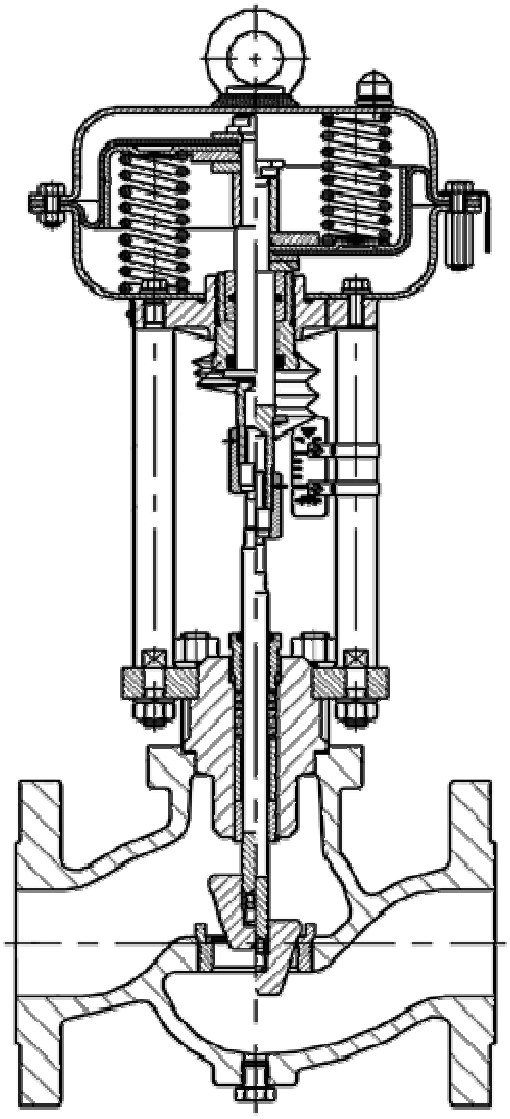
BR11 Instruction Manual



Contents:

To ensure trouble-free and safe operation of the valve, it is essential to be familiar with the contents of this BR11 Instruction Manual, and also with the general instructions for installation and operation, before installing and operating the valve.

Failure to observe or comply with these operating instructions will invalidate the manufacturer's guarantee and liability. The manufacturer's general conditions of sales and terms of delivery shall apply unless otherwise stated.

1. FUNCTIONAL PRINCIPLE

The valve regulates mass-flow by a linear movement of the valve spindle, which may be operated pneumatically, electrically or manually. As the stroke of the valve alters, the circular gap between the valve seat and the valve block is increased or reduced. This directly influences the amount of fluid flowing through the valve.

2. INSTALLATION

The valve may be mounted in any position; however, for valves of DN 80 size and above, vertical installation with the drive mounted above is preferred. For valves with extended construction, bellows, or drives weighing more than 50 kg, a suitable support or suspension mounting should be provided for the drive, otherwise its own weight might cause wear and leakage at the seals.

3. OPERATING CONDITIONS

Regulator valves should be operated under conditions that take into account the size and nature of the construction and the type of material. To ensure trouble-free operation over the whole operational lifetime, the regulator valve and its accessories should be regularly inspected and maintained.

Normal operating conditions:

a) With pneumatic positioning drive
Ambient temperature from - 25 to + 80 °C, with silicone diaphragm of -40 °C to +80 °C
Relative humidity up to 98 %,
The control and feed air supplies must contain no mechanical impurities, oil or corrosive substances, copper or aluminium alloys, and must be dehumidified such that the dew-point corresponds to a temperature that is at least 10 °C lower than the operating temperature of the position controller and the positioning drive.

b) With electrical positioning drive
In accordance with the manufacturer's instructions.

c) With hand-operated drives of type NN
Ambient temperature from - 25 to + 80 °C
Relative humidity up to 98 %.

4. OPERABILITY, MAINTENANCE AND REPAIR - STANDARD CONSTRUCTION

The operability of the regulator valve during use is based on maintaining an appropriate flow characteristic and not exceeding the permitted leakage level for the valve.

To ensure long-term correct and safe operation of the valve, it is essential to carry out regular recorded inspections. Valves that operate continuously should be checked at least every 6 months. Valves that operate discontinuously should be checked at least every 12 months.
If it is necessary to carry out maintenance or repair work on the regulator valve, it should be carried out as follows:

4.1. Gland packing

A key criterion for operability is external seal-tightness, which is provided by the gland packing.

The gland packing to be used is normally pre-specified based on the operating conditions.
With normal gland packing, the tightness of the seal is achieved by tightening the sealing nut.

WARNING:
When the valve is supplied, the sealing nut is only hand-tightened. Before putting the valve into service, it is essential to tighten the sealing sufficiently to achieve an adequate contact pressure, thus ensuring a secure external seal, but without blocking the valve spindle.

If self-adjusting sealing glands are used, the constant contact pressure is provided by a stainless steel spring. For this reason, the sealing nut should be screwed in up to the stop.

To change the gland packing, proceed as follows:

Before changing the gland packing, ensure that the valve is not under pressure and is not contaminated.

1. Loosen the upper part of the valve by opening the casing nuts (21) between the casing and the top of the valve.
2. Lift the upper part of the valve out of the casing, along with the valve spindle and the valve block. Loosen the coupling nut and counter-nut (35,37) and the lock-nut (36), and unscrew them from the valve spindle.
3. Undo the sealing nut (or screw plug) (12) from the sealing gland, and withdraw the valve spindle and valve block from the upper part of the valve.
4. Using appropriate tools, remove all parts of the sealing gland (13,14) from the gland packing space, and carefully clean out the packing space.
5. Fit a new casing gasket (15) and carefully clean the surfaces of the seal in the casing and on the upper part.
6. Insert the valve spindle and the valve block into the upper part of the valve.
7. Carefully locate the upper part of the valve on the valve casing and fasten it in place with the nuts (19).
8. Carefully fit the new sealing gland parts over the valve spindle and into the packing space, taking care to get everything in the correct order (insert the parts in reverse order to the order in which they were taken out).
9. Screw on and tighten the packing seal nut (12).
10. Screw the counter-nut and coupling nut (35,37) and the lock-nut (36) on to the valve spindle and connect the drive and the valve solidly back together.

4.2. Replacement of the valve seat and the valve block

If it is necessary to change the valve seat and valve block due to a change in the operating conditions or due to wear and tear, proceed as follows:
Before making the change, ensure that the valve is not under pressure and is not contaminated.

In order to achieve a better seal when changing the valve seat and valve block, we recommend lapping the seat and the block with a fine abrasive paste.

Replacing the valve block

1. Loosen the upper part of the valve by opening the casing nuts (21) between the casing and the top of the valve.
2. Lift the upper part of the valve out of the casing, along with the valve spindle and the valve block. Loosen the coupling nut and counter-nut (35,37) and the lock-nut (36), and unscrew them from the valve spindle.
3. Undo the sealing nut (or screw plug) (12) from the sealing gland, and withdraw the valve spindle and valve block from the upper part of the valve.
4.
   a) For Kvs = 0.01...1, the whole valve spindle is replaced, because the valve spindle and valve block are a single part.
   b) For Kvs = 1.6...16; Kvs = 63...630 (for DN 150...250) and Kvs = 0.01...1, and for models with extended construction or bellows.
   Knock out the dowel pin (6) using a punch, and unscrew the valve block; screw in a new block, drill it and knock in a dowel to secure it in place again.
   c) For Kvs = 25...160 (for DN 40...100):
   Unscrew the spindle from the block (4) and take out the insert (5). Place the insert on the spindle and screw it into a new valve block.
5. For a pressure-balanced valve block, the same procedure is used as for a normal block; however, when re-introducing the valve spindle into the upper part of the valve, take care not to damage the auxiliary edge-seal on the valve block.
6. Push the spindle with its new valve block into the upper part of the valve.
7. Carefully place the upper part of the valve into the valve casing and fasten it down with the nuts (19).
8. Tighten the gland seal nut.
9. Screw the counter-nut and coupling nut (35,37) and the lock-nut (36) on to the spindle and couple the drive and the valve solidly together again.

Replacing the seat

1. Loosen the upper part of the valve by opening the casing nuts (21) between the casing and the top of the valve.
2. Unscrew the valve seat (3) in counter-clockwise direction, using a suitable seat wrench.
3. Take a new or repaired valve seat, thoroughly clean the threads, lightly smear the seal cone with lubricant, and screw it in place.
4. Re-assemble the valve as when changing the valve block (items 7-9 above).

5. OPERABILITY, MAINTENANCE AND REPAIR – MODELS WITH EXTENDED OR BELLOWS CONSTRUCTION

The regulator valve's operability during use is based on maintaining an appropriate flow characteristic and not exceeding the permitted leakage level for the valve.

To ensure long-term correct and safe operation of the valve, it is essential to carry out regular recorded inspections. Valves that operate continuously should be checked at least every 6 months. Valves that operate discontinuously should be checked at least every 12 months.
If it is necessary to carry out maintenance or repair work on the regulator valve, it should be carried out as follows:

5.1. Gland packing

A key criterion for operability is external seal-tightness, which is provided by the gland packing.
The gland packing to be used is normally pre-specified based on the operating conditions.
With normal gland packing, the tightness of the seal is achieved by tightening the sealing nut.

WARNING:
When the valve is supplied, the sealing nut is only hand-tightened. Before putting the valve into service, it is essential to tighten the sealing sufficiently to achieve an adequate contact pressure, thus ensuring a secure external seal, but without blocking the valve spindle.

If self-adjusting sealing glands are used, the constant contact pressure is provided by a stainless steel spring. For this reason, the sealing nut should be screwed in up to the stop.

For models with extended and bellows construction, the gland packing is changed as described in item 4 above.

5.2. Replacement of the valve seat and the valve block

If it is necessary to change the valve seat and valve block due to a change in the operating conditions or due to wear and tear, proceed as follows:
Before making the change, ensure that the valve is not under pressure and is not contaminated.

In order to achieve a better seal when changing the valve seat and valve block, we recommend lapping the seat and the block with a fine abrasive paste.

Replacing the valve block

The procedure is identical to that described for models of normal construction; however, please note:

1. a) For Kvs = 0.01 ...16; Kvs = 63...630 (for DN 150...250) Knock out the dowel pin (6) using a punch, and unscrew the valve block; screw in a new block, drill it and knock in a dowel to secure it in place again.
   b) For Kvs = 25...160 (for DN 40...100):
   Unscrew the spindle from the block (4) and take out the insert (5). Place the insert on the spindle and screw it into a new valve block.

2. To avoid damage in the models with metal bellows (the version with insulating section does not have a bellows), take care that no torque is applied to the bellows when unscrewing the valve block and screwing it back in. We recommend applying an opposing torque to the valve spindle.

Replacing the seat

Exactly as described in item 4.2 above.

5.3. Replacing the bellows

1. Loosen the upper part of the valve by opening the casing nuts (21) between the casing and the top of the valve.
2. Lift the upper part of the valve out of the casing, along with the valve spindle and the valve block. Loosen the coupling nut and counter-nut (35,37) and the lock-nut (36), and unscrew them from the valve spindle.
3. Loosen the gland nut on the cover. Loosen the coupling nuts (99) on the bellows and take off the cover flange and the drive.
4. Loosen the cover (sleeve) (91), to expose the bellows.
5. Remove the valve block (4) from the bellows as described in item 5.2.
6. Withdraw the bellows spindle extension with the metal bellows welded on to it, drawing it upwards out of the bellows cover (89).
7. Clean the surfaces of the seal on the connecting piece.
8. Fit a new bellows seal (87) and insert the bellows. Fit a new cover seal (93) and replace the cover, then screw the cover flange back in place with the connecting nuts (99).
9. Tighten the gland nut.
10. Screw the valve block back into the bellows, as described above.
11. CAUTION
    Take great care that no torque is applied to the bellows when unscrewing the valve block and screwing it back in.
12. Screw the counter-nut and coupling nut (35,37) and the lock-nut (36) on to the valve spindle, and connect the drive and the valve solidly back together.

6. PNEUMATIC P/R DRIVE

When the pressure rises in the drive pressure chamber, a force is applied to the membrane in the drive unit. If this force exceeds the spring force of the springs in the second chamber, the springs are compressed and the drive spindle starts to travel out or in, according to the function. If the pressure continues to increase, once the maximum spring force is reached the springs will be pressed against the end-stop and the drive will halt. Thus, a simple pneumatic drive can reach a defined position in proportion to the air pressure.
The size of the drive is based on the cm^2 surface of the membrane.

Drive size	Stroke [mm]	Spring range (kPa)													
		1		2		3		4		5		6		7	
		20 - 100		40 - 200		40 - 120		80 - 240		60 - 140		120 - 280		180 - 380	
		No. of springs	Total tenstion [mm]	No. of springs	Total tenstion [mm]	No. of springs	Total tenstion [mm]	No. of springs	Total tenstion [mm]	No. of springs	Total tenstion [mm]	No. of springs	Total tenstion [mm]	No. of springs	Total tenstion [mm]
250	20	3	-	6	-	3	-	6	-	3	6	6	6	-	-
400	20	3	-	6	-	3	-	6	-	3	6	6	6	-	-
630	38	3	-	6	-	3	10	6	10	3	10 + 10	6	10 + 10	12	10 + 10
1000	38	3	-	6	-	3	9,5	6	9,5	3	9,5 + 9,5	6	9,5 + 9,5	12	9,5 + 9,5
	50	3	-	6	-	3	12,5	6	12,5	3	12,5 + 12,5	6	12,5 + 12,5	12	12,5 + 12,5
	63	3	-	6	-	3	16	6	16	3	16 + 16	6	16 + 16	12	16 + 16

Spring range and drive sizes for pneumatic drives of type P/R

P type drive: Single membrane drive.
Safe position NO (open on loss of pressure)
When pressure rises in the upper chamber, the drive spindle travels out.

R type drive: Single membrane drive.
Safe position NC (closed on loss of pressure)
When pressure rises in the lower chamber, the drive spindle travels in.

6.1. Changing the operating mode of the drive

No additional components are required in order to alter the direction of operation of type P/R pneumatic drives.

Changing P to R and vice versa

1. Disconnect the valve from the drive.
2. Ensure that no air pressure is applied to the drive.
3. Remove the top cover of the position drive, taking care that the tensioning nuts (long nuts) (82) are unscrewed to the ends – in accordance with the notes on the warning label.

The further steps in the procedure depend on the current operating mode of the drive before it is changed.

To change the drive function from P to R, proceed as follows:

4. Undo the special nuts (34) from the bolts on the positioning drive.
5. Remove the membrane with its membrane plate, spacer ring, washer and spacer cover (or spacer covers for drive sizes 630 and 1000).
6. Remove the springs (31) from the lower casing.
7. Turn the membrane together with all the parts as listed above through 180 degrees, and fit the membrane back over the drive bolts.
8. Screw the special nuts (34) on to the drive bolts, thus compressing the whole of the above group of components.
9. Place the springs on the membrane plate so that they fit in the guide cut-outs and their ends are aligned with the axis of the bolts.
10. Place the top cover over the springs and initially tighten the tensioning nuts (82).
11. Compress the springs evenly until the upper part of the drive end-stop is pressed against the lower part, then insert the rest of the bolts and screw on the nuts.

To change the drive function from R to P, proceed as follows:

4. Remove the springs (31) from the membrane plate (28).
5. Undo the special nuts (34) from the bolts on the positioning drive.
6. Remove the membrane with its membrane plate, spacer ring, washer and spacer cover (or spacer covers for drive sizes 630 and 1000).
7. Place the springs in the designated locations in the lower cover.
8. Turn the membrane together with all the parts as listed above through 180 degrees, and fit the membrane back over the drive bolts, so that the 6 mm diameter opening on the base and the nut on the edge of the drive membrane plate are axially aligned with one of the openings on the edge of the membrane.
9. Screw the special nuts (34) on to the drive bolts, thus compressing the whole of the above group of components.
10. Place the springs on the membrane plate (28) so that they fit in the guide cut-outs. To check that the springs are in the correct position, rotate the membrane (to the position of the notch on the nut at the edge of the membrane plate) until the 6 mm opening on the base is visible. By sighting through the opening, check that there is a spring in place on the underside.
11. Place the top cover over the springs and initially tighten the tensioning nuts (82).
12. Compress the springs evenly until the upper part of the drive end-stop is pressed against the lower part, then insert the rest of the bolts and screw on the nuts.

6.2. Changing the membrane

Should it be necessary to change a membrane, the drive should be dismantled as described in item 6.1. Instead of putting the drive back together in reverse order, it should simply be re-assembled in its original order after changing the membrane.

7. OTHER DRIVES

It is possible to equip model BR11 valves with electrical drives. Sizing the drive to the regulator valve is normally a part of the bidding process.

It is also possible to supply model BR11 valves with a purely manual operation (type NN), or to fit the pneumatic drive with an additional hand-wheel (type P/R-N).
(See the following diagrams)

8. DRAWINGS / SPARE PARTS LISTS

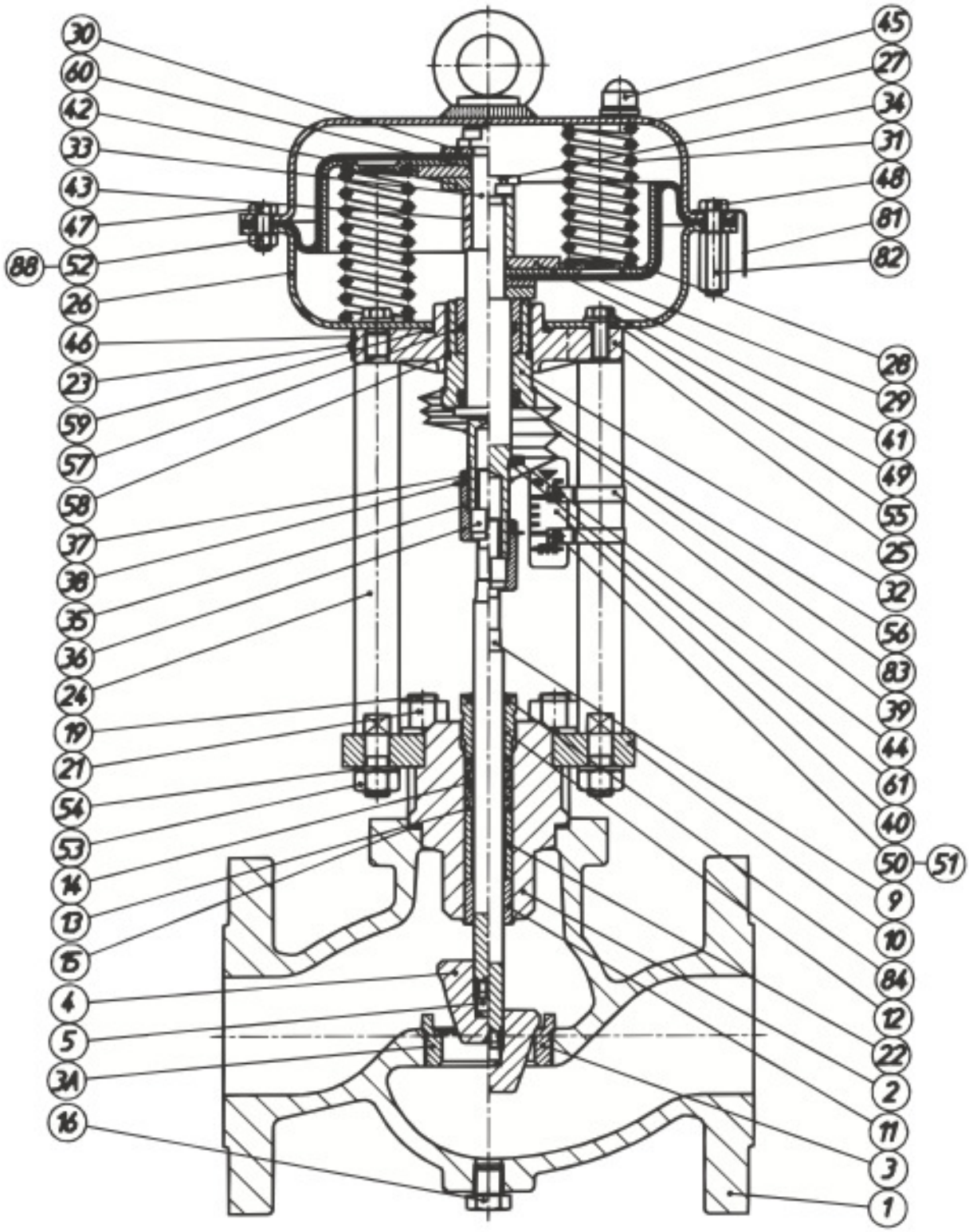


Figure 1 – Regulator valve DN 15... 100 with valve plates Kvs = 25... 160, with pneumatic positioning drive

Parts list and drawing numbers

No. on drawing	Name of component
1	Casing
2	Standard throttle
2A	Throttle of unloaded valve
2B	Extended throttle
2C	Bellows throttle
2C1	Seal unit
3	Valve seat
3A	Valve seat seal
4	Valve blade
4A	Unloaded valve blade (unit)
4A1	Unloaded valve blade seal ring
5	Insert piece
6	Dowel pin
7	Support ring
8	Ring
9	Valve bolts
10	Connecting plate
11	Guide sleeve
12	Threaded plug
13	Support ring
14	Seal
14A	V seal set
14B	Spring
15	Casing seal
16	Plug StB 3/8° (optional)
17	Plug StB ¼°
18	Valve nameplate
19	casing bolt
20	Fastening nut
21	Nut
22	Spacer sleeve
31	Spring

No. on drawing	Name of component
32	Throttle unit
33	Actuator drive bolts
34	Special nut
35	Connecting nut
36	Lock-nut
37	Thin nut (counter-nut)
38	Position indicator
39	Pillar clamp
40	Hub plate
41	Washer
42	Washer
43	Spacer sleeve
44	Support ring
45	Vent plug
46	Drive nameplate
47	Bolt
48	Bolt
49	Bolt
50	Bolt pin M4x8
51	Nut M4-A
52	Nut
53	Nut
54	Spring washer
55	Ring washer
56	Wiper ring
57	O seal ring
58	O seal ring
59	O seal ring
60	O seal ring
61	Circlip
62	Upper cover

No. on drawing	Name of component
71	Bolt
72	Washer
73	O seal ring 8.3x2.4
74	O seal ring
75	Z circlip
76	Bracket (bracket unit)
77	Drive bolt
78	Carrier
79	Connecting piece
80	Rack-nut (counter-nut)
81	Warning table
82	Tensioning nut
83	Bolt sleeve
84	Wiper ring
85	O seal ring
86	Linear throttle casing seal
87	Bellows unit seal
88	Washer
89	Throttle cover, DW and DM
90	Throttle – DW
91	Throttle – DM
92	Spacer sleeve
93	Bellows throttle seal
94	Sleeve
95	O seal ring
96	O seal ring
97	O seal ring
98	Bolt
99	Nut
100	Spring washer
101	Sleeve
102	O seal ring

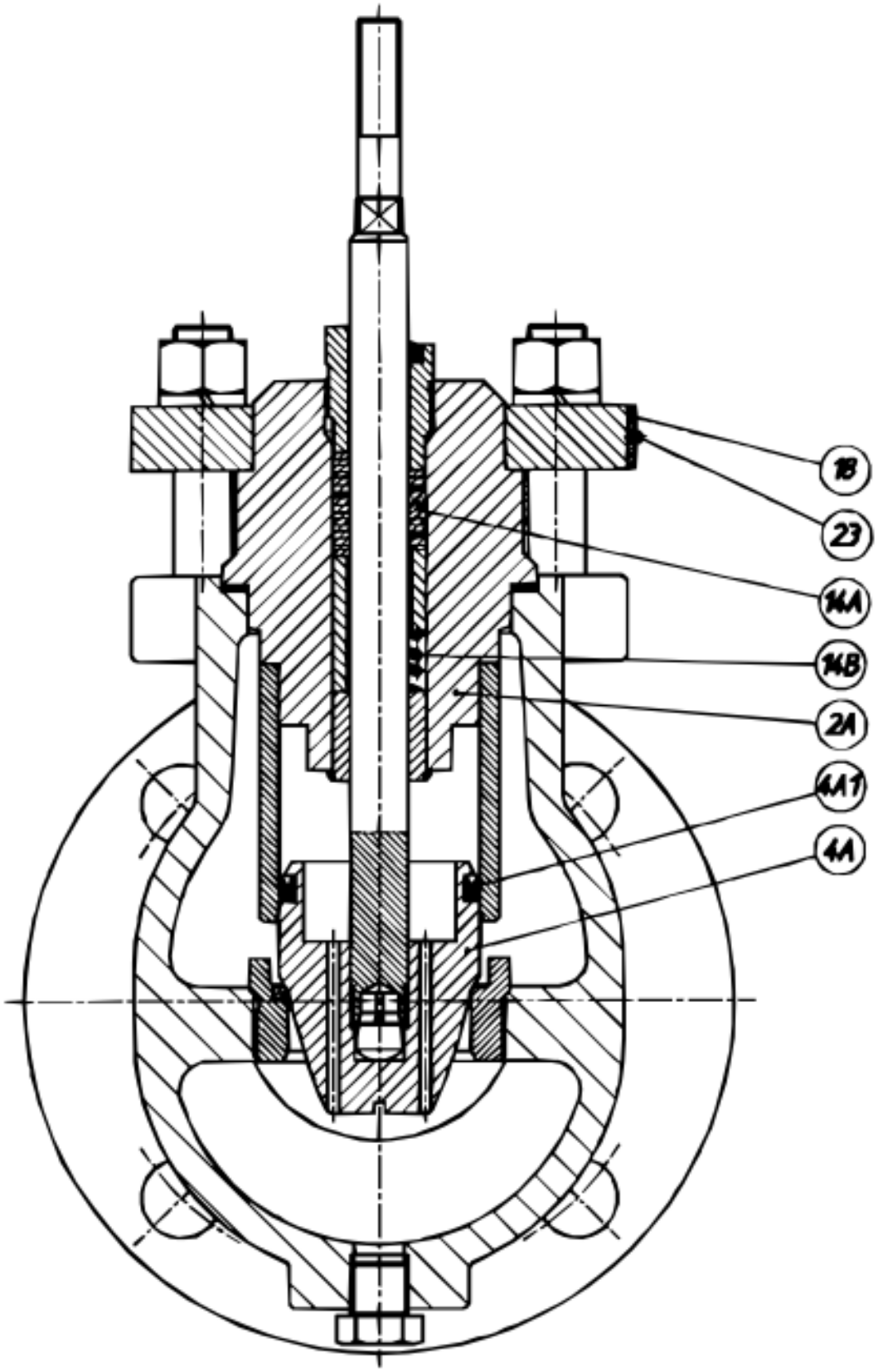


Figure 2 – Regulator valve DN 40... 100 with pressure-balanced block

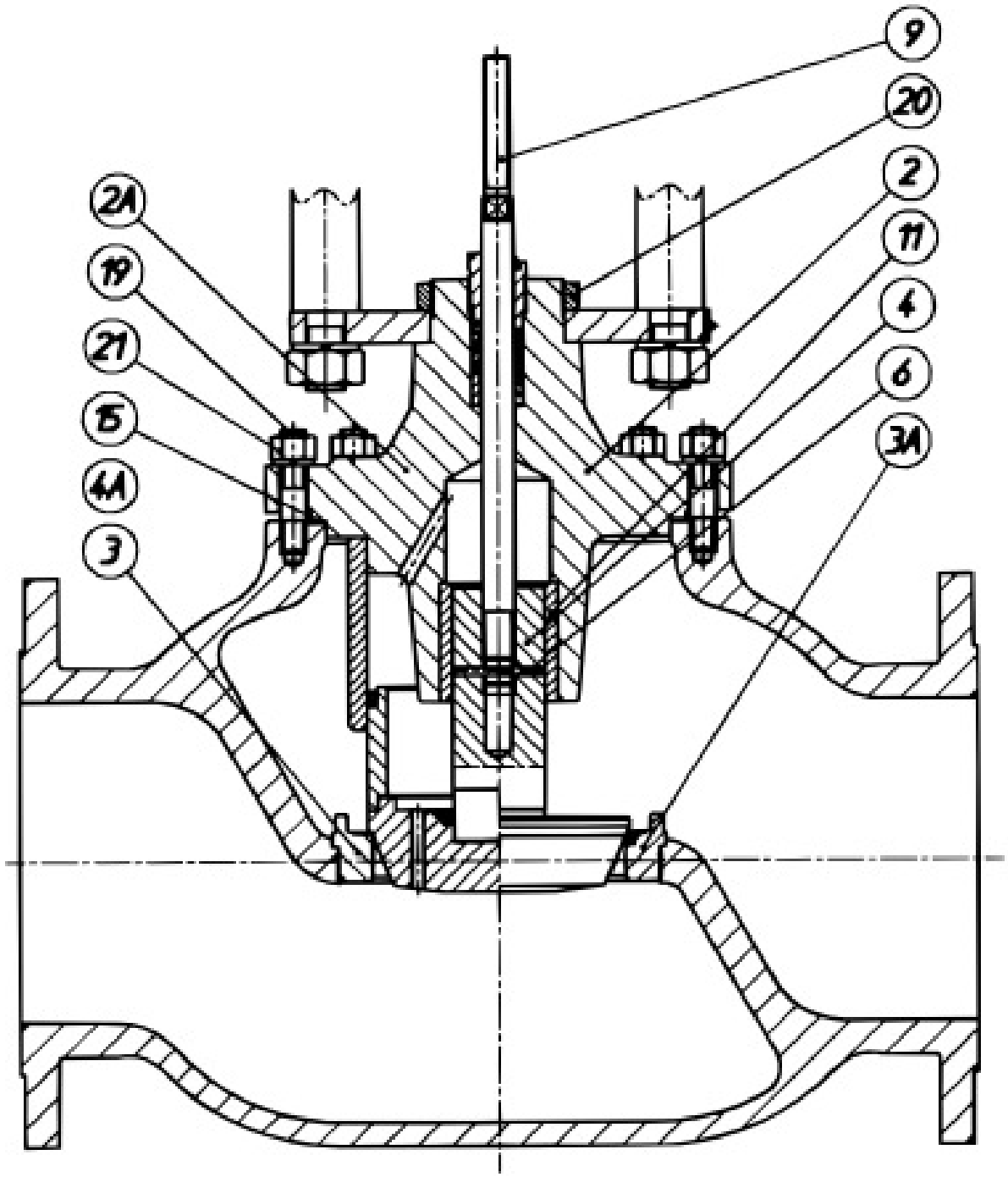


Figure 3 – Regulator valves DN 150... 250 with valve block Kvs = 63... 630
Standard valve and pressure-balanced valve

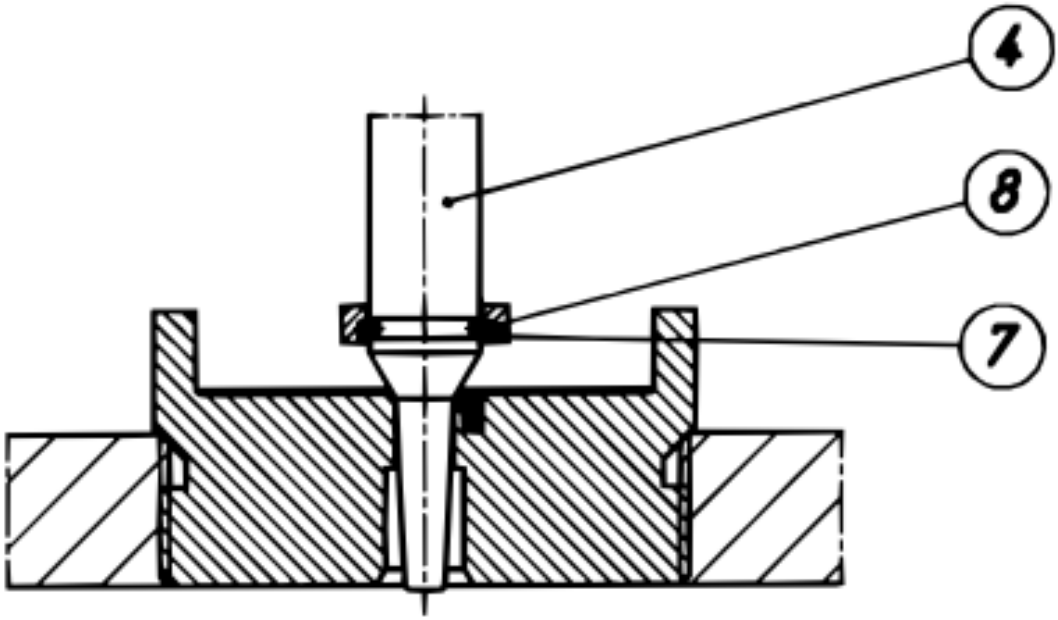


Figure 4 – Spindle with valve block Kvs = 0.01... 1 with standard seating

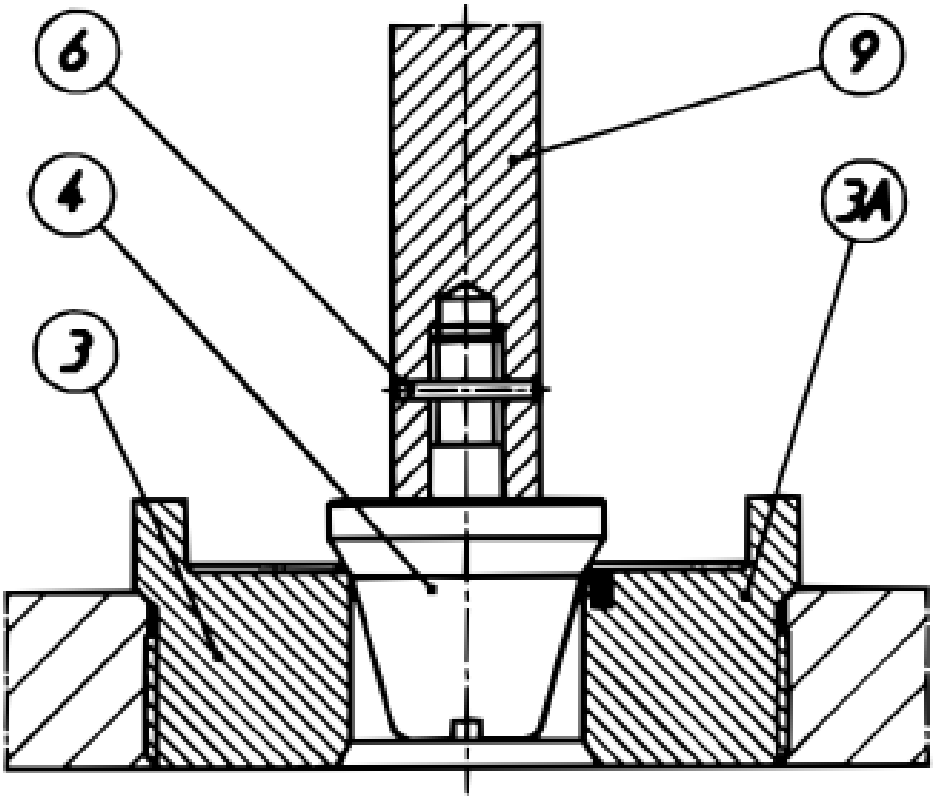


Figure 5 – Valve block Kvs = 1.6... 16, Kvs = 0.01... 1
(e.g. for models with bellows, extended cover)

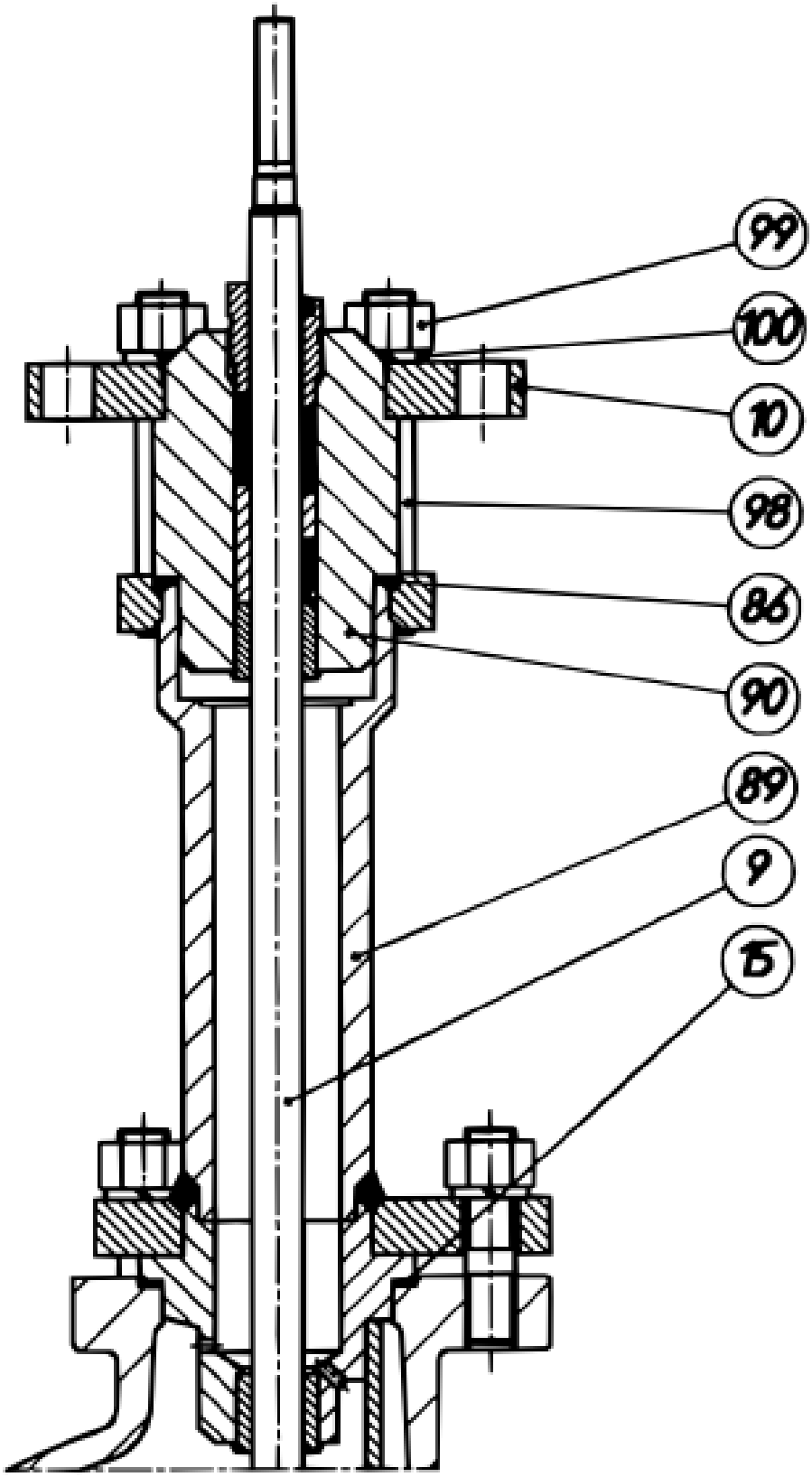


Figure 6 – Model with extended cover

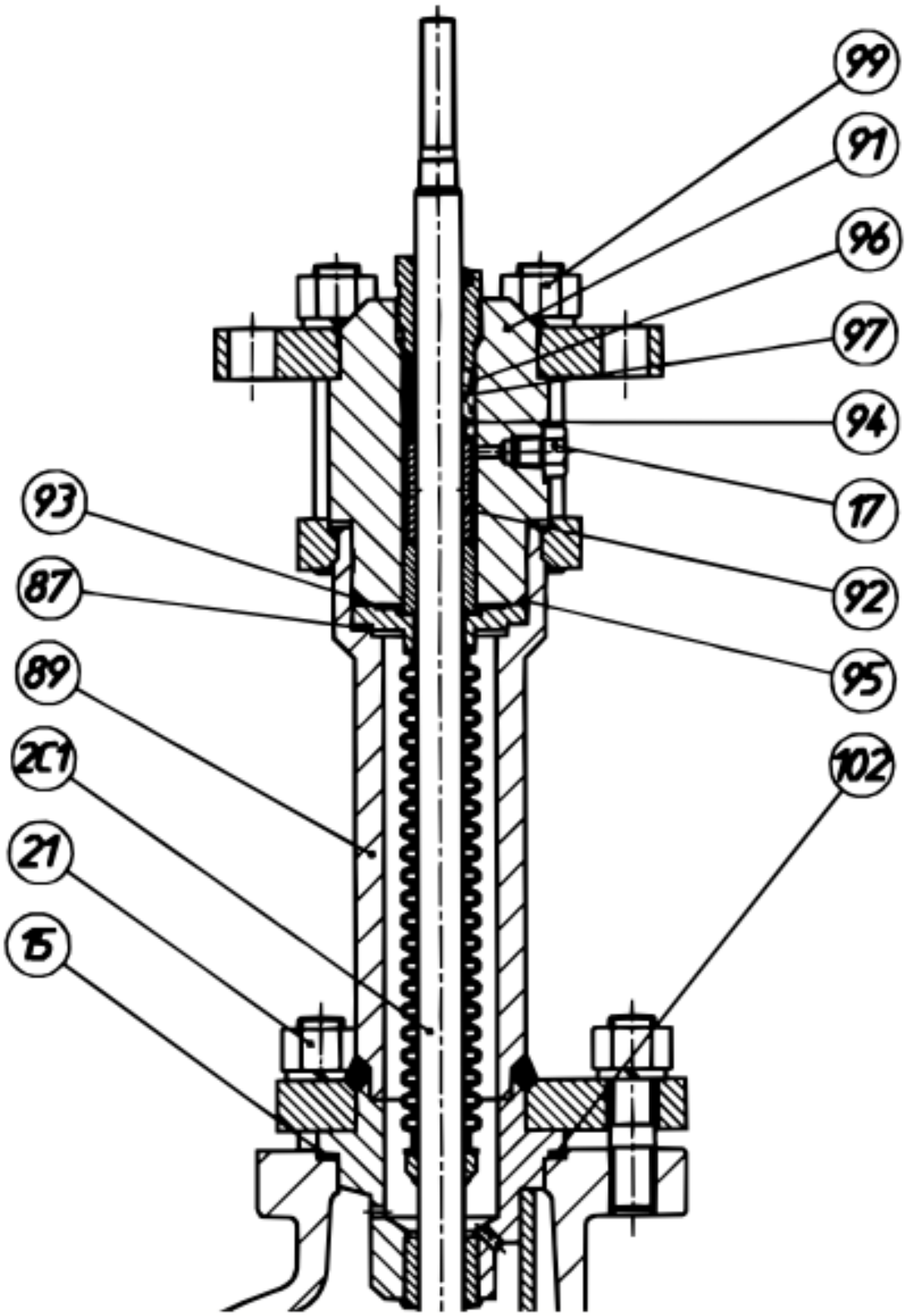


Figure 7 – Model with bellows - 2C

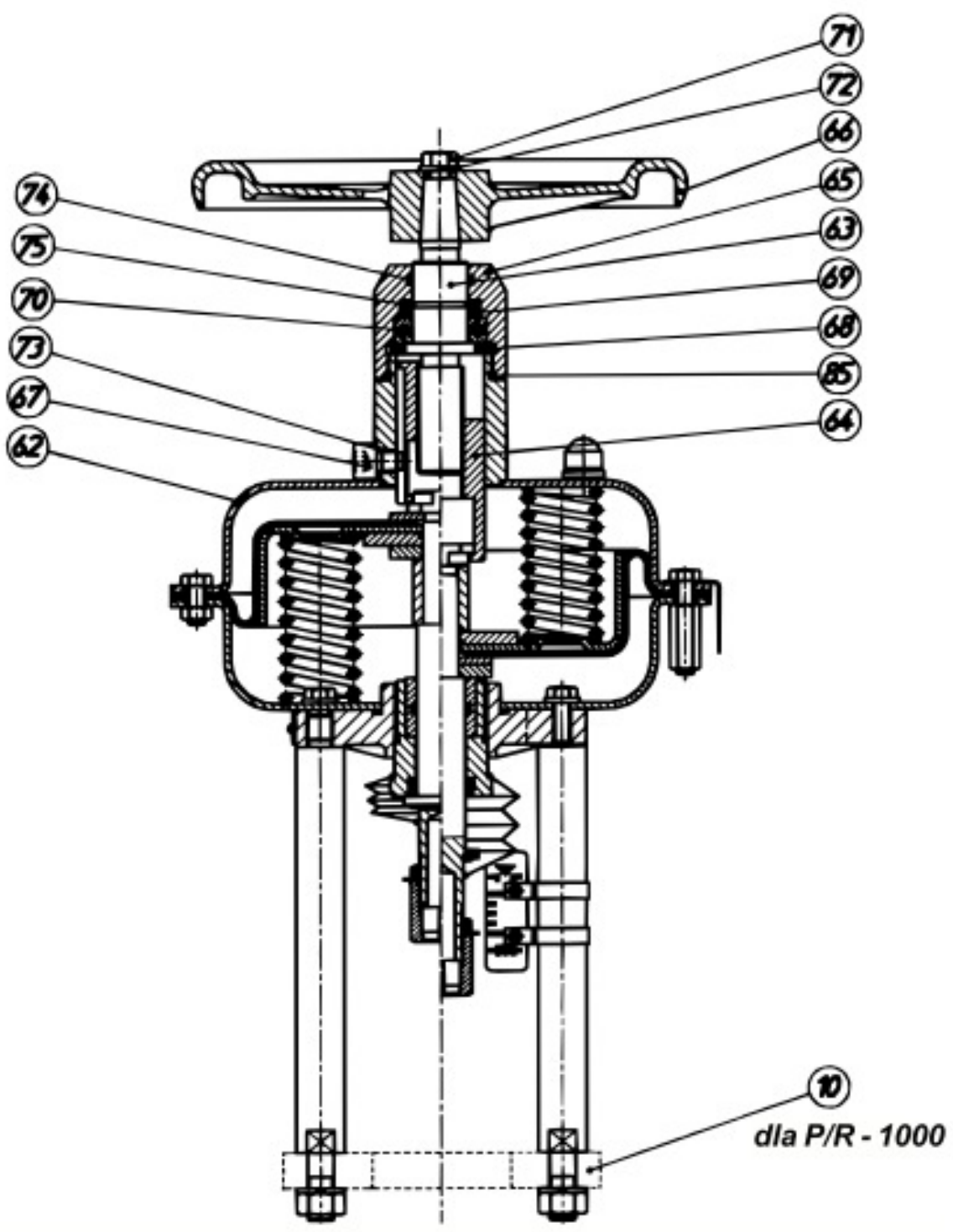


Figure 8 - Pneumatic positioning drive with manual drive type P/R-N

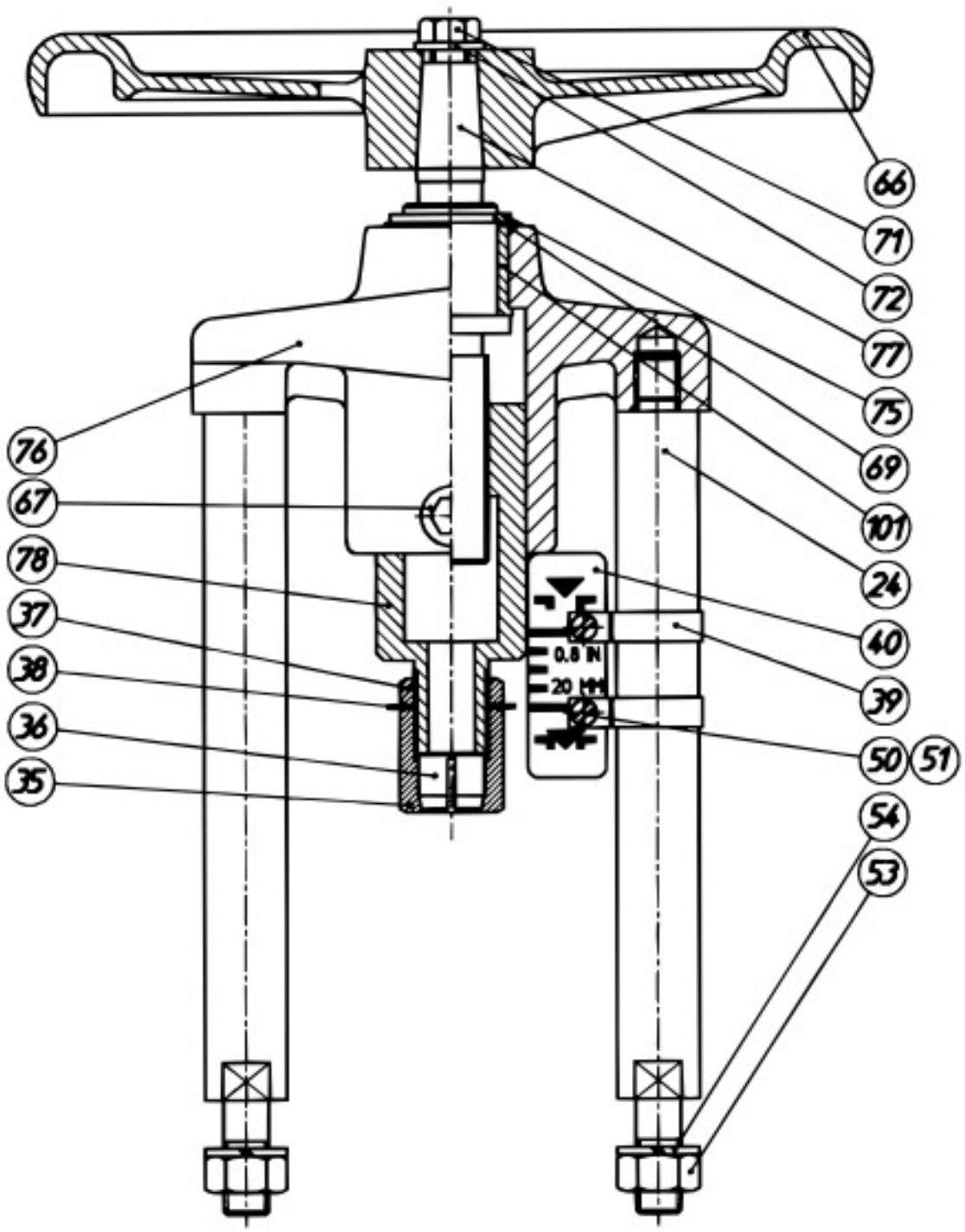


Figure 9 - Manual drive, type NN

9. Contacting us

Details / specific information (Operating instructions with spare parts lists) are available for download on our website.

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