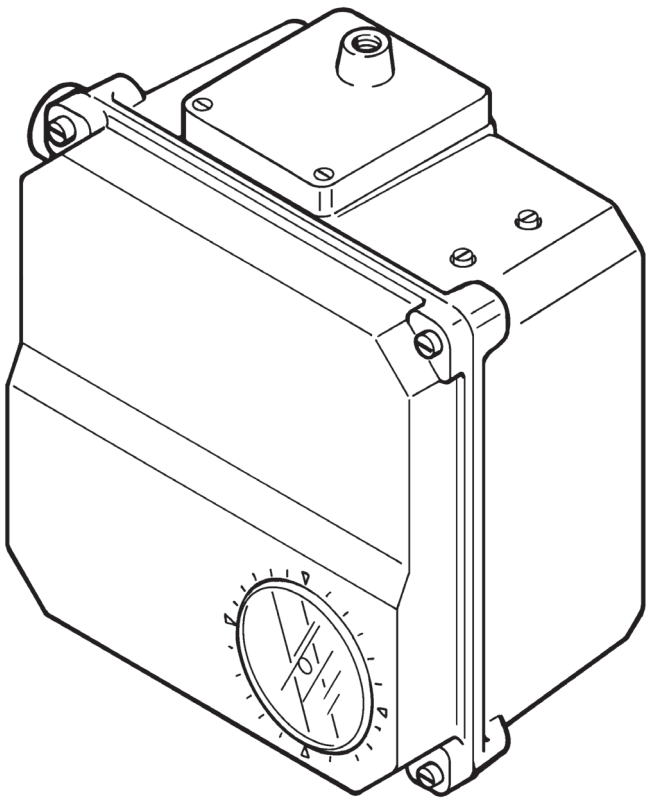
Neles™ positioner

Series NP700

Installation, maintenance and operating instructions



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READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the positioner.
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!

1 INTRODUCTION

1.1 General

Neles™ NP700 positioner is used for positioning double or single acting actuator.

1.2 Principle of operation

Operation is based on the force balance principle. One force is caused by the signal pressure (IN) and acts on the diaphragm (8), and the other is the compression force caused by the feedback spring (60.1). The latter is directly proportional to the position of the lower end of the spring, which is in turn dependent solely on the position of the actuator shaft via the lever (33), the cam (29), the positioner shaft (26) and the coupling (52).

When the equilibrium between the forces mentioned above is disrupted, the beam (5) moves in the direction of the stronger force. The end of the beam moves the spool (44.2) in the bore of the body (44.1). When diverted from the equilibrium position, the spool guides the supply air to one side of the actuator piston and the air on the other side of the piston outside.

When the spool is in the equilibrium position the small volume of leakage past the spool creates an equal pressure on either side of the unloaded cylinder piston. This pressure is roughly 0,7 x the supply pressure.

If the signal pressure is altered, the spool moven out of the equilibrium position and causes a pressure difference in the cylinder. The piston moves in the direction of the difference pressure until the compression force of the feedback spring generated by the change in position is in equilibrium with the force generated by the signal pressure.

Thus each signal pressure value corresponds to a single actuator position. If an external force acts on the actuator shaft, the shaft tends to move in the direction of the torque. This alters the position of the spool via the feedback system so that the pressure difference arising in the cylinder offsets the effect of the external torque.

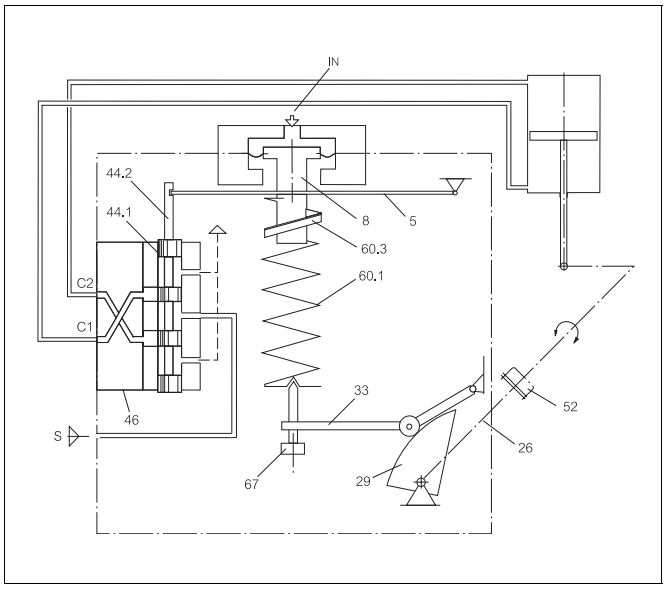


Fig. 1 Schematic diagram

Parts list for Figure 1:

Item	Part
5	Beam
8	Diaphragm piston
26	Shaft
29	Cam plate
33	Lever
44.1	Pilot valve body
44.2	Pilot valve spool
46	Changeover piece
52	Coupling
60.1	Feed-back spring
60.3	Range adjustment
67	Zero adjustment

1.3 Marking of positioner

The positioner has an adhesive ID plate, see Fig. 2.

The ID plate contains the following information (from top to bottom):

- Full type designation of the positioner
- Input signal
- Max. supply presssure
- Ambient temperature range
- Manufacturing series number

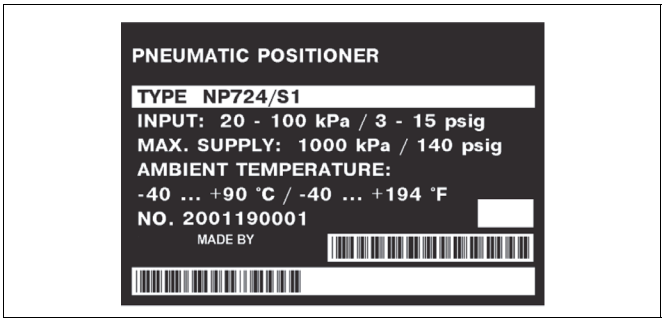


Fig. 2 ID plate

An additional plate, Fig. 3, has markings:

- Filter regulator (-K)
- Temperature range

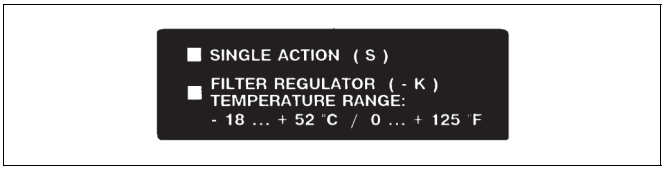


Fig. 3 Additional plate

1.4 Technical specifications

Signal pressure ranges	20-100 kPag, 0.2-1.0 barg, (3-15 psig)
Split ranges	20-60 kPag/60-100kPag, 0.2–0.6 barg/0.6–1.0 barg, (3–9 psig, 9–15 psig)
Turning angle of feed-back shaft	max. 90°
Relation between angle and signal	linear
Supply pressure ps	140-1000 kPag, 1.4–10 barg (20–145 psi)
Effect of supply pressure	< 0.2 % / 0.1 bar (< 0.14 % / 1 psi)
Ambient temperature	-40° to +90 °C (-40° to +185 °F)
Effect of temperature	< 0.07 % / °C (< 0.025 % / °F)
Performance, measured using a cylinder actuator with 12 % friction load	
- dead band	< 0.3 %
- hysteresis	< 1.2 %
- linearity	< 2 %
Effect of vibration (1.5 g, 5–100 Hz)	< 1 %
Weight approx.	1.5 kg / 3.3 lb
Construction materials	
- case	anodized aluminium alloy
- cover	polycarbonate (standard model)
- internal parts	stainless steel, aluminium alloy and stainless spring steel
- diaphragm and seals	nitrile rubber (standard model)

Table 1 Pilot valve alternatives

Positioner type	Actuator stroke volume dm^3 (litres)	Air consumption nm^3/h / scfm *)	Max. delivery nm^3/h / scfm *)
NP723	0.3–10	0.6 / 0.3	12 / 7
NP724	1.0–8.0	0.6 / 0.3	12 / 7
NP726	8.0–30.0	0.9 / 0.5	18 / 10.4
NP727	> 30	1.8 / 1.0	32 / 18.6

*) supply pressure 4 bar / 60 psi

1.5 Approvals

NP700/B construction has CENELEC EEx d IIC T5/T6 approval.

NP700/B1 construction has CSA Class I, Div. 1, Gr. B, C and D approval and

FM Class I, Div. 1, Gr. B, C and D approval.

CENELEC = European Committee for Electrotehnical Standardization

CSA = Canadian Standards Association

FM = Factory Mutual

1.6 Recycling and disposal

Most positioner parts can be recycled if sorted according to material. Most parts have material marking. A material list is supplied with the positioner. In addition, separate recycling and disposal instructions are available from the manufacturer. A positioner can also be returned to the manufacturer for recycling and disposal against a fee.

1.7 Safety precautions

CAUTION:
Do not exceed the positioner performance limitations!
Exceeding the limitations marked on the positioner may cause damage to the posioner, actuator and valve.
Damage or personal injury may result.

CAUTION:
Do not dismantle a pressurized positioner!
Dismantling a pressurized positioner will result in uncontrolled pressure release. Always isolate the relevant part of the pipeline, release the pressure from the positioner and the piping.
Failure to do this may result in damage or personal injury.

CAUTION:
Beware of the moving parts when positioner is operated!

2 MOUNTING ON THE NELES ACTUATOR

2.1 General

When the positioner is supplied together with the valve and actuator, the tubes are mounted and the positioner adjusted in accordance with the customer's specifications.

When the positioner is ordered separately, the mounting parts for the assembly must be ordered at the same time.

Example order: Positioner alone (BC12)-Z-NP724.

The positioner is equipped with VDI/VDE 3845 (S1) mounting face.

This mounting face requires a shaft with the H coupling.

Old Neles mounting face (S2) is no more available.

For mounting parts for Neles actuators, see Sections 13.2–13.3.

2.2 Installing positioner NP700/S1 on Neles actuators with VDI/ VDE 3845 mounting face

1. The actuator piston must be in the up position (in spring-return actuators as determined by the spring).
2. Install the pointer (only B_U) parallel with the valve closure member and fasten the draught piece (2) with a screw (29) to the pointer cover (B_U) or to the coupling (QP), as shown in Fig. 4. Secure the draught piece fastening screw with a sealant (e.g. Loctite) and tighten it properly.
3. Fasten the mounting bracket (1) to the positioner.
4. Fasten the mounting bracket (1) to the actuator.

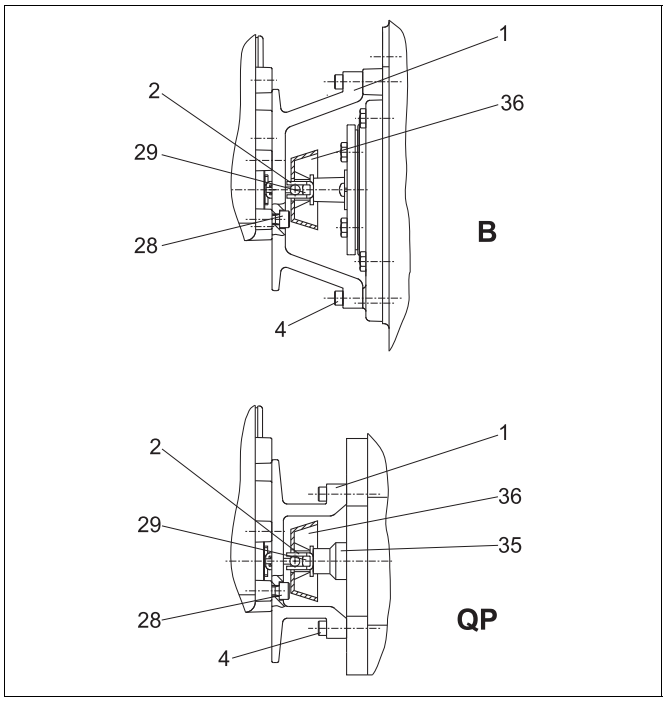


Fig. 4 Installing on a Neles actuator (S1)

2.3 NP_700/700 positioner/limit switch combination (Obsolete since 2013)

The bottom of the limit switch acts also as the cover for the positioner. Remove the limit switch before the adjustment of the positioner.

1. Loosen the cover screws. Note the position of the shaft relative to the positioner when removing the limit switch.
2. When the adjustment of the positioner is done, operate the actuator until the valve is in the closed or open position.
3. Note the position of the actuator and valve when mounting the limit switch on the actuator. Make sure that the position of the shaft is unchanged relative to the positioner.
4. Place the limit switch on the positioner so that the shafts are correctly engaged.
5. Fasten the cover screws.
6. Check the adjustment of the limit switch. See the instruction manual of the limit switch for details.

2.4 Piping of supply air

Table 2 provides the recommended pilot valve and tube sizes in accordance with the actuator sizes. Tube sizes are minimum values allowed.

Connect air supply to S (1/4 NPT).
Connect C1 and C2 (1/4 NPT) to the actuator according to Fig. 5. See also Chapter 3.
Connect signal air to IN (1/4 NPT).

NOTE:
A single action connection alone is permitted for positioners mounted on the spring actuator!
Place a plug in connection C1 or C2. See Figure 5.

For pipe threads are liquid sealants, e.g. Loctite, recommended.

NOTE:
Exessive sealant may cause faulty operation of the positioner.
Sealing tape is not recommended.
Ensure the cleaness of the air piping.

2.5 Instrument air supply

CAUTION:

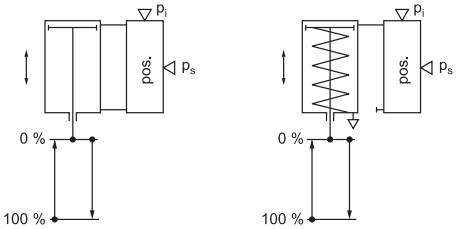
Do not exceed the permitted actuator supply air pressure!

The supply air must be clean, dry and oil-free instrument air, e.g. according to standard ISA S7.3-81. Supply pressure is 1.4–10 bar (20–140 psi).

Table 2 Piping and operating times

Actuator		NPT	Piping						Operating time / stroke (s) pilot valve			
			Plastic/Cu/SS (mm)			Plastic/Cu/SS (")						
B1C	**Stroke vol. dm^3/in^3**		**6/4**	**10/8**	**12/10**	**1/4**	**3/8**	**1/2**	**ø4LC**	**ø4**	**ø6**	**ø6 HC**
6	0.3/20	1/4	x			x			1	1		
9	0.6/37	1/4	x			x			1.5	1.5		
11	1.1/67	3/8	x			x			2	2		
13	2.3/140	3/8		x			x			4		
17 20	4.3/262 5.4/330	1/2		x x			x x			7 8.5	(6) (5.5)	
25 32	10.5/640 21/1282	1/2 3/4		x x	(x) (x)		x x	(x) (x)			10 17	(8.5) (16)
40 50	43/2624 84/5130	3/4 1			x x		(x) (x)	x x			(33) (60)	31 57
502	195/11900	1			x			x				
B1J B1JA	**Stroke vol. dm^3/in^3**	**NPT**	**6/4**	**10/8**	**12/10**	**1/4**	**3/8**	**1/2**	**ø4LC**	**ø4**	**ø6**	**ø6 HC**
6	0.47 / 28.7	1/4	x			x			1	1		
8 10	0.9/55 1.8/111	3/8	x	 x		x	 x		1.5/3	1.5/3 2.5/5.5		
12 16	3.6/225 6.7 / 415	1/2		x x			x x			4.5/11 8/18	(3.5/6) (4.5/11)	
20 25	13/795 27 / 1642	3/4		x x	(x) (x)		x x	(x) (x)			8.5/21 17/38	(7.5/19) (15/33)
32 322	53 / 3231 106 / 6480	1			x x		(x)	x x			(33/74)	30/64 60/130
QP	**Stroke vol. dm^3/in^3**	**NPT**	**6/4**	**10/8**	**12/10**	**1/4**	**3/8**	**1/2**	**ø4LC**	**ø4**	**ø6**	**ø6 HC**
1C	0.62/38	3/8	x			x			1.5/2	1.5/2	-	-
2C	1.08/66	3/8	x			x			2/3.5	2/3.5	-	-
3C	2.18/133	3/8		x			x		-	3/5	2/3	-
4C	4.34/265	3/8		x			x		-	6/10	4/6	-
5C	8.7/531	3/8		x			x		-	-	7/10	
6C	17.5/1068	3/4			x			x	-		12/18	10/15

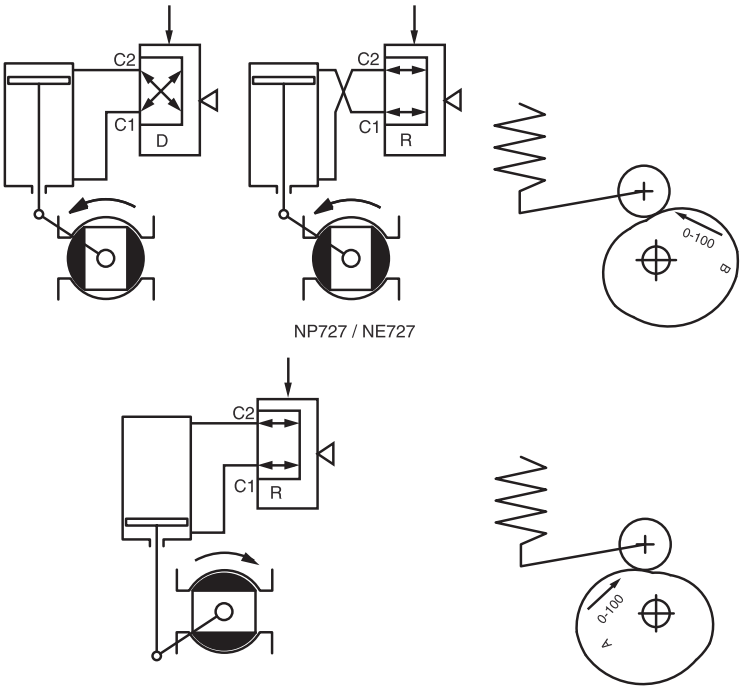
Times in parenthesis are achieved by changing pilot valve alone or pilot valve and tube size.



Operating times for spring return actuators B1J/B1JA and QP:
against the spring / direction of the spring

Actuator without valve:
p_s = 0.4–0.5 bar / 58 - 72 psi

Step of input signal:
p_i = 0-100 % and 100-0 %

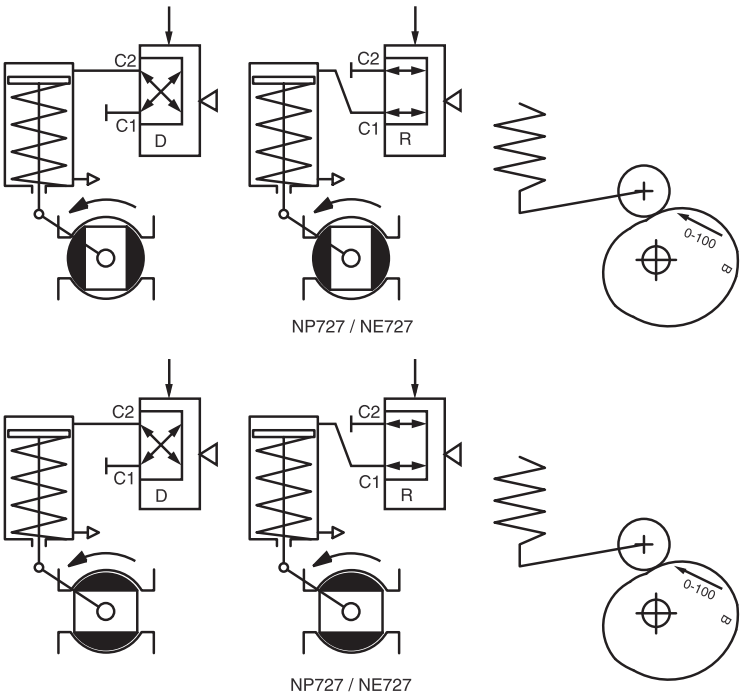


DOUBLE-ACTING

1. Increasing input signal to open valve.
   Cam segments:
   B/0-100, A/0-50, A/50-100

2. Increasing input signal to close valve.
   Cam segments:
   A/0-100, B/0-50, B/50-100

NOTE:
Reverse piping for ST actuators.



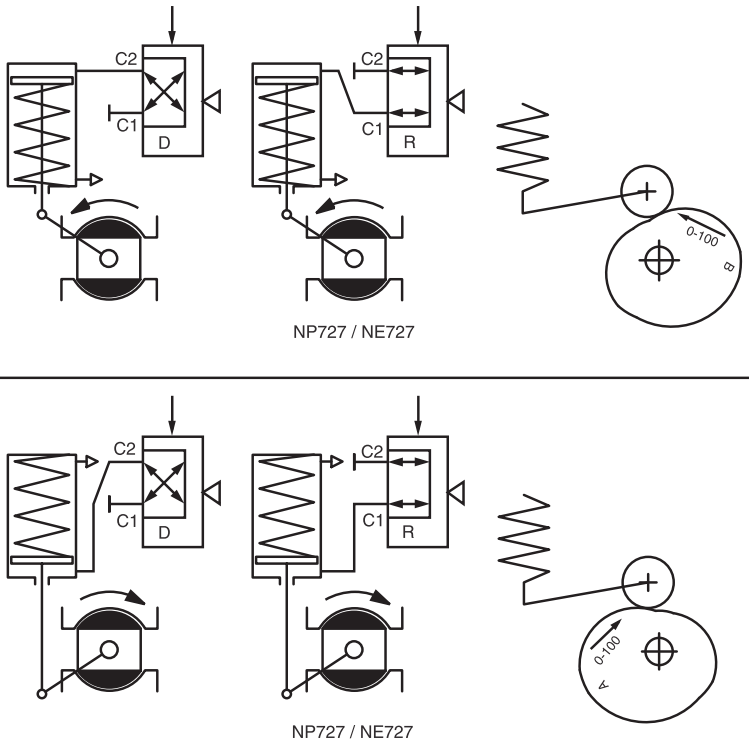
SINGLE-ACTING
(SPRING TO CLOSE)

3. Increasing input signal to open valve.
   Spring to close valve.
   Cam segments:
   B/0-100, A/0-50, A/50-100

4. Increasing input signal to close valve.
   Spring to open valve.
   Cam segments:
   B/0-100, A/0-50, A/50-100

WARNING:
Valve closes exceptionally counterclockwise.
Unsuitable for Q, R, T5, F and L series valve

NOTE:
Reverse piping for ST actuators. Spring and piston in the opposite position from shown.



SINGLE-ACTING
(SPRING TO OPEN)

5. Increasing input signal to close valve.
   Spring to open valve.
   Cam segments:
   A/0-100, B/0-50, B/50-100

NOTE:
Reverse piping for ST actuators. Spring and piston in the opposite position from shown.

Fig. 5 Positioner actions
NOTE: In positioner NP727 the changeover piece can be used in position R only.

3 INPUT SIGNAL AND DIRECTIONS OF OPERATION

Figure 6 assists in choosing the right segment for the cam plate (29) and position for the changeover piece (46).

3.1 Changeover piece

The function of connection C1 and C2 can be altered by turning the changeover piece (46). The diagram D (or R) shown on the protective plate (48) functions when the symbol D (or R) is visible in the lower lefthand corner of the changeover piece (46).
D = direct, R = reverse.

External changes in the tubes are not needed. Positioner NP727 is an exception (DIA6HC pilot valve). Then the changeover piece must always be in position R and the external tubes mounted in accordance with Fig. 5.

3.2 Cam plate

The figures marked on the cam plate (29) are the signal ranges expressed as percentages, for example 0-100 corresponds to 0.2–1.0 bar (3-15 psi), or 50-100 to 0.60-1.0 bar (9-15 psi), see Fig. 6.

The arrows on the cam show the direction it must turn when the input signal is rising in the cam segment in question.

The non-rising segments between the rising segments are roughly 15-20°.

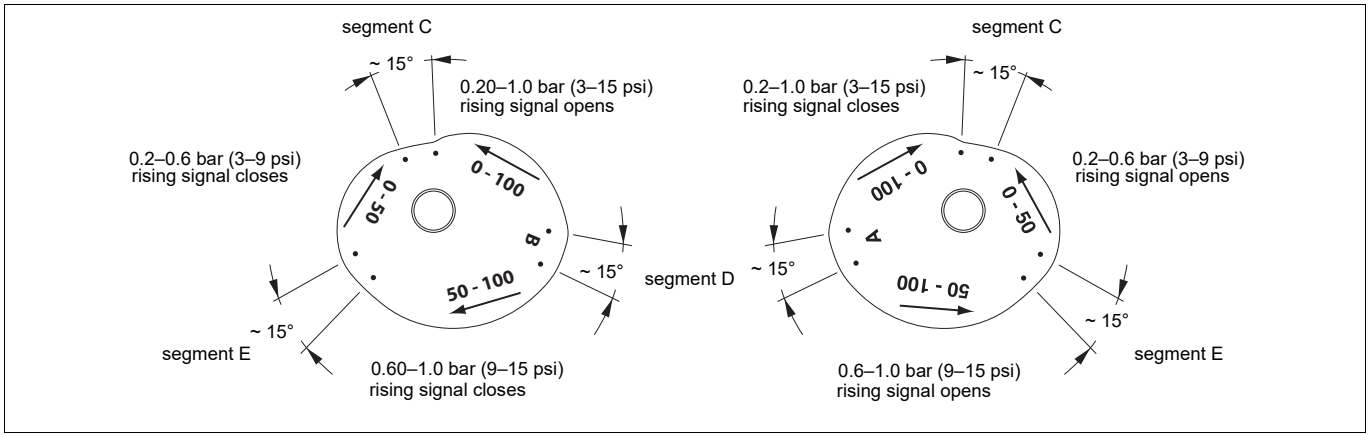


Fig. 6 Input signal ranges, the cam plate (29).

4 PRELIMINARY ACTIONS FOR THE ADJUSTMENT

Set the valve's open and closed limits with the actuator limiter screws; see the valve instruction manual. The changeover piece (46) and the cam (29) must be in correct positions. Check the pilot valve size from Table 2.

The adjustment must always be carried out when the supply pressure has been changed.

Please note that operating of the valve is required during the adjustment.

4.1 Position of the changeover piece

CAUTION:
Do not dismantle a pressurized positioner!

Choose the position of the changeover piece, D or R, from Fig. 7 in accordance with the function desired.
Turn the changeover piece (46) when necessary.

Loosen the nuts (49) and remove the protective plate (48). Pull out the changeover piece (46). Check the O-rings (47, 2 pcs.) and apply silicone grease lightly if needed. Place the changeover piece (46) and the protective plate (48) in the case. Tighten the nuts (49) evenly, one after the other.

NOTE:
Check that the changeover piece is mounted correctly: Symbol D or R is visible in the lower left hand corner.

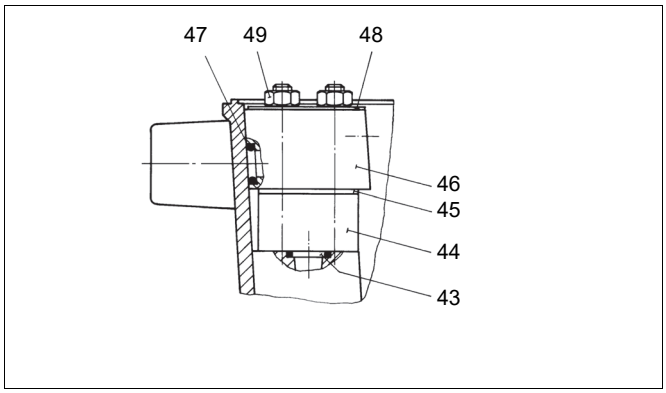


Fig. 7 Mounting the changeover piece

4.2 Pilot valve

Removal of the pilot valve is unnecessary when the changeover piece is turned around. For instructions of removal, see Section 8.2.

4.3 Position of the cam plate

Choose the side, A or B, and the rising segment of the cam plate from Fig. 7 in accordance with the function desired.

Move the actuator piston to the end where the input signal has its lower value. Shut off the supply pressure or move the pilot spool by deflecting the beam (5) gently so that the piston strokes to the desired limit. The input signal should be zero or at the lower limit.

Loosen the screw (57), remove the indicator (32), loosen the screw (31) and the locking wheel (30). Turn the cam plate (46) to the desired side.

In case of α_0 adjustment proceed acc. to Sections 6.1 and 6.2.

Place the roller so that its contact point is 1 mm (0.04") from the beginning of the rising segment. Then tighten the locking wheel (30) and the screw (31).

5 BASIC ADJUSTMENT

Basic adjustment is made to rotary and butterfly valves.

Please note the procedures in Chapter 4 before the adjustment.

1. Switch on the supply pressure (S) and the input signal (IN).
2. Set the input signal at the closed limit of the valve so that it is 2 % i.e. 0.02 bar (0.2 psi) higher or lower than the limit value, e.g. 0.2 + 0.02 = 0.22 bar (3 + 0.2 = 3.2 psi) or 1.0 - 0.02 = 0.98 bar (15 - 0.2 = 14.8 psi). Loosen the screw (56). Turn the zero adjustment screw (67) so that the actuator comes slowly to the closed limit. Tighten the screw (56) always after the zero adjustment. The valve should open slightly with a 4 % change in signal, that is 0.03 bar (0.5 psi), e.g. 0.2 + 0.03 = 0.23 bar (3 + 0.5 = 3.5 psi) or 1.0 - 0.03 = 0.97 bar (15 - 0.5 = 14.5 psi). See Figures 8 and 9.
3. Set the input signal to the other limit value. The valve should be entirely open at 100 %, i.e. 1.0 bar (15 psi) or 0.2 bar (3 psi). The valve should start to operate to closed direction at 98 %, i.e. 0.98 bar (14.0 psi) or 0.22 bar (3.2 psi). The range, i.e. turning angle, changes when the effective lenght of the spring (60) is increased or decreased by turning the range adjustment nut (60.3). See Fig. 9.
4. The zero and range adjustments affect each other, so stages 2 and 3 must be repeated a few times.
5. Screw on the pointer (32) into place so that the yellow line is in the direction of the valve closing member. Tighten the screw (57).

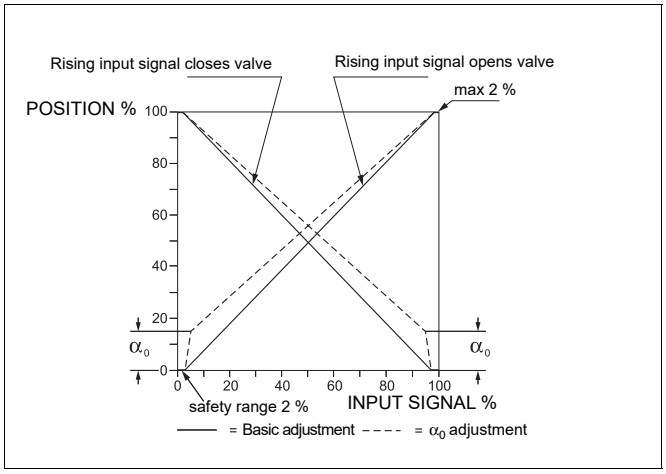


Fig. 8 Basic and α_0 adjustments

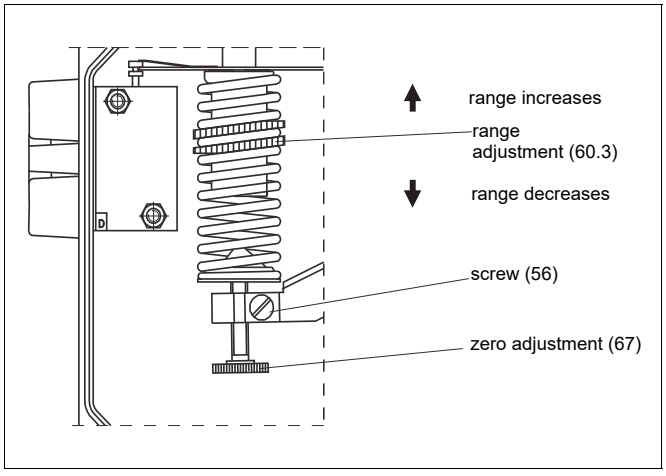


Fig. 9 Zero and range adjustments

6 α_0 ADJUSTMENT

α_0 adjustment is made to segment and ball valves. This adjustment takes into account the "dead angle" α_0 of the ball valve. The entire signal range is then used for effective valve opening 90°-α_0, see Figure 10.

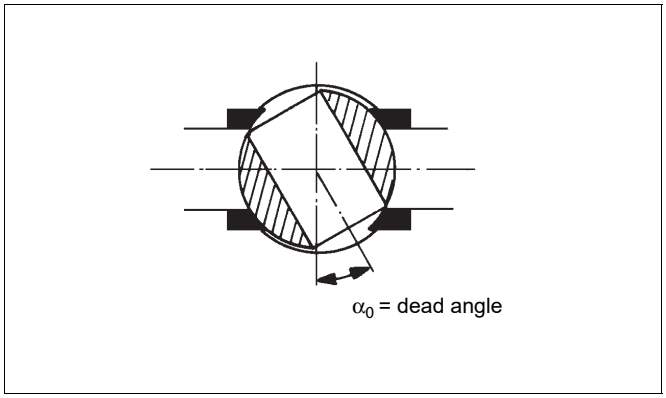


Fig. 10 Dead angle

The same adjustment method can be applied to butterfly valves in papermills for pulp flow control to avoid the dewatering of the pulp near the closed position of the disc.

Table 3 shows the shift on the circumference of the cam equal to the "dead angle" of the valve, Figure 11, in various cam segments (C, E, D).

Please note the procedures in Chapter 4 before the adjustment.

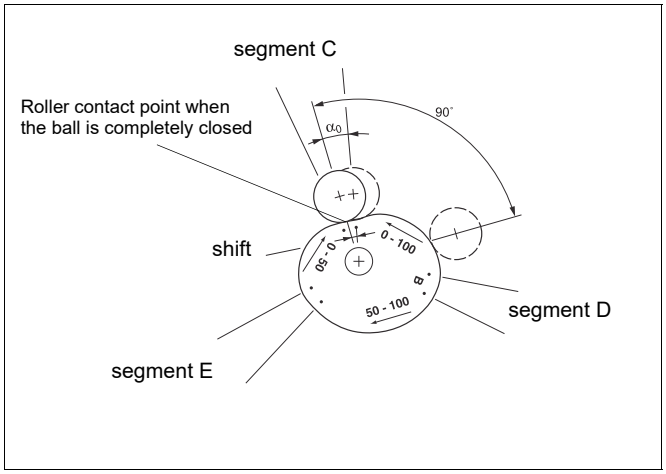


Fig. 11 Shift on circumference of cam equal to dead angle

1. Mark the shift in question on the edge of the cam, Fig. 11 and Table 3. Dimensions do not have to be measured if the dead angle can be reliably noticed from position of the closing member.
2. Lock the cam so that the roller touches the edge of the cam plate at the mark. Tighten the locking wheel (30) and the screw (31).
3. Switch on the supply pressure (S) and the input signal (IN).

Table 3 Dead angle in degrees

Valve size		Valve series							
		MBV QMBV 1)	MBV QMBV 2)	D 3)	T5, QT5	QXT5	T25, QT25	QXT25	R, QR
mm	mm	Dead angle in degrees							
25	1	12.5	-	-	23.0	17.5	-	-	14
40	1 1/2	11.0	-	-	22.0	11.0	-	-	11
50	2	9.0	8.0	12.0	22.0	11.0	16.0	7.0	15
65	2 1/2	8.0	-	-	-	-	-	-	11
80	3	9.0	7.0	11.0	16.0	7.0	15.0	8.0	8
100	4	9.0	7.0	11.0	15.0	7.5	14.5	8.0	7
125	5	11.0	-	-	-	-	11.0	6.0	7
150	6	9.0	7.0	10.5	14.5	8.0	12.0		7
200	8	8.0	6.5	7.5	11.0	6.0	8.5		6
250	10	8.0	6.5	7.0	12.0		8.5		6
300	12	7.0	5.5	5.5	8.5		7.0		5
350	14		5.4	5.5	-				4
400	16		4.5	5.0	8.5 (14")				4
450	18			5.0	7.0 (16")				
500	20			5.5					
600	24			5.0					
650	26			6.0					
700	28			6.0					
750	30			5.5					
800	32			-					
900	36			4.5					

1) Seat supported 2) Trunnion 3) S/G seat

4. Set the input signal at the closed limit of the valve so that it is 2 % i.e. 0.02 bar (0.2 psi) higher or lower than the limit value, e.g. 0.2 + 0.02 = 0.22 bar (3 + 0.2 = 3.2 psi) or 1.0 - 0.02 = 0.98 bar (15 - 0.2 = 14.8 psi). Loosen the screw (56). Turn the zero adjustment screw (67) so that the actuator comes slowly to the closed limit. Tighten the screw (56) always after the zero adjustment. The valve should open slightly with a 4 % change in signal, that is 0.03 bar (0.5 psi), e.g. 0.2 + 0.03 = 0.23 bar (3 + 0.5 = 3.5 psi) or 1.0 - 0.03 = 0.97 bar (15 - 0.5 = 14.5 psi). See Figure 9.
5. Set the input signal to the other limit value. The valve should be entirely open at 100 %, i.e. 1.0 bar (15 psi) or 0.2 bar (3 psi). The valve should start to operate to closed direction at 98 %, i.e. 0.98 bar (14.0 psi) or 0.22 bar (3.2 psi).

Table 4 Shift caused by dead angle, mm/inch

α_0	Segment C	Segment E	Segment D
20°	*)	6.1/0.24	8.1/0.31
19°	*)	5.8/0.22	7.7/0.30
18°	*)	5.5/0.21	7.3/0.28
17°	*)	5.2/0.20	6.9/0.27
16°	*)	4.9/0.19	6.5/0.25
15°	3.1/0.12	4.6/0.18	6.1/0.24
14°	2.9/0.11	4.3/0.16	5.7/0.22
13°	2.7/0.10	4.0/0.15	5.3/0.20
12°	2.5/0.09	3.7/0.14	4.9/0.19
11°	2.3/0.09	3.4/0.13	4.5/0.17
10°	2.1/0.08	3.1/0.12	4.1/0.16
9°	1.9/0.07	2.8/0.11	3.7/0.14
8°	1.7/0.06	2.5/0.09	3.3/0.12
7°	1.5/0.05	2.2/0.08	2.9/0.11
6°	1.3/0.05	1.9/0.07	2.5/0.09
5°	1.1/0.04	1.6/0.06	2.1/0.08
4°	0.9/0.03	1.3/0.05	1.7/0.06

*) Segment C: α_0 max. 15°

The range, i.e. turning angle, changes when the effective lenght of the spring (60) is increased or decreased by turning the range adjustment nut (60.3). See Fig. 9.

6. The zero and range adjustments affect each other, so stages 4 and 5 must be repeated a few times.
7. Screw on the pointer (32) into place so that the yellow line is in the direction of the valve closing member. Tighten the screw (57).

7 SPLIT-RANGE ADJUSTMENT

In principle, split range adjustments are made in the same manner as for a normal signal range. Select a split range, 20-60 kPag / 0.2–0.6 barg / 3–9 psig or 60-100 kPag / 0.6–1.0 barn / 9–15 psig, from the cam plate. See Figure 6.

8 MAINTENANCE

CAUTION:

Do not dismantle a pressurized positioner!

NOTE:

Ensure the cleanness of the air piping.

Regular maintenance is not necessary.

The need for maintenance depends on the quality of the instrument air. See also Section 2.5.

If there is need for servicing proceed according to the following sections.

8.1 Supply air filter

The supply air filter (50) is located in the supply air connection (S); the filter can be removed for cleaning.

8.2 Pilot valve

Remove the pilot valve (44) by first loosening the nuts (49), and then by lifting off the protective plate (48), the changeover piece (46) and the gasket (45).

The pilot valve spool (44.2) should slip easily in the pilot valve body (44.1).

If the pilot valve sticks, wash the body and spool with solvent.

NOTE:
The pilot valve body and spool constitute a pair, and must not be replaced separately.

See the exploded view for the correct installation position of the pilot valve. The size code for the pilot valve on the body, for example DIA 4.0, must be visible on the right side.

Check the condition of the O-rings (43, 47) and of the gasket (45). The end of the leaf spring on the beam must be on top of the pilot valve spool, Figure 7. Make sure that the end of the beam (5) goes into the spool groove without sideways deflections. After tightening the nuts (49), check the beam once again by hand to see that the pilot valve moves readily.

8.3 Replacement of the diaphragms

Remove the feedback spring (60), loosen the screws (23) and remove the screw (15). Replace the diaphragm (14).

Note the correct installation position for the diaphragm, with the convolution downward. See Figure 12.

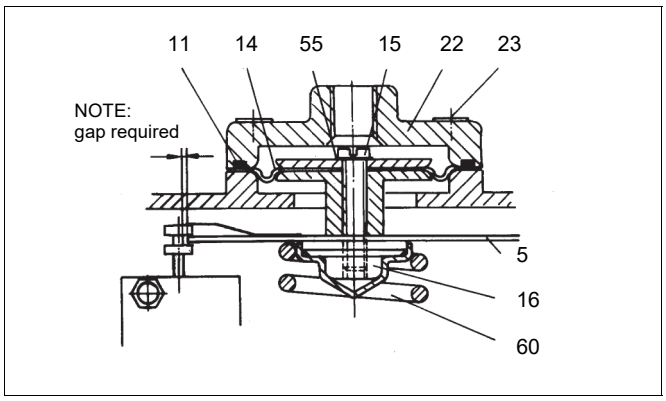


Fig. 12 Replacement of diaphragms

Check the condition of the washer (55) when assembling and secure the upper spring plate (16) with e.g. Loctite. Check that the O-ring (11) is in place. Tighten the cover screws (23) evenly. The positioner adjustment should be checked after replacement of diaphragm.

Note. O-ring (11) in the old construction only (manufactured before 12/94)

9 TROUBLESHOOTING

1. Signal pressure change does not affect actuator position
- supply pressure too low
- signal pressure tubes leak
- diaphragm damaged
- pilot valve sticks
- changeover piece seals leak
- tube installations between positioner and actuator
- changeover piece or cam position wrong, see Fig. 6.
- actuator or valve jammed

2. The actuator reaches final position with a small signal pressure change
- the tube installation between positioner and actuator, the changeover piece or the cam position wrong.

3. Inaccurate positioning
- pilot valve dirty
- beam (5) pushes pilot valve spool sideways
- diaphragm damaged
- actuator torque too low
- supply pressure too low
- valve torque requirement increased

4. Overshooting or too slow positioning
- pilot valve dirty or wrong size, see Table 2
- supply air tube too small or supply air filter dirty
- valve sticks

10 OPTIONS

10.1 NP700/B and NP700/B1

Equipped with a flameproof enclosure I/P converter.

To be adjusted like for standard posioners. Do not make any adjustments for the I/P converter!

10.2 NP700/GN natural gas construction

For clean "sweet" natural gas instead of compressed air. Like standard construction but with 3/4 NPT exhaust port.

Please note: do not remove the exhaust port (4).

10.3 NP700/R dust-proof construction (IP65)

For extremely dusty environments. The protective cover (3) behind the standard posioner is replaced with an exhaust port. The port has a 3/4 NPT filter.

Please note: do not remove the exhaust port (3).

10.4 NP700/A with pressure gauges

A standard positioner can be equipped with a pressure gauge block.

The block (70) is attached with three self-tapping screws (72).

The O-rings (71, 3 pcs.) must be in position before mounting. Check tightness after mounting.

For all other constructions see Type Code, Chapter 14.

11 TOOLS

In addition to standard general tools, you need the following equipment:

- calibration device for adjustments

12 ORDERING SPARE PARTS

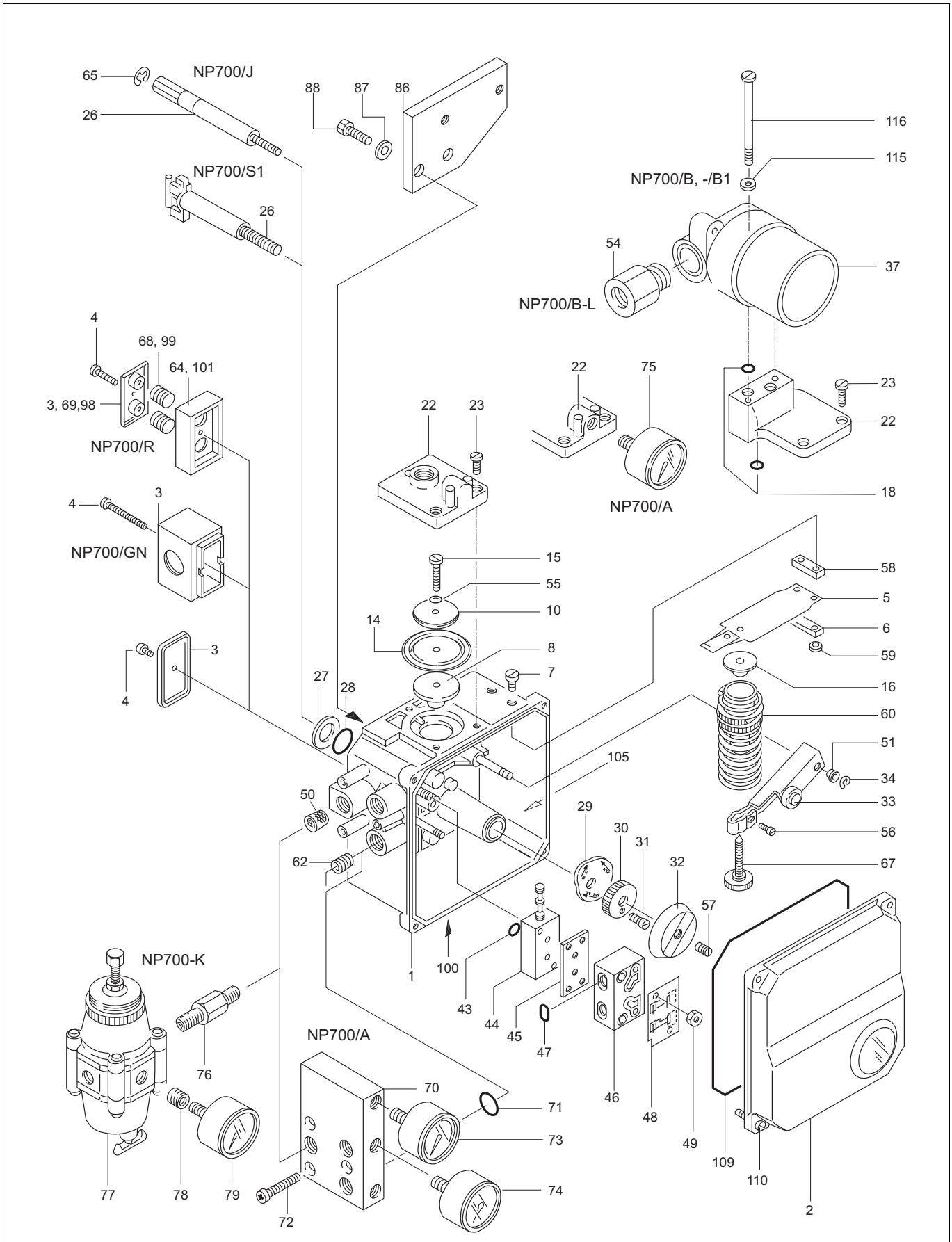
When ordering spare parts, always include the following information:

- type code, sales order number, serial number
- 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.

13 DRAWINGS AND PARTS LISTS

13.1 Exploded view and parts list



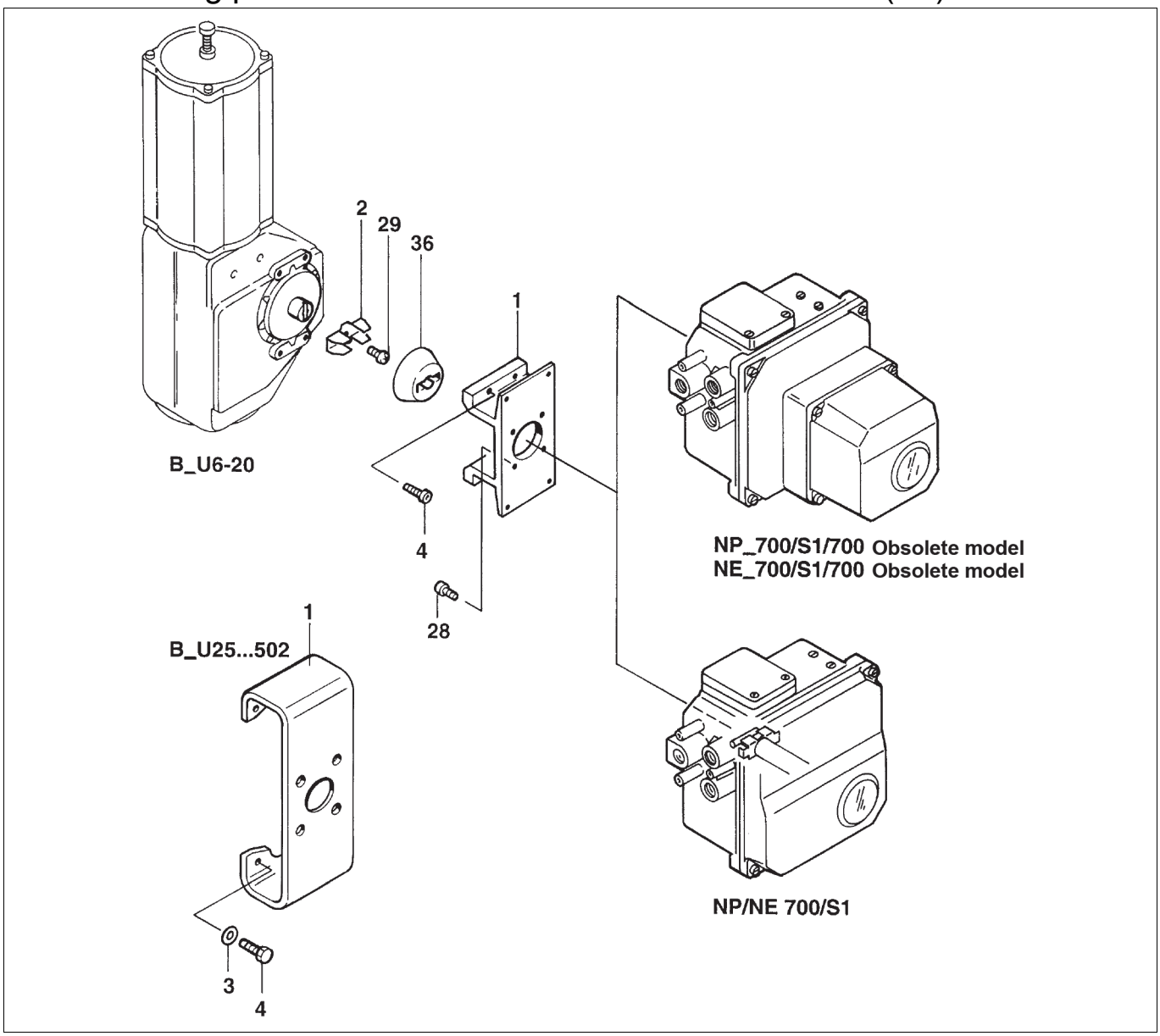
Item	Qty	Description	Spare part category
1	1	Housing assembly	
2	1	Cover	2
3	1	Protective cover	
	1	Exhaust port	
4	1	Screw	
5	1	Beam assembly	
6	1	Plate	
7	2	Screw	
8	1	Lower diaphragm plate	1
10	1	Upper diaphragm plate	
13 *)	1	O-ring	
14	1	Diaphragm	1
15	1	Screw	
16	1	Upper spring plate	
18	3	O-ring	
22	1	Diaphragm cover	
23	3	Screw	
26	1	Shaft assembly	3
27	1	Washer	
28	1	O-ring	1
29	1	Camplate	
30	1	Locking wheel	1
31	1	Screw	
32	1	Pointer	
33	1	Lever assembly	
34	1	Retaining ring	1
37	1	I/P converter	
43	1	O-ring	1
44	1	Pilot valve assembly	2
45	1	Gasket	1
46	1	Changeover piece	
47	2	O-ring	1
48	1	Protective plate	
49	2	Hexagon nut	
50	1	Filter	
51	2	Bearing	

Item	Qty	Description	Spare part category
55	1	Gasket	1
56	1	Screw	
57	1	Grub screw	
58	1	Support plate	
59	2	Barrel nut	
60	1	Spring	
62	1	Hexagon plug	
64	1	Body	
65	1	Lock ring	
67	1	Zero screw	
68	2	Spring	
69	2	Guide	
70	1	Pressure gauge block	
71	3	O-ring	
72	3	Screw	
73	1	Pressure gauge	
74	2 (1)	Pressure gauge	
75	1	Pressure gauge	
76	1	Double fitting	
77	1	Filter regulator	
78	1	Reduction fitting	
79	1	Pressure gauge	
86	1	Adapter plate	
87	2	Washer	
88	2	Screw	
98	2	Screw	
99	2	Spring plate	
100	1	Additional plate	
101	2	O-ring	
105	1	ID plate	
109	1	Seal	
110	4	Screw	
115	2	Washer	
116	2	Screw	

*) Only in positioners manufactured before 12/94

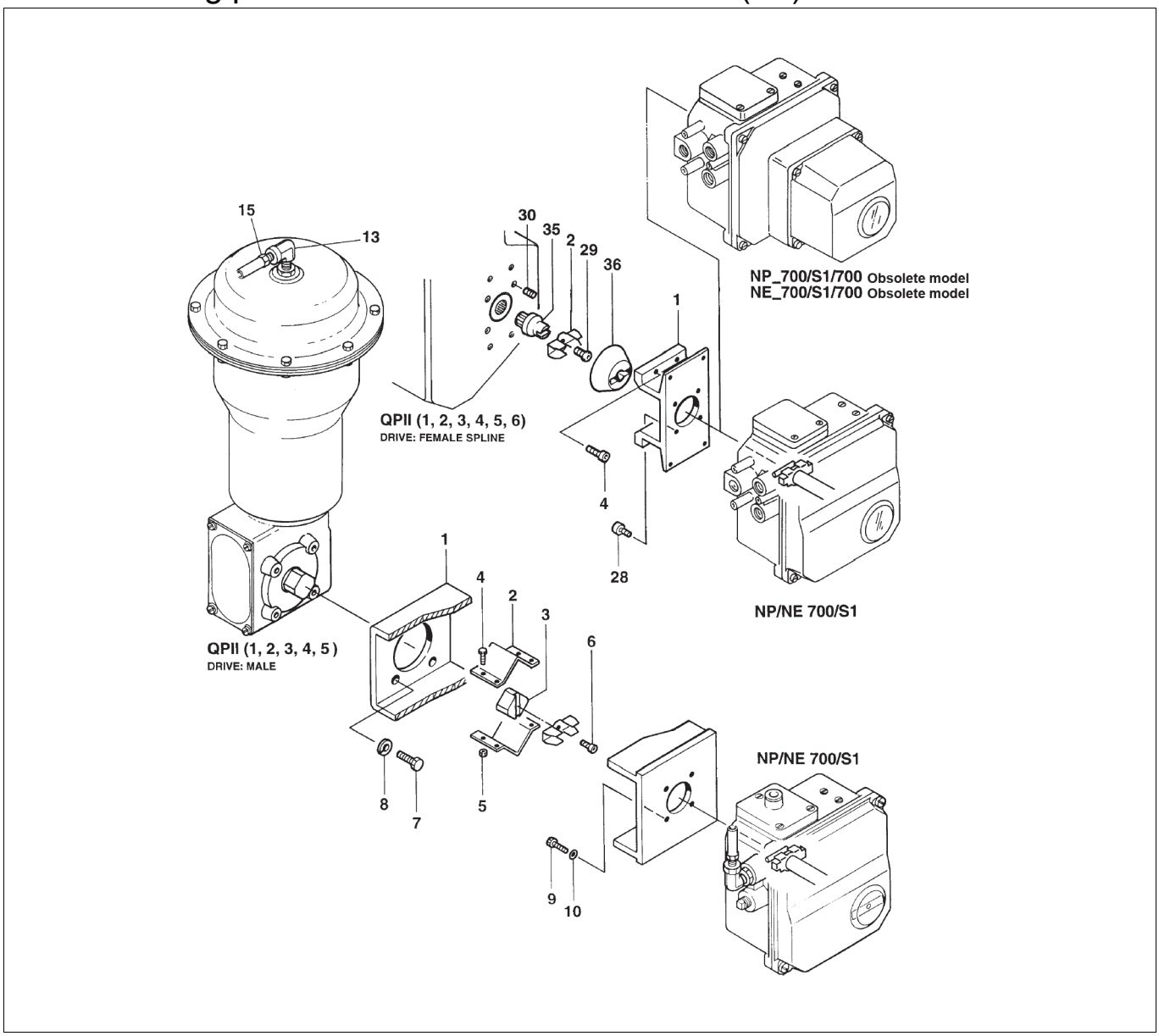
Spare part category 1: Parts for basic maintenance. Delivered as a set.
Spare part category 2: Parts for spool valve and cover replacement.
Spare part category 3: Parts for shaft replacement.

13.2 Mounting parts for B1C6-502 and B1J8-322 actuators (S1)



Item	Qty	Description
1	1	Mounting bracket
2	1	Draught piece
3	4	Washer
4	4	Screw
28	4	Screw
29	2	Screw
36	1	Coupling jacket

13.3 Mounting parts for Quadra-Powr® actuators (S1)



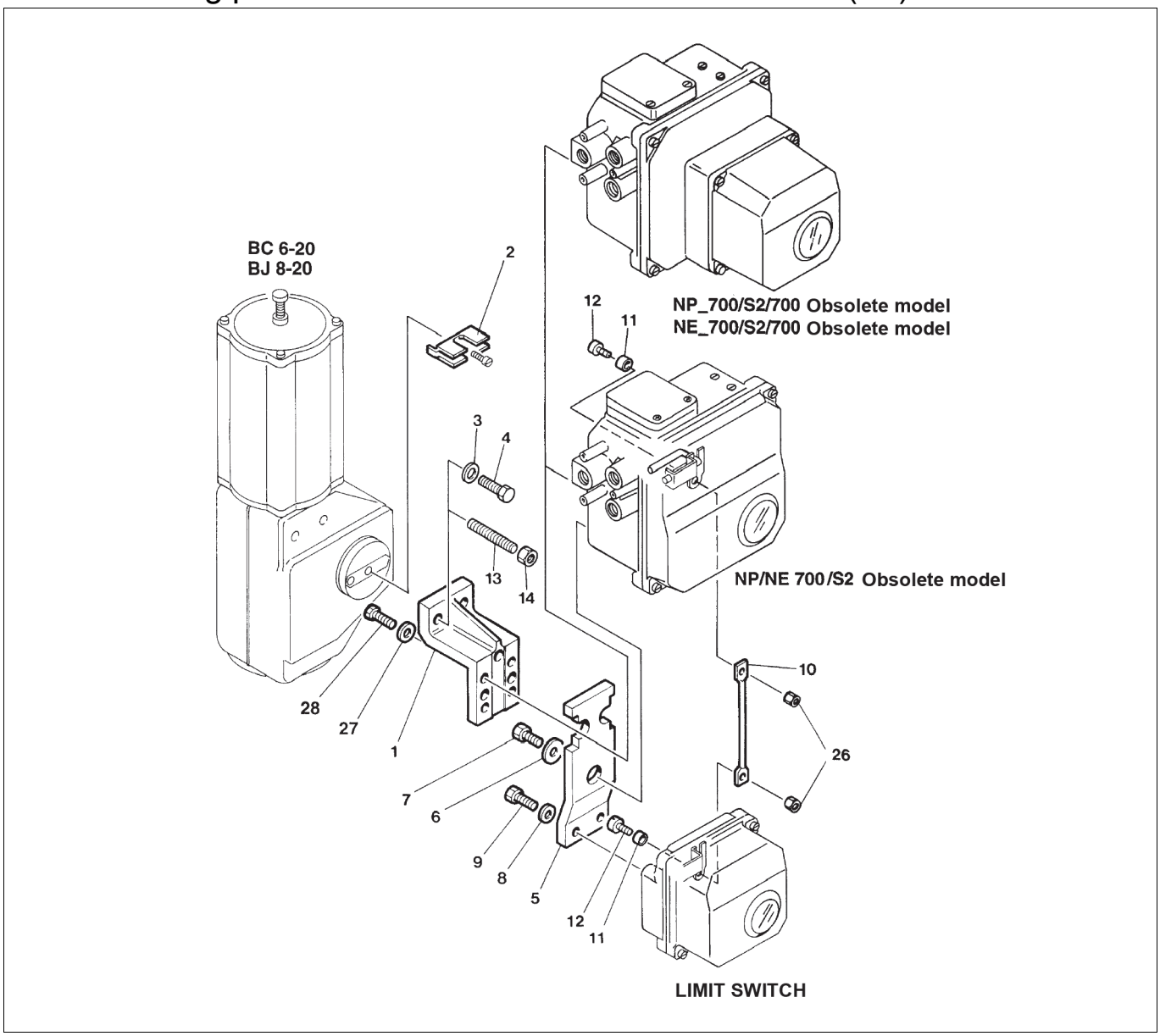
Drive: male

Item	Qty	Description
1	1	Mounting bracket
2	2	Coupling half
3	1	Adapter
4	4	Screw
5	4	Hex nut
6	1	Screw
7	4	Screw
8	4	Washer
9	4	Screw
10	4	Washer

Drive: female spline

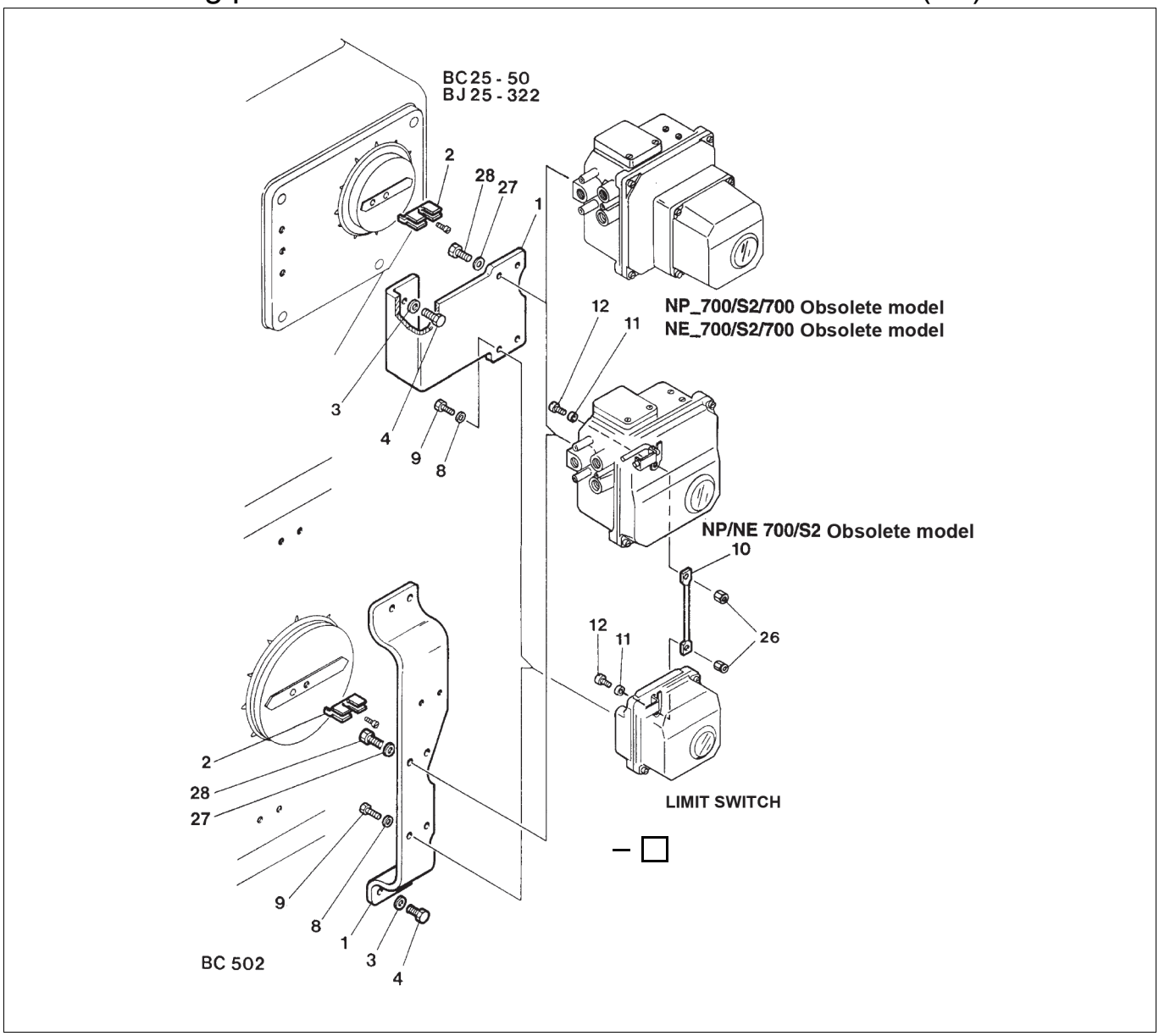
Item	Qty	Description
1	1	Mounting bracket
2	1	Ear
4	4	Screw
28	4	Screw
29	1	Screw
30	(4)	Screw
35	1	Coupling
36	1	Coupling jacket

13.4 Mounting parts for B1C6-20 and B1J8-20 actuators (S2)



Item	Qty	Description
1	1	Mounting bracket
2	1	Draught piece
3	2	Washer
4	2	Screw
5	1	Bracket
6	1	Washer
7	1	Screw
8	2	Washer
10	1	Rod
11	2	Bushing
12	2	Screw
13	2	Stud (B1C6 only)
14	2	Hexagon nut (B1C6 only)
26	2	Locking nut
27	2	Washer
28	2	Screw

13.5 Mounting parts for B1C25-502 and B1J25-322 actuators (S2)



Item	Qty	Description
1	1	Mounting bracket
2	1	Draught piece
3	2 (4)	Washer
4	2 (4)	Screw
8	2	Washer
9	2	Screw
10	1	Rod
11	2	Bushing
12	2	Screw
26	2	Locking nut
27	2	Washer
28	2	Screw

14 TYPE CODE

PNEUMATIC POSITIONER NP 700

1.	2.	3.	4.	5.		6.		
NP	7	2	4		/	S1	–	K

1.	PRODUCT GROUP
NP	Pneumatic positioner

2.	SERIES CODE

3.	INPUT SIGNAL RANGE
0	4-20 mA, only with options B and B1 (6th sign).
2	20-100 kPag /0.2-1.0 barg / 3-15 psig.

4.	PILOT VALVE SIZE	CONNECTIONS S, C1, C2
3	Ø4 mm LC	1/4 NPT
4	Ø4 mm	1/4 NPT
6	Ø6 mm	1/4 NPT
7	Ø6 mm HC	3/8 NPT

5.	ACTION
	Suitable for Double and Single action, without sign.
A	Single action, linear motion. Applicable ONLY to D/R series spring diaphragm linear actuators, max. stroke size 57 mm (2-¼ in).

6.	OPTIONS
	If several options below are needed to the same positioner, the codes shall be marked in presented order from top. Temperature range for various options shall be considered carefully.
-	Standard, (IP 54 enclosure). 6. sign S1 always to be defined Temperature range -40 °C... +90 °C/ -40 °F...+194 °F.
B	Flameproof enclosure I/P-converter (IP65), ATEX EEx d IIC T6. Input signal range 4-20 mA. M20x1,5 conduit entry. 3. sign always 0. Temperature range -40 °C... +55 °C / -40 °F...+131 °F.
B1	Explosion proof enclosure I/P-converter (IP65), FM/CSA-approval. Class 1, Div. 1, Groups B, C, D. Input signal range 4-20 mA. 1/2 NPT conduit entry. 3. sign always 0. Temperature range -40 °C... +55 °C/ -40 °F...+131 °F.
GN	For natural gas. Exhaust adapter, 3/4 NPT thread. Not usable inside with options B and B1.
R	Water and dustproof enclosure IP65/NEMA 4 and 4X. Not available with option GN.
H	High temperature construction. Viton diaphragm and seals. Not available with options B, B1, A, A1 and K. Temperature range -10° to +120 °C/ +14° to +248 °F.
S1	Positioner with attachment face acc. to standard VDI/VDE 3845, equipped with H-clip. When positioners are separate deliveries, VDI/VDE ear is supplied. Not applicable to globe valve actuators (5th sign A).
A	Pressure gauges, scale bar/psi/kPa, basic material brass, nickel plated, housing stainless steel, glycerine filled. 5. sign always to be defined. Temperature range -40 °C... +70 °C / -40 °F... +158 °F.
Y2	Brass bearing of small lever arm.
J30	Square shaft and special mounting kit.
Y	Special construction.

-□	ACCESSORIES
K	Filter regulator for supply air. Pressure gauge, scale bar/psi/kPa, basic material brass, nickel plated, housing stainless steel, glycerine filled. Temperature range -40 °C... +82 °C / -40 °F... +180 °F. Filter size 5 µm. Not available with HC-pilot (4. sign 7). Will be specified in the option sticker. In connection with the Ø6 HC-pilot valve (4. sign 7) must be used large capacity filter regulator (not K) for actuator bigger than BC 40 and BJ 32. Installation with mounting bracket.
CE01	PG11 / 1/2 NPT conduit entry nipple. Will be specified in the option sticker.
CE02	PG11 / M20x1.5 conduit entry nipple. Will be specified in the option sticker.
CE03	PG11 / R1/2 (PF1/2) conduit entry nipple. Will be specified in the option sticker.

Valmet Flow Control Oy
Vanha Porvoontie 229, 01380 Vantaa, Finland.
Tel. +358 10 417 5000.
www.valmet.com/flowcontrol