TYPE P1/R1 PNEUMATIC ACTUATOR

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

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TYPE P1/R1 PNEUMATIC ACTUATOR MANUAL

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1. GENERAL SAFETY PRINCIPLES

This manual establishes the requirements for the installation, operation and servicing and their safety requirements for type P1/R1 actuators. The following principles shall be complied with to ensure operating safety:

- Type P1/R1 actuators are designed for installation on valves;
- Prior to installation and operation, read this manual carefully.
- The actuator springs are preloaded and during operation, they are protected by design against full relaxation. If the cases are removed, follow the guidance on the warning plates and in this manual. !
- This product shall only be installed by qualified and authorised personnel, and the installation process shall be completed with acceptance on written record.
- The operating hazards are indicated with the character "**!**" in this document.

2. STANDARD OPERATING CONDITIONS

The actuator shall be operated in conditions that are within the engineering design of the product. To ensure problem-free operation throughout the entire operating life, the actuator and its fittings shall be protected against mechanical impact/shock and damage, and subjected to regular maintenance and periodic inspections. Additional operating conditions: !

- Ambient temperature: -40°C to +80°C;
- Relative humidity (RH): 98% max.;
- Min./max. supply air pressure fluctuations: ±10%
- The supply air shall be free of all solids, oil and substances causing corrosion of steel, copper and alloys; it shall be dry so that its dew point is equal to temperature at least 10°C lower than the minimum operating temperature of the product.

3. STORAGE AND TRANSPORT

The actuators shall be stored in dry and ventilated indoor storage locations with a maximum relative humidity of 80% RH. The indoor atmosphere must be free of aggressive vapours and gases. The actuators can be transported in any enclosed-body vehicle, with or without their packaging, secured against shifting and protected against strong shocks. Handle the actuators during their packaging, loading or unloading using flexible straps or belts, with either secured against touching the actuator fittings. !

4. INSTALLATION

The actuators are usually supplied complete with their corresponding valves. If it is necessary to install the actuator on the valve, the locking nut (60) is the mounting fastener. The actuator stem is connected to the valve stem using the coupling (39, 40, 41). It is critical to adjust the stem-to-stem coupling as to obtain the rating value of the actuator stroke while ensuring approx. 0.5 mm of the distance of the plug thrust to the valve seat in the end positions of the actuator stems. !

Connect the pneumatic control input lines (from a control unit or an operating panel) to the actuator.

The pneumatic input supply shall be plumbed using copper, acid-proof or plastic tubing. All pneumatic connections shall be perfectly tight at the joints. Verify the tightness of connections using a monitoring pressure gauge, after the compressed air under pressure equal to the supply

pressure is applied to the actuator, followed by isolating the air supply with a stop valve.

VALVES WITH MOUNTED PNEUMATIC ACTUATORS ARE RECOMMENDED TO BE INSTALLED WITH THE ACTUATOR UPWARD AND THE MAXIMUM ANGLE FROM THE PLUMB LINE SHALL NOT EXCEED 30°.

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In special cases, other installation orientation can be agreed upon with the manufacturer.

For a pneumatic control input supply line 7.5 m long, use □ 6 x 1 mm tubing. For longer lines, use □ 8 x 1 mm (OD x wall thickness) tubing. The pneumatic control input shall be connected to the upper diaphragm case on a regular-action type P1 actuator or to the lower diaphragm case on a reverse-action type R1 actuator. The connection is made using straight or elbow unions with threaded ends (1/4" NPT).

While installing a valve with a pneumatic or electro-pneumatic positioner, connect the pneumatic or current control input lines from the control unit or operating panel to the input port end / input terminal labelled "SIGNAL" (control input). The compressed air supply line with a pressure of 140; 250; 400 or 450 kPa (depending on the requirements), shall be connected via a filter regulator unit, to the positioner's input port end / input terminal labelled "SUPPLY" (supply input), respecting the recommendations for the line length and OD stated above.

5. COMMISSIONING

Connect the supply air, start the actuator and verify that the valve stem (5) moves smoothly and without stuttering, within the entire rated travel range.

6. PRODUCT OVERVIEW

6.1 TECHNICAL SPECIFICATIONS:

The product is available in the following versions:
- regular-action (air input extends the stem): type P1;
- reverse-action (air input retracts the stem): type R1;
- regular-action, manual drive: type P1B;
- reverse-action, manual drive: type R1B

Table 1. Diaphragm effective area, stroke, and spring range of the actuator

Diaphragm effective area	Stroke	Spring range
[cm^2]	[mm]	[kPa]
400	20	20...100 kPa; 40...120 kPa; 60...140 kPa — 3 springs used 40..200 kPa; 80...240 kPa; 120...280 kPa — 6 springs used
630	20; 38	20...100 kPa; 40...120 kPa; 60...140 kPa — 3 springs used 40..200 kPa; 80...240 kPa; 120...280 kPa — 6 springs used 180...380 kPa — 12 or 24 springs used
1000	38; 50; 63	
1500	38; 50; 63; 80; 100	
3000	50; 63; 80; 100	

- Maximum air supply pressure: 400 kPa (450 kPa for 180...380 kPa range)
- Operating temperature: - 40...+80°C
- Relative humidity (RH): max. 98%
- weight: (actuator with 3 springs): see Table 2

Table 2. Actuator weight

Actuator size	Weight [kg]	
	P1; R1	P1B; R1B
400	20	28
630	40	50
1000	85	105
1500	120	150
3000	225	255

6.2 CONSTRUCTION

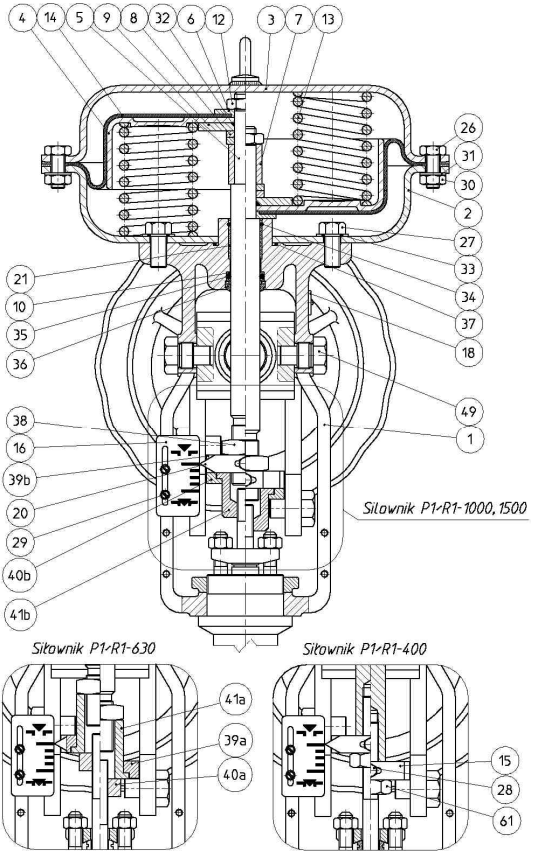


Fig. 1. Type P1/R1 pneumatic actuator with manual side drive

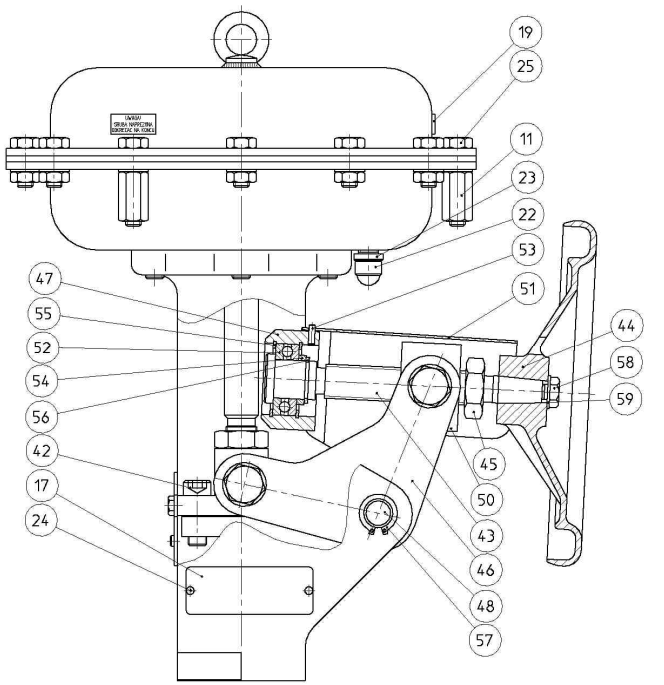
Table 3. Parts list

#	Part name
1	Yoke
3	Upper diaphragm case
5	Stem
7	Distance Sleeve
9	Washer
11	Tension nut
13	Spring
15	P1/R1-400 actuator stem flange
17	Actuator nameplate

#	Part name
2	Lower diaphragm case
4	Diaphragm plate
6	Distance ring
8	Distance sleeve
10	Resistance ring
12	Low-profile nut
14	Diaphragm
16	Stroke indicator scale
18	Valve nameplate

19	Warning plate
21	Sliding sleeve
23	Pipe plug
25	Bolt
27	Bolt
29	Screw
31	Washer
33	Washer ring
35	O-ring
37	O-ring
39a	P1/R1-630 upper stem coupling
40a	P1/R1-630 lower stem coupling
41a	P1/R1-630 coupling bushing
42	Socket head bolt
44	Drive handwheel
46	Lever
48	Lever shaft
50	Moving nut
52	Lengthwise ball bearing
54	P1/R1B-400; 630 thrust ring
56	Snap ring
58	Bolt
60	Locking nut

20	Stroke indicator
22	Cap
24	Round head grooved pin
26	Bolt
28	Bolt
30	Nut
32	O-ring
34	Retaining ring
36	Z-form scraper ring
38	Nut
39b	P1/R1-1000; 1500 upper stem coupling
40b	P1/R1-1000; 1500 lower stem coupling
41b	P1/R1-630 coupling sleeve
43	Drive screw
45	Thrust nut
47	Drive joint
49	Joint pin
51	Drive cover
53	Plug pin
55	Snap ring
57	Snap ring
59	Washer
61	Low-profile nut



6.2 CONNECTION DIMENSIONS

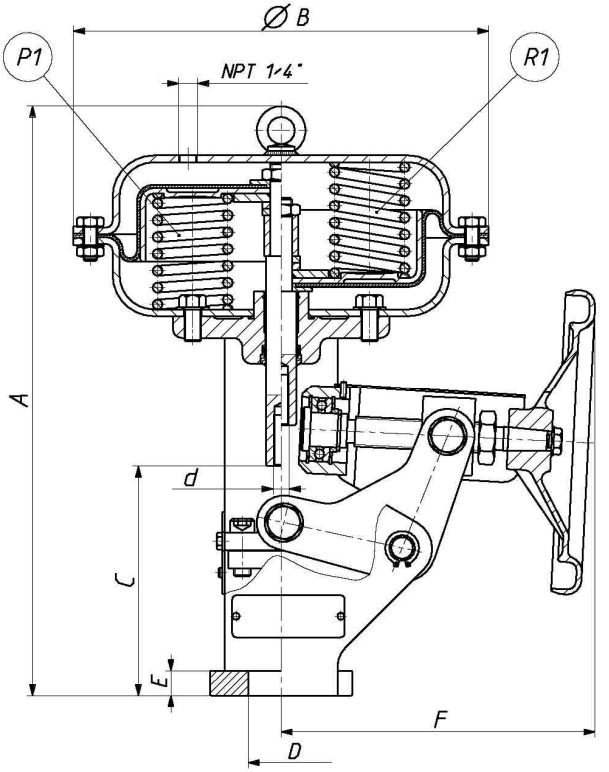


Fig. 2. Type P1/R1 pneumatic actuator connection dimensions

Table 4. Connection dimensions

Actuator size	A	B	C		D	E	F	d
			P1; P1B	R1; R1B				
	[mm]							
400	453	305	127	100	57.15	17.7	255	M12x1.25
630	548	375	127	107	57.15	17.7	280	M12x1.25 M16x1.5
					84.15	22.5		
1000	773	477	153	90	57.15	17.7	340	M12x1.25 M16x1.5 M20x1.5
					84.15; 95.25	22.5		
1500	833	550	184	102	57.15	17.7	410	M12x1.25 M16x1.5 M20x1.5
					84.15; 95.25	22.5		
3000	1138	550			84.15; 95.25			M24x1.5

6.3 PRINCIPLE OF OPERATION

The operation of the pneumatic actuator consists in processing a pneumatic input (compressed air with a nominal control air pressure range of 20...100 kPa; 40...200 kPa or another range specific to the positioner in use) into linear motion which translates the moving parts of the actuator.

The main parts of the actuator are:

- cast yoke (1), lower and upper diaphragm case (2, 3), trim, which provides guidance and guarding of the actuator moving parts and stroke indicator;
- the cases (2 and 3) are bolted together using fasteners (11, 25, 26, 30);
- the movement assembly inside the actuator comprises of the diaphragm (14), the diaphragm plate (4), the stem (5), the distance sleeves (7, 8), and the valve stem fasteners (38, 39, 40, 41);
- the springs (13).

The diaphragm separates the void between the cases, forming two chambers: the pressure chamber and the non-pressure (spring-actuated) chamber. Applying a pneumatic control input to the pressure chamber translates the actuator stem in one of the two directions, depending on the actuator's version of action (P1 or R1).

7. SERVICING, MAINTENANCE & REPAIRS

Caution:
The actuator springs are pre-tensioned. Therefore, when disassembling the actuator, release the tension nuts (11) last, as shown on the warning plate (11). Before every disassembly operation, verify that all compressed air and electrical power supply lines have been isolated.

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In-operation servicing of the actuator is to maintain the appropriate level of tightness of the cases and the actuator stem; also, visually inspect and verify that the actuator stem moves smoothly. Compulsory documented periodic inspections ensure long-lasting and safe operation of the actuator. For continuous-duty actuators, the periodic inspection shall be done every 6 months or more frequently. For non-continuous duty actuators, the periodical inspection shall be done every 12 months or more frequently.

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During each inspection, the actuator shall have its maintenance done and be repaired as required. Whenever required, the following servicing shall be done during each maintenance or repair:

- replace the pneumatic actuator diaphragm;
- replace the pneumatic actuator seals (for type R1).

7.1 DIAPHRAGM REPLACEMENT

7.1.1 PNEUMATIC ACTUATOR ACTION VERSION:

CLOSING action with rising air pressure (type P1)

a) Disconnect the control air supply line from the actuator;
b) Remove the actuator's upper diaphragm case (3) and remember to release the tension nuts (11) last, as shown on the warning plate (19);
c) Remove the low-profile nut (12) from the actuator stem and remove the distance ring (6);
d) Replace the diaphragm (14) and re-assemble the actuator;
e) Reconnect the control air supply line to the actuator.

7.1.2 PNEUMATIC ACTUATOR ACTION VERSION:

OPENING action with rising air pressure (type R1)

a) Disconnect the control air supply line from the actuator;
b) Remove the actuator's upper diaphragm case and remember to release the tension nuts (11) last, as shown on the warning plate;
c) Remove the springs (13);
d) Remove the low-profile nut from the actuator stem and remove the diaphragm plate (4) together with the distance sleeve (7) and the washer (9);
e) Replace the diaphragm and re-assemble the actuator;
f) Reconnect the control air supply line to the actuator,

7.2 STEM SEAL REPLACEMENT IN TYPE R1 PNEUMATIC ACTUATOR

Perform the following procedure to replace the actuator seal (the O-ring (35); the Z-form scraper ring (36)):

a) Remove the stem coupling to detach the valve stem from the actuator/drive stem by releasing the low-profile nut (61) and: (i) unscrewing the valve stem clear from the actuator stem (for type P1/R1-400) or (ii) unscrewing the valve stem clear from the lower stem coupling (40a) by rotating the plug-to-stem assembly (for P1/R1-630), or (iii) unscrewing the valve stem clear from the coupling bushing (41b) by rotating the plug-to-stem assembly (for type P1/R1-1000; 1500);
b) Release the actuator locking nut (60) and remove the actuator from the actuated unit;
c) Release the counternut (38) and remove it together with the coupling bushing (41a (for type R1-630) or the upper stem coupling (39b) (for type R1-1000; 1500) from the actuator stem;
d) Remove the actuator's upper diaphragm case assembly and remove the springs, as shown in Section 7.1.2 b & c;
e) Remove the stem together with the diaphragm and the diaphragm plate from the yoke packing box chamber;
f) Replace the O-ring and scraper rings if worn out;
g) Re-assemble the actuator parts in the reverse order of disassembly;
h) Place the actuator on the valve and complete the reassembly by installing the remaining parts which have been removed during the disassembly process.

7.3 MODIFYING THE VALVE ACTION AND CONTROL AIR RANGE

7.3.1 MODIFYING THE PNEUMATIC ACTUATOR ACTION

The reversible design of type P1/R1 type pneumatic diaphragm actuators facilitates reversing the action of the valve operated by the actuator from the CLOSING action with rising air pressure to OPENING action with rising air pressure, and vice versa.

This requires modifying the actuator action. The procedure:
a) Remove the valve stem and actuator stem coupling assembly;
b) Remove the upper diaphragm case of the actuator and remember to release the tension nuts last, as shown on the warning plate.

Further steps of the procedure will depend on the action version of the actuator prior to the modification.

Converting P1 action to R1 action:

c) Remove the low-profile nut from the actuator stem;
d) Remove the diaphragm together with the diaphragm plate, the washer, and the distance sleeve, while keeping the stem secure to prevent its detachment to the outside of the yoke packing box chamber;
e) Remove the springs from the lower diaphragm case;
f) Reverse the diaphragm with the parts removed as above by 180° and reinstall the diaphragm on the actuator stem;
g) Secure the low-profile nut to the actuator stem while compressing the parts removed as above;
h) Place the springs on the diaphragm plate so that engage the guide bosses and the spring ends are equidistant from the stem centreline;
i) Place the upper diaphragm case assembly on the springs and first begin tightening the tension nuts alternately to produce equal compression of the springs; continue until the upper and lower diaphragm cases meet. Reinstall the remaining bolts and secure both cases together by tightening the bolt nuts.

Converting R1 action to P1 action:

j) Remove the springs from the diaphragm plate;
k) Remove the low-profile nut from the actuator stem;
l) Remove the diaphragm together with the diaphragm plate, the washer, and the distance sleeve, while keeping the stem secure to prevent its detachment to the outside of the yoke packing box chamber;
m) Place the springs in their marked locations on the lower diaphragm case;
n) Reverse the diaphragm with the parts removed as above by 180° and install it on the actuator stem so that the Ø 6 hole at the bottom and the groove on the edge of the diaphragm plate are aligned with one of the holes along the diaphragm perimeter;
o) Place the diaphragm assembly on the springs so that the latter engage the guide bosses on the diaphragm plate. Verify that the springs are in the correct locations: bend away the diaphragm (at the groove on the edge of the diaphragm plate) enough to show Ø 6 hole in the bottom of the diaphragm plate; a spring should be visible through the hole;
p) Secure the low-profile nut to the actuator stem while compressing the parts removed as above;

r) Place the upper diaphragm case on the stem face plane and first begin tightening the tension nuts alternately to produce equal compression of the springs; continue until the upper and lower diaphragm cases meet. Reinstall the remaining bolts and secure both cases together by tightening the bolt nuts.

7.3.2 MODIFYING THE CONTROL AIR RANGE (SPRING RANGE) IN THE PNEUMATIC ACTUATORS

The design of the actuator facilitates setting different operating ranges by adding/removing a suitable number of springs or modifying the spring pre-tension with suitable spacers installed:

5.0 mm high – 2 pcs. (for a 20 mm stroke);
9.5 mm high – 2 pcs. (for a 38/80 mm stroke);
12.5 mm high – 2 pcs. (for a 50 mm stroke);
15.5 mm high – 2 pcs. (for a 63 mm stroke) – applies to the 1000 & 1500 actuators.

For the rated ranges, these parts are installed on the actuator stem, from the inward side of the diaphragm plate. The spring pre-tension is increased by installing one or two spacers on the outward side of the diaphragm plate, depending on the desired range.
The selection of parts and their assembly are specified in Table 5.
The spring pre-tension is modified by relocating the 5 mm distance sleeves for the 20 mm stroke, the 9.5 mm distance sleeves for the 38/80 mm stroke, the 12.5 mm distance sleeves for the 50 mm stroke, and the 15.5 mm distance sleeves for the 63 mm stroke. For the rated ranges, these parts are installed on the actuator stem, from the inward side of the diaphragm plate. The spring pre-tension is increased by installing 1 or 2 spacers on the outward side of the diaphragm plate, depending on the desired range. For the 80 mm stroke, additional 4.5 mm thick spring plates are installed. For the 100 mm stroke, the springs are replaced while the spacer bush height is not changed.

The selection of parts is specified in Table 5; the installation procedure is shown in the actuator's assembly drawing.

Table 5.

Actuator 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	extra tens. [mm]	no. of springs	extra tens. [mm]	no. of springs	extra tens. [mm]	no. of springs	extra tens. [mm]	no. of springs	extra tens. [mm]	no. of springs	extra tens. [mm]	no. of springs	extra tens. [mm]
400	20	3		6		3	5	6	5	3	5+5	6	5+5		
630	20	3		6		3	5	6	5	3	5+5	6	5+5	12	5+5
	38	3		6		3	9.5	6	9.5	3	9.5+9.5	6	9.5+9.5	12	9.5+9.5
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	15.5	6	15.5	3	15.5+15.5	6	15.5+15.5	12	15.5+15.5
1500	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	15.5	6	15.5	3	15.5+15.5	6	15.5+15.5	12	15.5+15.5
	80	3		6		3	9.5	6	9.5	3	9.5+9.5	6	9.5+9.5	12	9.5+9.5

All spacers are included in the actuator's construction. Order additional springs directly from the manufacturer.

Procedure for the control air range modification:
a) Complete the steps in Section 7.1 (a) and (b);
b) Remove the low-profile nut from the actuator stem; remove the

diaphragm together with the diaphragm plate, the washer, and the distance sleeve, while keeping the stem secure to prevent its detachment to the outside of the yoke packing box chamber;

c) Relocate and install the spacers appropriately and add (or remove) the springs as required and shown in Table 1;

d) Reinstall the low-profile nut, reassemble the casing, and readjust the actuator. Table 6.

#	Symptoms	Causes	Remedy
1	Large hysteresis	- excessive friction resistance	- check, clean, and lubricate the friction parts: the stem guide (5) and sliding sleeve (21) surfaces; - replace the components if worn
2	No proper stroke	- stem surface dirty or damaged; - failed diaphragm; - valve-to-actuator stem coupling out of adjustment	- check the condition of the stem (5) and repair or replace as required; - check the diaphragm (14) and replace as required; - check the stem coupling assembly (38, 39, 40, 41) and reset the stroke as required.
3	No external tightness	- incorrect installation torque of the cases and diaphragm; - wear (failure) of sealing parts	- locate the leaks; - re-tighten the threaded fasteners (11, 25, 26, 30); - replace the diaphragm and/or washer rings (33); replace the seals
4	Actuator stuck	- seizure of the stem in the sliding sleeve; - failed diaphragm; - broken spring(s)	- replace the sliding sleeve (21); clean and buff out the stem (5); - replace the diaphragm (14); - replace the failed springs (13)

7.4. INSTALLATION/REMOVAL OF THE PNEUMATIC ACTUATOR SIDE DRIVE UNIT (P1B / R1B - 400…3000)

Before attempting to install the manual drive unit, always depressurize the pressure chamber in the actuator!

The actuator stem shall be in the end home position that depends on the action version. Install the side drive unit in the yoke (1) using the lever shaft (48) secured with two spring rings (57). Depending on the actuator type (action), locate the joint pin (49) which is on the lever (46) above the upper stem coupling (ref. 39a & b for type P1B) or below the lower stem coupling (ref. 40a & b for type R1B). Operate the drive handwheel (44) to set the moving nut (50) in a position which allows threading in the joint pins (49) into the yoke (1) and setting the position of the side drive unit.
The side drive unit is removed by performing the assembly procedure in the reverse order and with respect for the safety requirements.

8. CAUTION!

Operating abnormalities caused by poor action of electric actuators, positioners, filter regulator units, solenoid valves or other fittings installed on the control valve shall be remedied in conformity with the applicable OEM manuals.

9. LIST OF SPARE PARTS

Table 7.

#	Part name
13	Spring
21	Sliding sleeve
36	Scraper ring

#	Part name
14	Diaphragm
35	O-ring
37	O-ring

NOTE!
Genuine spare parts from the valve manufacturer are recommended. Failure to comply will release the manufacturer from all liability for the product.

10. OPERATING SAFETY CONDITIONS

The following principles shall be complied with to ensure operating safety:

- The valve can be removed from the pipeline or the parts in contact with the medium can be removed only after it has been positively verified that these parts are no longer under the medium's pressure.

- The actuator springs are preloaded and during operation, they are protected by design against full relaxation. If springs are replaced, the tension nuts (as shown on the warning plates) must be released last.
- If the service is at high temperature, hot valve parts are a risk of burns; provide protections where feasible to do so.
- Only qualified personnel may assemble/disassemble the valve.
- Other operating hazards are indicated with the character "!" in this document.
- For valves with a bellows bonnet, never attempt to rotate the valve stem inside of the bonnet body as the bellows can fail.

11. PRODUCT DISPOSAL

When the service life of the product ends, it shall be dismantled and its parts must be separated by material, into metal parts (non-ferrous metals, acid-resistant and carbon steel grades), rubber parts (diaphragms and seals) and plastic parts (flat seals and packing, electrical components, plugs/blinds). The recycling of these materials shall conform to the waste management regulations applicable. The product does not contain materials the disposal of which is harmful for the environment.

12. ADDITIONAL REQUIREMENTS FROM THE PRODUCT OPERATION IN EXPLOSIVE ATMOSPHERES PER DIRECTIVE 94/9/EC (ATEX)

12.1. DESIGN REQUIREMENTS

Type P/R or P1/R1 pneumatic actuators are designed in compliance with the requirements for equipment operated in explosive atmospheres, Group II, Category 2, per PN-EN 13463-1:2002, with specific consideration of the following:
- operation in compliance with the technical specifications established by the manufacturer and high level of protection is ensured;
- operation in areas where explosive atmospheres are likely to be formed mixtures of air with gases, mists, vapours or dust-air mixtures;
- explosion protection measures are applied to provide high level of protection, even in conditions of frequent disturbance or failure.

12.2 APPLICATION REQUIREMENTS

Type P/R or P1/R1 pneumatic actuators manufactured with the  marking are approved for operation in the following Ex zones defined in PN-EN 1127-1:1997:
(a) Zone 1 for gases / vapours, which includes locations where explosive atmosphere may sometimes be present during normal operation; the Zone may include (but is not limited to):
- direct vicinity of Zone 0;
- direct vicinity of locations supplied with materials, and/or where materials are handled for filling or evacuation;
- direct vicinity of damage-sensitive equipment and insufficiently protected seals

(b) Zone 2 for gases / vapours, which includes locations where no explosive atmosphere is present during normal operation or if present, its duration is short. This Zone may include (and is not limited to) the vicinity of Zone 0 and 1.
(c) Zone 21 for dust, which includes locations in which explosive atmospheres in the form of a flammable dust cloud in the air may sometimes be present during normal operation and may include (and is not limited to) locations in the direct vicinity of facilities where the dust is loaded/unloaded and locations where dust layers are present which, during standard operation, may form flammable mixtures with air, within

explosive concentration limits.
(d) Zone 22 for dust including, locations in which explosive atmosphere in a form of flammable dust cloud in the air is not present during normal operation or if present, its duration is short. This Zone may include (and is not limited to) locations in the direct vicinity of facilities where dust may accumulate or be released.

(e) If an explosive atmosphere comprises acetylene, carbon disulphide, hydrogen, hydrogen sulphide or ethyl oxide, the actuator non-pressure (spring-actuated) chamber shall be connected using piping open to a non-explosive atmosphere to eliminate the risk of explosion caused by mechanically generated sparks, e.g. if a spring breaks.

(f) if an actuator is used to supply natural gas as a pneumatic control input, connect the actuator non-pressure chamber using piping open to a non-explosive atmosphere to eliminate the risk of explosion caused by mechanically generated sparks, e.g. if a spring breaks.

12.3. REPAIR AND MAINTENANCE REQUIREMENTS

During inspection, repairs and maintenance in explosive atmospheres, ensure the safety conditions for the work tools and the Zones specified in EN 1127-7 Annex A in which the tools can be used.

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Issue P1/R1/04/**2017**