

V-port segment valves

Series R1L Titanium

Series R2_S High consistency

Installation, maintenance and
operating instructions

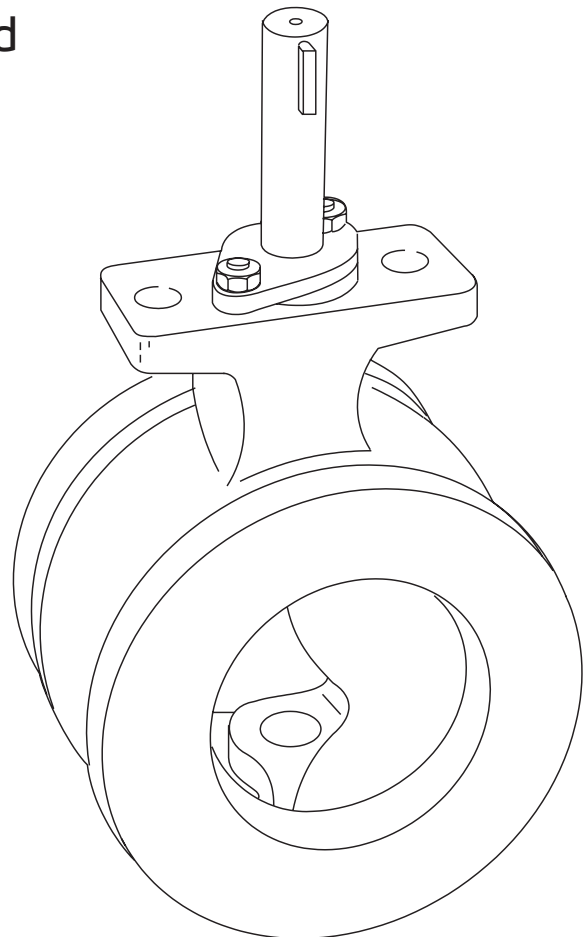


Table of contents

GENERAL	3	INSTALLING THE ACTUATORS	11
Scope of the manual	3	General	11
Valve construction	3	Installing B1C actuators	11
Valve markings	3	Installing B1J actuators	11
Technical specifications	3		
Valve approvals	4	MALFUNCTIONS	12
CE and Atex marking	4		
Recycling and disposal	4	TOOLS	12
Safety precautions	5		
Welding notes	5	ORDERING SPARE PARTS	12
TRANSPORTATION, RECEPTION AND STORAGE	5	EXPLODED VIEW AND PARTS LISTS	13
		R1L	13
INSTALLATION AND COMMISSIONING	6	R2_S, sizes DN50-300/2"-12"	14
General	6	R2_S, sizes DN350-500/14"-20"	15
Installing in the pipeline	6		
Actuator	6	DIMENSIONS	16
Commissioning	6	Series R1	16
		Series R2_S	17
MAINTENANCE	7	TYPE CODE	19
Maintenance general	7		
Replacing the gland packing	7	GENERAL SAFETY WARNINGS AND DISCLAIMERS	20
Detaching the actuator	7	General safety warnings	20
Removing the valve from the pipeline	8	General disclaimers	20
Replacing the seat	8		
Dismantling the valve	10		
Inspection of removed parts	10		
Assembly	10		
TESTING THE VALVE	11		

Subject to change without notice.

All trademarks are property of their respective owners.

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 on R series V-port segment valves. Actuators and other accessories are only discussed briefly. Refer to the individual manuals for further information on their installation, operation and maintenance.

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 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

R1 series valves are V-port segment valves installed between flanges. R2 series valves are flanged V-port segment valves. The body is in one part; the shaft and the segment are separate. Shaft blow-out is prevented by plates mounted against the shaft shoulder.

The valve is either soft or metal seated. Tightness derives from the spring force pressing the seat against the segment. The structure of the valve supplied may vary, depending on the customer's requirements. The detailed structure is revealed by the type code shown on the valve identification plate. The type code is explained in section 12.

The valve is designed for both control and shut-off applications.

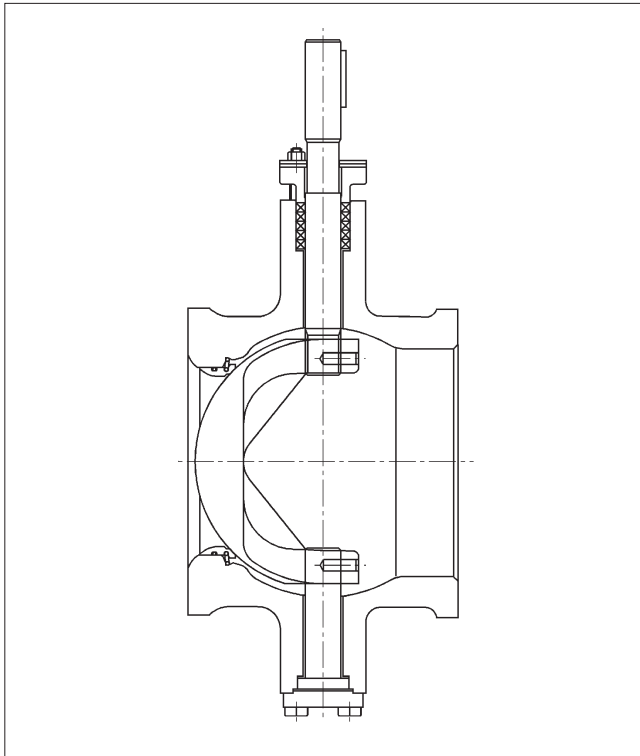


Fig. 1 Construction of a V-port segment valve

1.3 Valve markings

Body markings are cast on the body. The valve also has an identification plate attached to it, see Fig. 2.

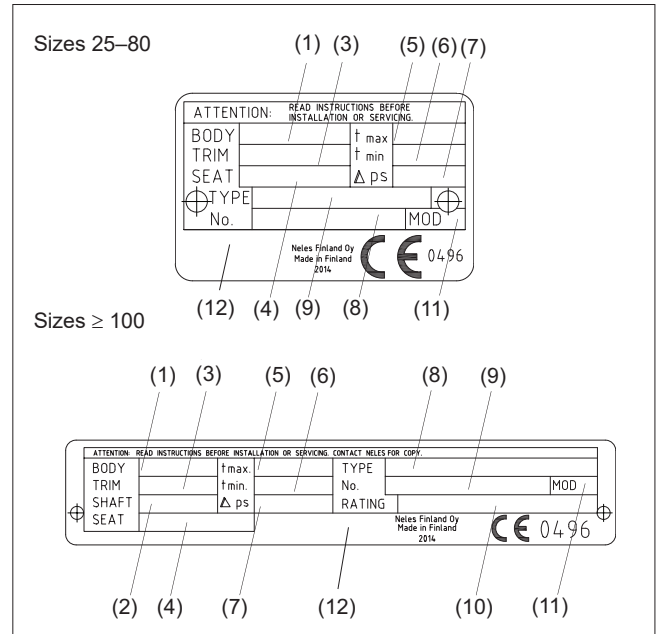


Fig. 2 Identification plate

Identification plate markings:

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

1.4 Technical specifications

Face-to-face length:

R1L: special length

R2_S: special length

Body rating: see Section 12

Max. pressure differential: see Fig. 4 and 5

Temperature range: see Fig. 3

Flow direction: indicated by an arrow on the body

Dimensions: see Section 11

Weights: see Section 11

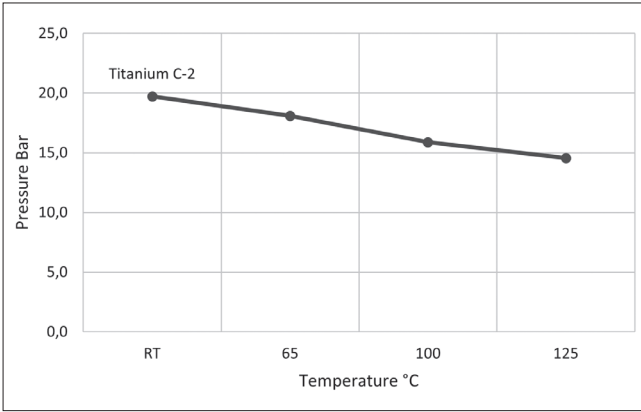


Fig. 3 Maximum pressure/temperature rating for R1L (PN25) titanium valve

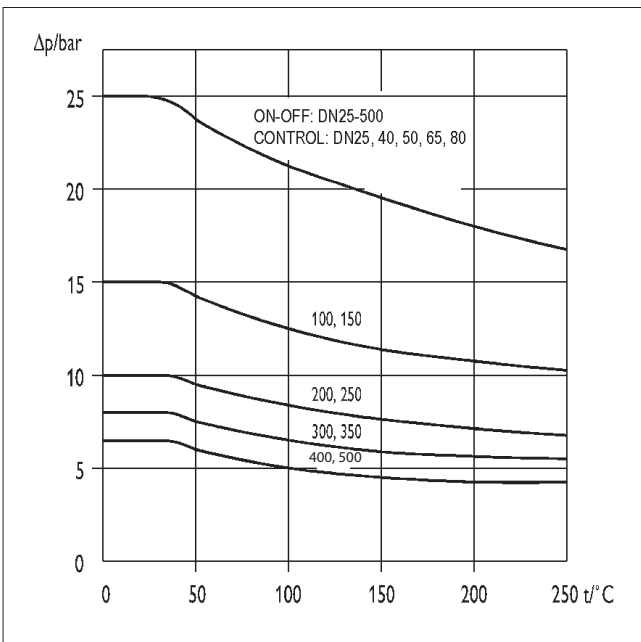


Fig. 4 Maximum pressure differentials of acid-resistant and carbon-steel standard valves in control and on-off operation

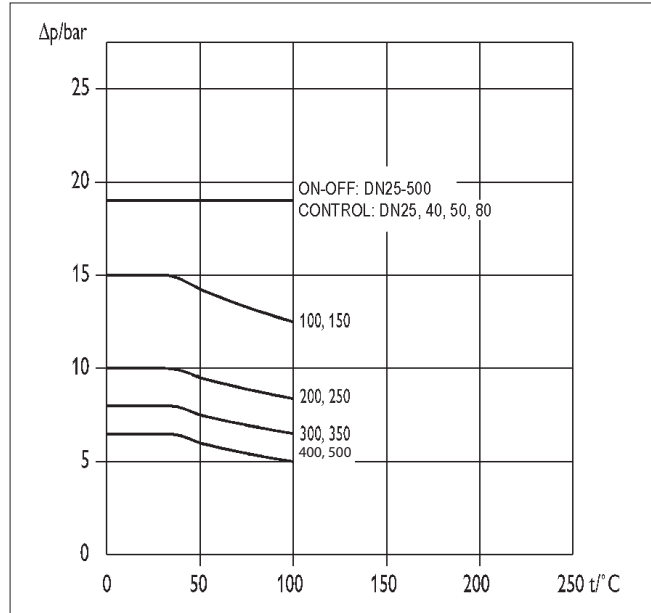


Fig. 5 Maximum pressure differentials of standard titanium valves in control and on-off operation

1.5 Valve approvals

The valve meets the Fire-safe requirements of BS6755/API 607 Edition 3.

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 segment 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 segment functions as a cutting device. The segment 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.

ATEX/Ex Safety

CAUTION:

Potential electrostatic charging hazard. Ensure the protection 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.

1.9 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 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 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 closed position. A valve equipped with a spring-return actuator is delivered in the position determined by the spring.

3. INSTALLATION AND COMMISSIONING

3.1 General

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

CAUTION:

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

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 segment sealing surface and seats.

The valve has an arrow indicating the flow direction. Install the valve in the pipeline so that the flow direction of the pipe corresponds to that marked on the valve. The mounting position does not place restrictions on operation of the valve, actuator or positioner. You should, however, avoid installing the valve so that the shaft points downwards because impurities travelling in the pipeline may then enter the body cavity and damage the gland packing. See Fig. 6. Choose flange gaskets according to the operating conditions.

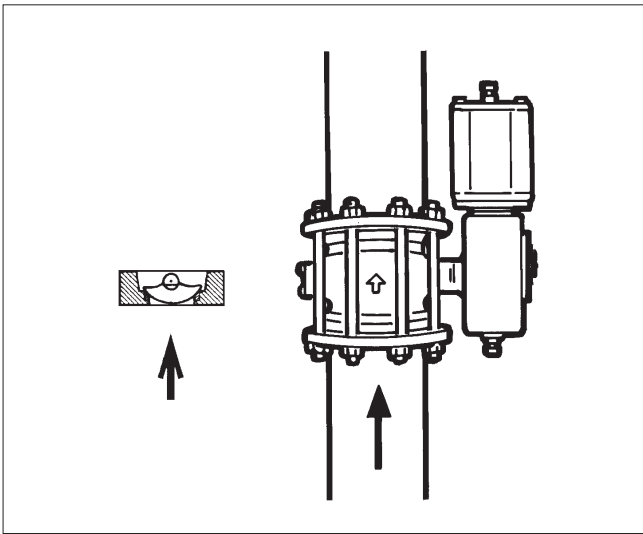


Fig. 6 Installing the valve into pipeline

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.

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. 7.

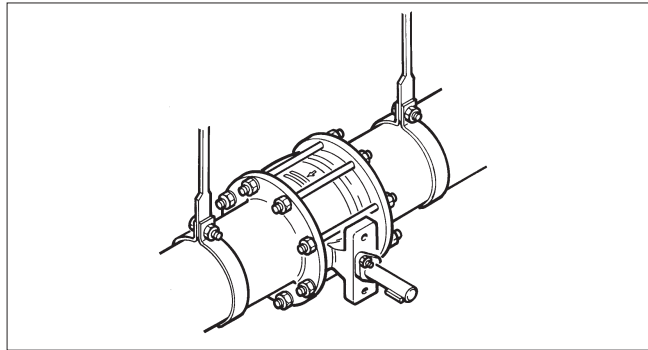


Fig. 7 Supporting the valve

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 valve closed and open positions are indicated as follows:

- by a marking on the actuator, or
- by a groove at the end of the valve shaft.

Both show the position of the segment with respect to the flow port. If there is any uncertainty about the marking, check the position of the segment by the groove at the end of the shaft, see Fig. 8.

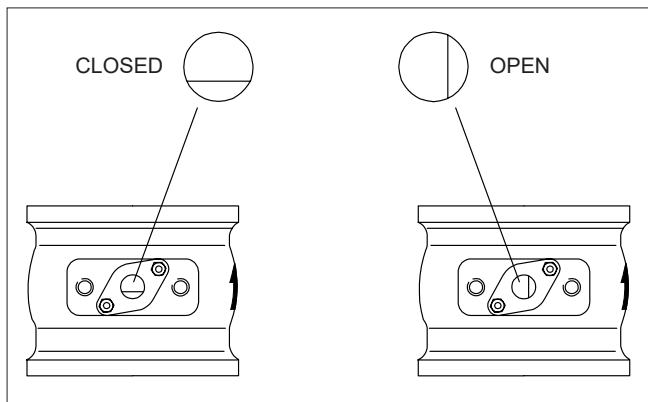


Fig. 8 Closed and open positions

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 a large-size actuator is used or when the pipeline vibrates heavily, supporting the actuator is recommended. Contact Valmet for further information.

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. Refer to their installation, operation and service manuals.

The gland packing may leak after prolonged storage. Tighten the packing evenly at both nuts until the leakage stops.

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!

CAUTION:

For safety reasons the retaining plates **MUST** always be installed acc. to Section 4.2.

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 Replacing the gland packing

CAUTION:

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

In gland packings, tightness is ensured by the contact between the gland follower and the packing rings. See Fig. 9.

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

- Make sure that the valve is not pressurized.
- Unfasten the nuts (25) and remove the retaining plates (42 or 30) and the gland follower (9).
- Remove the old packing rings (20).
- Clean the packing ring counterbore. Mount the new packing rings one by one using the gland follower as a tool. Mount the retaining plates with the text UPSIDE on top (see Fig. 9).

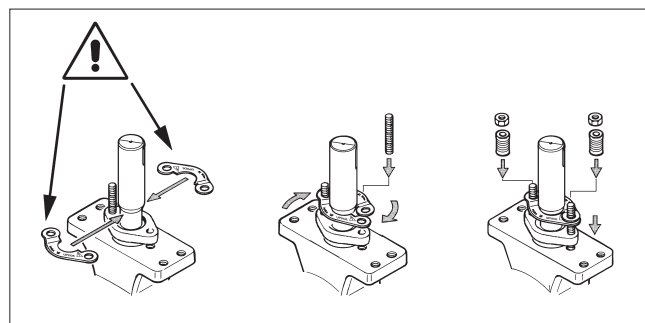


Fig. 9 Installing the retainer plates

- Place the nuts on the studs and tighten them so that the disc springs are compressed to the height Hc, or with torque Tt if valve doesn't have them. Values in Table 1

Table 1 Torques for the gland packing nuts.

Size	Shaft D	Thread	Tt (Nm)	Hc (mm)
25	15	5/16 UNC	5	22,5
40	15	5/16 UNC	5	22,5
50	15	5/16 UNC	5	22,5
80	20	5/16 UNC	7	22,3
100	20	5/16 UNC	7	22,3
150	25	3/8 UNC	12	29
200	25	3/8 UNC	12	29
250	35	3/8 UNC	16	28
300	40	3/8 UNC	18	28
350	45	1/2 UNC	34	40,5
400	50	1/2 UNC	37	40,5
500	70	M16	63	44,2

The actuator may be detached to facilitate the work.

4.3 Detaching the actuator

CAUTION:

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

NOTE:

Before dismantling, carefully observe the position of the valve in relation to the actuator and positioner/limit switch so as to make sure that the package can be properly reassembled.

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.

- 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. The tool can be ordered from the manufacturer.
- Remove the bracket and coupling, if any.

4.4 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 pipeline is not pressurized and that it is empty. Also make sure that no medium is led into the pipeline while the valve is being removed or after it has been removed.
- Place the hoisting ropes carefully, unscrew the pipe flange bolts and lift the valve from the pipeline using the ropes. Note the correct lifting method.

4.5 Replacing the seat

CAUTION:

Beware of the segment movement!

Detaching the seat

- The valve must be removed from the pipeline.
- Turn the segment (3) so that it does not touch the seat, Fig. 10.

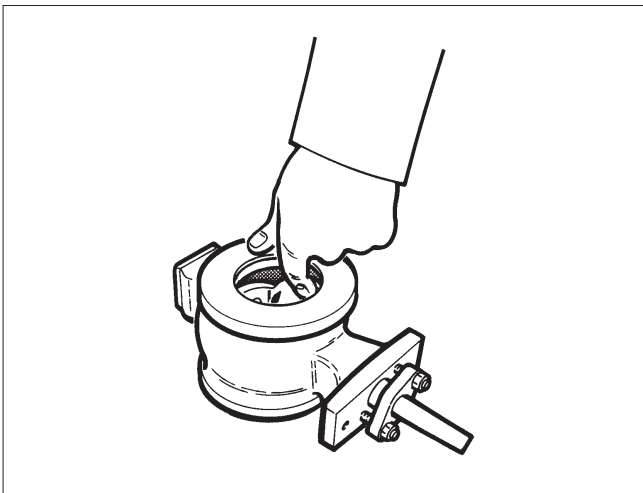


Fig. 10 Turning the ball segment

- In DN 25-40 valves (excluding the low-Cv versions), unfasten the flange (10) and push the segment into the back position (Fig. 11).
- DN 25 / 1" valves can be dismantled, as described in 4.6, to make the replacement of the seat easier. Dismantling is always necessary when a DN 25 / 1" valve has a low-Cv segment. If a DN 25 / 1" valve with a low-Cv segment has an extra bushing (ø 33 mm / 1.3") in the downstream bore, send the valve to the manufacturer for repair.

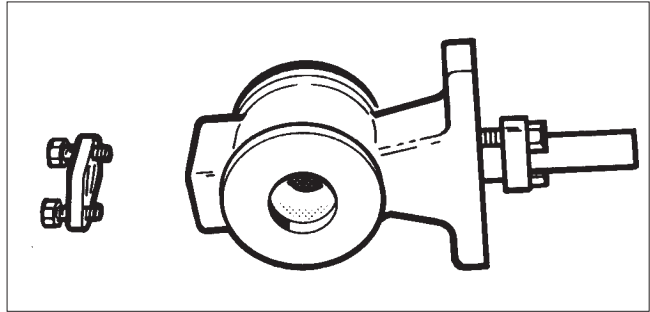


Fig. 11 Removing the blind flange

- Tap the seat (4) with a soft spindle all around the circumference from the upstream side to make it fall into the body, Fig. 12.

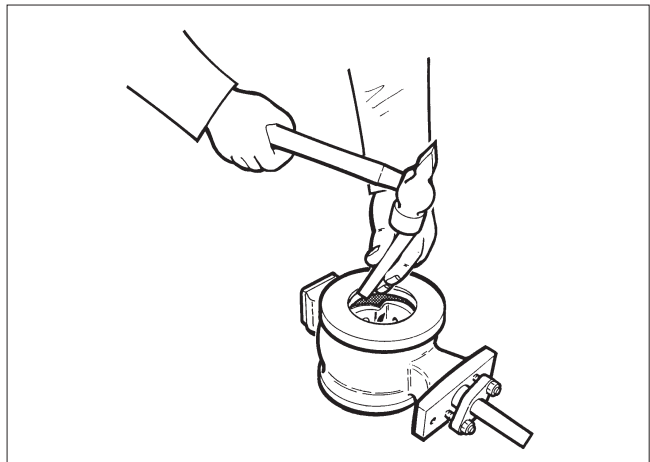


Fig. 12 Knocking off the seat

- Turn the valve and lift the seat from the body through the downstream flow port, Fig. 13.
- Clean and check the removed parts.

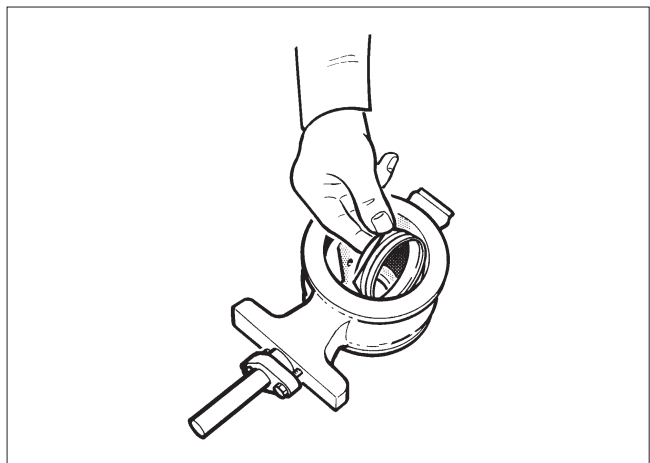


Fig. 13 Lifting the seat

Installing the seat

The back seal (6) of the segment seat (4) is normally a lip seal. The seat is easier to install if the back seal is precompressed. An O-ring seal does not need precompression.

- Clean the flow port that houses the seat. Remove any burrs. Round off the edges using a fine abrasive paper and clean the flow port carefully, see Fig. 14.

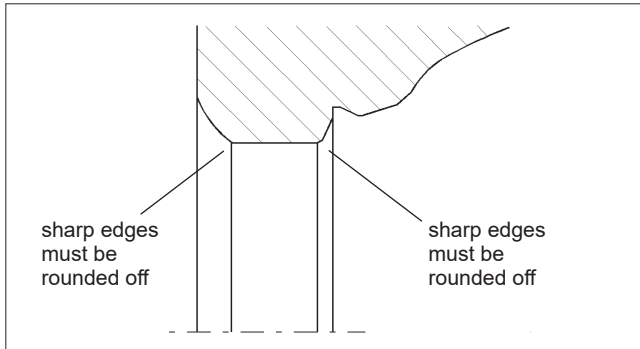


Fig. 14 Rounding the sharp edges

- Place the back seal (6) onto the seat (4).
- Lubricate the flow port, seat (4) and back seal (6) and the lock spring (5) with a volatile lubricant, e.g. Hyprez. Make sure that the lubricants are compatible with the medium.
- **Only for a lip seal:** Push the seal carefully into the flow port for about 15 minutes, Fig. 15. The following work phases must be completed before the precompression is lost.

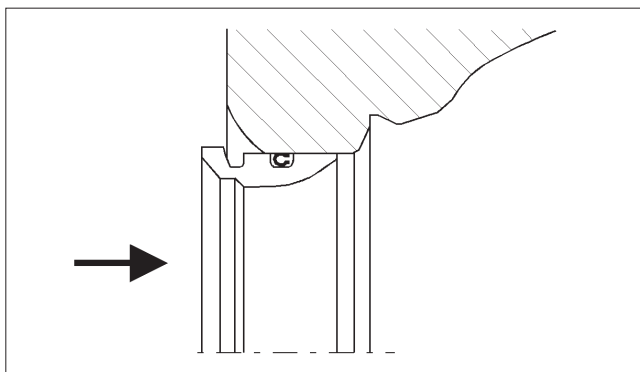


Fig. 15 Precompression of the lip seal

- Place the lock spring (5) on the seat.
- When the valve is opened, the ends of the spring must be by the V-shaped opening, see Fig. 16.



Fig. 16 Mounting the seat

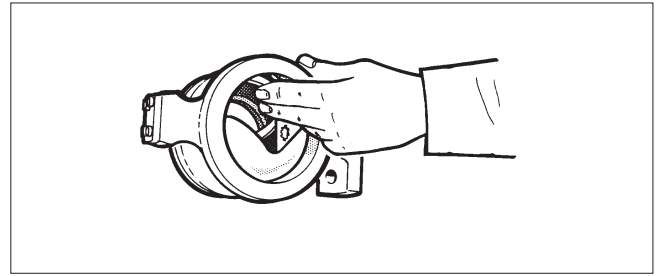


Fig. 17 Slipping the seat into the body

- Check that the spring angles extend to the control face.

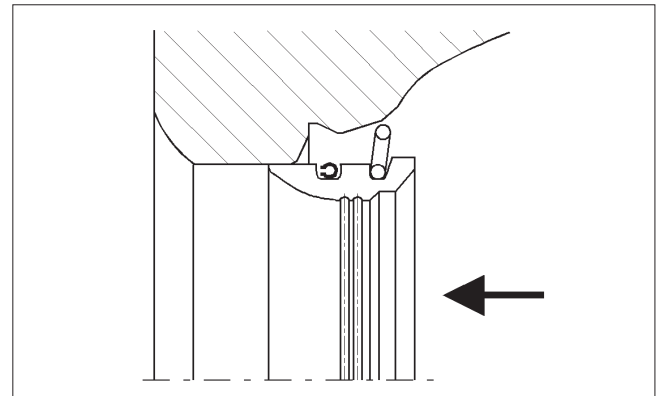


Fig. 18 Pushing the the spring angles against the control face

- Place a screwdriver on each visible spring angle one after the other and knock the spring into the groove, see Fig. 19.

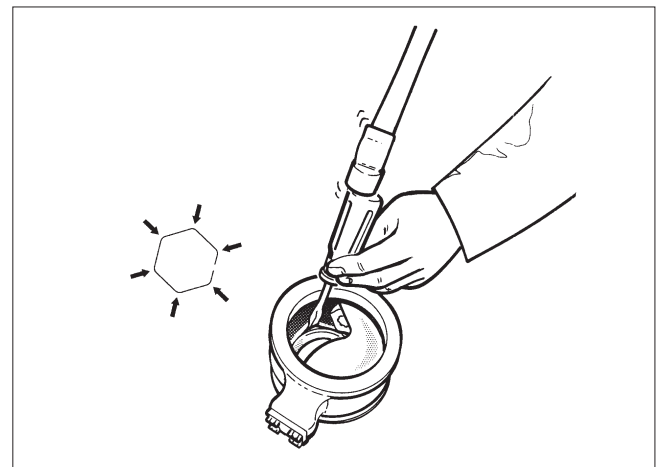


Fig. 19 Knocking the spring into the groove

- Turn the segment 180° clockwise and knock the rest of the spring angles into the groove, Fig. 20. A special tool available from the manufacturer may also be used for the work phases in Figs. 19 and 20.

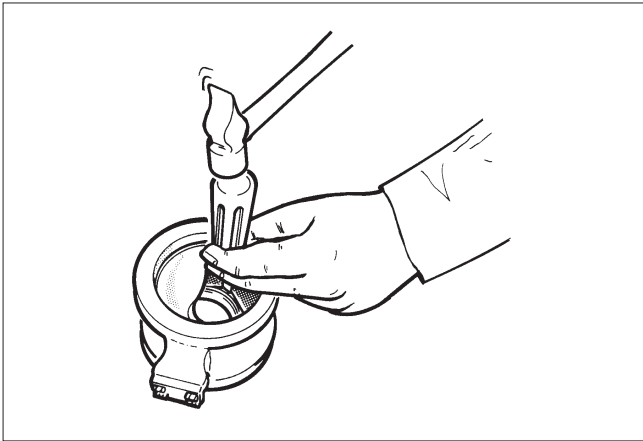


Fig. 20 Knocking the spring after turning the seat around

- Use a plastic spindle to ensure that the seat is correctly placed and can move freely, Fig. 21.

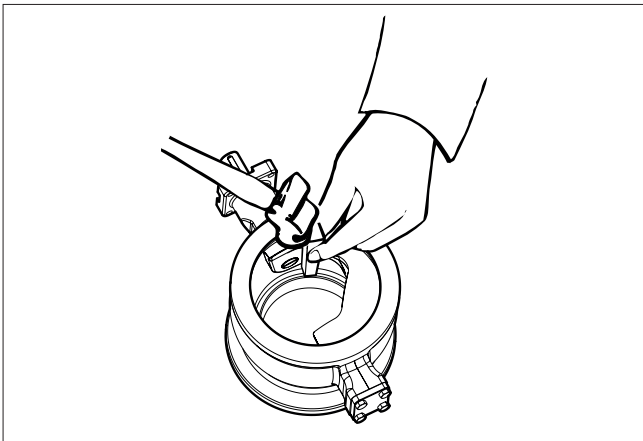


Fig. 21 Securing with a plastic spindle

4.6 Dismantling the valve

- Turn the valve into the closed position.
- Remove the pin lockings either by grinding or using a spindle. Detach the pins (14 and 15) by drilling, Fig. 22. Be careful not to damage the original bores. Note! The pins and the drive shaft have been secured by welding in the titanium version and in the acid-resistant high-consistency version S.

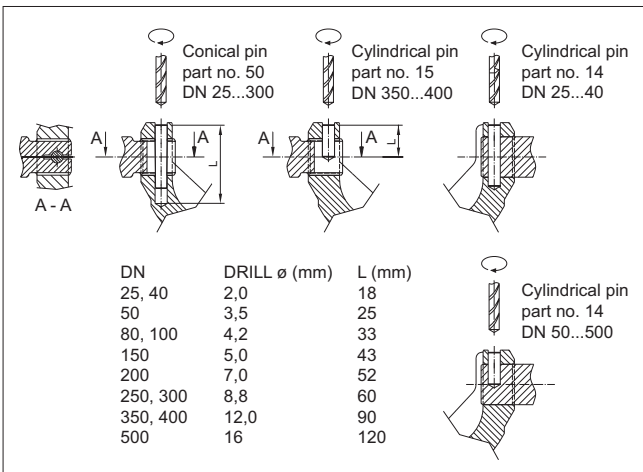


Fig. 22 Drilling the pin, R1L and R2_S

- Detach the retainer plates (42 and 30).
- Detach the gland packings (20).
- Remove the shafts (11 and 12), Fig. 23.
- Lift the segment from the body.
- Remove the bearings (15 and 16) and clean the bearing spaces.
- Remove the seat by pushing it evenly inside the body.

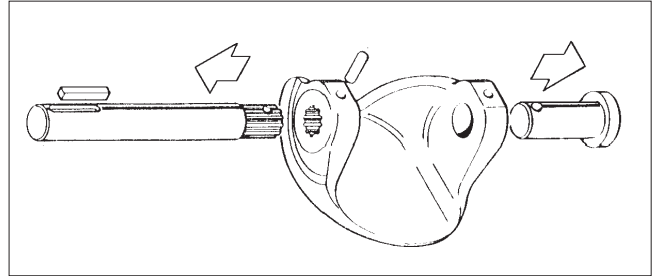


Fig. 23 Removing the shafts

4.7 Inspection of removed parts

- Clean the removed parts.
- See if the shafts (11, 12) and bearings (15, 16) are damaged.
- Check if the sealing surfaces of the segment and the seat (4) are damaged.
- If necessary, replace the parts with new.

4.8 Assembly

- Put the bearings (15, 16) in their places.
- Mount the seat as explained in Section 4.5.
- Mount the segment in the body in the closed position. Press the segment to fit the shaft (12).

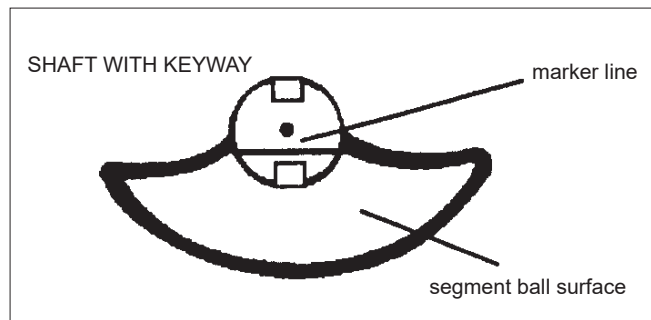


Fig. 24 Segment and shaft position

- Install the drive shaft (11). Note the location of the pin hole and the keyway. See Fig. 24.
- Please note the depth of the hole (L) for the conical pin (Fig. 22). Put the pins (14, 50) in their places and lock them. Both pins are locked with TIG welding in the high-consistency acid-resistant version and in the standard and high-consistency titanium versions. Moreover, the drive shaft is welded to the segment in the high-consistency versions. Contact the manufacturer for more information.

- Install the blind flange (10) with gaskets (19), tighten the bolts (26), see Table 2.
- Install the gland packing (20) and retainer plates according to Section 4.2.

Table 2 Screw torques, Nm (for lubricated screws)

Screw	M6 / UNC 1/4	M8 / UNC 5/16	M10 / UNC 3/8	M12 / UNC 1/2	M16	M20	M24
A2/A4	8,6	18	33	70	170	340	590
B8M Cl.1	4,7	10	18	38	95	190	320
Gr.660	11	24	43	91	230	440	770

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 the open position during the test.

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

6. INSTALLING THE ACTUATORS

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 B1 or Quadra-Powr series.

6.2 Installing B1C actuators

CAUTION:

Beware of the segment movement!

- Drive the actuator piston to the extreme outward position and turn the valve into the closed position, see Fig. 8.
- Clean the shaft bore and file off any burrs. Lubricate the shaft bore.
- If a coupling is needed between the actuator shaft bore and the valve shaft, lubricate the coupling and install it in the actuator.
- Fasten the bracket loosely to the valve using lubricated screws.
- Push the actuator carefully onto the valve shaft. Avoid forcing it, since this may damage the segment and seat. We recommend mounting the actuator so that the cylinder is pointing upwards.
- Align the actuator as accurately as possible using the valve as a guide. Lubricate the mounting screws. Install the washers and tighten all screws, see Table 2.
- Adjust the segment open and closed positions (limits to piston movement) by means of the actuator stop screws, see Fig. 25. The correct opening angle is 90°. The accurate position can be seen in the flow port. Check that the yellow arrow indicates the position of the segment. **Keep your fingers out of the flow port!**

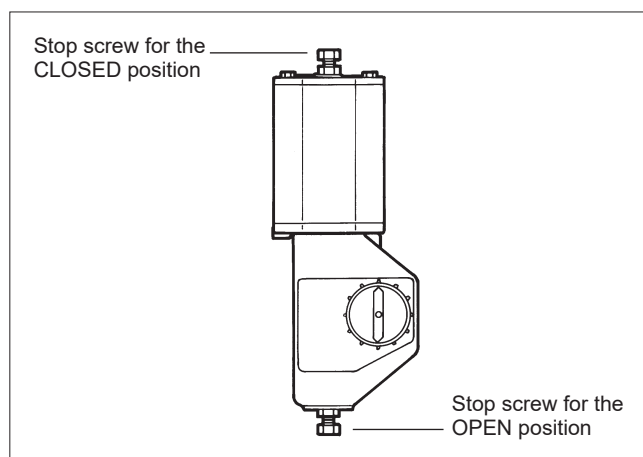


Fig. 25 Open and closed positions of a B1 actuator

There is no need to adjust the stop screw if the actuator is re-installed in the same valve. Drive the actuator piston to the housing end (open position). Turn the actuator by hand until the valve is in the open position (unless it is already open). Fasten the actuator in this position. The actuator may be installed in another position with respect to the valve by selecting another keyway in the actuator, see Fig. 26.

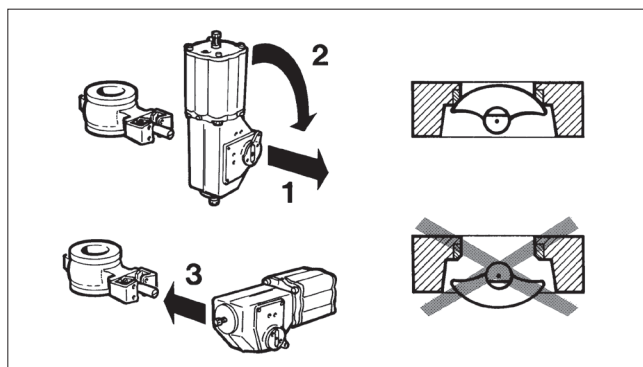


Fig. 26 Changing the actuator position

CAUTION:

Actuator needs to be removed from the valve when changing the actuator position!

- Check the tightness of the stop screw at the end of the cylinder during cylinder operation. The threads must be sealed using an appropriate non-hardening sealant, e.g. Loctite 225.
- Check that the actuator is functioning correctly. Check the segment flow bore position and the actuator movement relative to the valve (clockwise: close, counterclockwise: open) after installing the actuator. The valve should be closed when the piston is in the extreme outward position.
- Check that the yellow arrow indicates the position of the segment. If necessary, change the position of the arrow.

6.3 Installing B1J actuators

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 is between the piston and the cylinder end and pushes the piston towards the housing.

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

Type B1J

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, see Fig. 8.

Type B1JA

Install the actuator so that the piston is in the cylinder-end position at housing side. The cylinder must not be pressurized and the air supply connection must be open. The valve must be in the open position, see Fig. 8.

The rest of the installation procedure is the same as for B1C actuators.

7. MALFUNCTIONS

Table 3 lists malfunctions that might occur after prolonged use.

Table 3 Possible malfunctions

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 segment	Replace segment
	Segment in a wrong position relative to the actuator	Select the correct keyway in the actuator
Irregular valve movements	Actuator or positioner malfunction	Check the operation of the actuator and positioner
	Process medium accumulated on the segment surface	Clean the segment
	Segment or seat damaged	Replace the segment or seat
	Crystallizing medium has entered the bearing spaces	Flush the bearing spaces
Gland packing is leaking	Gland packing set worn or damaged	Replace the gland packing set

8. TOOLS

In addition to standard tools, the following special tools might be needed to facilitate working. The tools can be ordered from the manufacturer.

- For removal of the actuator
 - Extractor (ID-code table in actuator's IMO).
- For mounting and removal of the seat
 - Seat mounting tool (table 4).

Table 4 Seat mounting tool (Valve Series R1, R2)

Product:	ID:
DN 01	273336
DN 015	273337
DN 02	273338
DN 03	273339
DN 04	273340
DN 06	273341
DN 08	273342
DN 10	273343
DN 12	273344

9. ORDERING SPARE PARTS

NOTE:

Always use original spare parts to make sure that the valve functions as intended.

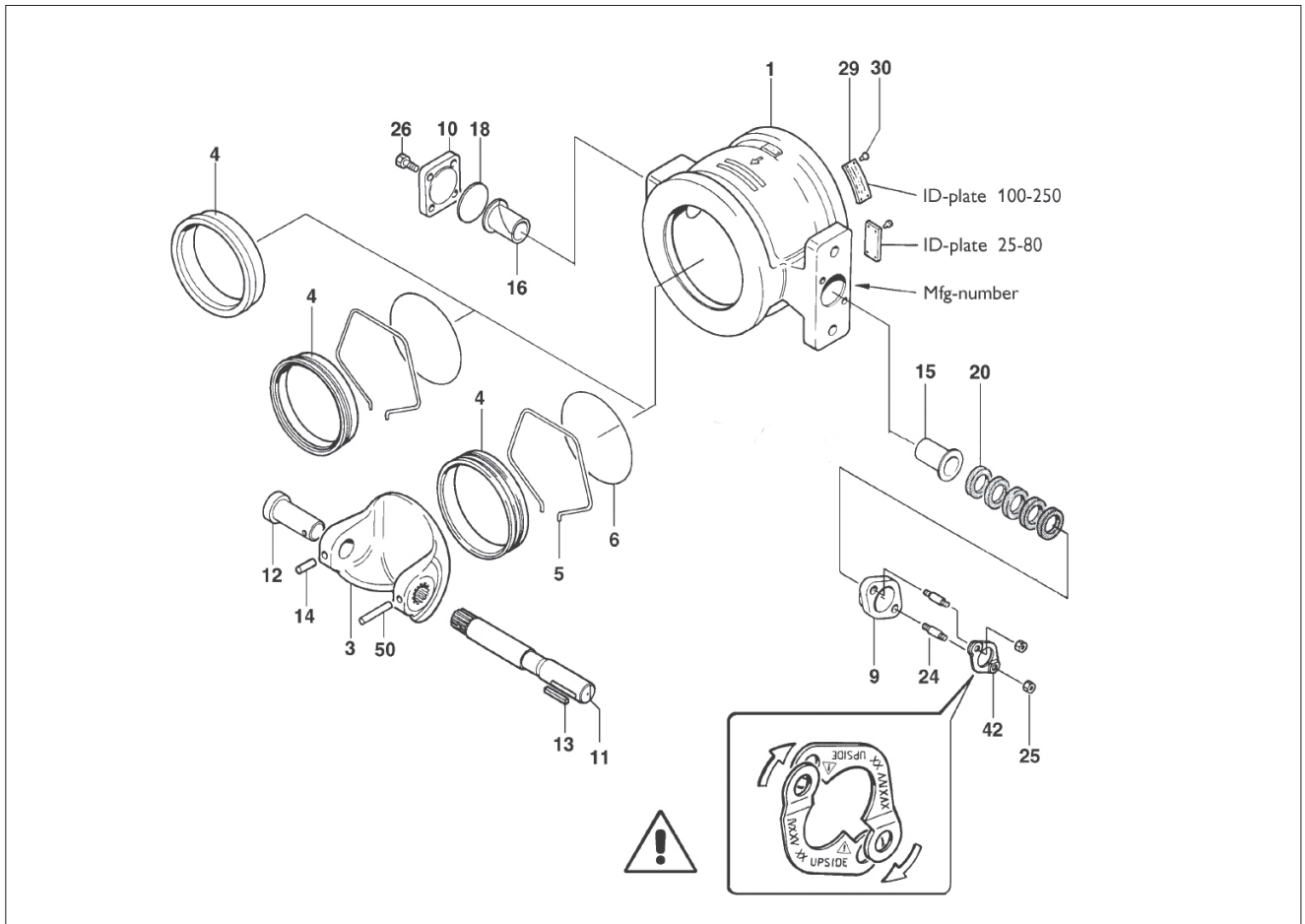
When ordering spare parts, always include the following information:

- 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 LISTS

10.1 R1L



Item	Qty	Description	Spare part category
1	1	Body	
3	1	Segment	
4	1	Seat	3
5	1	Lock spring	2
6	1	Back seal	2
9	1	Gland follower	
10	1	Blind flange	
11	1	Drive shaft	3
12	1	Shaft	3
13	1	Key	3
14	1	Pin	3 (Cat. 2 for sizes 01"-02")
15	1	Bearing	3
16	1	Bearing	3
18	1-2	Gasket	1
20	5	Gland packing	1
24	2	Stud	
25	2	Hexagon nut	
26	2-4	Hexagon bolt	
29	1	Identification plate	
30	2	Screw	
42	2	Retainer plate	
50	1	Tapered pin	3 (Cat. 2 for sizes 01"-02")

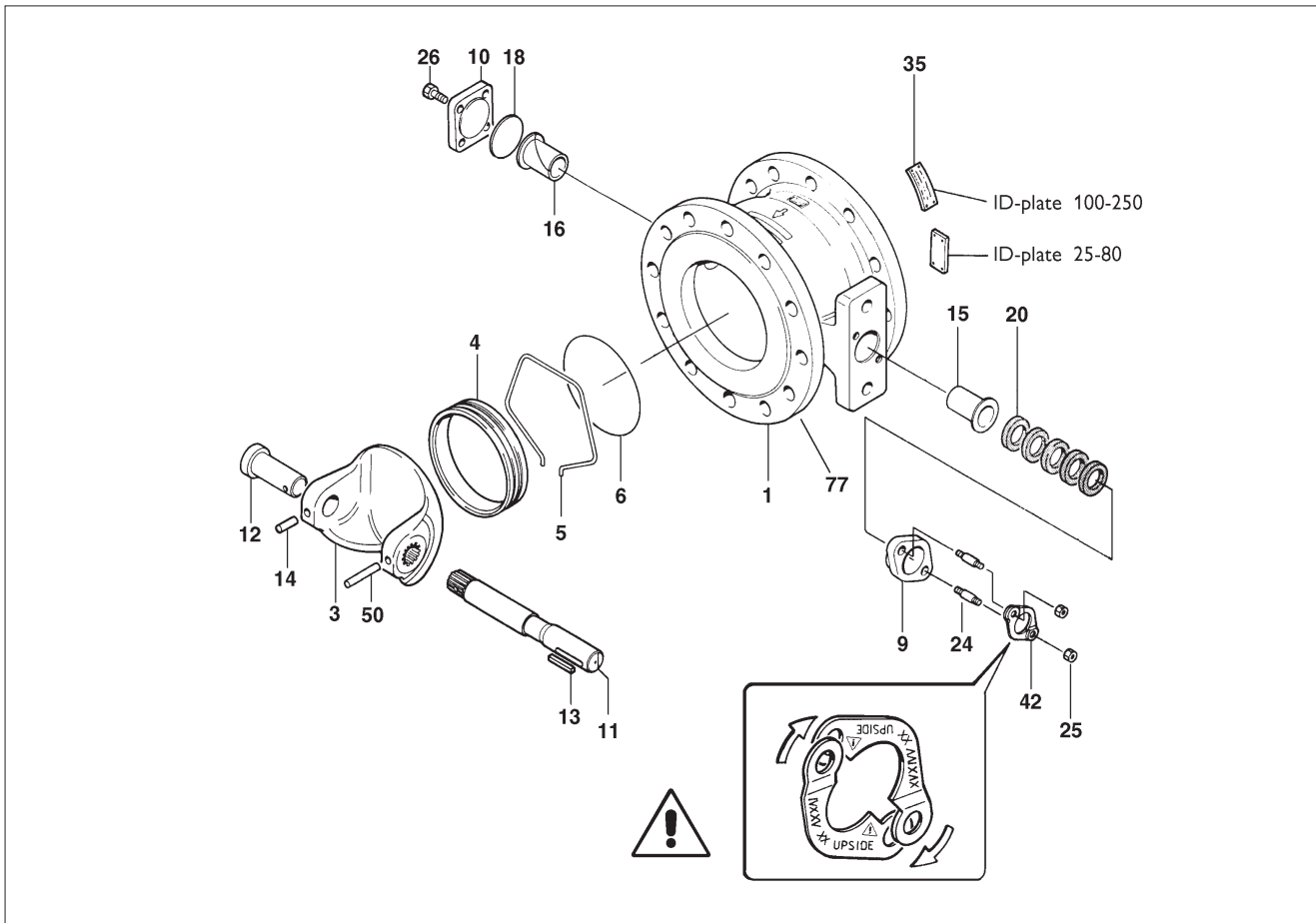
Spare part (Spare Part Set): Recommended soft parts, always needed for the repair. Delivered as a set.

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.

10.2 R2_S, sizes DN50-300/2"-12"



Item	Qty	Description	Spare part category
1	1	Body	
3	1	Segment	3
4	1	Seat	2
5	1	Lock spring	2
6	1	Back seal	2
9	1	Gland follower	
10	1	Blind flange	
11	1	Drive shaft	3
12	1	Shaft	3
13	1	Key	3
14	1	Cylindrical pin	
15	1	Bearing	3
16	1	Bearing	3
18	1-2	Sealing plate	1
20	5	Packing	1
24	2	Stud	
25	2	Hexagon nut	
26	2-4	Hexagon bolt	
35	1	Identification plate	
42	2	Retainer plate	
50	1	Taper pin	3
77	1	Hexagon plug	

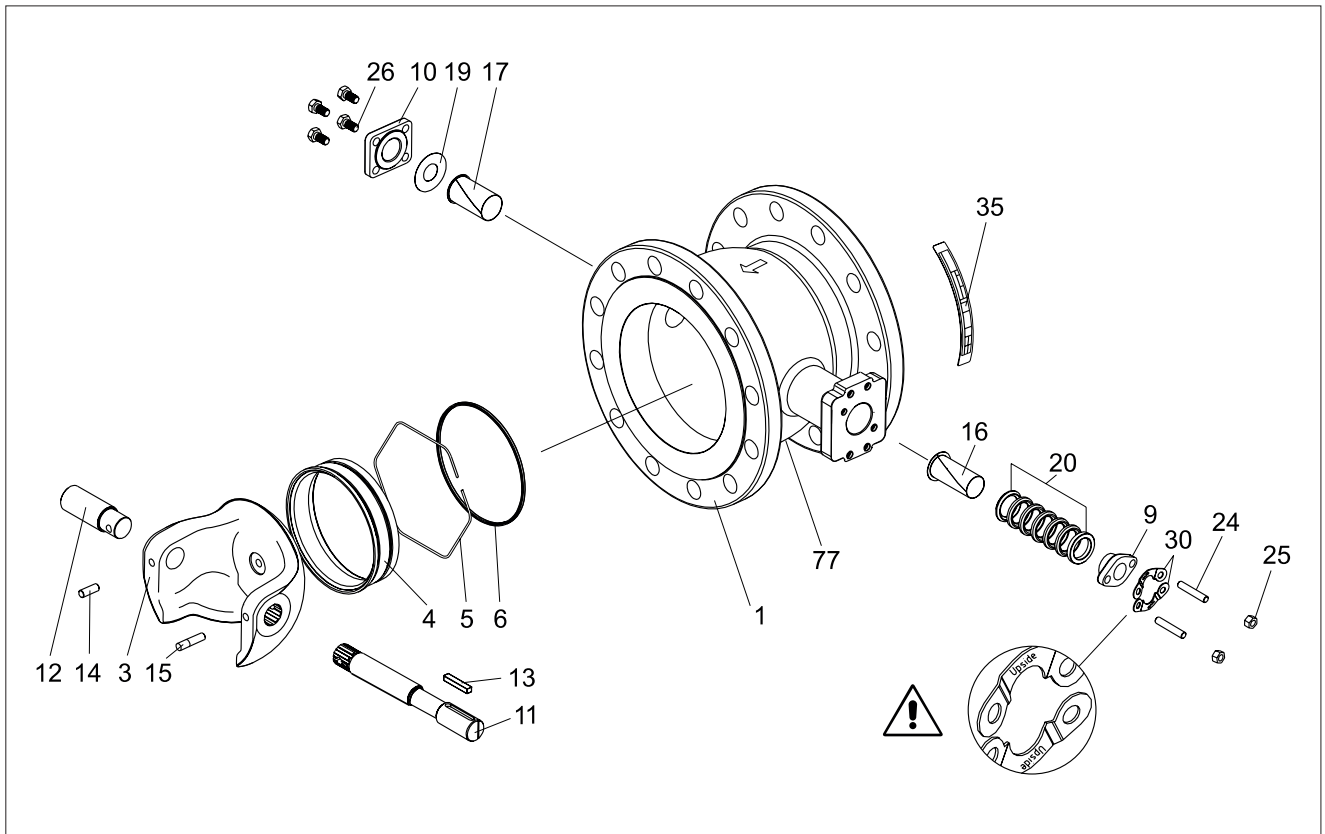
Spare part (Spare Part Set): Recommended soft parts, always needed for the repair. Delivered as a set.

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.

10.3 R2_S, sizes DN350-500/14"-20"



Item	Qty	Description	Spare part category
1	1	Body	
3	1	Segment	3
4	1	Seat	2
5	1	Lock spring	2
6	1	Back seal	2
9	1	Gland follower	
10	1	Blind flange	
11	1	Drive shaft	3
12	1	Shaft	3
13	1	Key	3
14	1	Cylindrical pin	3
15	1	Cylindrical pin	3
16	1	Bearing	3
17	1	Bearing	3
19	1	Sealing plate	1
20	1	Packing	1
24	2	Stud	
25		Hexagon nut	
26	4	Hexagon bolt	
30	2	Retainer plate	
35	1	Identification plate	
77	1	Hexagon plug	

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

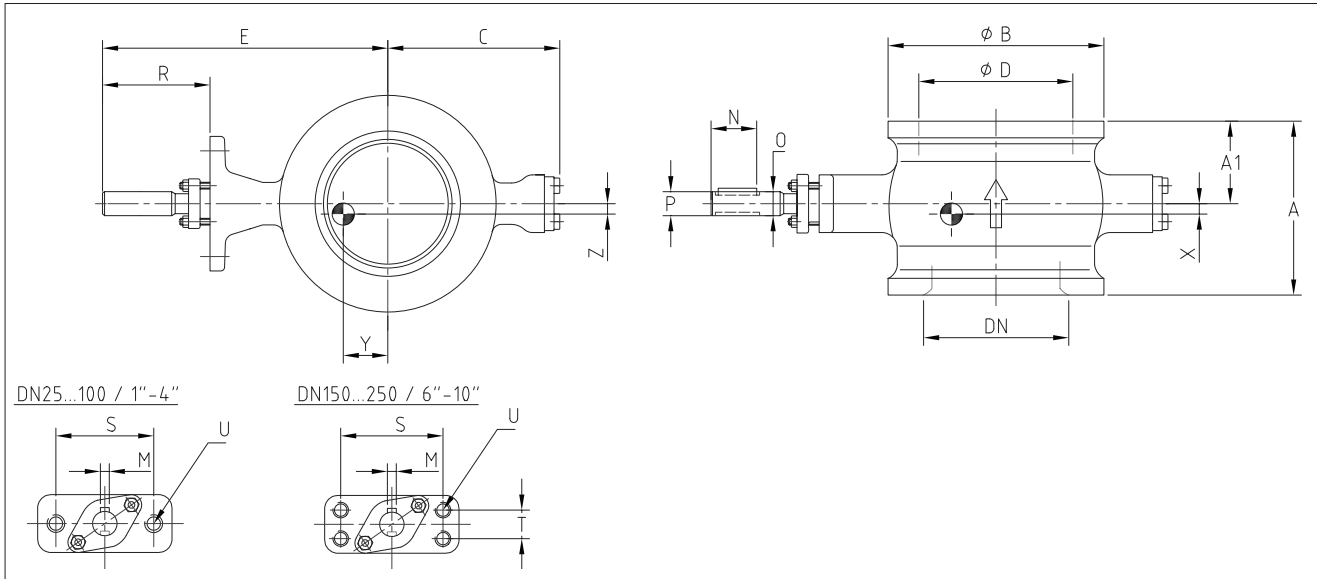
Spare part category 2: Parts for replacing of the seat. Available also as a set.

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.

11. DIMENSIONS

11.1 Series R1



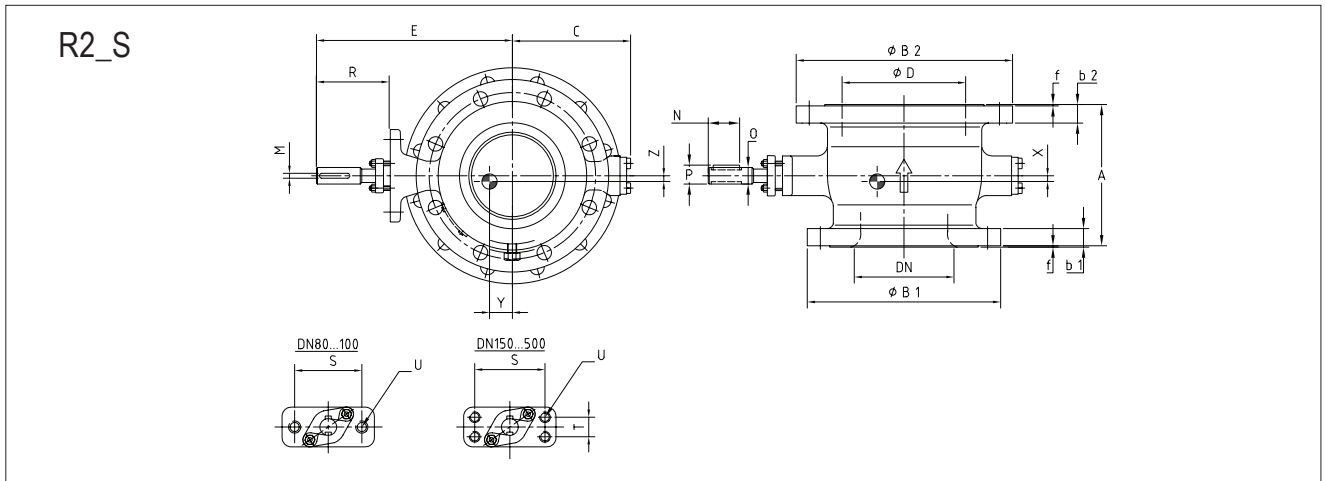
DN	MAIN DIMENSIONS, mm									SHAFT DIMENSIONS, mm						
	D	A	A1	B	C	S	T	U UNC	kg	O	E	R	M	P	N	DI
25	33/38*	50	25	64	57	70	-	3/8	1.4	15	144	70	4.76	17	25	15
40	49	60	25	82	63	70	-	3/8	2	15	151	71	4.76	17	25	15
50	60	75	32	100	92	70	-	3/8	2.8	15	170	70	4.76	17	25	15
80	89	100	45	131	108	90	-	1/2	5.1	20	196	79	4.76	22.2	35	20
100	113	115	50	158	117	90	-	1/2	6.2	20	205	80	4.76	22.2	35	20
150	164	160	65	216	177	110	32	1/2	14.7	25	295	110	6.35	27.8	46	25
200	205	200	80	268	200	130	32	1/2	27.1	25/30	346	140	6.35	27.8	46	30
250	259	240	92	326	252	130	32	1/2	44	35	390	141	9.52	39.1	58	35

* Low capacity segment: max Cv 0.5, 1.5, 5 or 15

DN	X	Y	Z
200	35	9	3
250	52	7	5

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

11.2 Series R2_S



MAIN DIMENSIONS, mm																
Valve size	DN	D	A	C	E	E'	S	T	O	R	R'	M	P	N	U UNC	Plug NPTF
50/80	50	80	165	92	170	205	70	-	15	70	105	4.8	17	25	3/8	1/2
80/100	80	102	165	108	196	241	90	-	20	79	124	4.8	22.2	35	1/2	1/2
100/150	100	136	163	117	205	250	90	-	20	80	125	4.8	22.2	35	1/2	1/2
150/200	150	190	207	177	295	325	110	32	25	110	140	6.4	27.8	46	1/2	1/2
200/250	200	240	248	200	346	362	130	32	25	140	156	6.4	27.8	46	1/2	3/4
250/300	250	296	297	250	390	420	130	32	35	141	171	9.5	39.1	58	1/2	3/4
300/350	300	336	338	270	462	497	160	40	40	165	200	9.5	44.2	68	5/8	3/4
350/400	350	390	400	311	513	513	160	40	45	200	200	12.7	50.4	80	M16	3/4
400/450	400	450	400	353	584	584	160	55	50	230	230	12.7	55.5	90	M20	3/4
500/600	500	660	508	420	727	727	230	90	70	292	292	19.05	78.2	119	M27	3/4

FLANGE DIMENSIONS, mm																								
SIZE	R2JS PN 10						R2KS PN 16						R2LS PN 25						R2MS PN 40					
	B1	b1	B2	b2	F	kg	B1	b1	B2	b2	F	kg	B1	b1	B2	b2	F	kg	B1	b1	B2	b2	F	kg
50/80	165	20	200	20	2	12	165	20	200	20	2	12	165	20	200	20	3	12	-	-	-	-	-	-
80/100	200	20	220	20	2	16	200	20	220	20	2	16	200	24	235	24	2	18	-	-	-	-	-	-
100/150	220	20	285	22	2	24	220	20	285	22	2	24	235	24	300	28	2	30	-	-	-	-	-	-
150/200	285	22	340	24	2	43	285	22	340	24	2	43	300	28	360	30	2	52	-	-	-	-	-	-
200/250	340	24	395	26	2	68	340	24	405	26	2	69	360	30	425	32	2	80	-	-	-	-	-	-
250/300	395	26	445	26	2	98	405	26	460	28	2	100	425	32	485	34	2	110	-	-	-	-	-	-
300/350	445	26	505	26	2	145	460	28	520	30	2	155	485	34	555	38	2	175	-	-	-	-	-	-
350/400	505	26	565	26	2	162	520	30	580	32	2	172	555	38	620	40	2	201	580	46	660	50	2	244
400/450	565	26	615	28	2	196	580	32	640	40	2	219	620	40	670	46	2	249	660	50	685	57	2	298
500/600	670	26	780	28	2	289	715	42	840	40	2	325	730	46	845	46	2	361	755	57	890	60	2	398

FLANGE DIMENSIONS, mm												
SIZE	R2CS ANSI 150						R2DS ANSI 300					
	B1	b1	B2	b2	F	kg	B1	b1	B2	b2	F	kg
50/80	150	26.3	190	19.5	2	13	165	22.7	210	29	2	19
80/100	191	19.5	229	24.0	2	17	210	24	254	24	2	19
100/150	229	24.0	279	25.5	2	27	254	24	318	28	2	30
150/200	279	25.5	343	29.0	2	46	318	28	381	34	2	50
200/250	343	26.0	406	30.5	2	74	381	34	450	38	2	82
250/300	406	30.6	483	32.0	2	105	450	38	521	42	2	115
300/350	483	32.0	534	35.0	2	170	521	42	584	42	2	190
350/400	535	35.4	595	37	2	187	585	54.4	650	57.6	2	247
400/450	595	37	635	40.1	2	225	650	57.6	710	60.8	2	308
500/600	700	41.3	815	46.1	2	338	775	64	915	68.3	2	408

FLANGE DIMENSIONS, mm																		
SIZE	R2RS JIS 10 K						R2SS JIS 16 K						R2TS JIS 20 K					
	B1	b1	B2	b2	f	kg	B1	b1	B2	b2	f	kg	B1	b1	B2	b2	f	kg
50/80	155	16	185	18	2	9	155	16	200	20	2	11	155	18	200	22	2	13
80/100	185	18	210	18	2	14	200	20	225	22	2	17	200	22	225	24	2	20
100/150	210	18	240	22	2	23	225	22	305	24	2	28	225	24	305	28	2	34
150/200	280	22	330	22	2	41	305	24	350	26	2	49	305	28	350	30	2	59
200/250	330	22	400	24	2	65	350	26	430	28	2	78	350	30	430	34	2	94
250/300	400	24	445	24	2	98	430	28	480	30	2	118	430	34	480	36	2	142
300/350	445	24	500	26	3	165	480	30	540	34	3	150	480	36	540	40	3	180
350/400	490	26	560	28	3	159	540	34	605	38	3	192	540	40	605	46	3	201
400/450	560	28	600	30	3	201	605	38	675	40	3	247	605	46	675	48	3	260
500/600	675	30	795	32	3	298	730	42	845	46	3	360	730	50	845	54	3	378

R', E': Dimension with live loading construction

Size	Class 150			Class 300/PN40			PN10			PN16			PN25		
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
50/80	-26	8	0	-27	8	0	-25	9	0	-23	9	0	-25	9	0
80/100	-9	5	0	-10	5	0	-9	5	0	-2	7	0	-10	5	0
100/150	-10	3	0	-10	3	0	-10	3	0	-9	5	-1	-10	3	0
150/200	-6	6	-1	-6	6	-1	-6	6	-1	-2	8	-1	-6	6	-1
200/250	-2	5	-1	-3	4	-1	5	6	-2	-2	5	-1	-3	4	-1
250/300	3	3	-2	2	3	-2	15	4	-3	4	3	-2	2	3	-2
300/350	5	8	-2	4	7	-2	12	9	-2	5	8	-2	4	8	-2
350/400	36	6	-2	33	6	-2	46	6	-3	37	6	-2	36	6	-2
400/450	58	6	-3	55	5	-3	67	8	-4	58	6	-3	57	6	-3
500/600	40	15	-4	39	14	-3	42	16	-4	48	18	-4	40	15	-3

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

12. TYPE CODE

V-port segment valve, series R1 and R2_S													
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	11.		12.
	R2		L	A	100	T	T	T	U	T	-	/	

1.	C _V -CODE FOR VALVE SIZE 01
STANDARD C_V	
	Without sign
NON-STANDARD C_V	
C005	Max. C _V = 0.5
C015	Max. C _V = 1.5
C05	Max. C _V = 5
C15	Max. C _V = 15

2.	PRODUCT SERIES
R1	Flangeless, reduced bore
R2	Flanged, reduced bore

3.	FACE-TO-FACE DIMENSIONS
	Face-to-face length Neles factory standard, without sign

4.	PRESSURE RATING
J	PN 10, flanged R2_S
K	PN 16, flanged R2_S
L	PN 25, flanged R2_S; flangeless R1
M	PN 40, flanged R2_S
C	ASME 150, flanged R2_S
D	ASME 300, flanged R2_S
R	JIS 10K, flanged R2_S
S	JIS 16K, flanged R2_S
T	JIS 20K, flanged R2_S

5.	CONSTRUCTION
A	Standard R1LA
S	High-consistency version R2_S flanged
Y	Special

6.	SIZE
R1L	
025, 040, 050, 065, 080, 100, 150, 200, 250	
01, 1H, 02, 2H, 03, 04, 06, 08, 10	
R2_S	
050/080, 080/100, 100/150, 150/200, 200/250, 250/300, 300/350, 350/400, 400/450, 500/600	
02/03, 03/04, 04/06, 06/80, 08/10, 10/12, 12/14, 14/16, 16/18, 20/24	

7.	BODY	SCREWS
C	CG8M only for R2_S	A4-80 / B8M
D	WCB only for R2_S (sizes 14", 16")	A4-80 / B8M
T***	Titanium for R1 and R2_S	A4-80 / B8M
U	CK3MCuN only for R2_S	A4-70/B8M
Y	Special	Special

Seals for above: Gland packing:

For blind flange:

*** For blind flange:

PTFE

Graphite

PTFE

8.	SEGMENT
C	CG8M + chromium
H	Hastelloy C
J	AISI 329 + chromium
K	W. no. 1.4408 + chromium
L	W. no. 1.4308/1.4306 + chromium
T	Titanium + ceramic coating for R1 and R2_S
R	CG8M
S	AISI 329
Y	Special

9.	SHAFTS, PINS/BEARINGS
J	AISI 329 / PTFE
H	Hastelloy C / PVDF
N	Nitronic 50 / PTFE
T	Titanium / PVDF for R1 and R2_S
Y	Special

10.	SEAT
K	Metal seat, general service
U	Titanium, back seal Viton GF
T	PTFE + C25%, metal body
Y	Special

11.	OTHER PARTS
F	Graphite gland packing
T	Live loaded PTFE V-ring packing
G	Live loaded graphite packing
V	V-ring packing, PTFE
Y	Special, to be specified

12.	FLANGE FACING
-	EN 1092-1 Type B1 (Ra 3.2 - 12.5), without sign.

Example codes:

R1 LA 100 T T T U - - / -

R2 L S 100/150 C J J K V - / -

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.
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.

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.
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.

Valmet Flow Control Oy

Vanha Porvoontie 229, 01380 Vantaa, Finland.

Tel. +358 10 417 5000.

www.valmet.com/flowcontrol

Subject to change without prior notice.

Neles, Neles Easyflow, Jamesbury, Stonel, Valvcon and Flowrox, and certain other trademarks, are either registered trademarks or trademarks of Valmet Oyj or its subsidiaries in the United States and/or in other countries.

