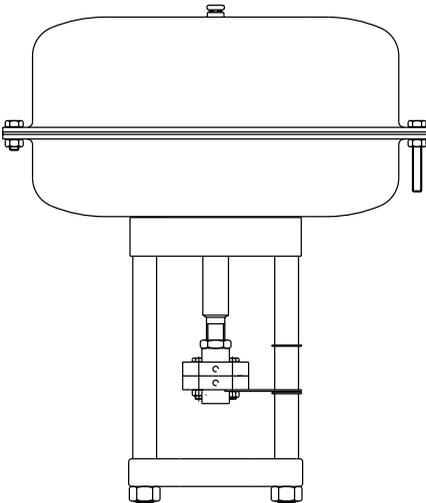


**PN5700 and PN6700**  
**Series Pneumatic Actuators**  
**Installation and Maintenance Instructions**

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- 1. General*
- 2. Installation*
- 3. Commissioning*
- 4. Maintenance*
- 5. Spares*



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# 1. General

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## 1.1 Description

A range of compact multi-spring linear actuators having various spring ranges for matching the requirements of large size valves at various differential pressures. Each actuator is fitted with a stroke indicator and incorporates a semi-rolling diaphragm which gives good linearity over the operating stroke.

### Available types

<b>PN5700 series</b>	Spring extend spindle, multi-spring, pillar mounted actuators
<b>PN6700 series</b>	Spring retract spindle, multi-spring, pillar mounted actuators

These actuators are designed to operate with 2-port KE and 3-port QL valves as detailed below:

Type	Control valve	Valve size	Actuator type
<b>2-port</b>	<b>KE series</b>	DN125, DN150 and DN200	50 mm travel*
<b>3-port</b>	<b>QL series</b>	DN125, DN150 and DN200	50 mm travel

\* Can also be used for 30 mm travel reduced K<sub>v</sub> trims on KE series 2-port valves.

## 1.2 Spring ranges

Actuator type	Spring range	Travel
<b>PN5750</b>	0.2 (0.4) to 1 (1.2) bar	50 mm
<b>PN5756</b>	1.0 to 3.0 bar	50 mm
<b>PN5757</b>	0.8 to 2.4 bar	50 mm
<b>PN6750</b>	0.2 (0.4) to 1 (1.2) bar	50 mm
<b>PN6757</b>	0.8 to 2.4	50 mm

## 1.3 Technical data

Actuator type	Temperature range	Maximum operating pressure
<b>PN5700 series</b>	-20°C to 100°C	4.5 bar g
<b>PN6700 series</b>	-20°C to 100°C	4.5 bar g

## 1.4 Air supply connection and consumption

Actuator type	Connection	Consumption
<b>PN5700 series</b>	¼" NPT	Volume 8.5 N Litres
<b>PN6700 series</b>	¼" NPT	Volume 8.5 N Litres

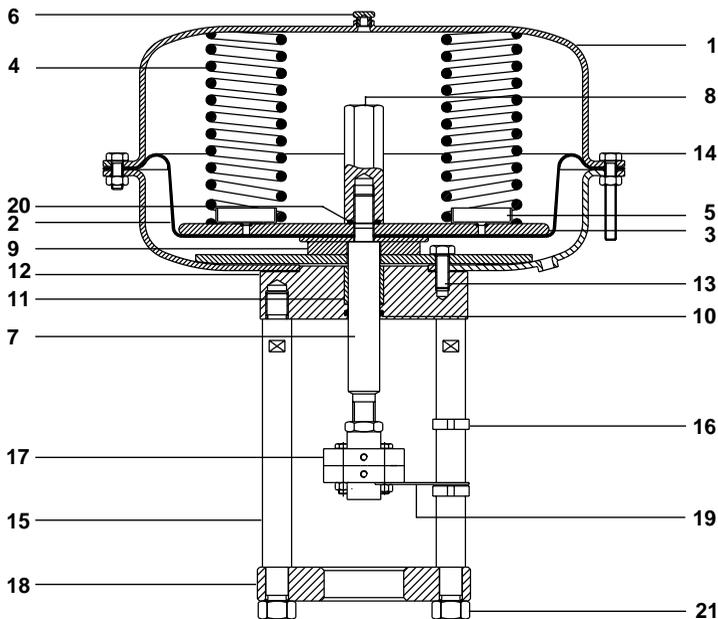


Fig. 1

## 1.5 Materials for PN5700 series

No	Part	Material
1	Diaphragm housing	Steel
2	Diaphragm	Reinforced nitrile rubber
3	Diaphragm plate	Steel
4	Spring	Spring steel
5	Spring guide	Zinc plated steel
6	Vent plug	Nickel plated brass
7	Spindle	Stainless steel
8	Lock-nut	Stainless steel
9	Spacer	Zinc plated steel
10	Spindle 'O' ring	Nitrile rubber
11	Guide bush	Bronze
12	Gasket	Non-asbestos fibre
13	Fixing screws	Steel
14	Housing bolts and nuts	Steel
15	Pillar	Zinc plated steel
16	Travel indicator	Stainless steel
17	Linkage set	Zinc plated steel
18	Mounting plate	Zinc plated steel
19	Anti-rotation plate	Zinc plated steel
20	Sealing 'O' ring	Nitrile rubber
21	Pillar nuts	Zinc plated steel

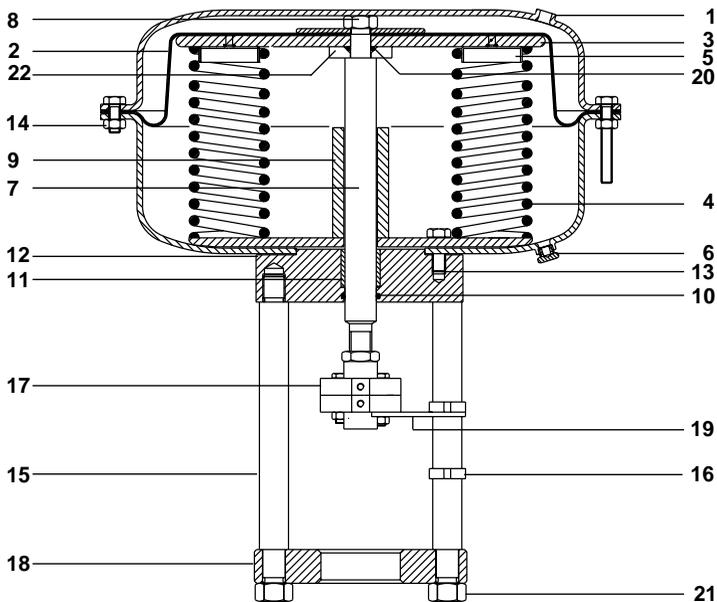


Fig. 2

## 1.6 Materials for PN6700 series

No	Part	Material
1	Diaphragm housing	Steel
2	Diaphragm	Reinforced nitrile rubber
3	Diaphragm plate	Steel
4	Spring	Spring steel
5	Spring guide	Zinc plated steel
6	Vent plug	Nickel plated brass
7	Spindle	Stainless steel
8	Lock-nut	Stainless steel
9	Spacer/stroke limiter	Zinc plated steel
10	Spindle 'O' ring	Nitrile rubber
11	Guide bush	Bronze
12	Gasket	Non-asbestos fibre
13	Fixing screws	Steel
14	Housing bolts and nuts	Steel
15	Pillar	Zinc plated steel
16	Travel indicator	Stainless steel
17	Linkage set	Zinc plated steel
18	Mounting plate	Zinc plated steel
19	Anti-rotation plate	Zinc plated steel
20	Sealing 'O' ring	Nitrile rubber
21	Pillar nuts	Zinc plated steel
22	Spacer	Zinc plated steel

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## 2. Installation

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**Note:** refer to the separate Installation and Maintenance Instructions for the control valve.

The actuators should be installed in such a position as to allow full access to both actuator and valve for maintenance purposes. The preferred mounting position is with the actuator and valve spindle in the vertical position above or below the horizontal pipework.

The actuator ambient limits are -20°C to +100°C. For low temperature conditions the air supply must be dry. For high temperature conditions insulate the control valve and pipework to protect the actuator.

### Warning

The actuator housing must only be pressurized on the opposite side of the diaphragm to the springs. The housing vent cap must be left unrestricted.

## 2.1 Fitting the PN5700/PN6700 actuator onto the valve

(refer to Figures 3 and 4)

### Actuator:

- Loosen the actuator half-coupling lock-nut (17a).
- Remove the coupling locking screws and nuts (17e) and anti-rotation plate (19) and valve half-coupling (17c).
- Screw the actuator half-coupling lock-nut (17a) and actuator half-coupling (17b) onto the actuator spindle (7) until it is flush with the bottom of the spindle whilst ensuring the M6 threaded mounting hole is facing the front of the valve (see Fig. 4).
- Remove the pillar nuts (21) and remove the mounting plate (18).

### Valve:

- Remove the slotted mounting nut (23).
- Fit mounting plate (18) over the threaded spigot of the valve bonnet and align with axis of the valve.
- Refit the slotted mounting nut (23) and tighten to the recommended tightening torque (see Table 1).
- Screw the half coupling (17c) onto the valve spindle. Adjust the valve half-coupling position so that it is positioned 125 mm ± 1 mm above the actuator mounting face, with the M6 threaded mounting hole facing the front of the valve (Fig. 4).
- Screw the valve stem lock-nut (17d) finger tight to set the valve half-coupling (17c) in this position.
- Using the lifting eyes provided, lift the actuator and position it over the valve.
- Apply air pressure to the actuator to position the spindle at the required travel position (see Fig. 6).
- Gently lower the actuator onto the valve, locating the pillars (15) into the mounting plate holes (18). Fit the pillar nuts (21) and tighten to the recommended tightening torque (see Table 1).

Follow the spring adjustment procedure as described in Section 3.

**Table 1 Recommended tightening torques**

Item	Part	Tightening torque N m
23	Slotted valve mounting nut	140 - 150
21	Pillar nut	40 - 50
17a and 17d	Half coupling lock-nuts	60 - 70
17e	Coupling locking screws	35 - 40
8	Diaphragm plate lock-nut	25 - 30
14	Housing bolts	15 ± 2

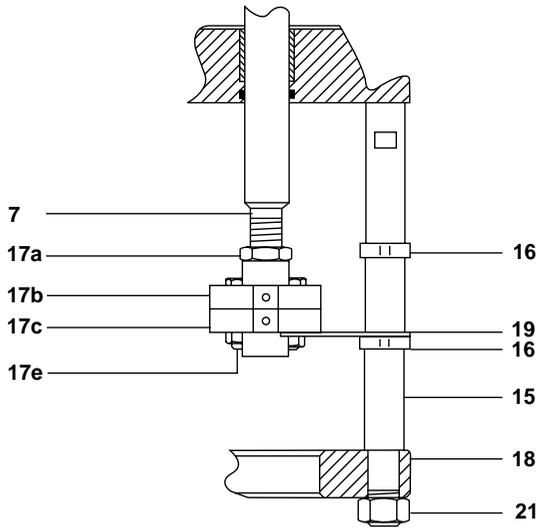


Fig. 3

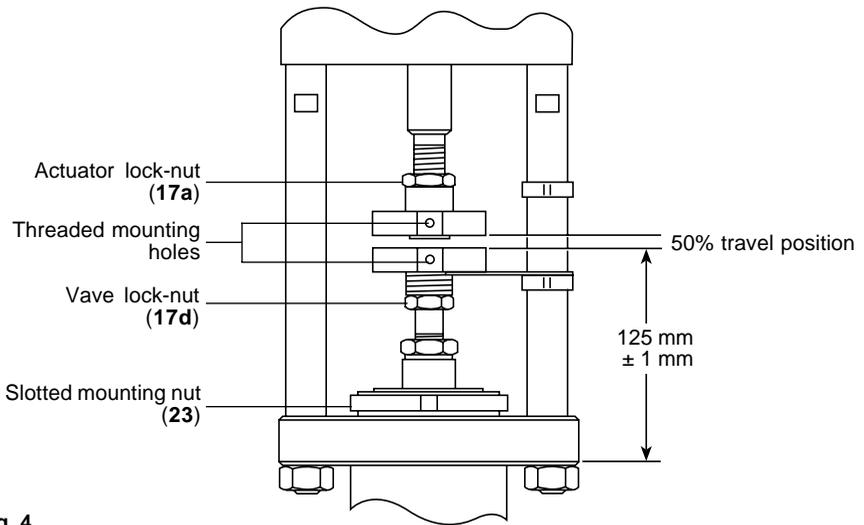


Fig. 4

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## 3. Commissioning

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If a valve positioner is fitted refer to the separate Installation and Maintenance Instructions for this product.

### 3.1 Adjusting springs

The actuator spring range is indicated on the name-plate. Should it be necessary to check or adjust the spring range follow the procedure described in Section 3.2 or 3.3.

**Note:** Adjustment of the springs will only alter the pressure of the control signal at which the valve starts to move (set point) and will not alter the spring range required to move the valve through its full travel. i.e. 0.2 to 1.0 bar spring (range 0.8 bar) set to commence to lift at 0.4 bar will require a 1.2 bar pressure (0.4 + 0.8) to obtain valve full travel.

#### Important

To prevent damage to the valve seat, please ensure the plug does not turn while pressing on the seat during assembling or adjustment.

**To prevent damage to the diaphragm ensure the actuator spindle is not allowed to rotate when the diaphragm is assembled within its housing.**

### 3.2 PN5700 spring extend actuators (Refer to Figures 5 and 6)

Ensure the control valve has been isolated and the actuator housing is vented.

Loosen and remove the coupling locking screws and nuts (17e).

Remove the anti-rotation plate (19).

Set the air pressure to the actuator equal to the minimum spring range pressure for the actuator. With the valve plug on its seat screw the actuator half-coupling (17b) down until it touches the valve half-coupling (17c).

Ensure that the two M6 threaded mounting holes are aligned, facing the front of the valve, **increasing** actuator pressure slightly above the minimum if required to achieve this.

Refit the coupling locking screws and nuts (17e) and anti-rotation plate (19) and tighten to the recommended tightening torque (Table 1, page 6).

Increase the air pressure to position the valve to 50% travel.

Tighten the actuator half-coupling lock-nut (17a) and valve half-coupling lock-nut (17d) to the recommended tightening torque (Table 1, page 6).

Release air pressure checking that the valve is closed at the minimum control signal pressure. Apply the control signal pressure to complete the full travel of the valve spindle and check whether the pressure corresponds to the desired maximum control signal pressure (within a tolerance of -10%).

### 3.3 PN6700 spring retract actuators (Refer to Figures 5 and 6)

Ensure the control valve has been isolated and the actuator housing is vented.

Loosen and remove coupling locking screws and nuts (17e).

Remove the anti-rotation plate (19).

Set the air pressure to the actuator equal to the maximum spring range pressure for the actuator. Screw the actuator half-coupling (17b) down until it touches the valve half-coupling (17c).

Ensure that the two M6 threaded mounting holes are aligned, facing the front of the valve, **reducing** actuator pressure slightly below the maximum if required to achieve this.

Refit the coupling locking screws and nuts (17e) and anti-rotation plate (19), and tighten to the recommended tightening torque (Table 1, page 6).

Decrease the air pressure to position the valve to 50% travel.

Tighten the actuator half-coupling lock-nut (17a) and valve half-coupling lock-nut (17d) to the recommended tightening torque (Table 1, page 6).

Increase air pressure checking that the valve is fully closed at the maximum control signal pressure.

Reduce the control signal pressure to complete the full travel of the valve spindle and check whether the pressure corresponds to the desired minimum control signal pressure (within a tolerance of +10%).

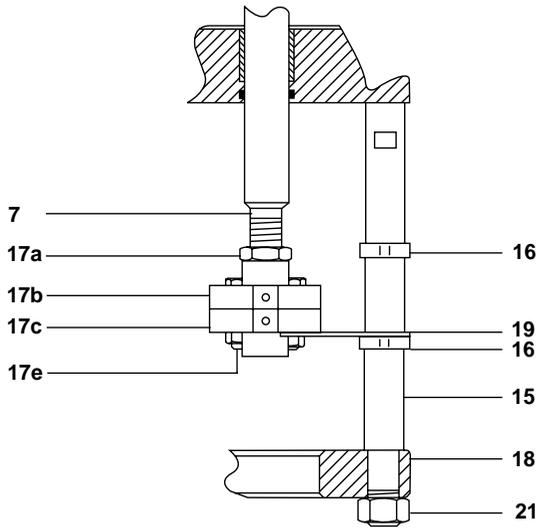


Fig. 5

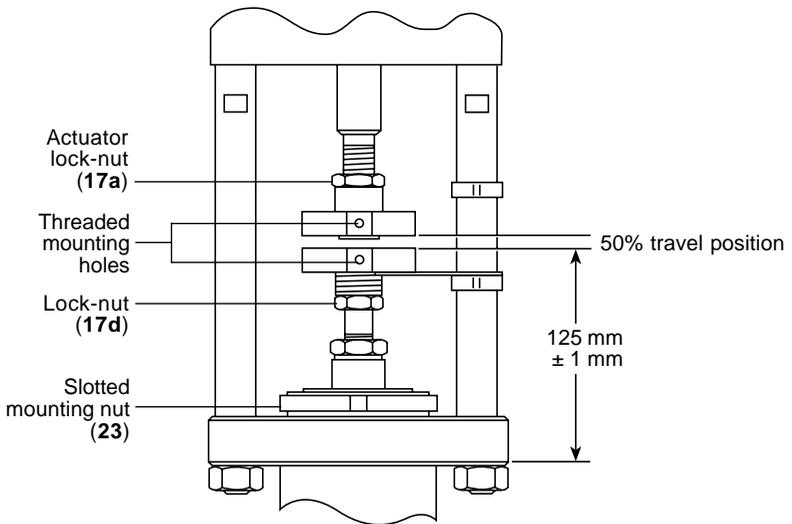


Fig. 6

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## 4. Maintenance

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The PN5700 and PN6700 series pneumatic actuators are maintenance free. To ensure satisfactory operation it is strongly recommended that the air control signal is filtered to remove oil, water and other contaminants.

Should it be necessary to replace parts (see Section 5 for available spares) the following procedure should be used.

### 4.1 Remove actuator from valve (refer to Figures 7 and 8)

Increase the air pressure to the actuator until the valve is positioned at mid. travel (50% travel).

Loosen and remove the coupling nuts and screws (17e).

Loosen and remove pillar mounting nuts (21) and lift the actuator off the valve.

Reduce the air pressure to zero to exhaust the actuator of air.

Disconnect the air supply from the actuator.

### 4.2 PN5700 series (refer to Figure 7)

#### 4.2.1. Stem seal kit - How to fit

Remove the actuator from the valve as described in Section 4.1.

Loosen the actuator half coupling lock-nut (17a) and remove the actuator half coupling (17b).

Loosen and remove the housing nuts and bolts (14) and remove the housing lid (1).

**Note 1:** 3 x longer housing bolts (14) are fitted. These should be removed after all other bolts are removed and should be loosened evenly to prevent distortion.

Remove springs.

Whilst holding the diaphragm, plate and spindle assembly withdraw the actuator spindle.

Remove the spindle 'O' ring (10) taking care not to damage the grooves.

Smear the new 'O' ring with silicon grease and replace.

Refit actuator spindle taking care not to damage 'O' ring or spindle surface.

Reassemble components in reverse order.

Refit the top housing securing the nuts and bolts (14).

Refit the actuator as described in Section 2 and recommission as described in Section 3.

**Note 2:** To avoid distortion of the diaphragm do not fully tighten the housing bolts until all the bolts and nuts have been fully fitted. Final tightening should then be carried out evenly to the recommended tightening torque (Table 1, page 6).

#### 4.2.2. Diaphragm kit - How to fit

Remove the diaphragm, plate and spindle assembly as described in Section 4.2.1.

Loosen the diaphragm plate lock-nut (8) by using the two coupling lock-nuts secured to the spindle (7) to prevent rotation.

Remove the springs (4), spacer (9), 'O' ring (20), diaphragm plate (3) and diaphragm (2).

Refit using new diaphragm and 'O' ring, reassembling all items in reverse order.

Using two spanners, whilst holding the actuator spindle tighten the diaphragm plate lock-nut (8).

Refer to Table 1, page 6 for the recommended tightening torque.

Reassemble components in reverse order.

Refit the top housing (1) securing the nuts and bolts (14).

#### 4.2.3 Spring kit - How to fit

Remove the actuator from the valve as described in Section 4.1.

Loosen and remove the housing nuts and bolts (14) and remove the housing lid (1), as described in Section 4.2.1.

Remove the springs (4).

Replace with new springs.

Reassemble components in reverse order.

Refit the actuator as described in Section 2 and recommission as described in Section 3.

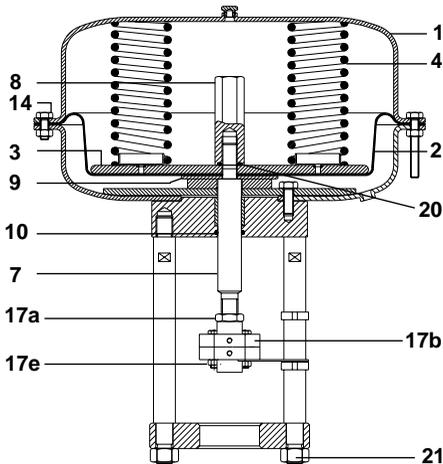


Fig. 7 PN5700 series

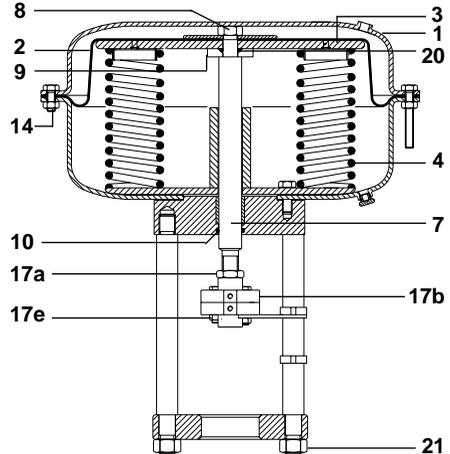


Fig. 8 PN6700 series

### 4.3 PN6700 Series (refer to Figure 8)

#### 4.3.1. Diaphragm kit - How to fit

Remove the actuator from the valve as described in Section 4.1.

Loosen the actuator half-coupling lock-nut (17a) and remove the actuator half-coupling (17b).

Loosen and remove the housing nuts and bolts (14) and remove the housing lid (1).

**Note 1:** 3 x longer housing bolts (14) are fitted. These should be removed after all other bolts are removed and should be loosened evenly to prevent distortion.

Whilst holding the diaphragm, plate and spindle assembly withdraw the actuator spindle.

Loosen the plate lock-nut (8) by using the two coupling lock-nuts secured to the spindle (7) to prevent rotation.

Remove the springs (4), spacer (9), 'O' ring (20), diaphragm plate (3) and diaphragm (2).

Refit using new diaphragm and 'O' ring, reassembling all items in reverse order.

Using two spanners, whilst holding the actuator spindle tighten the plate lock-nut. Refer to

**Table 1**, page 6 for the recommended tightening torque.

Reassemble components in reverse order.

Refit the housing lid securing the nuts and bolts (14).

Refit the actuator as described in Section 2 and recommission as described in Section 3.

**Note 2:** To avoid distortion of the diaphragm do not fully tighten the housing bolts until all the bolts and nuts have been fully fitted. Final tightening should then be carried out evenly to the recommended tightening torque (**Table 1**, page 6).

#### 4.3.2. Spring kit - How to fit

Remove the actuator from the valve as described in Section 4.1.

Loosen and remove the housing nuts and bolts (14) and remove the housing lid (1), remove the diaphragm, plate and spindle assembly as described in Section 4.2.1.

Remove the springs.

Replace with new springs.

Reassemble components in reverse order.

Refit the actuator as described in Section 2 and recommission as described in Section 3.

## 5. Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.

### Available spares

<b>Stem seal kit</b>	(packet of three)	<b>10, 20</b>
Spindle 'O' ring, sealing 'O' ring		
<b>Diaphragm kit</b>		<b>2, 10, 20</b>
Diaphragm, spindle 'O' ring, sealing 'O' ring		
<b>Spring kit</b>		<b>4, 14</b>
Set of springs - includes 3 off longer hexagon head bolts and nuts		
<b>Linkage set</b>		<b>16, 17a, 17b, 17c, 17e, 19</b>
Actuator lock-nut, valve and actuator half-coupling, anti-rotation plate, screws and nuts		

### How to order spares

Always order spares by using the description in the column headed 'Available spares' stating the actuator type.

**Example:** Stem seal kit for PN5756 pneumatic actuator.

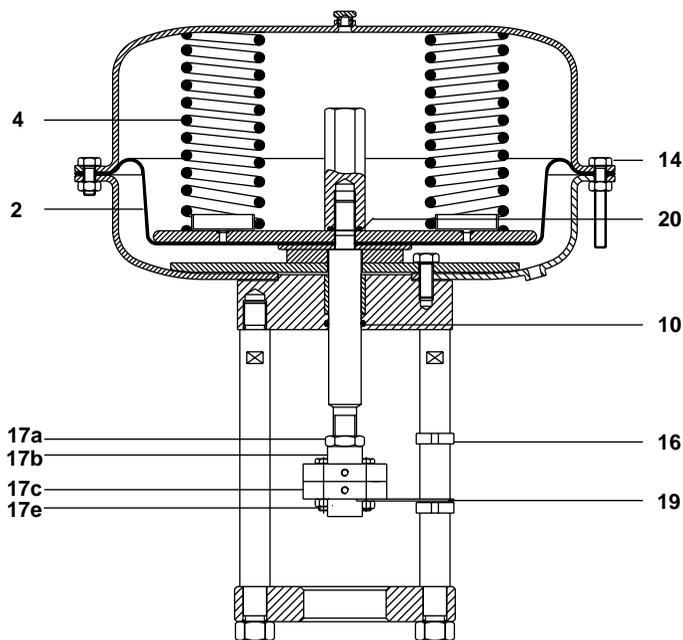


Fig. 9

**Table 2 PN5700/PN6700 spring identification**

Actuator type	Spring range	Travel	Number of springs	Inside dia. (mm)	Length (mm)	Identification (Vert. stripe)
PN5750/PN6700	0.2 - 1.0 bar	50 mm	7	57.5	135	Black
PN5756	1.0 - 3.0 bar	50 mm	8	57.5	210	Black
			8	47.0	210	Black
PN5757/PN6757	0.8 - 2.4 bar	50 mm	8	57.5	210	Black
			4	47.0	210	Black