

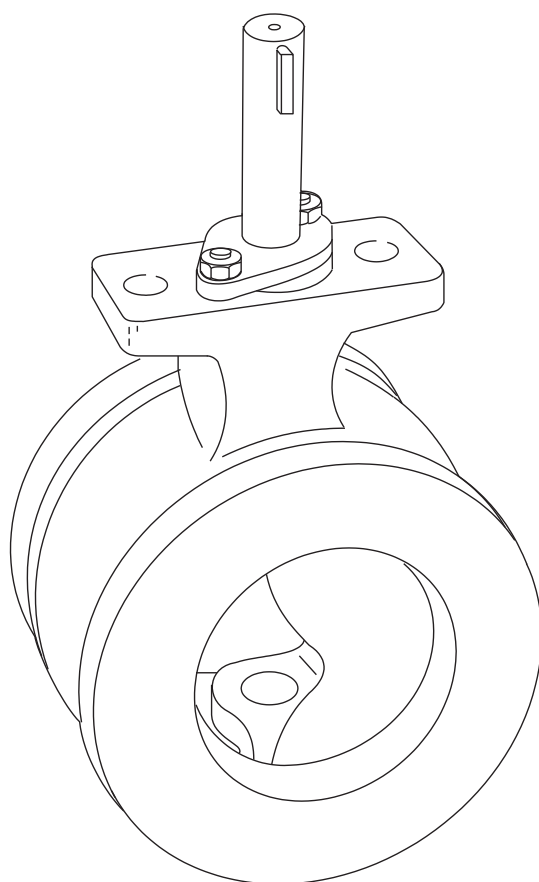
# V-port segment valves

**Series R1L Titanium**

**Series R21L Titanium**

**Series R2\_S High consistency**

Installation, Maintenance and  
Operating Instructions



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### READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the valve.  
If you require additional assistance, please contact the manufacturer or manufacturer's representative.  
Addresses and phone numbers are printed on the back cover.

### SAVE THESE INSTRUCTIONS!

Subject to change without notice.

All trademarks are property of their respective owners.

## 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 Metso 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.

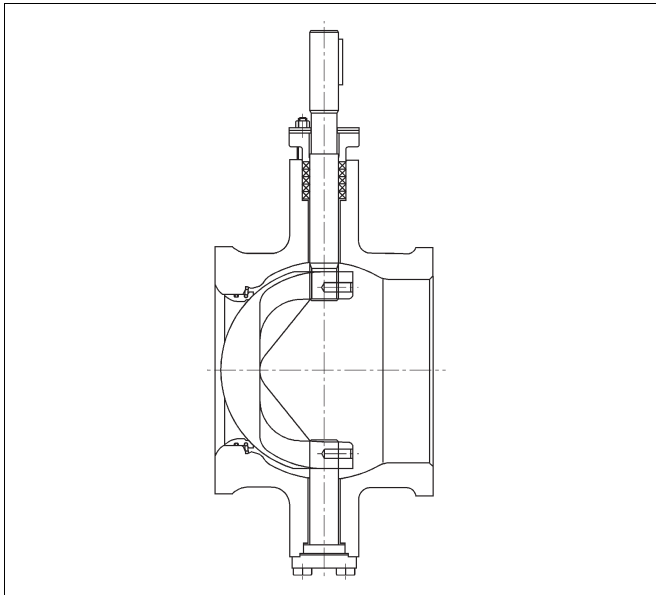


Fig. 1 Construction of a V-port segment valve

### 1.3 Valve markings

Body markings are cast on the body. The valve also has an identification plate attached to it, see Fig. 3.

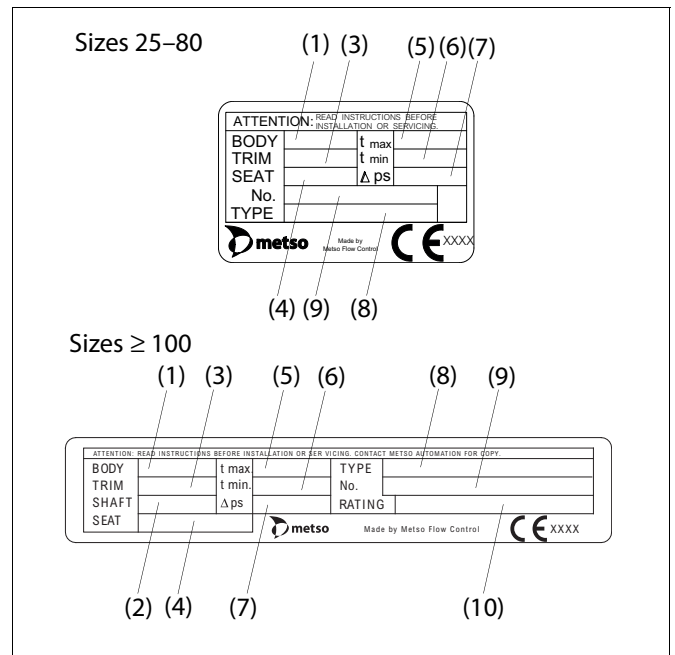


Fig. 2 Identification plate

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

## 1.4 Technical specifications

Face-to-face length:

R1L:	special length
R21:	according to ISA S75.04 and IEC/DIN 534-3-2
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

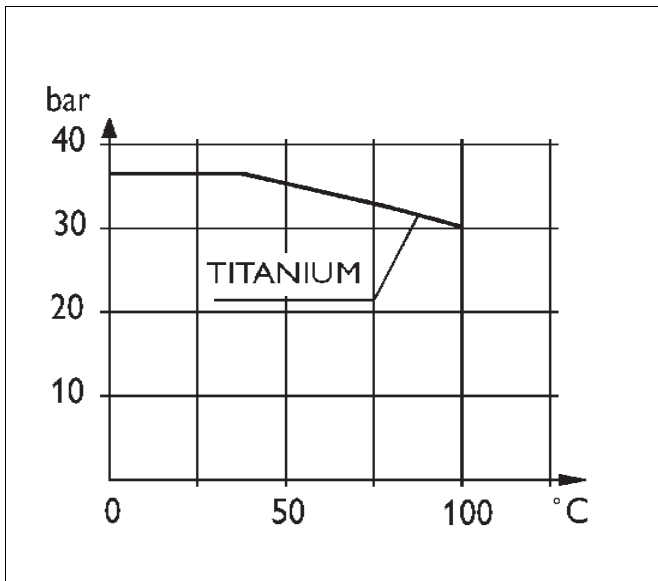


Fig. 3 Maximum pressure differentials of R series valves

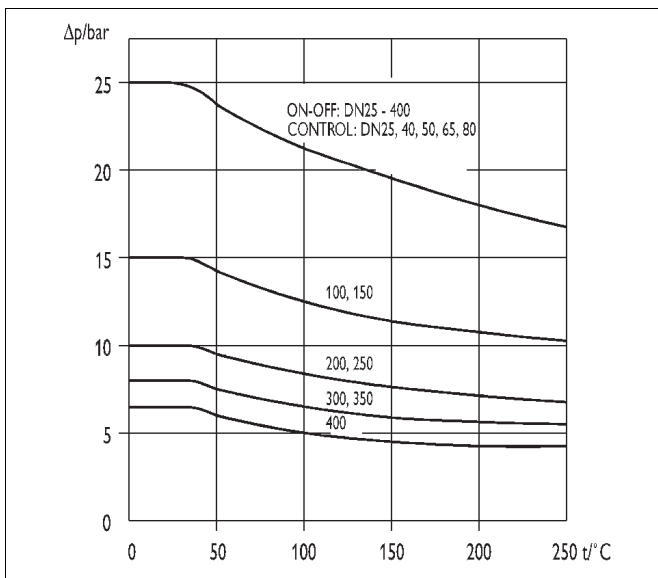


Fig. 4 Maximum pressure differentials of acid-resistant and carbon-steel standard valves in control and on-off operation

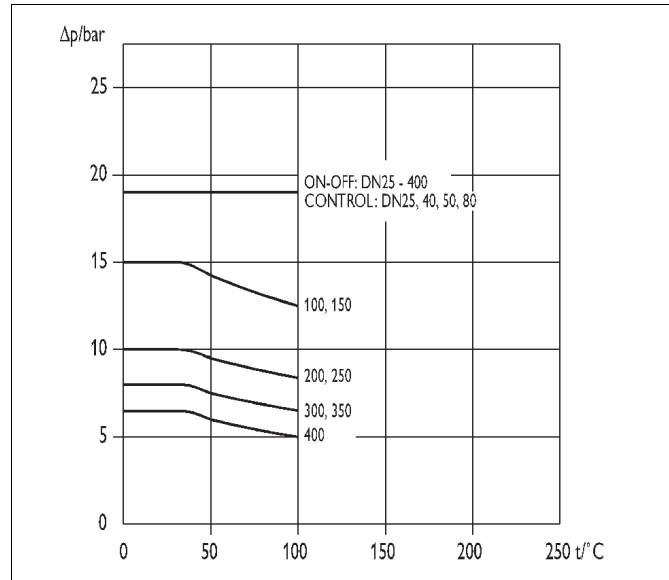


Fig. 5 Maximum pressure differentials of standard titanium valves in control and on-off operation

## 1.5 Valve approvals

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

## 1.6 CE 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.

## 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 Metso 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.

Place the lifting ropes securely around the valve body (see Fig. 7). Damage or personal injury may result from falling parts.

## 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.

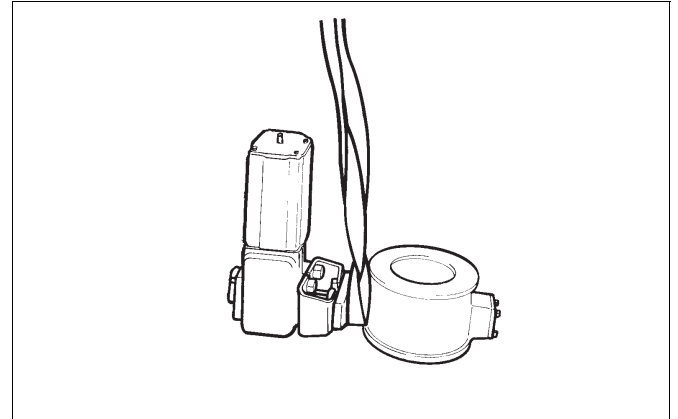


Fig. 6 Lifting the valve

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. 7.

Choose flange gaskets according to 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.

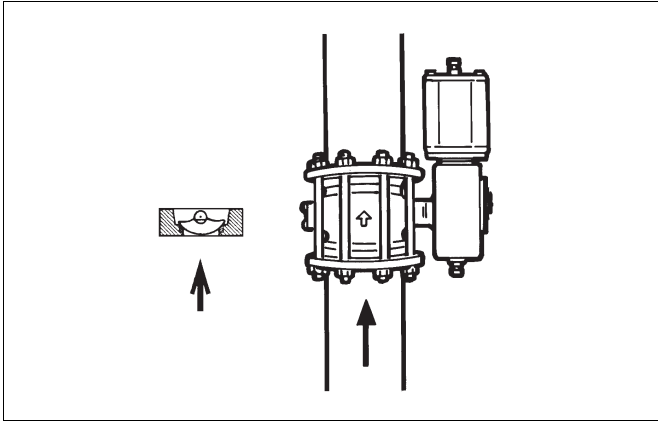


Fig. 7 Installing the valve into pipeline

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. 8.

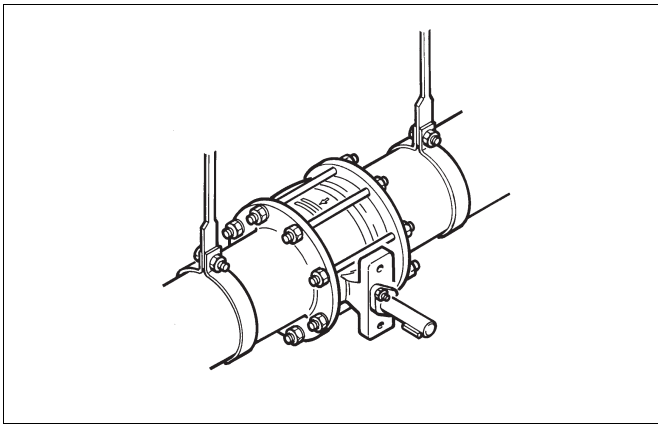


Fig. 8 Supporting the valve

### 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. 9.

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 Metso's Automation business for further information.

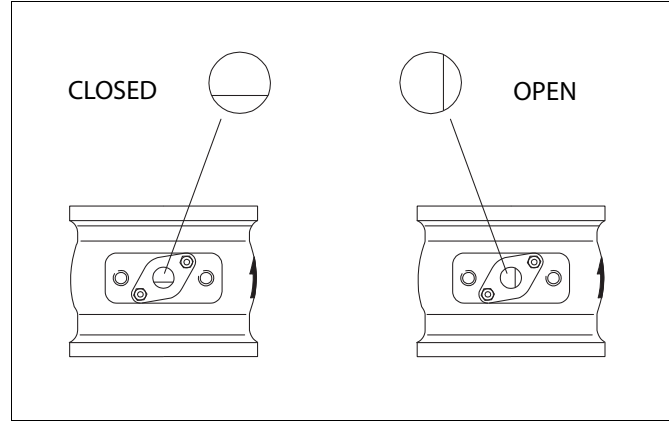


Fig. 9 Closed and open positions

### 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 Metso's 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. Metso 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 Metso 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 Metso 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. 10.

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) and the gland follower (9).
- Remove the five 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. 10).

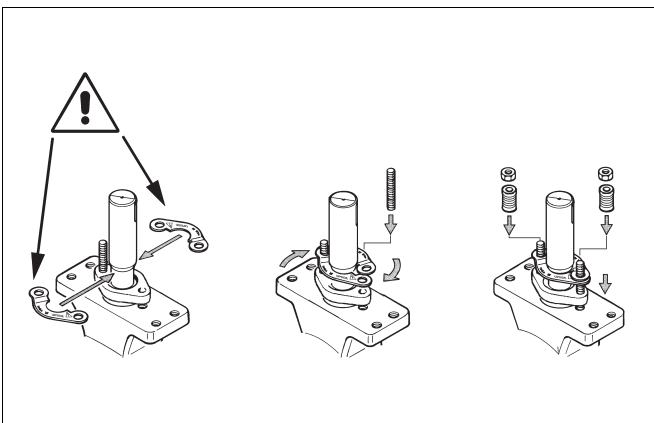


Fig. 10 Installing the retainer plates

- Place the nuts on the studs and tighten the gland packings (see Table 1).

Table 1 Torques for the gland packing nuts

Thread	Torque, Nm
5/16 UNC	10
3/8 UNC	20
1/2 UNC	50

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 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.

- Disconnect the actuator from its power source; detach the air supply pipe and control signal cables 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. See also Fig. 6.

**4.5 Replacing the seat**

**4.5.1 Detaching the seat**

- The valve must be removed from the pipeline.
- Turn the segment (3) so that it does not touch the seat, Fig. 11.

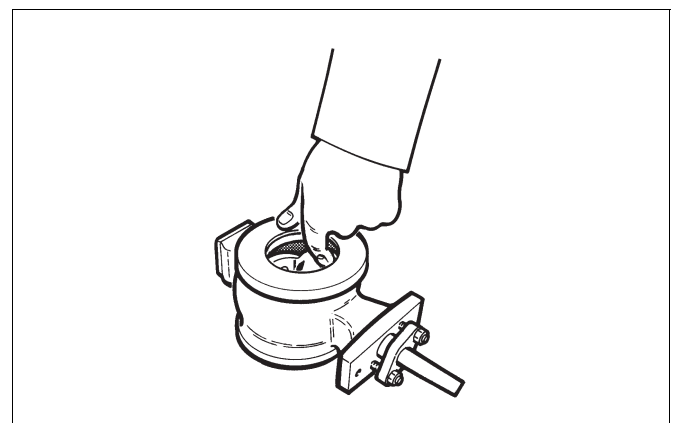


Fig. 11 Turning the ball segment

- ❑ In DN 25-40 valves (excluding the low-Cv versions), unfasten the flange (10) and push the segment into the back position (Fig. 12).
- ❑ 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.

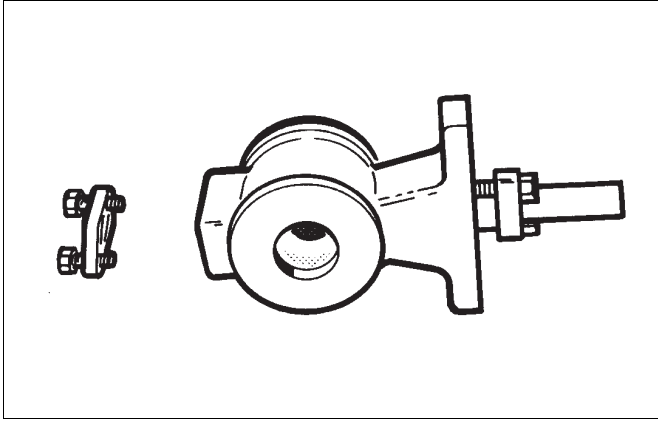


Fig. 12 Removing the blind flange

- ❑ Tap the seat (4) with a soft spindle all around the circumference from the upstream side to make it fall into the body, Fig. 13.

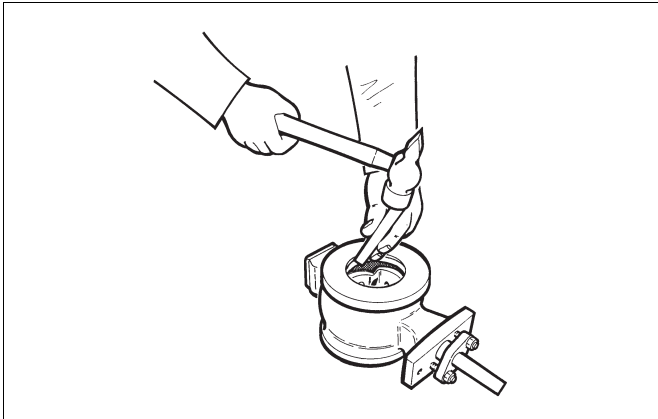


Fig. 13 Knocking off the seat

- ❑ Turn the valve and lift the seat from the body through the downstream flow port, Fig. 17.
- ❑ Clean and check the removed parts.

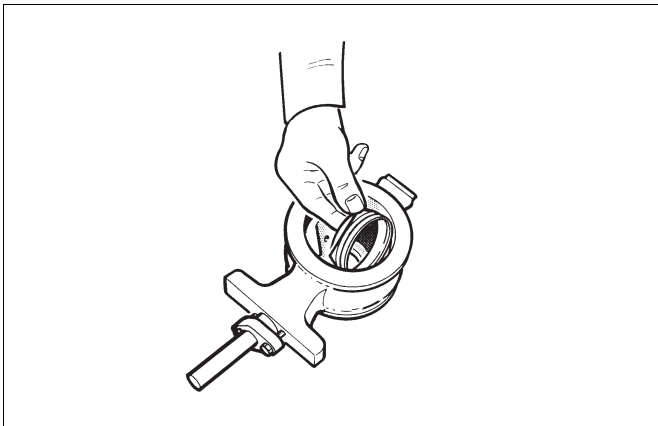


Fig. 14 Lifting the seat

#### 4.5.2 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. 15.

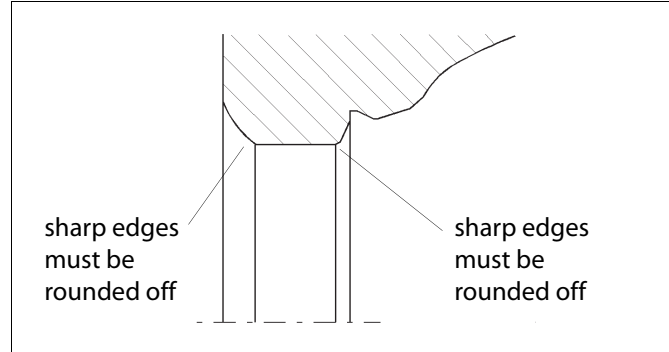


Fig. 15 Rounding the sharp edges

- ❑ 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. 16. The following work phases must be completed before the precompression is lost.

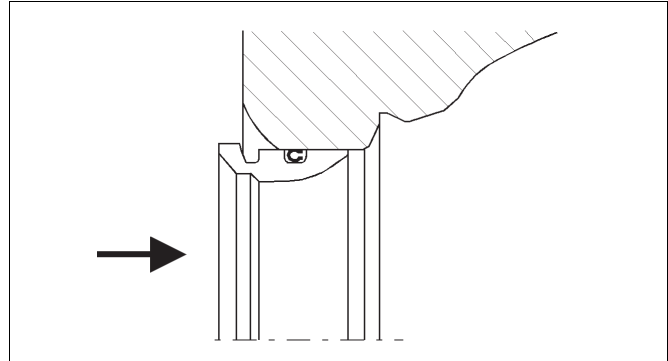


Fig. 16 Precompression of the lip seal

- ❑ 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. 17.

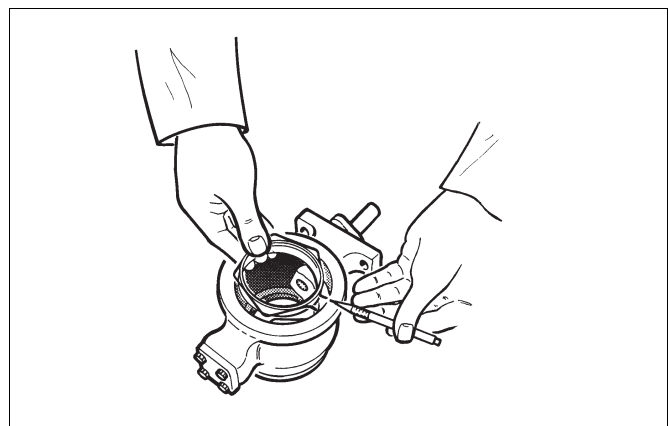


Fig. 17 Mounting the seat



- ❑ Place the seat package into the body as shown in Figs. 18 and 19.

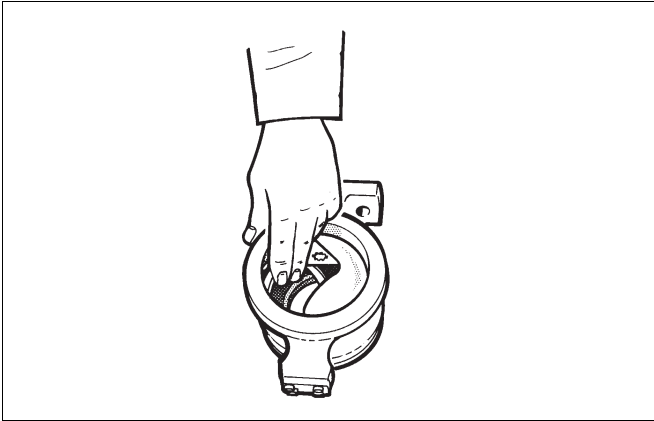


Fig. 18 Slipping the seat into the body

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

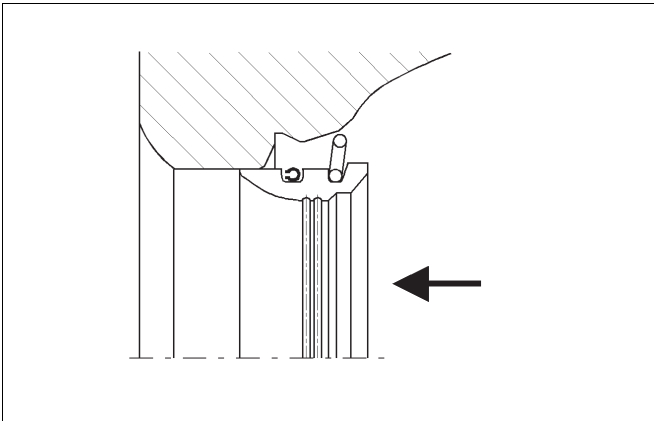


Fig. 19 Pushing the the spring angles against the control face

- ❑ Place a screwdriver on each visible spring angle one after the other and knock the spring into the groove, see Fig. 20.

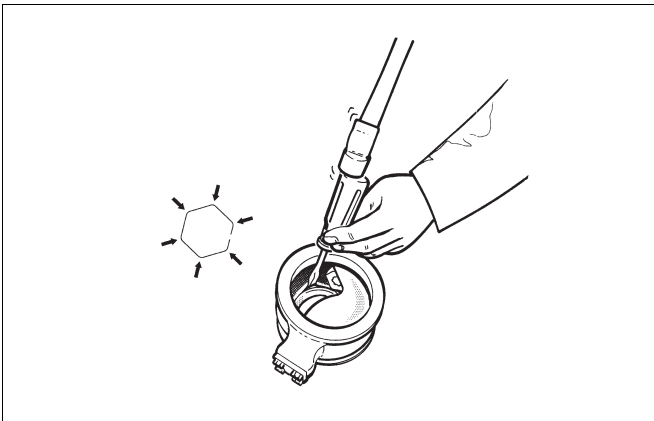


Fig. 20 Knocking the spring into the groove

- ❑ Turn the segment 180° clockwise and knock the rest of the spring angles into the groove, Fig. 21. A special tool available from the manufacturer may also be used for the work phases in Figs. 20 and 21.

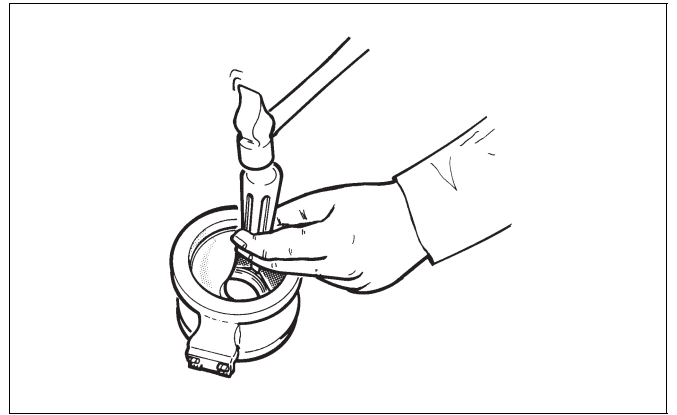


Fig. 21 Knocking the spring after turning the seat around

- ❑ Use a plastic spindle to ensure that the seat is correctly placed and can move freely, Fig. 25.

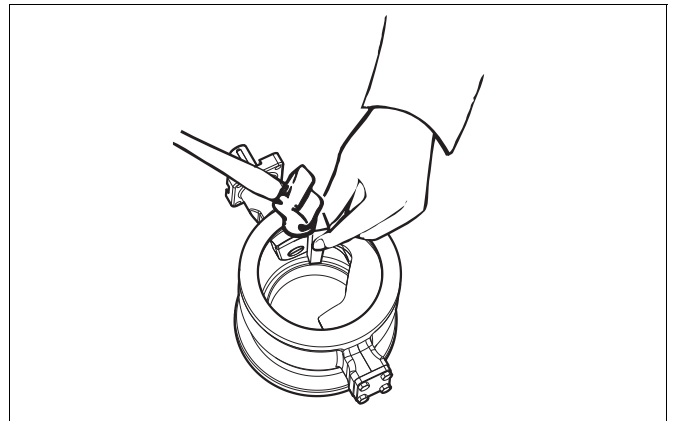


Fig. 22 Securing with a plastic spindle

#### 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. 23. 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.

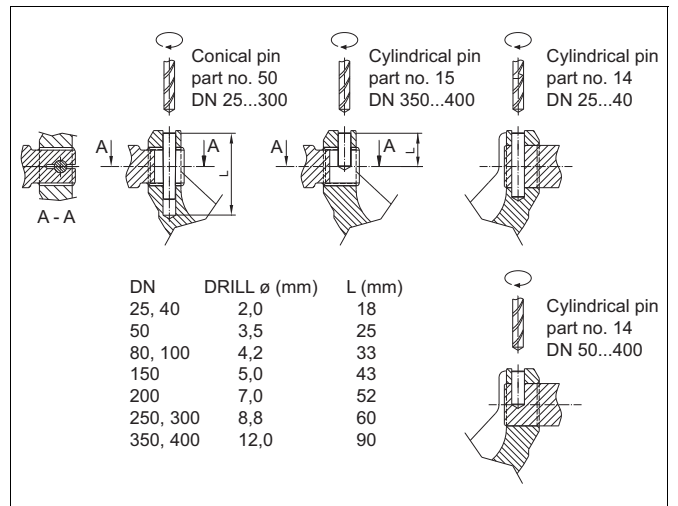


Fig. 23 Drilling the pin, R1L and R2\_S

- ❑ Detach the retainer plates (42).
- ❑ Detach the gland packings (20).
- ❑ Remove the shafts (11 and 12), Fig. 24.
- ❑ 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.

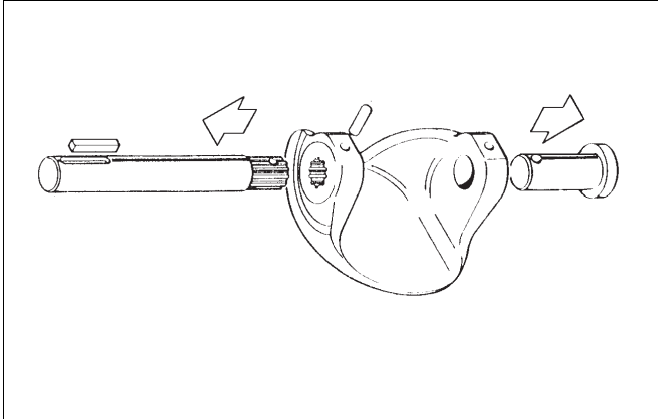


Fig. 24 Removing the shafts

#### 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 4.5.2.
- ❑ Mount the segment in the body in the closed position. Press the segment to fit the shaft (12).

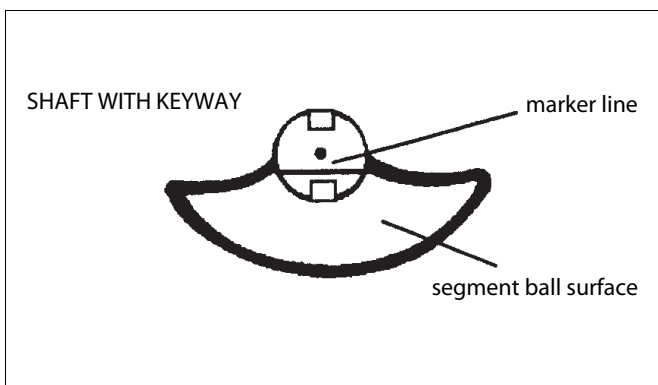


Fig. 25 Segment and shaft position

- ❑ Install the drive shaft (11). Note the location of the pin hole and the keyway. See Fig. 25.
- ❑ Please note the depth of the hole (L) for the conical pin (Fig. 23). Put the pins (14, 50) in their places and lock them (Fig. 26). 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.

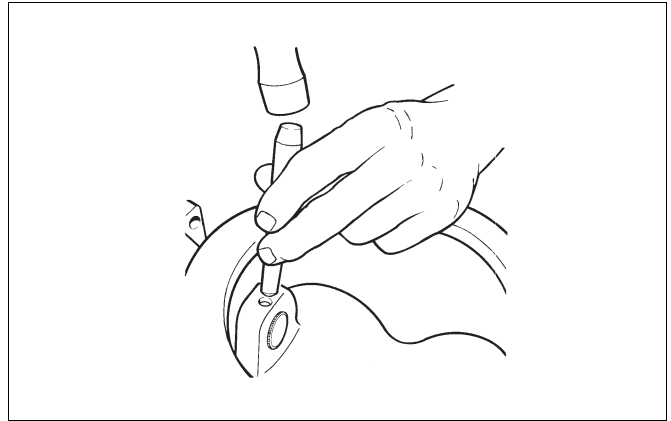


Fig. 26 Locking a pin

- ❑ 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 (for lubricated screws)

Screw	M6 UNC 1/4	M8 UNC5/16	M10 UNC 3/8	M12 UNC 1/2
Torque, Nm	8	18	35	65

## 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 Metso 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. 9.
- ❑ 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 4.
- ❑ Adjust the segment open and closed positions (limits to piston movement) by means of the actuator stop screws, see Fig. 24. The correct opening angle is 90°, for the R2\_S valve 70°. 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!**

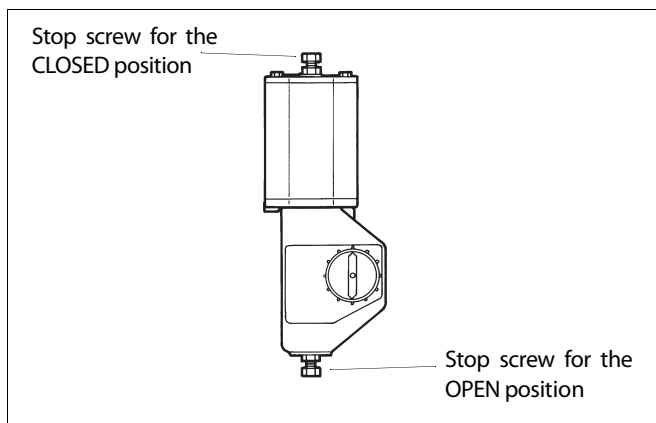


Fig. 27 Open and closed positions of a B1 actuator

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. 28.

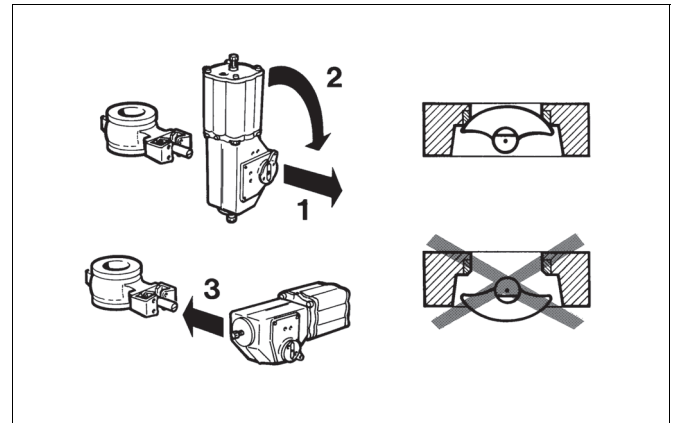


Fig. 28 Changing the actuator position

- ❑ 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.

#### 6.3.1 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. 9.

#### 6.3.2 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. 9.

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.

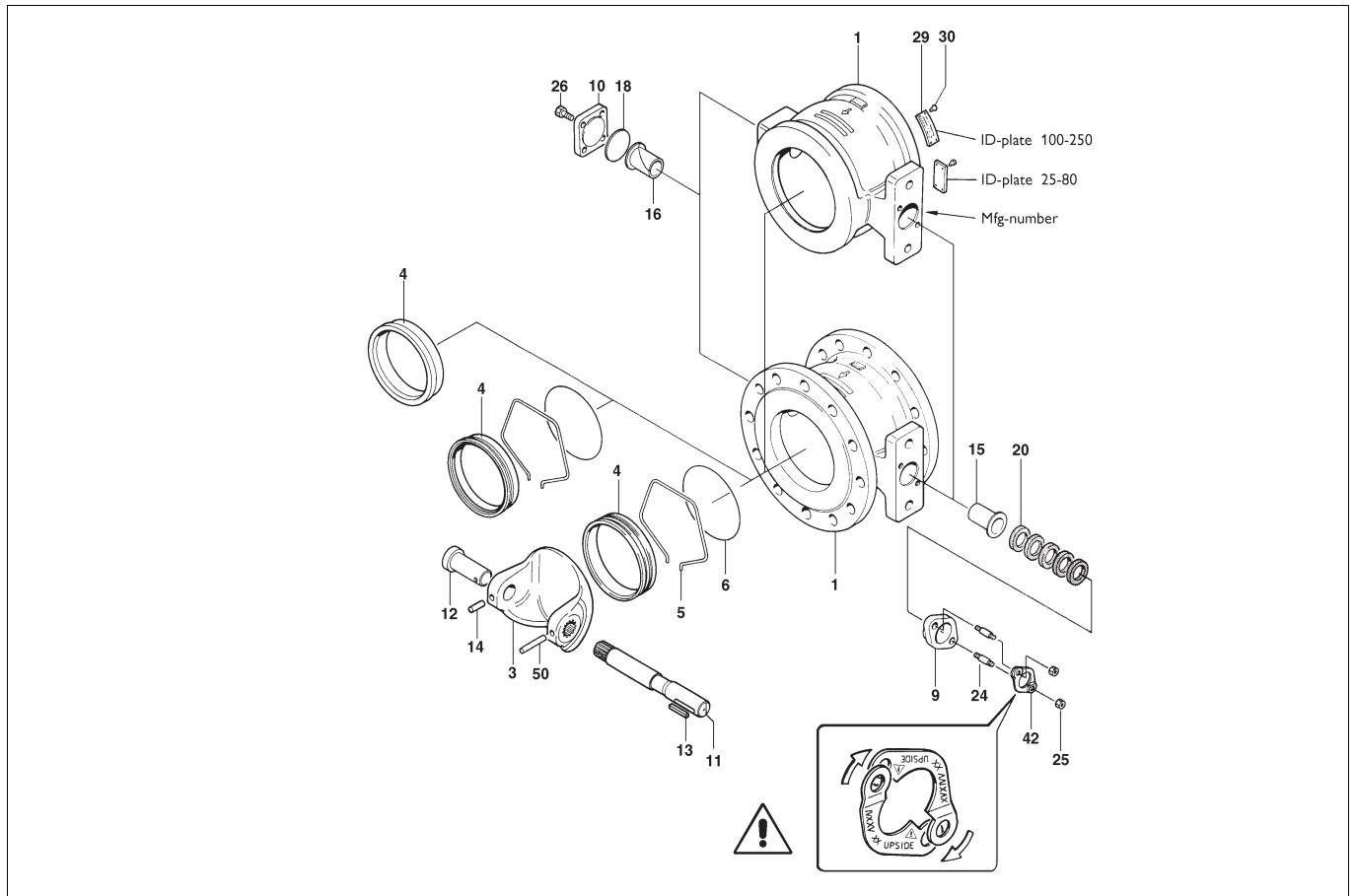
When ordering spare parts, always include the following information:

- 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 and R21 Titanium



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	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")

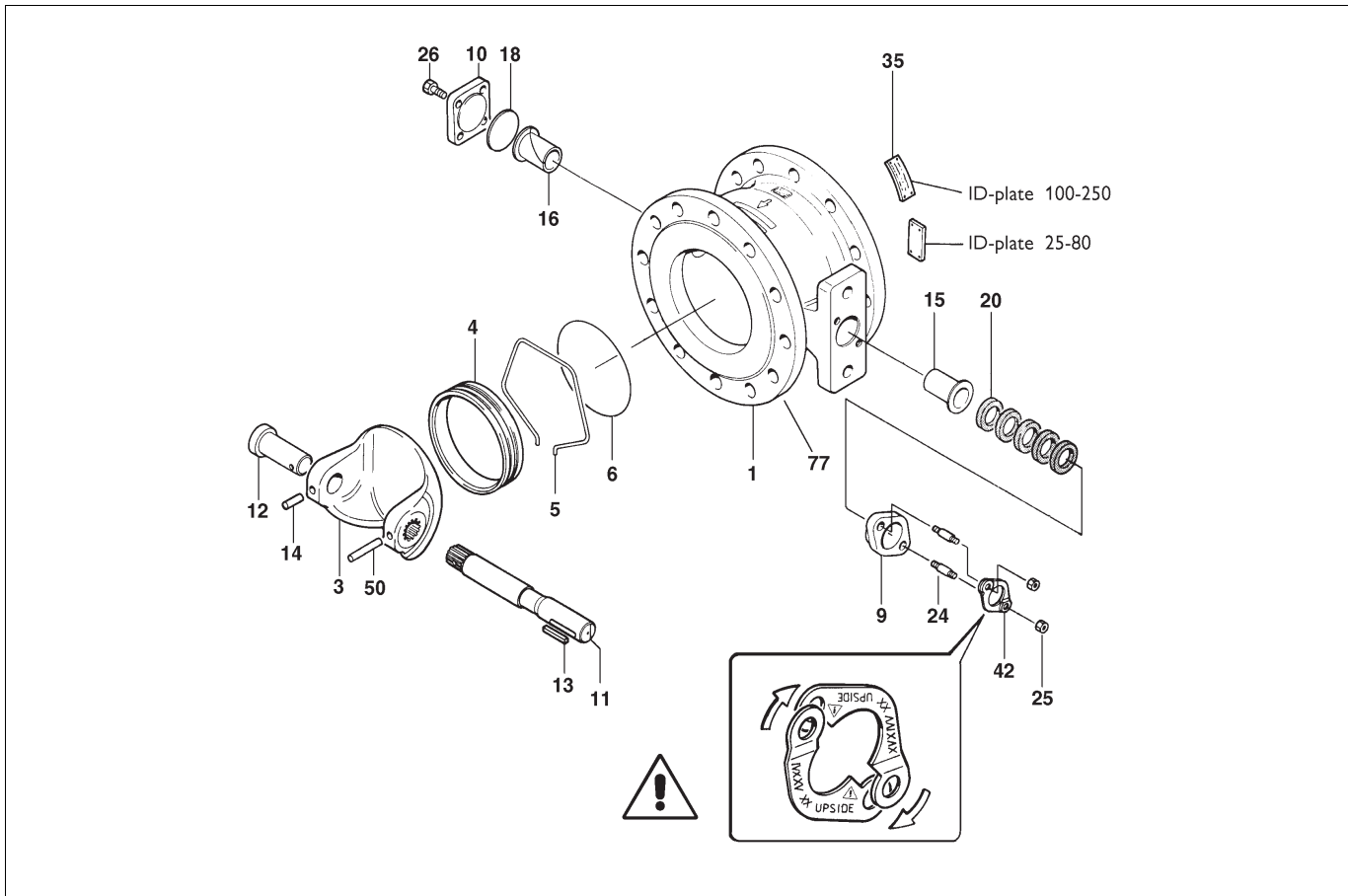
Spare part (Spare Part Set): Recommended soft parts, always needed for the repair. Delivered as a set.

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 DN80 - 300/3" - 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	

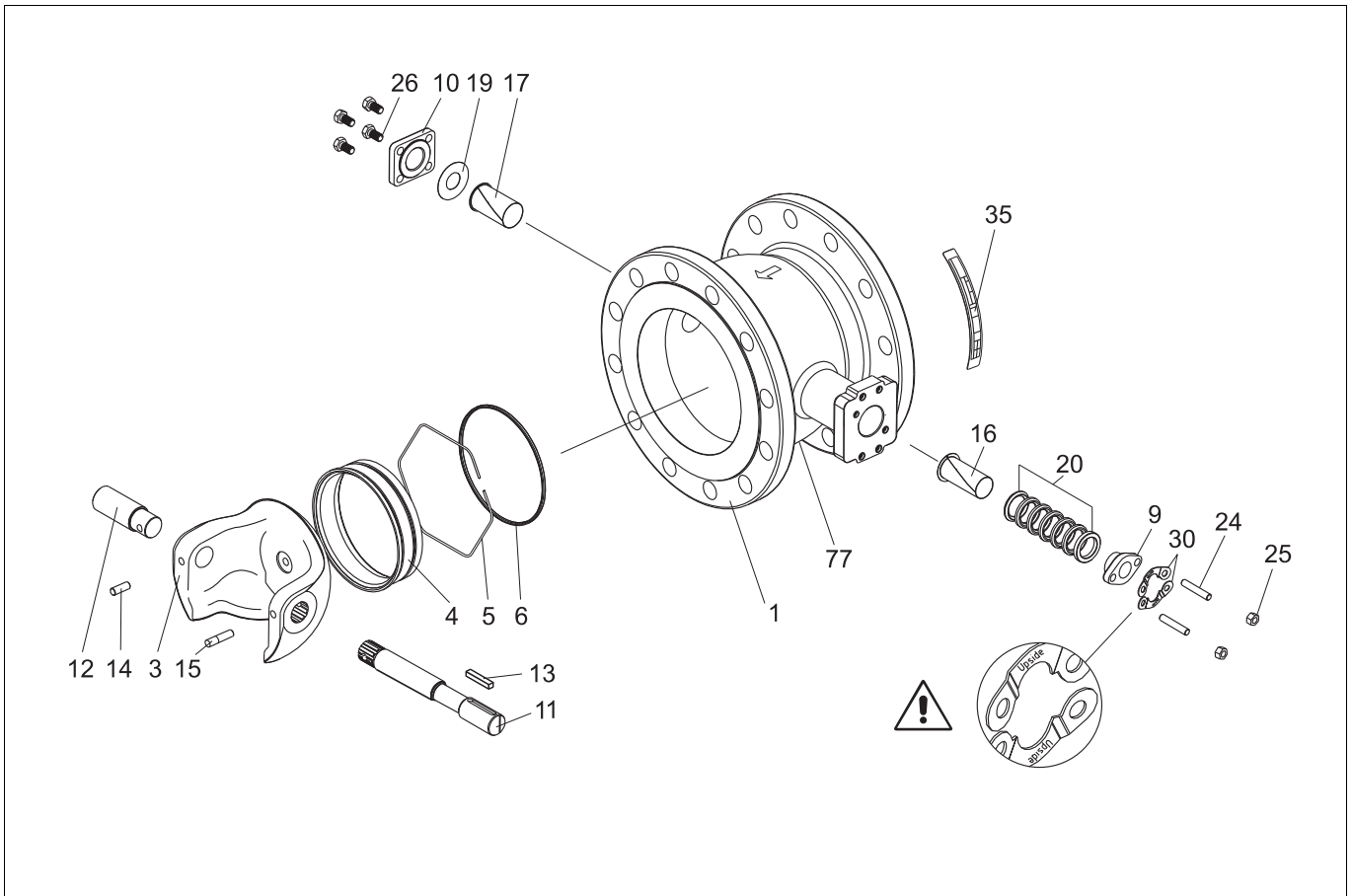
Spare part (Spare Part Set): Recommended soft parts, always needed for the repair. Delivered as a set.

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 - 400/14" - 16"



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.

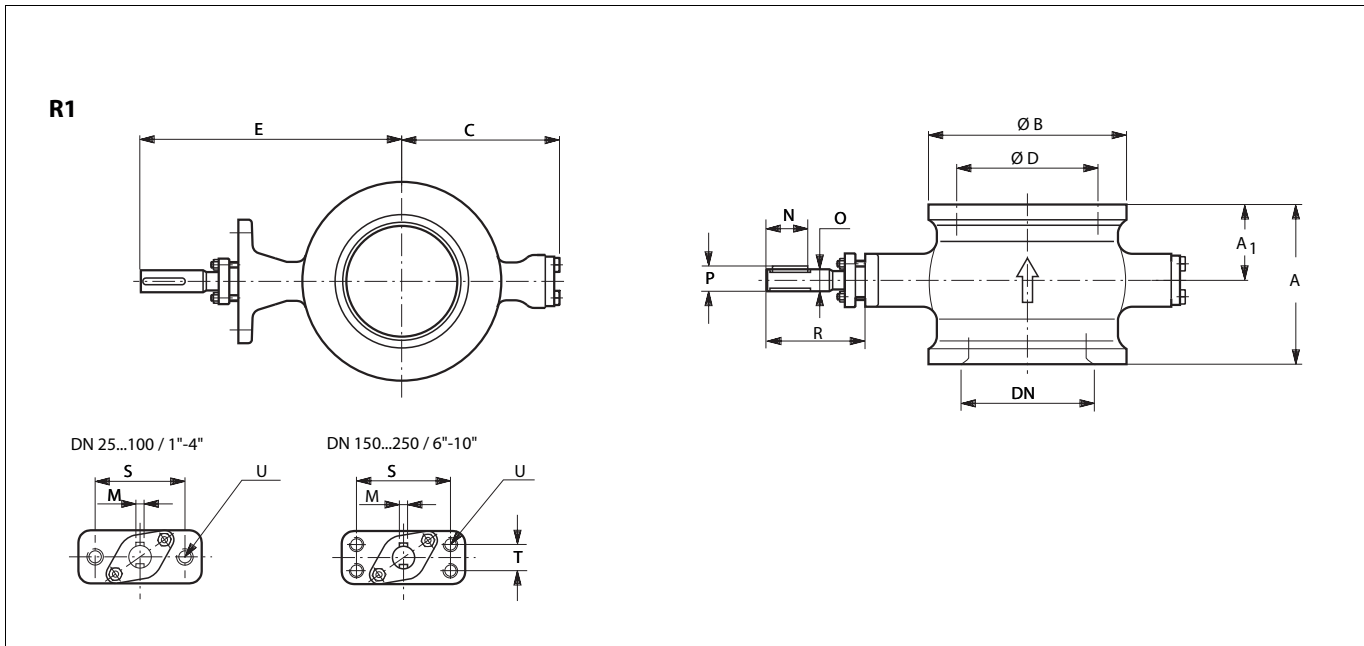
Spare part category 2: Parts for replacing of the seat. Available also as a set.

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

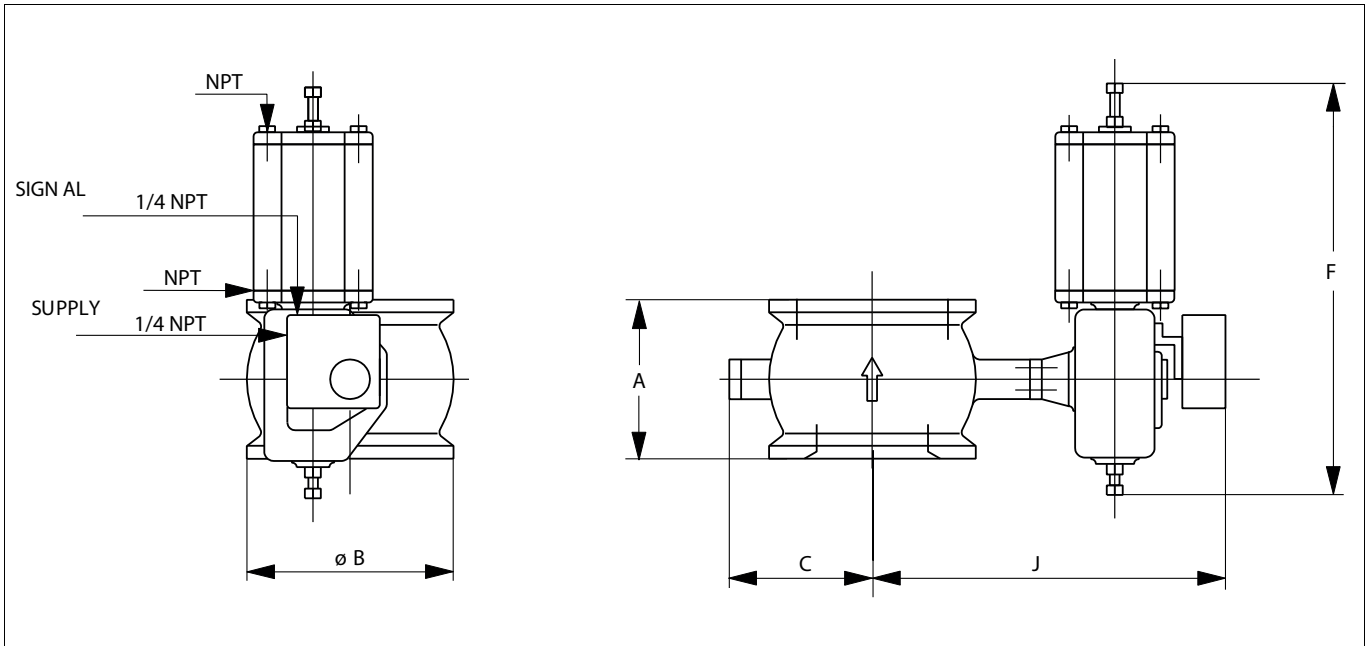


DN	MAIN DIMENSIONS, mm									SHAFT DIMENSIONS, mm						
	D	A	A <sub>1</sub>	B	C	S	T	U UNC	kg	O	E	R	M	P	N	DI
25	33/38*	50	25	64	57	70	-	3/8	2.5	15	144	70	4.76	17	25	15
40	49	60	25	82	63	70	-	3/8	3.5	15	151	71	4.76	17	25	15
50	60	75	32	100	92	70	-	3/8	5	15	170	70	4.76	17	25	15
80	89	100	45	131	108	90	-	1/2	9	20	196	79	4.76	22.2	35	20
100	113	115	50	158	117	90	-	1/2	11	20	205	80	4.76	22.2	35	20
150	164	160	65	216	177	110	32	1/2	26	25	295	110	6.35	27.8	46	25
200	205	200	80	268	200	130	32	1/2	48	25/30	346	140	6.35	27.8	46	30
250	259	240	92	326	252	130	32	1/2	78	35	390	141	9.52	39.1	58	35

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



**R1L-B1C, B1J/B1JA**



**R1L-B1C**

TYPE	Max. Δp bar*	DIMENSIONS, mm					NPT	Kg
		A	B	C	F	J		
R1L25-B1C6	25	50	64	57	400	405	1/4	10
R1L40-B1C6	25	60	82	63	400	410	1/4	11
R1L50-B1C6	25	75	100	92	400	430	1/4	13
R1L80-B1C6	25	100	131	108	400	445	1/4	17
R1L100-B1C6	25	115	158	117	400	455	1/4	19
R1L150-B1C6	10	160	216	177	400	530	1/4	34
R1L150-B1C9	25	160	216	177	455	525	1/4	36
R1L200-B1C9	15	200	268	200	455	575	1/4	57
R1L200-B1C11	25	200	268	200	540	590	3/8	63
R1L250-B1C11	15	240	326	252	540	630	3/8	95
R1L250-B1C13	25	240	326	252	635	645	3/8	110

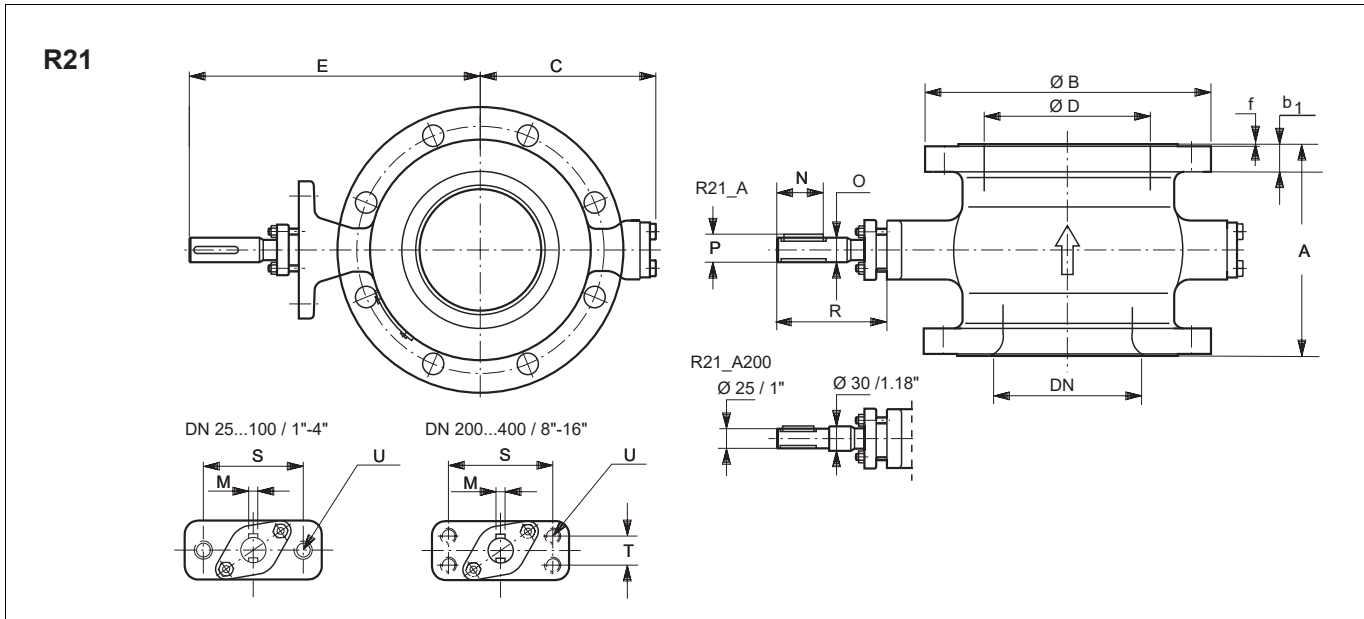
\* Supply pressure 5 bar

**R1L-B1J/B1JA**

TYPE	Max. Δp bar*	DIMENSIONS, mm					NPT	Kg
		A	B	C	F	J		
R1L25-B1J8/B1JA8	25/25	50	64	57	560	400	3/8	19
R1L40-B1J8/B1JA8	25/25	60	82	63	560	405	3/8	20
R1L50-B1J8/B1JA8	25/25	75	100	92	560	425	3/8	22
R1L80-B1J8/B1JA8	25/25	100	131	108	560	445	3/8	26
R1L100-B1J8/B1JA8	25/25	115	158	117	560	450	3/8	28
R1L150-B1J8/B1JA8	10/25	160	216	177	560	525	3/8	43
R1L150-B1J10/B1JA10	25/25	160	216	177	650	535	3/8	54
R1L200-B1J10/B1JA10	15/25	200	268	200	650	590	3/8	75
R1L200-B1J12/B1JA12	25/25	200	268	200	800	605	1/2	100
R1L250-B1J12/B1JA12	20/25	240	326	252	800	645	1/2	130
R1L250-B1J16/B1JA16	25/25	240	326	252	990	680	1/2	170

\* Supply pressure B1J 4 bar / B1JA 5 bar

## 11.2 Series R21



## R21

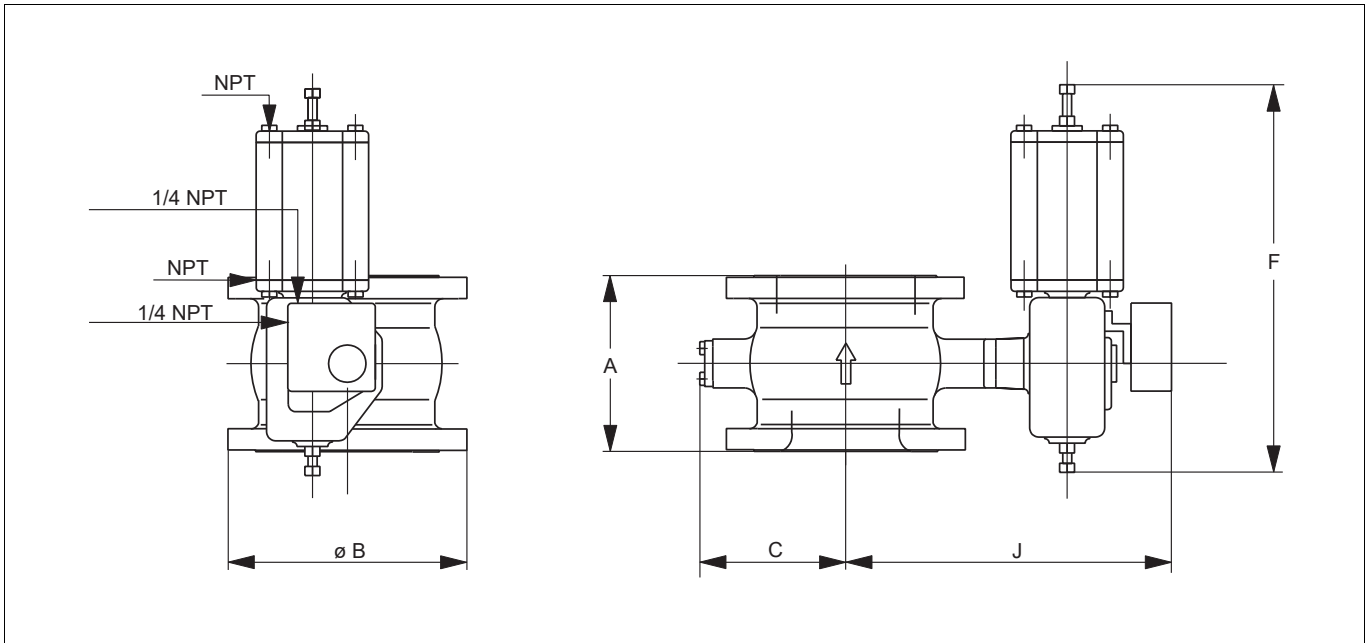
DN	DIMENSIONS, mm						SHAFT DIMENSIONS, mm						FLANGE DIMENSIONS, mm							
	D	A	C	S	T	U UNC	O	E	R	M	P	N	ASME 150				ASME 300			
													B	b <sub>1</sub>	F	kg	B	b <sub>1</sub>	F	kg
25	33/ 38*	102	57	70	-	3/8	15	144	70	4.76	17	25	108	14.5	1.6	3.5	17.5		1.6	5
40	49	114	63	70	-	3/8	15	151	71	4.76	17	25	127	14.5	1.6	5	156	21	1.6	8
50	60	124	92	70	-	3/8	15	170	70	4.76	17	25	152	16	1.6	8	165	22.5	1.6	10
80	89	165	108	90	-	1/2	20	196	79	4.76	22.2	35	191	19.5	1.6	15	210	29	1.6	20
100	113	194	117	90	-	1/2	20	205	80	4.76	22.2	35	229	24	1.6	23	254	32	1.6	31
200	205	243	200	130	32	1/2	25/30	346	140	6.35	27.8	46	343	29	1.6	70	381	41.5	1.6	95
250	259	297	252	130	32	1/2	35	390	140	9.52	39.1	58	406	30.5	1.6	105	445	48	1.6	140
300	300	338	270	160	40	5/8	40	462	165	9.52	44.2	68	483	32	1.6	155	520	51	1.6	205

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

Cv 100 % of 95° travel. The allowed pressure differential in closed position is 25 bar / 370 psi.

DN	FLANGE DIMENSIONS, mm															
	R21J PN10				R21K PN16				R21L PN25				R21M PN40			
	B	b <sub>1</sub>	f	kg	B	b <sub>1</sub>	f	kg	B	b <sub>1</sub>	f	kg	B	b <sub>1</sub>	f	k
25	115	18	2	4.5	115	18	2	4.5	115	18	2	4.5	115	18	2	4.5
40	150	18	3	7	150	18	3	7	150	18	3	7	150	18	3	7
50	165	20	3	10	165	20	3	10	165	20	3	10	165	20	3	10
80	200	20	3	16	200	20	3	16	200	24	3	17	200	24	3	17
100	220	20	3	21	220	20	3	21	235	24	3	24	235	24	3	24
200	340	24	3	65	340	24	3	65	360	30	3	75	375	34	3	85
250	395	26	3	100	405	26	3	105	425	32	3	115	450	38	3	130
300	445	26	4	135	460	28	4	145	485	34	4	160	515	42	4	185

DN	FLANGE DIMENSIONS, mm											
	R21R JIS 10K				R21S JIS 16K				R21T JIS 20K			
	B	b <sub>1</sub>	f	kg	B	b <sub>1</sub>	f	kg	B	b <sub>1</sub>	f	kg
25	125	14	1	5	125	14	1	5	125	16	1	5
40	140	16	2	6	140	16	2	6	140	18	2	7
50	155	16	2	8	155	16	2	8	155	18	2	8
65	175	18	2	10	175	18	2	10	175	20	2	12
80	185	18	2	14	200	20	2	14	200	22	2	16
100	210	18	2	19	225	22	2	22	225	24	2	23
150	280	22	2	40	305	24	2	45	305	28	2	50
200	330	22	2	65	350	26	2	70	350	30	2	75
250	400	24	2	100	430	28	2	110	430	34	2	120
300	445	24	3	135	480	30	3	150	480	36	3	160

**R21-B1C, B1J/B1JA****R21-B1C**

TYPE	Max. $\Delta p$ bar*	DIMENSIONS, mm				NPT	R21J PN 10		R21K PN 16		R21L PN 25		R21M PN 40		R21C ASME 150		R21D ASME 300	
		A	C	F	J		ØB	kg	ØB	kg	ØB	kg	ØB	kg	ØB	kg	ØB	kg
		R21_25-B1C6	25	102	57		400	405	1/4	115	9	115	9	115	9	115	9	108
R21_40-B1C6	25	114	63	400	410	1/4	150	11	150	11	150	11	150	11	127	9	156	12
R21_50-B1C6	25	124	92	400	430	1/4	165	14	165	14	165	14	165	14	152	12	165	14
R21_80-B1C6	25	165	108	400	445	1/4	200	20	200	20	200	21	200	21	191	19	210	24
R21_100-B1C6	25	194	117	400	455	1/4	220	25	200	25	235	28	235	28	229	27	254	35
R21_200-B1C9	15	243	200	455	575	1/4	340	75	340	75	360	85	375	95	343	80	381	105
R21_200-B1C11	25	243	200	540	590	3/8	340	80	340	80	360	90	375	100	343	85	381	110
R21_250-B1C11	15	297	252	540	630	3/8	395	115	405	120	425	130	450	150	406	125	445	160
R21_250-B1C13	25	297	252	635	645	3/8	395	130	405	135	425	145	450	165	406	140	445	175
R21_300-B1C13	19	338	270	635	695	3/8	445	165	460	175	485	190	515	215	483	185	520	235
R21_300-B1C17	25	338	270	770	730	1/2	445	190	460	200	485	215	515	240	483	210	520	260
R21_350-B1C13	9	400	310	635	710	3/8	505	215	520	225	555	255	580	290	534	240	584	310

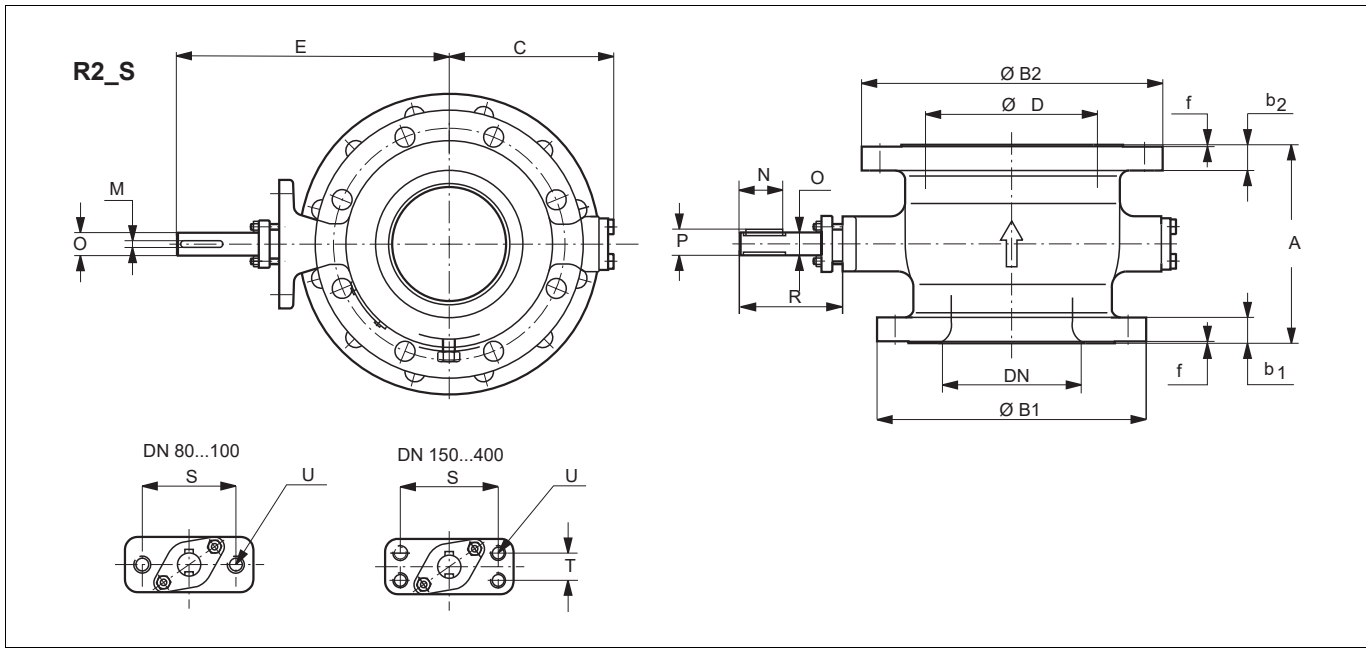
\* Supply pressure 5 bar

**R21-B1J/B1JA**

TYPE	Max. $\Delta p$ bar*	DIMENSIONS, mm				NPT	R21K PN 10		R21K PN 16		R21L PN 25		R21M PN 40		R21C ASME 150		R21D ASME 300	
		A	C	F	J		OB	kg	OB	kg	OB	kg	OB	kg	OB	kg	OB	kg
		R21_25-B1J8/B1JA8	25/25	102	57		560	400	3/8	115	21	115	21	115	21	115	21	108
R21_40-B1J8/B1JA8	25/25	114	63	560	405	3/8	150	23	150	23	150	23	150	23	127	21	156	24
R21_50-B1J8/B1JA8	25/25	124	92	560	425	3/8	165	26	165	26	165	26	165	26	152	24	165	26
R21_80-B1J8/B1JA8	25/25	165	108	560	445	3/8	200	32	200	32	200	33	200	33	191	31	210	36
R21_100-B1J8/B1JA8	25/25	194	117	560	450	3/8	220	37	220	37	235	40	235	40	229	39	254	47
R21_200-B1J10/B1JA10	15/25	243	200	650	590	3/8	340	95	340	95	360	105	375	115	343	100	381	125
R21_200-B1J12/B1JA12	25/25	243	200	800	605	1/2	340	115	340	115	360	125	375	135	343	120	381	145
R21_250-B1J12/B1JA12	20/25	297	252	800	645	1/2	395	150	405	155	425	165	450	185	406	160	445	195
R21_250-B1J16/B1JA16	25/25	297	252	990	680	1/2	395	190	405	195	425	205	450	225	406	200	445	235
R21_300-B1J12/B1JA12	8/18	338	270	800	695	1/2	445	185	460	195	485	210	515	235	483	205	520	255
R21_300-B1J16/B1JA16	20/25	338	270	990	730	1/2	445	225	460	235	485	250	515	275	483	245	520	295
R21_300-B1J16/B1JA16	25/25	338	270	1200	765	3/4	445	295	460	305	485	320	515	345	483	315	520	365

\* Supply pressure B1J 4 bar / B1JA 5 bar

11.3 Series R2\_S

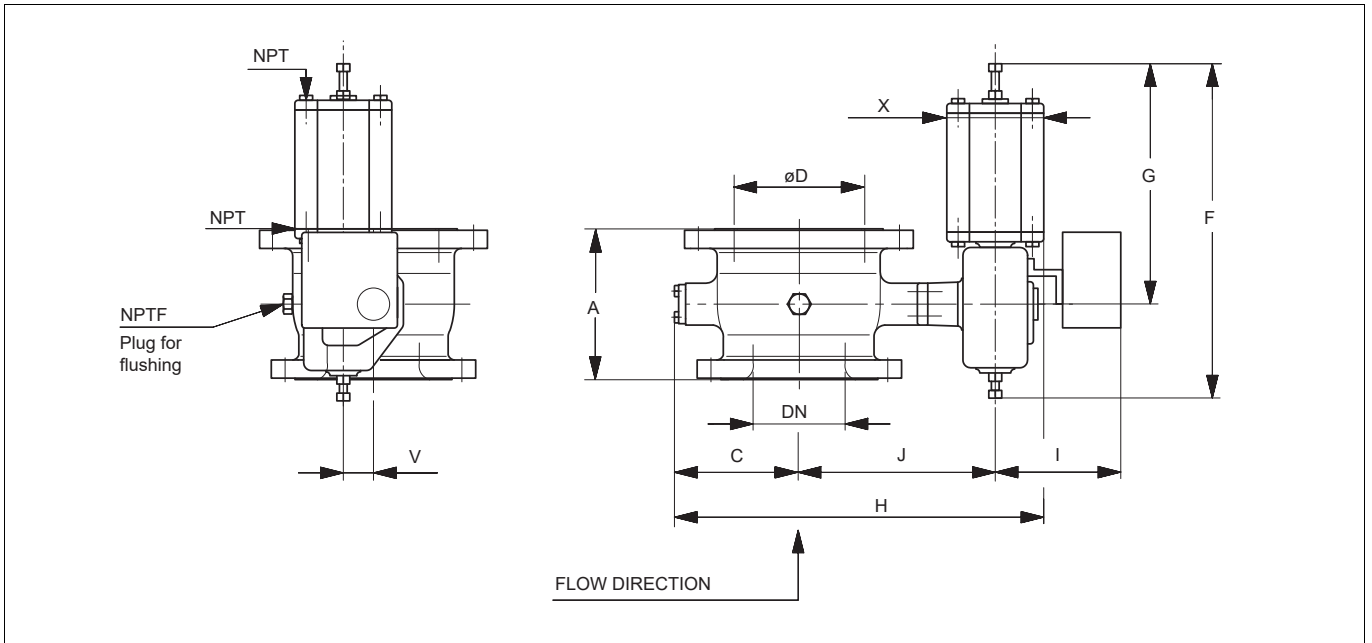


Valve size	MAIN DIMENSIONS, mm													
	DN	D	A	C	E	S	T	O	R	M	P	N	U UNC	Plug NPTF
80/100	80	102	165	108	196	90	-	20	79	4.8	22.2	35	1/2	1/2
100/150	100	136	163	117	205	90	-	20	80	4.8	22.2	35	1/2	1/2
150/200	150	190	207	177	295	110	32	25	110	6.4	27.8	46	1/2	1/2
200/250	200	240	248	200	346	130	32	25	140	6.4	27.8	46	1/2	3/4
250/300	250	296	297	250	390	130	32	35	141	9.5	39.1	58	1/2	3/4
300/350	300	336	338	270	462	160	40	40	165	9.5	44.2	68	5/8	3/4
350/400	350	390	400	311	513	160	40	45	200	12.7	50.4	80	M16	3/4
400/450	400	450	400	353	584	160	55	50	230	12.7	55.5	90	M20	3/4

SIZE	FLANGE DIMENSIONS, mm																								
	R2JS PN 10						R2KS PN 16						R2LS PN 25						R2MS PN 40						
	B1	b	B2	b2	F	kg	B1	b	B2	b2	F	kg	B1	b	B2	b2	F	kg	B1	b	B2	b2	F	kg	
80/100	200	20	220	20	3	16	200	20	220	20	3	16	200	24	235	24	3	18	-	-	-	-	-	-	-
100/150	220	20	285	22	3	24	220	20	285	22	3	24	235	24	300	28	3	30	-	-	-	-	-	-	-
150/200	285	22	340	24	3	43	285	22	340	24	3	43	300	28	360	30	3	52	-	-	-	-	-	-	-
200/250	340	24	395	26	3	68	340	24	405	26	3	69	360	30	425	32	3	80	-	-	-	-	-	-	-
250/300	395	26	445	26	3	98	405	26	460	28	3	100	425	32	485	34	3	110	-	-	-	-	-	-	-
300/350	445	26	505	26	4	165	460	28	520	30	4	175	485	34	555	38	4	195	-	-	-	-	-	-	-
350/400	505	26	565	26	2	166	520	30	580	32	2	177	555	38	620	40	2	206	580	46	660	50	2	244	
400/450	565	26	615	28	2	201	580	32	640	40	2	224	620	40	670	46	2	256	660	50	685	57	2	298	

SIZE	FLANGE DIMENSIONS, mm											
	R2CS ASME 150						R2DS ASME 300					
	B1	b	B2	b2	F	kg	B1	b	B2	b2	F	kg
80/100	191	19.5	229	24.0	1.6	17	210	24	254	24	2	19
100/150	229	24.0	279	25.5	1.6	27	254	24	318	28	2	30
150/200	279	25.5	343	29.0	1.6	46	318	28	381	34	2	50
200/250	343	26.0	406	30.5	1.6	74	381	34	450	38	2	82
250/300	406	30.6	483	32.0	1.6	105	450	38	521	42	2	115
300/350	483	32.0	534	35.0	1.6	185	521	42	584	42	2	190
350/400	535	35.4	595	37	2	192	585	54.4	650	57.6	2	257
400/450	595	37	635	40.1	2	230	650	57.6	710	60.8	2	315

SIZE	FLANGE DIMENSIONS, mm																	
	R2RS JIS 10 K						R2SS JIS 16 K						R2TS JIS 25 K					
	B1	b1	B2	b2	f	kg	B1	b1	B2	b2	f	kg	B1	b1	B2	b2	f	kg
80/100	185	18	210	18	2	14	-	-	-	-	-	-	-	-	-	-	-	-
100/150	210	18	280	22	2	23	-	-	-	-	-	-	-	-	-	-	-	-
150/200	280	22	330	22	2	41	-	-	-	-	-	-	-	-	-	-	-	-
200/250	330	22	400	24	2	65	-	-	-	-	-	-	-	-	-	-	-	-
250/300	400	24	445	24	2	98	-	-	-	-	-	-	-	-	-	-	-	-
300/350	445	24	490	26	3	165	-	-	-	-	-	-	-	-	-	-	-	-
350/400	490	26	560	28	3	159	540	34	605	38	3	192	540	40	605	46	3	201
400/450	560	28	620	30	3	201	605	38	675	40	3	247	605	46	675	48	3	260

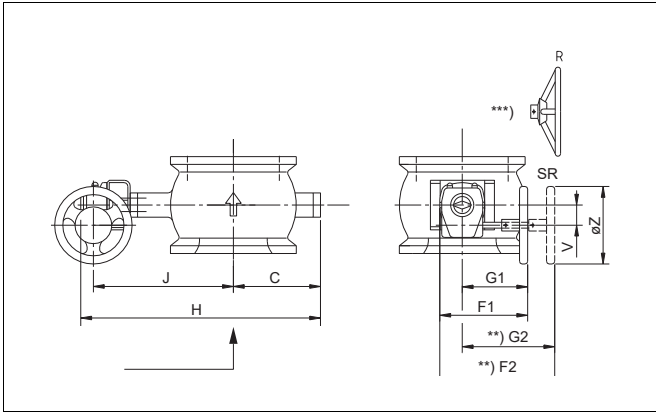
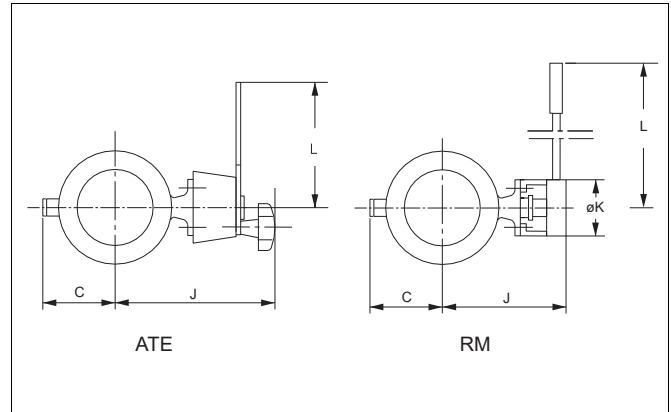
**R2\_S-B1C, B1J/B1JA****R2\_S-B1C**

TYPE	DIMENSIONS, mm											NPT	NPTF	kg
	DN	A	C	D	F	G	X	V	J	H	I			
R2_S 80/100-BC 9	80	165	108	102	455	315	110	43	221	405	220	1/4	1/2	30
R2_S100/150-BC 9	100	163	117	136	455	315	110	43	229	425	220	1/4	1/2	42
R2_S150/200-BC11	150	207	177	190	540	375	135	51	310	570	225	3/8	1/2	69
R2_S200/250-BC13	200	248	200	240	635	445	175	65	367	665	235	3/8	3/4	113
R2_S250/300-BC17	250	298	252	296	700	470	175	78	420	760	260	1/2	3/4	170
R2_S300/350-B1C17	300	338	270	336	770	545	215	78	495	880	340	1/2	3/4	230
R2_S350/400-B17	350	400	311	390	770	545	215	78	582	1000	340	1/2	3/4	260
R2_S350/400-B20	350	400	311	390	840	575	215	97	601	1020	355	1/2	3/4	279
R2_S400/450-B25	400	400	353	450	1040	710	265	121	691	1177	390	1/2	3/4	387

**R2\_S-B1J/B1JA**

TYPE	DIMENSIONS, mm											NPT	NPTF	kg
	DN	A	C	D	F	G	X	V	J	H	I			
R2_S 80/100-B1J10	80	165	108	102	640	480	175	51	225	420.5	225	3/8	1/2	48
R2_S 100/150-B1J10	100	163	117	136	640	480	175	51	234	438.5	225	3/8	1/2	60
R2_S 150/200-B1J12	150	207	177	190	815	620	215	65	330	614.5	235	1/2	1/2	109
R2_S 200/250-B1J16	200	248	200	240	990	760	265	78	396	728.5	340	1/2	3/4	180
R2_S 250/300-B1J20	250	298	252	296	1230	940	395	97	447	896.5	355	3/4	3/4	285
R2_S 300/350-B1J20	300	338	270	336	1230	940	395	97	509	976.5	355	3/4	3/4	370
R2_S 350/400-B1J20	350	400	311	390	1230	940	395	97	548	1056.5	355	3/4	3/4	419
R2_S 400/450-B1J25	400	400	353	450	1490	1140	505	121	632	1237.5	390	3/4	3/4	648

## R1LA/R21LA-M

R1LE/R21LE-ATE  
R1LE/R21LE-RM

DN	ACTUATOR/ ISO 5211 mounting	DIMENSIONS, mm									
		C	F1	G1	F2	G2	H	J	V	ØZ	Kg
25	M07/F07	57	196	152	-	-	235	146	39	125	6
40	M07/F07	63	196	152	-	-	250	152	39	125	7
50	M07/F07	92	196	152	-	-	295	172	39	125	9
65	M07/F07	99	196	152	-	-	310	177	39	125	12
80	M07/F07	108	196	152	-	-	330	189	39	125	13
100	M07/F07	117	196	152	-	-	345	197	39	125	15
150	M07/F07	177	196	152	-	-	490	282	39	125	31
150	M10/F10 or M10E/F10	177	227	169	297	239	500	290	52	200	33
200	M10/F10 or M10E/F10	200	227	169	297	239	565	331	52	200	55
200	M12/F12 or M12E/F12	200	285	210	357	282	580	338	67	250	60
250	M12/F12 or M12E/F12	252	378	279	453	354	685	389	90	457	100

DN	TYPE	DIMENSIONS, mm			kg
		C	J	L	
25	R1LE 25-ATE114	57	195	160	2.8
40	R1LE 40-ATE114	63	200	160	3.8
50	R1LE 50-ATE114	92	220	160	5.3
80	R1LE 80-ATE114	108	217	160	10
100	R1LE 100-ATE218	117	225	220	12
150	R1LA 150-RM 525	177	295	500	28
200	R1LA 200-RM 625	200	346	550	50
250	R1LA 250-RM 635	252	390	550	80

E = extended shaft

\*\*) actuators M07...M12 with handwheel SR

\*\*\*) actuators M14...M16 with handwheel R

## 12 TYPE CODE

### V-port segment valve, series R1, R21 and R2\_S

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	11.	12.
	R2	1	L	A	100	T	T	T	U	T	-	/

<b>1.</b>	<b>C<sub>v</sub>-CODE FOR VALVE SIZE 01</b>
	<b>STANDARD C<sub>v</sub></b>
	Without sign
	<b>NON-STANDARD C<sub>v</sub></b>
<b>C005</b>	Max. C <sub>v</sub> = 0.5
<b>C015</b>	Max. C <sub>v</sub> = 1.5
<b>C05</b>	Max. C <sub>v</sub> = 5
<b>C15</b>	Max. C <sub>v</sub> = 15

<b>2.</b>	<b>PRODUCT SERIES</b>
<b>R1</b>	Flangeless, reduced bore
<b>R2</b>	Flanged, reduced bore

<b>3.</b>	<b>FACE-TO-FACE DIMENSIONS</b>
	Face-to-face length Neles factory standard, without sign
<b>1</b>	ISA S 75.04 and DIN/IEC 534 Teil 3-2

<b>4.</b>	<b>PRESSURE RATING</b>
<b>J</b>	PN 10, flanged R21
<b>K</b>	PN 16, flanged R21
<b>L</b>	PN 25, flanged R21; flangeless R1
<b>M</b>	PN 40, flanged R21
<b>C</b>	ASME 150, flanged R21
<b>D</b>	ASME 300, flanged R21
<b>R</b>	JIS 10K, flanged R21
<b>S</b>	JIS 16K, flanged R21
<b>T</b>	JIS 20K, flanged R21

<b>5.</b>	<b>CONSTRUCTION</b>
<b>A</b>	Standard R1LA or R21_A
<b>S</b>	High-consistency version R2_S flanged
<b>Y</b>	Special

<b>6.</b>	<b>SIZE</b>
	<b>R1L</b>
	025, 040, 050, 065, 080, 100, 150, 200, 250
	01, 1H, 02, 2H, 03, 04, 06, 08, 10
	<b>R21</b>
	025, 040, 050, 080, 100, 200, 250, 300
	01, 1H, 02, 03, 04, 08, 10, 12
	<b>R2_S</b>
	080/100, 100/150, 150/200, 200/250, 250/300, 300/350, 350/400, 400/450
	03/04, 04/06, 06/80, 08/10, 10/12, 12/14, 14/16, 16/18

<b>7.</b>	<b>BODY</b>	<b>SCREWS</b>
<b>A</b>	CF8M	A4-80 / B8M
<b>C</b>	CG8M	A4-80 / B8M
<b>D</b>	WCB	A4-80 / B8M
<b>T</b>	Titanium	Titanium
<b>U</b>	CK3MCuN	A4-70/B8M
<b>Y</b>	Special	Special

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

<b>9.</b>	<b>SHAFTS, PINS/BEARINGS</b>
<b>J</b>	AISI 329 / PTFE
<b>H</b>	Hastelloy C / PVDF
<b>N</b>	Nitronic 50 / PTFE
<b>T</b>	Titanium / PVDF
<b>Y</b>	Special

<b>10.</b>	<b>SEAT</b>
<b>K</b>	Metal seat, general service
<b>S</b>	Stellite, back seal PTFE lipseal
<b>E</b>	Stellite, erosion resistant version, non-tight
<b>U</b>	Titanium, back seal Viton GF
<b>T</b>	PTFE + C25%, metal body
<b>Y</b>	Special

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

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

#### Example codes:

R1 L A 100 T T T U - - / -

R2 1 L A 100 T T T U F - / -

R2 1 C A 04 T T T U T - / -

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

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