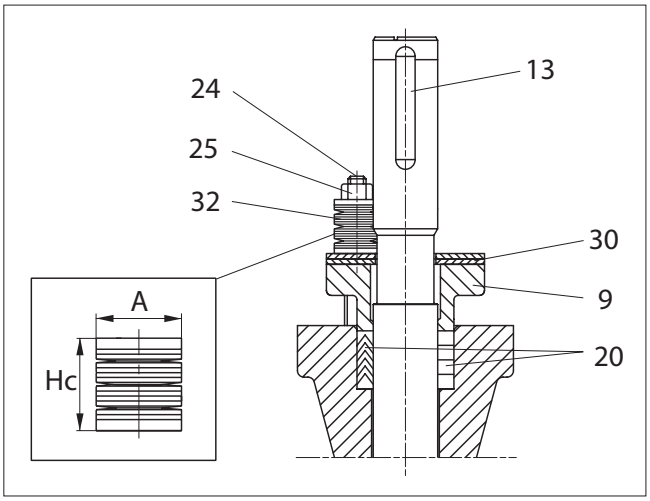


Fig. 17 Gland packing, FL

- Make sure that the valve is not pressurized.
- Detach the actuator and bracket according to the instructions in Section 4.4.
- Remove the key (13).
- Remove the hexagon nuts (25), disc spring sets (32), one stud (24), retaining plates (30) and gland follower (9).
- Remove the packing rings (20) from around the shaft using a knife or some other pointed instrument without scratching the surfaces.
- Clean the packing ring counterbore.
- Place the new packing rings (20) over the shaft (11). The gland follower may be used for pushing the rings into the counterbore. Do not damage packing rings in the shaft keyway. See Fig. 17.
- Screw down the removed stud.
- Deform the packing rings first by tightening the gland nuts (25) without disc springs to the torque Tt, see the value from Table 3.
- Remove the gland nuts and one stud. Mount the retaining plates (30) with the text UPSIDE on top, see Fig. 18, and the removed stud and place the disc spring sets (32) on the gland studs. Tighten the nuts (25) so that the disc springs are compressed to the height Hc, see Table 3. Lock the nuts with locking compound e.g. Loctite 221.

CAUTION:
For safety reasons the retainer plates MUST always be installed according to the above instructions.

- Insert the key (13) in the drive shaft (11) keyway.
- Re-install the actuator.
- Check leakage when the valve is pressurized.

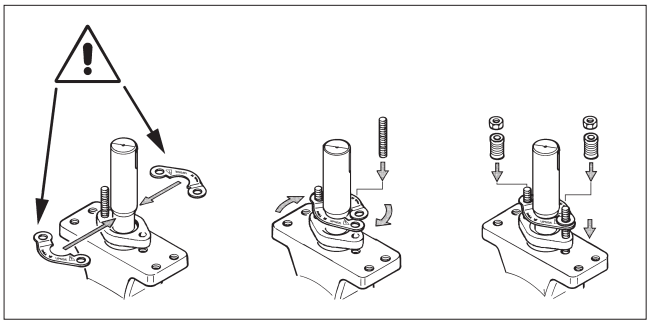


Fig. 18 Installing the retainer plates

Table 3 Tightening of the gland packing

A (mm)	Hc (mm)	Tt (Nm)
20	20.4	5

4.4 Detaching the actuator

CAUTION:
When handling the valve or the valve package, bear in mind its weight!

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 and its auxiliary devices before removing the valve from the pipeline. If the valve package is small or if it is difficult to access, it may be more practical to remove the entire package at the same time.

See Section 6 for details of detaching actuators.

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!

After you have detached the actuator as described above, unscrew the pipe flange bolts. If necessary, support the valve to prevent it from falling, for instance, with hoisting ropes. Turn the valve so that no medium is left inside.

4.6 Changing the seat

FC and FG series

- Remove the valve from the pipeline and the actuator from the valve as described above.
- Before starting to dismantle the valve operate the valve to fully closed position with proper handlever using torque value specified in Table 8.
- Remove the locking shoulders of the insert (2) and unscrew the insert using a special tool, see exploded view and parts list in Section 10. The special tool is available from the valve manufacturer.
- Remove the back seal (63) and unscrew the seat (7) from the valve body.
- Replace the insert (2), seat (7) and back seal (63) with new parts.
- Centre the plug (3) in the closed position relative to the flow port by turning the stem (5) with a hand lever.
- Lubricate the seat threads with Molykote D 321R or a similar substance. Screw the seat (7) into place by hand and centre the plug in the closed position with respect to the seat, by turning the stem with the hand lever using torque specified on Table 8.
- Install the back seal (63) into the insert.
- Screw the insert (2) onto the threads of the seat (7).
- Keep the seat (7) in place with the help of the plug (3) by turning the stem with the hand lever using torque specified on Table 8. At the same time tighten the insert (2) with a spanner wrench using torque specified on Table 4.
- Lock the insert by hitting it with a nail punch to make juts over two of the four available notches on the body.
- Install the actuator and adjust the limits (see Section 6).

FL series

NOTE:
The seat cannot be replaced without dismantling the valve.

- Turn the valve into closed position and place it vertically the seat side pipe flange toward a planar surface. Make sure that the surface is soft enough to prevent the pipe flange surface damages.
- There are two alternatives to remove the pins:
  a) carefully drill a 2 mm hole that is 10…12 mm deep to both pins (14) and remove the pins (14), shaft (12) and drive shaft (11),
  b) in the new versions where the pin drilling is made through the ball remove the pin locking made with centre punch carefully by drilling, turn the ball 180 degrees and push the pins via the hole. See Fig. 19.

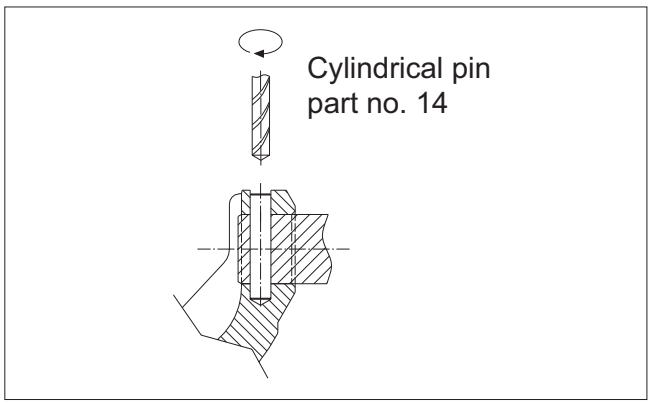


Fig. 19 Drilling the pin

- Remove the key (13) from the shaft (11). Unfasten the blind flange bolts (26) and remove the blind flange (10) and seal (19). Unfasten the nuts (25) and remove the disc spring sets (32), retainer plates (30) and gland (9). Remove the bearings (16, 17).
- Remove the ball (3) by turning it so that the shaft holes in the ball (3) are parallel to the valve body (1) flow bore.
- Remove the seat (7), back seal (6), support ring (8) and the spring (5). Note that part (4) is locked with a special tool to the valve body and is not recommended to be removed.
- Assemble a new back seal (6) into a new seat (6). Push the support ring (8) on the seat (6) following with the spring (5). Push these parts as a package in the body cavity. Note that part (4) is factory locked to the body and should not have been removed.
- Put the lower bearing (17) on the shaft (12) and the upper bearing (17) in the body cavity. Check that the pin holes in the ball (3) have not been damaged during dismantling.
- Assemble the ball (3) in the body and the shafts (11,12) through the shaft holes so that the pin holes are parellel with each other. Press the pins into the ball/shaft holes and lock them with a centre punch.
- Assemble the seal (19), blind flange (10) and the hexagon screws (26) and tighten.
- Assemble and tighten the studs (24), insert packing rings (20), gland (9), retainer plates (30), disc spring sets (32) and the nuts (25) and tighten.
- Insert the key (13) in the drive shaft (11) keyway.

4.7 Dismantling the valve

FC and FG series

- Remove the valve from the pipeline and dismantle the packing (69) as described above (see Section 4.3).
- Remove the locking shoulders of the insert (2) and unscrew the insert using a special tool, see exploded view and parts list in Section 10. The special tool is available from the valve manufacturer.
- Remove the back seal (63) and unscrew the seat (7) from the valve body.
- Unfasten the nuts (17) of the bonnet. Pull the bonnet out and remove the bonnet seal (66) from under the bonnet.
- Pull the stem (5) out from the body (1).
- Remove the plug (3) from the body through the flow opening.
- Detach the upper bearing (15) from the body by tapping it through the stem bore, using a suitable bar. **Do not use the stem!**
- Detach the lower bearing using a special tool and drive shaft. Set up the tool as illustrated in Fig. 20. Use a soft hammer to carefully hit shaft end. This will detach the bearing.

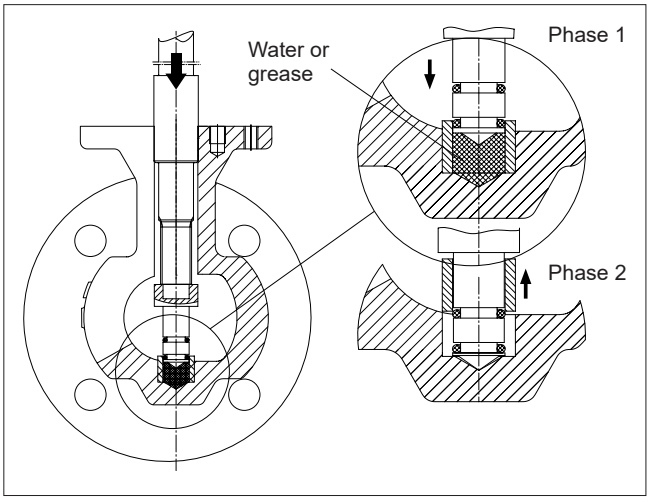


Fig. 20 Removal of the lower bearing

FL series

- Turn the valve into closed position and place it vertically the seat side pipe flange toward a planar surface. Make sure that the surface is soft enough to prevent the pipe flange surface damages.
- There are two alternatives to remove the pins:
  a) Carefully drill a 2 mm hole that is 10…12 mm deep to both pins (14) and remove the pins (14), shaft (12) and drive shaft (11),
  b) If the pin drilling is made through the ball, remove the pin locking made with centre punch carefully by drilling. Turn the ball 180 degrees and push the pins via the hole. See Fig. 19 and 21

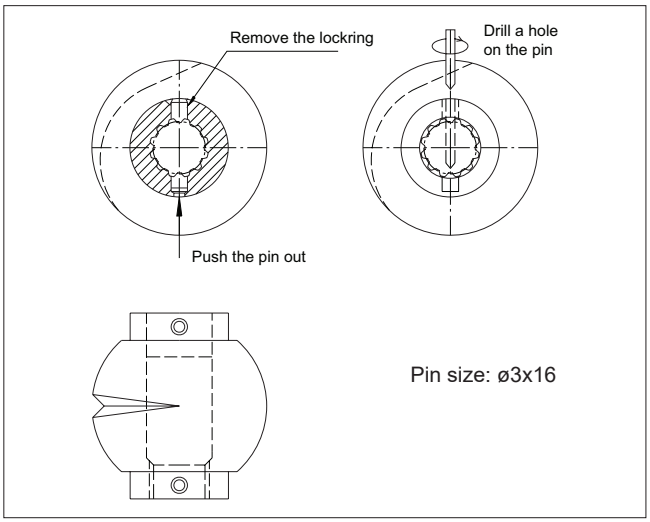


Fig. 21 Drilling the pin, FL

- Remove the key (13) from the shaft (11). Unfasten the blind flange bolts (26) and remove the blind flange (10) and seal (19). Unfasten the nuts (25) and remove the disc spring sets (32), retainer plates (30) and gland (9). Remove the bearings (16, 17).
- Remove the ball (3) by turning it so that the shaft holes in the ball (3) are parallel to the valve body (1) flow bore.

- Remove the seat (7), back seal (6), support ring (8) and the spring (5). Note that part (4) is locked with a special tool to the valve body and is not recommended to be removed.

4.8 Cleaning and inspection of removed parts

We recommend that soft material parts be replaced whenever the valve is dismantled for servicing. Clean the other parts removed. If you use a detergent, rinse the parts carefully after washing. Handle detergents with sufficient care and follow the instructions for their use. Check the parts for wear and replace worn parts. The insert (2) must be changed when the seat (7) is changed.

4.9 Assembly

FC and FG series

- Lubricate the seat threads with Molykote 321R or a similar substance.
- Screw the seat loosely to the end of the body threads.
- Place the valve so that the flange rests on a soft base and the threaded flow port is pointing downwards.
- Push the lower bearing (16) into place using the stem as help. Avoid forcing it.
- **Valves manufactured before January 1, 1995:**
  Slip the upper bearing (15) on the stem.
  Valves manufactured after January 1, 1995: (Mark "A" in the ID plate field MOD):
  Slip the upper bearing (15) through the flow port into body counterbore.
- Place the plug (3) into the body on the seat, in the closed position. Make sure that the plug is in the correct position: the splines must face the lower bearing (sizes DN 25 and 50 have splines facing both the upper and lower bearings) and the position of the contour of the plug with respect to the body must be as shown in the exploded view.
- Slip the stem through the plug. One tooth has been removed from the stem, so there is only one way of fitting the stem into the plug. Keep the plug in place by pressing it against the seat; the seat should not be screwed in too deep. Do not force the stem through the plug. After you have assembled the valve, you will see the plug position from the marking at the end of the stem or from markings on the side of the stem.
- Slip the thrust bearings (70) on the stem.
- Place a new bonnet seal (66) into the bonnet (8) and assemble the bonnet. Fasten the lubricated hexagon nuts (17) onto the studs (13) and tighten them alternately. See Table 1.
- Push the packings/V-ring set (69) onto the stem and on into the packing recess. Take care not to damage the packing rings/V-rings in the stem splines. Use the gland follower (9) to push the packings all the way down.
- Install the gland follower (9). Tighten the hexagon nuts (18) onto the studs (14) by hand.
- Install the bracket (29), lubricate the screws (30) and tighten them. See Table 1.
- Turn the valve so that it rests on the other flange (the threaded flow port pointing upwards).
- Centre the plug (3) relative to the seat (7) by turning the stem with the hand lever.
- Screw the seat (7) against the plug by hand.
- Install the back seal (63) into the insert (2).
- Screw the insert (2) onto the threads of the seat (7).
- Keep the seat (7) in place with the help of the plug (3) by turning the stem with the hand lever using torque specified on Table 8. At the same time tighten the insert (2) with a spanner wrench using torque specified on Table 4.
- A light can be shined behind the plug to determine the best possible alignment. The best alignment is when the least amount of light can be seen between the plug and seat.
- Lock the insert by hitting it with a nail punch to make juts over two of the four available notches on the body.
- Tighten the gland nuts (18) 1.5 to 2 turns using a wrench. The packings are damaged if they are tightened too much.

Table 4 Insert torques, graphite and PTFE back seal

Size		Graphite back seal		PTFE back seal	
DN	NPS	Nm	ft lb	Nm	ft lb
25	1	30	22	20	15
40	1.5	70	52	50	37
50	2	120	89	90	66
80	3	330	244	230	170
100	4	500	370	350	260
150	6	900	666	630	465
200	8	2400	1776	1700	1250
250	10	3200	2368	2200	1650
300	12	5000	3676	-	-

FL series

- Assemble the back seal (6) into the seat (7). Push the support ring (8) on the seat (6) following with the spring (5). Push these parts as a package in the body cavity. Note that part (4) is factory locked to the body and should not have been removed.
- Put the lower bearing (17) on the shaft (12) and the upper bearing (17) in the body cavity. Check that the pin holes in the ball (3) have not been damaged during dismantling.
- Assemble the ball (3) in the body and the shafts (11,12) through the shaft holes so that the pin holes are parellel with each other. Press the pins into the ball/shaft holes and lock them with a centre punch. See Fig. 21.
- Assemble the seal (19), blind flange (10) and the hexagon screws (26) and tighten.
- Assemble and tighten the studs (24), insert packing rings (20), gland (9), retainer plates (30), disc spring sets (32) and the nuts (25) and tighten.
- Insert the key (13) in the drive shaft (11) keyway.

5. TESTING THE VALVE

CAUTION:
Pressure testing should be carried out using equipment conforming to the correct pressure class!

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

The pressure test should be carried out in accordance with an applicable standard, using the pressure rating required by the pressure class or flange bore of the valve. The valve must be in an open position during the test. Water is used as the medium.

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

6. INSTALLING AND DETACHING THE ACTUATOR

6.1 General

Different Neles actuators can be mounted using suitable brackets and couplings. The valve can be operated, for example, by actuators of the Quadra-Powr or B1 series.

6.2 Installing the Quadra-Powr actuators

General

CAUTION:
Beware of the plug cutting movement!

NOTE:
Adjust the positioner always after installating the actuator!

- The Quadra-Powr actuator can be used for ’spring-to-close’ or ’spring-to-open’ operations, depending on its installation position. Fig. 22 shows the installation positions for both options.

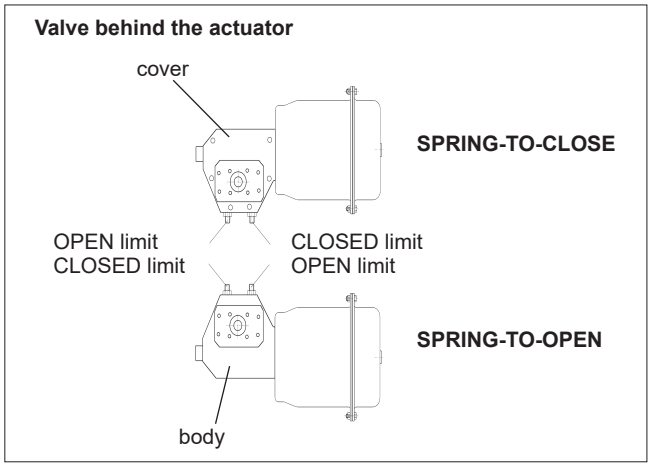


Fig. 22 Installation of the Quadra-Powr actuator and adjustment of the open and closed limits

Spring to close

CAUTION:
Beware of spring forces when using compressed air to drive the actuator to the correct installation position!

- The actuator must be free from pressure and the air supply connection must be open.
- Turn the plug closed position. The line at the end of the stem shows the position.
- Clean the stem bore and lubricate it.
- Push the actuator carefully onto the valve stem. Make sure that the installation position is correct. Avoid forcing it, since this may damage the plug and seat.
- Connect the supply pressure to the actuator. Increase the pressure slowly until the actuator is perpendicular or parallell (depending on the mounting position) to the flow opening.
- Lubricate the actuator mounting screws and fasten them. Tighten the screws on actuator side first, then the other ones. See Table 1.
- Adjust the valve open and closed limits by means of the screws on the side of the actuator. Remember to tighten the locking nuts. See Fig. 22. **Keep your fingers out of the flow bore!**
- Adjust the closed limit of the actuator to the contact point using the supply pressures given in Table 5 (applies not to low C_V valves). Select the pressure according to the flow direction and the operation mode of the actuator. The pressure relieves the opening in the ’spring-to-close’ actuators.

Spring to open

CAUTION:
Beware of spring forces when using compressed air to drive the actuator to the correct installation position!

- Clean the stem bore and lubricate it.
- Connect the supply pressure to the actuator. Operate the actuator until it reaches closed position.
- Turn the plug closed position. The line at the end of the stem shows the position.
- Push the actuator carefully onto the valve stem. Make sure that the installation position is correct. Avoid forcing it, since this may damage the plug and seat.
- Increase the supply pressure slowly until the actuator is perpendicular or parallell (depending on the mounting position) to the flow opening.
- Lubricate the actuator mounting screws and fasten them. Tighten the screws on actuator side first, then the other ones. See Table 1.
- Adjust the valve open and closed limits by means of the screws on the side of the actuator. Remember to tighten the locking nuts. See Fig. 22. **Keep your fingers out of the flow bore!**
- Adjust the closed limit of the actuator to the contact point using the supply pressures given in Table 5 (applies not to low C_V valves). Select the pressure according to the flow direction and the operation mode of the actuator. The pressure relieves the opening in the ’spring-to-close’ actuators.

NOTE:
If the supply pressure is higher than the values given in Table 5, the stem of a valve equipped with a ’spring-to-open’ actuator may be damaged when the valve is closed.

Table 5 Supply pressures for adjusting the closed limit, Quadra-Powr actuators

Valve size	Actuator	Spring	Supply pressure, bar	
			Spring-to-close	Spring-to-open
DN25	QP 1	C	0.8	3.4
	2	B	0.8	2.3
	2	C	1.3	3.2
DN40	1	C	0.7	3.4
	2	B	0.7	2.3
	2	C	1.2	3.2
DN50	2	B	0.5	2.6
	2	C	1.0	3.5
	2	D	1.4	4.0
	3	B	0.8	2.3
	3	C	1.3	3.1
	3	D	1.7	3.9
DN80	3	C	1.0	3.5
	3	D	1.4	4.2
	4	B	0.8	2.2
	4	C	1.3	3.1
	4	D	1.9	3.7
DN100	4	C	0.8	3.5
	4	D	1.3	4.2
	5	B	0.7	2.3
	5	C	1.2	3.1
	5	D	1.8	3.8
DN150	5	B	0.6	2.4
	5	C	1.1	3.2
	5	D	1.7	3.9

Note: This table is not applicable to low Cv valves

6.3 Installing the B1C series actuators

CAUTION:
Beware of plug cutting movement!

- Turn the valve to the closed position and drive actuator piston to the extreme outward position.
- Clean the stem bore.

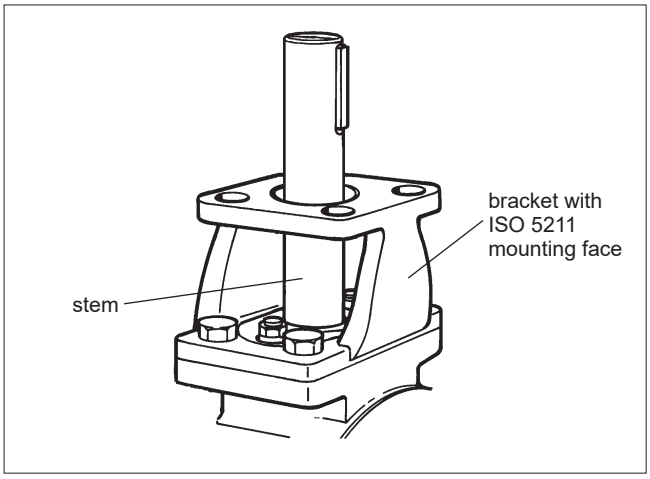


Fig. 23 Bracket mounted on valve.

- Place a coupling over the stem, when applicable. Note the correct position. The line at the end of the stem indicates the direction of the flow bore.
- Lubricate the stem and stem bore. Fasten the bracket loosely to the valve.
- Slip the actuator carefully onto the stem. Avoid forcing it since this may damage the plug 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. See table 1 for torques.
- Adjust the plug open and closed positions by means of the actuator stop screws located at both ends, Fig. 24. An accurate open position can be seen in the body flow bore. Check that the yellow arrow on the actuator indicates the plug flow opening position. **Keep fingers out of the flow bore!**

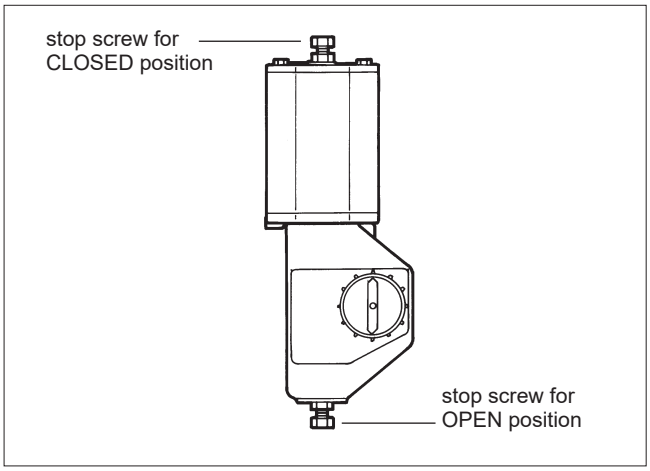


Fig. 24 Adjusting the open and closed position

- Adjust the closed limit of the actuator to the contact point using the supply pressures given in Table 6 (does not apply to low C_v valves).
- Check the stop screw thread tightness. The threads must be sealed using an appropriate non-hardening sealant, e.g Loctite 225.
- Check that the actuator is functioning correctly. Drive the actuator piston to both cylinder ends and check the plug 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.

Table 6 Supply pressures for adjusting the closed limit, B1C and B1J actuators

Valve size	Actuator	Supply pressure, bar
DN25	B1C 6	0.8
DN40	6	0.9
DN50	6	1.6
	9	0.8
DN80	9	1.6
	11	0.9
DN100	11	2.2
	13	1.0
DN150	13	1.3
	17	0.7
DN200	17	1.3
	20	1.1
DN250	20	1.3
	25	0.7
DN25	B1J 6	0.9
DN40	B1J 6	0.9
DN50	B1J 6	0.5
DN25	B1J 8	1.2
DN40	8	1.1
DN50	8	1.0
DN80	10	0.9
	12	1.2
DN100	12	0.8
	16	1.1
DN150	16	1.0
	20	1.2
DN200	20	1.0
DN250	25	1.1
DN25	B1JA 8	2.7
DN40	8	2.8
DN50	8	2.9
DN80	10	2.9
	12	2.8
DN100	12	3.1
DN150	16	2.9
	20	2.7
DN200	20	2.8
DN250	25	2.7

Note: This table is not applicable to low Cv valves

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 Detaching B series actuators

- Disconnect the actuator from its power source; detach the air supply pipe and control signal cables or pipes from their connectors.
- Unscrew the bracket screws.
- Detach the actuator using a suitable extractor, see Fig. 25. The tool can be ordered from the manufacturer.

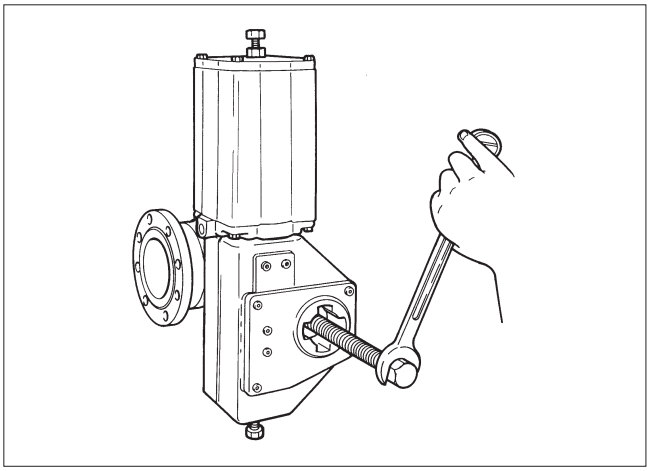


Fig. 25 Detaching B series actuator

- Remove the bracket and coupling, if any.

6.6 FL low C_V valve

- Adjust the open and closed limits by means of the actuator stop screws only. See Table 7 for dead angle.
  Table 6, 8 and 11 are not applicable.

Table 7 Dead angle in degrees

Valve type	Dead angle
FL01 _ _ _ +C1	9.9°
FL01 _ _ _ +C2	9.9°
FL01 _ _ _ +C3	8.8°

6.7 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.
- If the actuator has a torque switch, like the Auma actuators, closing torques must meet the values given in Table 8.
- If the torque is not within the adjusting range, a mechanical or inductive switch must be used.

Table 8 Closing torques

	Torque, Nm	
	Metal seat	Soft seat
25	15	15
40	20	20
50	40	40
80	62	70
100	155	170
150	300	350
200	550	600
250	600	700
300	1100	-

7. MALFUNCTIONS

The following Table 9 lists malfunctions that might occur after prolonged use.

Table 9 Malfunctions

Symptom	Possible fault	Recomended actions
Leakage through the valve	The valve is not in closed position.	Check the position by means of actuator indicator arrow or shaft marking.
	The actuator is not mounted to the correct splines.	Check the mounting position and remount if required.
	The open and closed limits incorrectly adjusted.	Check the adjustment.
	The positioner incorrectly adjusted.	Adjust the positioner.
	Internal parts, plug (3) and seat (7) damaged.	Replace the damaged parts.
Leakage out of the valve	Gland packing (69) is leaking.	Tighten the packing. Do not use excessive force. Replace the gland packing if required.
	Leakage between body (1) and bonnet (8).	Replace the bonnet seal (66).

8. TOOLS

In addition to standard tools, the following special tools might facilitate some phases of the work. The tools can be ordered from the manufacturer.

- For removal of the actuator
  - Extractor (ID-code table in actuator's IMO)
- To remove/tighten the insert
  - seat retainer tool

Table 10 Seat retainer tools (Valve Series Finetrol FC and FG)

Product:	ID:
DN 25 (1")	975800
DN 40 (1½")	975780
DN 50 (2")	975760
DN 80 (3")	975740
DN 100 (4")	975720
DN 150 (6")	975140
DN 200 (8")	H194039
DN 250 (10")	H077813
DN 300 (12")	H242762

- To turn a splined stem
  - hand lever

Table 11 Hand lever wrench, 4 keyways

Product:	ID:
Hole Ø120 X lenght 780 mm	H108850
Hole Ø105 X lenght 780 mm	H108848
Hole Ø95 X lenght 770 mm	H108847
Hole Ø85 X lenght 760 mm	H108845
Hole Ø75 X lenght 555 mm	H108844
Hole Ø70 X lenght 555 mm	H108843
Hole Ø65 X lenght 550 mm	H108842
Hole Ø55 X lenght 550 mm	H108841
Hole Ø50 X lenght 550 mm	H108839
Hole Ø45 X lenght 440 mm	H108838
Hole Ø40 X lenght 430 mm	H108837
Hole Ø35 X lenght 278 mm	H108836
Hole Ø30 X lenght 278 mm	H108835
Hole Ø25 X lenght 272 mm	H108833
Hole Ø20 X lenght 270 mm	H108832
Hole Ø15 X lenght 270 mm	H108828

9. ORDERING SPARE PARTS & TOOLS

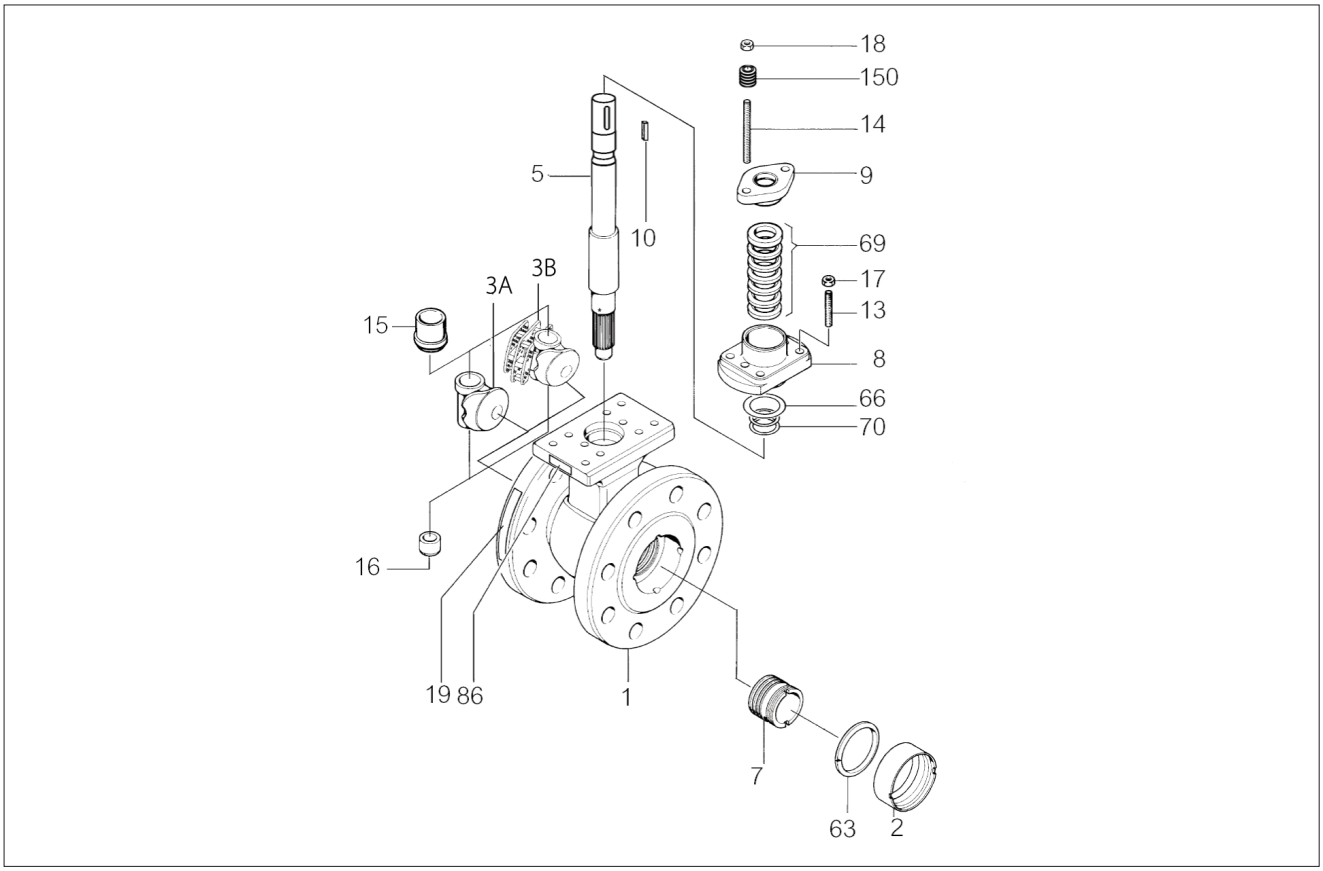
When ordering spare parts, always include the following information:

- 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.

10. EXPLODED VIEW AND PARTS LIST

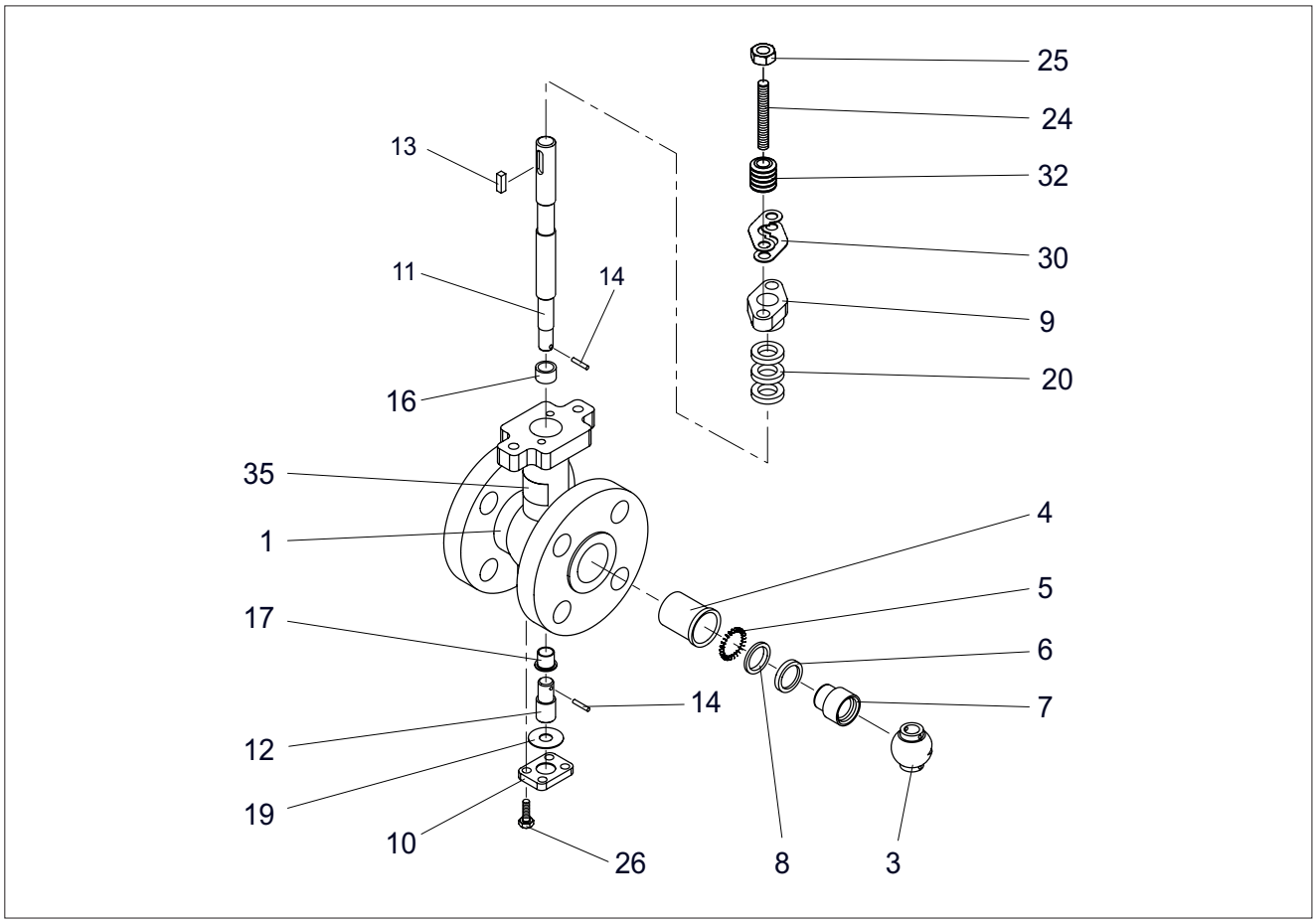
10.1 Series FC and FG



Item	Qty.	Description	Spare part category
1	1	Body	
2	1	Insert	2
3	1	Plug	3
3a	1	Plug with Q-plate	3
5	1	Stem (one piece shaft)	3
7	1	Seat	2
8	1	Bonnet	
9	1	Gland	
10	1	Key	
13	4	Stud	
14	2	Stud	
15	1	Upper bearing	3
16	1	Lower bearing	3
17	4	Hexagon nut	
18	2	Hexagon nut	
19	1	Identification plate	
63	1	Back seal	2
66	1	Bonnet seal	1
69	1	Gland packing	1
70	2	Thrust bearing	3
86	1	Flow direction arrow	
150	2	Disc spring set	

Spare part category 1: Spare part set. Recommended soft parts, always needed for the repair.
Spare part category 2: Seat set. Parts for replacing of the seat. Available only 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.

10.2 Series FL

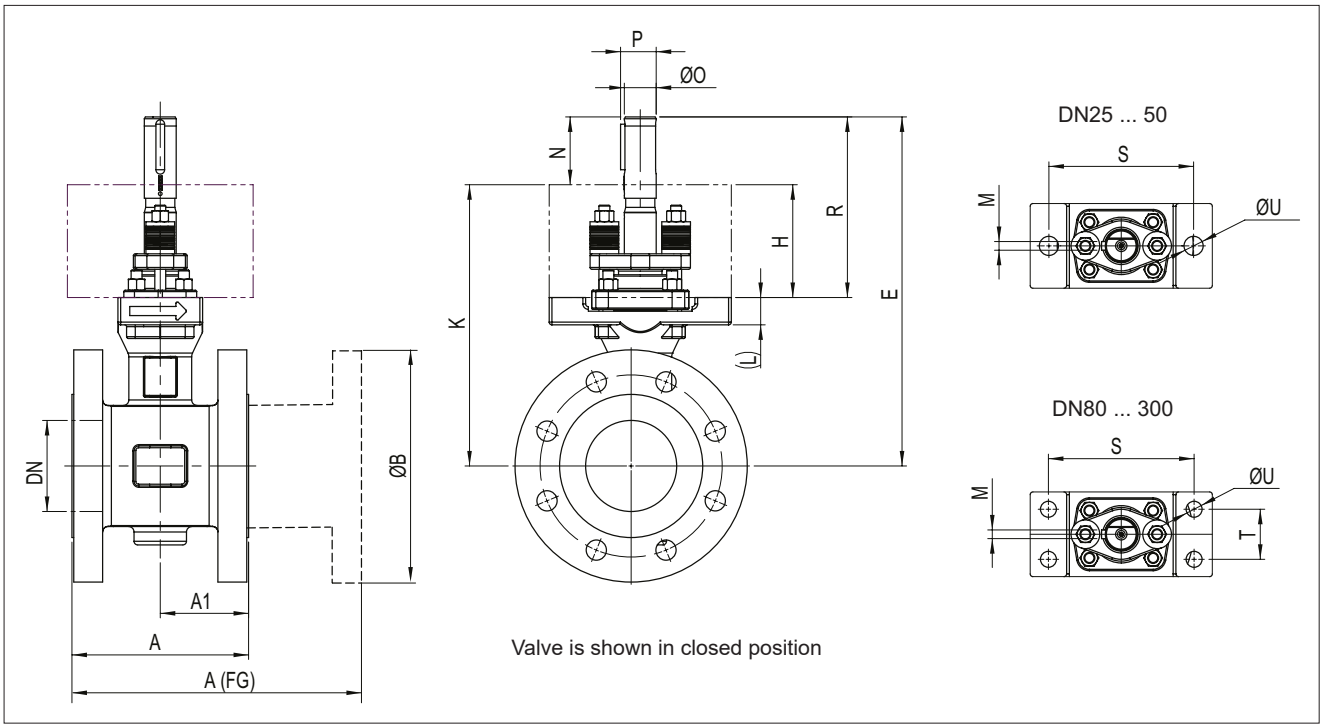


Item	Qty.	Description	Spare part category
1	1	Body	
3	1	Ball	3
4	1	Bushing	2
5	1	Spring	2
6	1	Back seal	2
7	1	Seat	2
8	1	Support ring	2
9		Gland	
10		Blind flange	
11	1	Drive shaft	3
12	1	Shaft	3
13	1	Key	3
14	2	Cylindrical pin	3
16	1	Upper bearing	3
17	1	Lower bearing	3
19	1	Gasket	1
20	1	Gland packing	1
24	2	Stud	
25	2	Hexagon nut	
26	4	Hexagon screw	
30	2	Retainer plate	
32	2	Disc spring set	
35	1	Identification plate	

Spare part category 1: Spare part set. Recommended soft parts, always needed for the repair.
Spare part category 2: Seat set. Parts for replacing of the seat. Available only 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.

11. DIMENSIONS

11.1 Series FC & FG

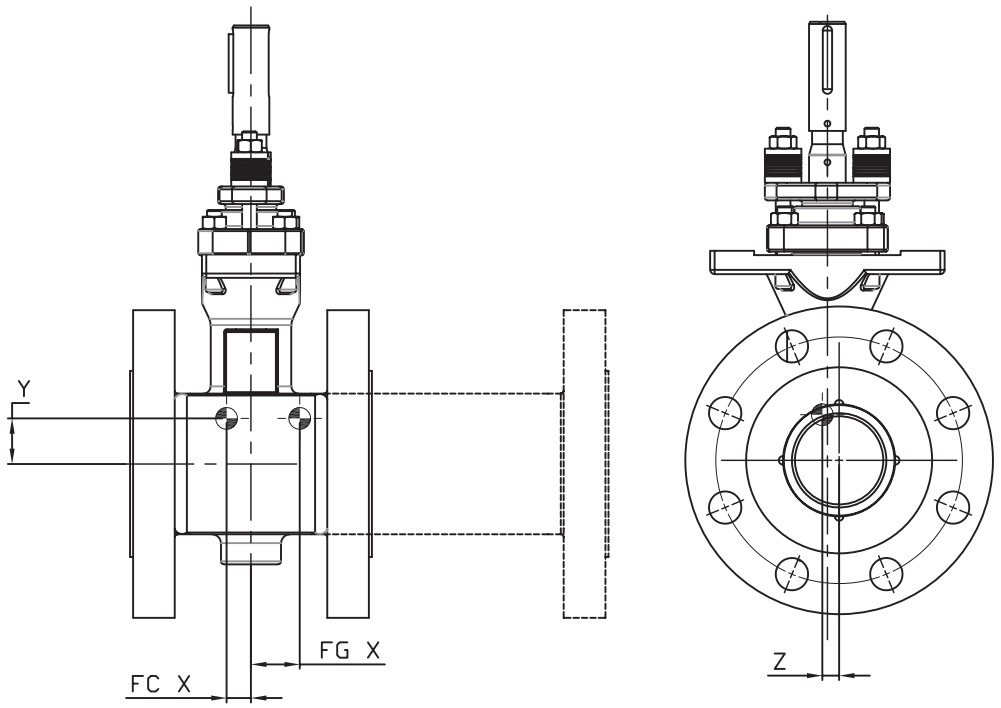


Valve is shown in closed position

DN/Inch	Dimensions, mm																
	Series FC	Series FG, globe face to face			A1	K	S	T	U	L	H	E	R	øO	M	P	N
		A															
	A	#150	#300	#600													
25/1”	102	184	197	210	51	192	90	-	2 x M12	18	90	217	115	15	4,76	17	25
40/1 1/2”	114	222	235	251	57	207	90	-	2 x M12	18	90	232	115	15	4,76	17	25
50/2”	124	254	267	286	62	217	90	-	2 x M12	18	90	252	125	20	4,76	22,2	35
80/3”	165	298	318	337	82,5	253	130	32	4 x M12	16	110	299	156	25	6,35	27,8	46
100/4”	194	352	368	394	97	325	160	55	4 x M20	30	140	383	198	35	9,53	39,1	58
150/6”	229	-	-	-	114,5	365	160	55	4 x M20	30	140	423	198	35	9,53	39,1	58
200/8”	243	-	-	-	121,5	473	230	90	4 x M24	36	180	553	260	45	12,7	50,4	80
250/10”	297	-	-	-	148,5	510	230	90	4 x M24	36	180	590	260	45	12,7	50,4	80
300/12”	338	-	-	-	169	530	230	90	4 x M24	35	215	630	315	70	19	75	100

DN/Inch	Flange dimensions (B) and weights														
	ASME 150			ASME 300			ASME 600			PN 10	PN 16	PN 25	PN 40	PN 63	PN 100
	ØB	Kg(FC)	Kg(FG)	ØB	Kg(FC)	Kg(FG)	ØB	Kg(FC)	Kg(FG)	ØB					
25/1”	110	8	9	125	8	9	125	9	10	115	115	115	115	140	140
40/1 1/2”	125	11	12	155	11	13	155	12	13	150	150	150	150	170	170
50/2”	150	18	20	165	18	21	165	19	21	165	165	165	165	180	195
80/3”	190	24	26	210	24	28	210	26	30	200	200	200	200	215	230
100/4”	230	41	44	255	41	45	275	46	53	220	220	235	235	250	265
150/6”	280	58	-	320	58	-	355	73	-	285	285	300	300	345	355
200/8”	345	140	-	380	140	-	420	165	-	340	340	360	375	415	430
250/10”	405	190	-	445	190	-	510	230	-	395	405	425	450	470	505
300/12”	-	-	-	520	220	-	-	-	-	-	-	-	520	-	-

Dimension for low CV version (Class 300)															
DN	A	A1	K	S	T	U	L	H	E	R	øO	M	P	N	ØB	Kg
25	102	51	180	70	-	2 x M10	15,5	78	205	103	15	4,76	17	25	125	5



NOTE! Center of mass values ere approximate based on 3D-models.
Please be aware the actual values may vary due to manufacturing tolerances.

	FC Class 150-300			FC Class 600			FG Class 150			FG Class 300			FG Class 600		
Size	**X**	**Y**	**Z**	**X**	**Y**	**Z**	**X**	**Y**	**Z**	**X**	**Y**	**Z**	**X**	**Y**	**Z**
3	3	25	2	3	24	2	38	28	2	53	22	2	61	20	2
4	3	35	2	3	31	2	42	37	3	55	31	2	71	26	2
6	7	28	3	5	22	2	65	29	3	85	22	2	109	18	2
8	7	50	6	6	39	5	89	47	6	108	40	5	137	30	4
10	12	45	8	8	35	6	117	42	8	144	34	6	174	25	4
	FC Class 150-300 Cryo			**FC Class 600 Cryo**			**FG Class 150 Cryo**			**FG Class 300 Cryo**			**FG Class 600 Cryo**		
Size	**X**	**Y**	**Z**	**X**	**Y**	**Z**	**X**	**Y**	**Z**	**X**	**Y**	**Z**	**X**	**Y**	**Z**
3	2	110	4	2	101	3	27	118	4	40	98	3	48	89	3
4	2	137	4	2	118	4	30	144	5	42	124	4	56	106	4
6	5	108	5	4	84	4	52	52	5	72	89	4	96	70	3
8	5	170	9	5	134	8	68	165	9	86	143	8	116	108	7
10	9	145	11	7	106	8	96	139	11	122	116	9	156	82	6

12. TYPE CODE

FINETROL eccentric rotary plug control valve									
1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**
FC	04	D	W	TA	S6	KB	SGT	D	A

ASME / ISA VALVES	
1.	**Valve Series and face-to-face length**
FC	Finetrol rotary control valve, flanged face-to-face length acc. to ISA S75.04
FG	Finetrol rotary control valve, flanged, face-to-face length acc. to ISA S75.03 globe valve face-to-face
FL	Finetrol rotary control valve, flanged, face-to-face length acc. to ISA S75.04. Low Cv construction for size 1"

2.	**Size**
01	1"
1H	1 1/2"
02	2"
03	3"
04	4"
06	6"
08	8"
10	10"
10	12"

3.	**Pressure ratings, flanges, flange drilling**	**Series**
C	ASME class 150 (Flange thickness acc. to ASME 300).	FC, FG, FL
D	ASME class 300	FC, FG, FL
F	ASME class 600 (1"–6" Full Rated)	FC, FG

4.	**End connection style**
W	ASME B16.5, Raised face (Ra 3.2–6.3)

METRIC, EN VALVES	
1.	**Valve series and face-to-face length**
FC	Finetrol rotary control valve, flanged face-to-face length acc. to IEC 534-3-2
FL	Finetrol rotary control valve, flanged, face-to-face length acc. to IEC 534-3-2. Low Cv construction for size 25 mm. Inch threads.

2.	**Size**
025	25 mm
040	40 mm
050	50 mm
080	80 mm
100	100 mm
150	150 mm
200	200 mm
250	250 mm
300	300 mm

3.	**Pressure ratings, flanges, flange drilling**	**Series**
J	EN 1092-1 PN 10, Flange thickness acc. to ASME 300.	FC
K	EN 1092-1 PN 16, Flange thickness acc. to ASME 300.	FC
L	EN 1092-1 PN 25, Flange thickness acc. to ASME 300.	FC
M	EN 1092-1 PN 40, Flange thickness acc. to ASME 300.	FC, FL
N	EN 1092-1 PN 63, Flange thickness acc. to ASME 600.	FC
P	EN 1092-1 PN 100, Flange thickness acc. to ASME 600.	FC

4.	**End connection style**
C	Raised face, standard Rz 40–160 (Ra 10–40)

ALL FINETROL VALVES	
5.	**Application and/or construction**
TA TB	Live loaded single packing, FTO, TA-luft tested and certified by TÜV. Live loaded single packing, FTC, TA-luft tested and certified by TÜV.
KA KB	Cryogenic construction, extended bonnet, FTO. Cryogenic construction, extended bonnet, FTC.
QT	Noise attenuating trim, FTO (FTC not allowed)
FA	Flushing connection for shaft bearings (1/4" NPTF), FTO
FB	Flushing connection for shaft bearings (1/4" NPTF), FTC
HA	HA Protected bearings (O- rings), FTO
HB	Protected bearings (O- rings), FTC
MA	Steam jacket with flushing connections, FTO
MB	Steam jacket with flushing connections, FTC
C1	Max. Cv-value 4.2 . Series FL, Low Cv construction (size 1"/DN 25 only), FTO. Live loaded single packing.
C2	Max. Cv-value 1.5. Series FL, Low Cv construction (size 1"/DN 25 only), FTO. Live loaded single packing.
C3	Max. Cv-value 0.5. Series FL, Low Cv construction (size 1"/DN 25 only), FTO. Live loaded single packing.

ASME / ISA VALVES				
6.	Body	Insert	Bonnet	Gland
S6	CF8M	316 SS	CF8M	316 SS
J1	WCC	316 SS	WCC	316 SS

METRIC VALVES				
6.	Body	Insert	Bonnet	Gland
B6	1.4408	1.4436	1.4408	1.4436
D2	1.0619	1.4436	1.0619	1.4436

7.	Plug	Coating	Stem	Bearings
KB	CF8M	Cobalt based hard facing	17-4 PH, nitrated, keyway	17-4 PH, nitrated
KK	CF8M	Cobalt based hard facing	XM-19, keyway	Cobalt based alloy
XB	CF8M	Cobalt based hard facing	17-4 PH, nitrated, spline	17-4 PH, nitrated
XK	CF8M	Cobalt based hard facing	XM-19, spline	Cobalt based alloy

7.	Plug	Coating	Stem	Bearings
KB	1.4581	Cobalt based hard facing	17-4 PH, nitrated, keyway	17-4 PH, nitrated
KK	1.4581	Cobalt based hard facing	XM-19,keyway	Cobalt based alloy
XB	1.4581	Cobalt based hard facing	17-4 PH, nitrated, spline	17-4 PH, nitrated
XK	1.4581	Cobalt based hard facing	XM-19, spline	Cobalt based alloy

ALL FINETROL VALVES					
8.	Seat type	Seat material	Back seal	Packings	Bonnet seal
SGT	S Cv 100 %	1"-4" : XM-19 ; 6"-10": 316 + cobalt based hard facing	Graphite	V-rings PTFE	Graphite
SGG	S Cv 100 %	1"-4" : XM-19 ; 6"-10": 316 + cobalt based hard facing	Graphite	Graphite	Graphite
TGT	S, Cv 100 %	1"-10": UNS S32750 + cobalt based hard facing	Graphite	V-rings PTFE	Graphite
TGG	S, Cv 100 %	1"-10": UNS S32750 + cobalt based hard facing	Graphite	Graphite	Graphite
RGT	R Cv 50 %	1"-4": XM-19 ; 6"-10": 316 + cobalt based hard facing	Graphite	V-rings PTFE	Graphite
RGG	R Cv 50 %	1"-4": XM-19 ; 6"-10": 316 + cobalt based hard facing	Graphite	Graphite	Graphite
UGT	R, Cv 50 %	1"-10": UNS S32750 + cobalt based hard facing	Graphite	V-rings PTFE	Graphite
UGG	R, Cv 50 %	1"-10": UNS S32750 + cobalt based hard facing	Graphite	Graphite	Graphite
LGT	L, low Cv	316 + Cobalt based hard facing	Graphite	V-rings PTFE	Graphite
LGG	L, low Cv	316 + Cobalt based hard facing	Graphite	Graphite	Graphite

ASME/ISA VALVES		
9.	Studs	Nuts
D*	B8M	8M
F**	L7M	2HM
METRIC VALVES		
K*	A2	A2
R**	L7M	2HM

*) Bolting materials for stainless steel body. Applies to all FL versions.
**) Bolting materials for carbon and low alloy steel body

10.	MODEL CODE
A	Standard mounting face
-	Non standard mounting face (old body design)

Table 12 Availability for PN rated valves with new design (10th sign “A”)

SIZE	PN10	PN16	PN25	PN40	PN63	PN100
025*	PN40	PN40	PN40	M	PN100	P
040*	PN40	PN40	PN40	M	PN100	P
050*	PN16	K	PN40	M	N	P
080*	PN16	K	PN40	M	N	P
100*	PN16	K	PN40	M	N	P
150*	PN16	K	PN40	M	N	P
200	J	K	L	M	N	P
250	J	K	L	M	N	P
300	-	-	-	M	-	-

* In EN 1092-1 the flange dimensions and drillings in some sizes are identical for different ratings, accordingly those sizes are available only in the highest equal pressure class.

Table 13 Special ASME Flange drillings with threats

Size	Pressure	Flange threats	pcs/flange
01	600	5/8 UNC	4
02	600	5/8 UNC	2
03	600	3/4 UNC	2
04	600	7/8 UNC	2
06	600	1 UNC	2
08	600	1 1/8 8UN	2
10	600	1 1/4 8UN	2

Table 14 Special PN Flange drillings with threats

Size / mm	Pressure class	Flange threats	pcs/flange
080	PN63	M20	2
080	PN100	M24	2
100	PN63	M24	8
100	PN100	M27	8
150	PN63	M30	2
150	PN100	M30	2
200	PN63	M33	2
200	PN100	M33	2
250	PN63	M33	12
250	PN100	M36	2

13. GENERAL SAFETY WARNINGS AND DISCLAIMERS

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.

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.
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.

Operating

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. 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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