
PN7000 and PN8000 Pneumatic Actuators
Installation and Maintenance Instructions

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— 1. PN7000 - General information —

PN7000 series, spring extend pneumatic actuators

Available types

Spring extend spindle, single spring, yoke mounted actuators: PN7200, PN7300, PN7400, PN7500, and PN7600 series.

Description

A range of compact linear actuators having 5 diaphragm sizes for matching the requirements of different 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. These actuators are designed to operate with 2-port KE and 3-port QL valves as detailed below.

| Actuator type | Valve type |
|---------------|--------------------------------|
| 20 mm travel | KE and QL series DN15 - DN50 |
| 30 mm travel | KE and QL series DN65 - DN100 |
| 50 mm travel | KE and QL series DN125 - DN200 |

Technical data

| | |
|----------------------------|----------------|
| Temperature range | -20° to +100°C |
| Maximum operating pressure | 2.5 bar g |

Air supply connection

| Actuator type | Connection |
|-------------------------|------------|
| PN7200 to PN7600 series | ¼" NPT |

Actuator capacities

| Actuator type | Travel | Volume (Litres) |
|---------------|--------|-----------------|
| PN7200 series | 20 mm | 0.6 |
| | 30 mm | 1.0 |
| PN7300 series | 20 mm | 1.4 |
| | 30 mm | 2.1 |
| PN7400 series | 20 mm | 2.4 |
| | 30 mm | 3.6 |
| PN7500 series | 20 mm | 3.8 |
| | 30 mm | 5.7 |
| PN7600 series | 30 mm | 5.7 |
| | 50 mm | 8.5 |

Spring ranges

| Actuator type | | Spring range | Travel |
|----------------------|--------|--------------------------|--------|
| PN7200 series | PN7220 | 0.2 (0.4) to 1 (1.2) bar | 20 mm |
| | PN7225 | 0.4 to 2 bar | 20 mm |
| PN7300 series | PN7320 | 0.2 (0.4) to 1 (1.2) bar | 20 mm |
| | PN7325 | 0.4 to 2 bar | 20 mm |
| PN7400 series | PN7420 | 0.2 (0.4) to 1 (1.2) bar | 20 mm |
| | PN7425 | 0.4 to 2 bar | 20 mm |
| | PN7430 | 0.2 (0.4) to 1 (1.2) bar | 30 mm |
| | PN7435 | 0.4 to 2 bar | 30 mm |
| PN7500 series | PN7520 | 0.2 (0.4) to 1 (1.2) bar | 20 mm |
| | PN7525 | 0.4 to 2 bar | 20 mm |
| | PN7530 | 0.2 (0.4) to 1 (1.2) bar | 30 mm |
| | PN7535 | 0.4 to 2 bar | 30 mm |
| PN7600 series | PN7620 | 0.2 (0.4) to 1 (1.2) bar | 20 mm |
| | PN7625 | 0.4 to 2 bar | 20 mm |
| | PN7630 | 0.2 (0.4) to 1 (1.2) bar | 30 mm |
| | PN7635 | 0.4 to 2 bar | 30 mm |
| | PN7650 | 0.2 (0.4) to 1 (1.2) bar | 50 mm |
| | PN7655 | 0.4 to 2 bar | 50 mm |

Materials

| No | Part | Material |
|----|-----------------------------|---------------------------|
| 1 | Diaphragm housing | Pressed steel |
| 2 | Diaphragm | Reinforced nitrile rubber |
| 3 | Diaphragm plate | Cast iron |
| 4 | Spring | Spring steel |
| 5 | Spindle | Stainless steel |
| 6 | Lock-nut | Zinc plated steel |
| 7 | 'O' Ring | Rubber |
| 8 | Spring setting nut | Zinc plated steel |
| 9 | Spring holder | Cast iron |
| 10 | Fixing screws | Steel |
| 11 | Spacer | Zinc plated steel |
| 12 | Travel indicator | Aluminium |
| 13 | Yoke | Cast iron |
| 14 | Gasket | Non asbestos fibre |
| 15 | Cap (with vent hole) | Plastic |
| 16 | Housing (bolts and nuts) | Steel |
| 17 | Top adaptor | Steel |
| 18 | Lock-nut | Steel |
| 19 | Bottom adaptor | Steel |
| 20 | Connectors | Stainless steel |
| 21 | Connectors (bolts and nuts) | Stainless steel |

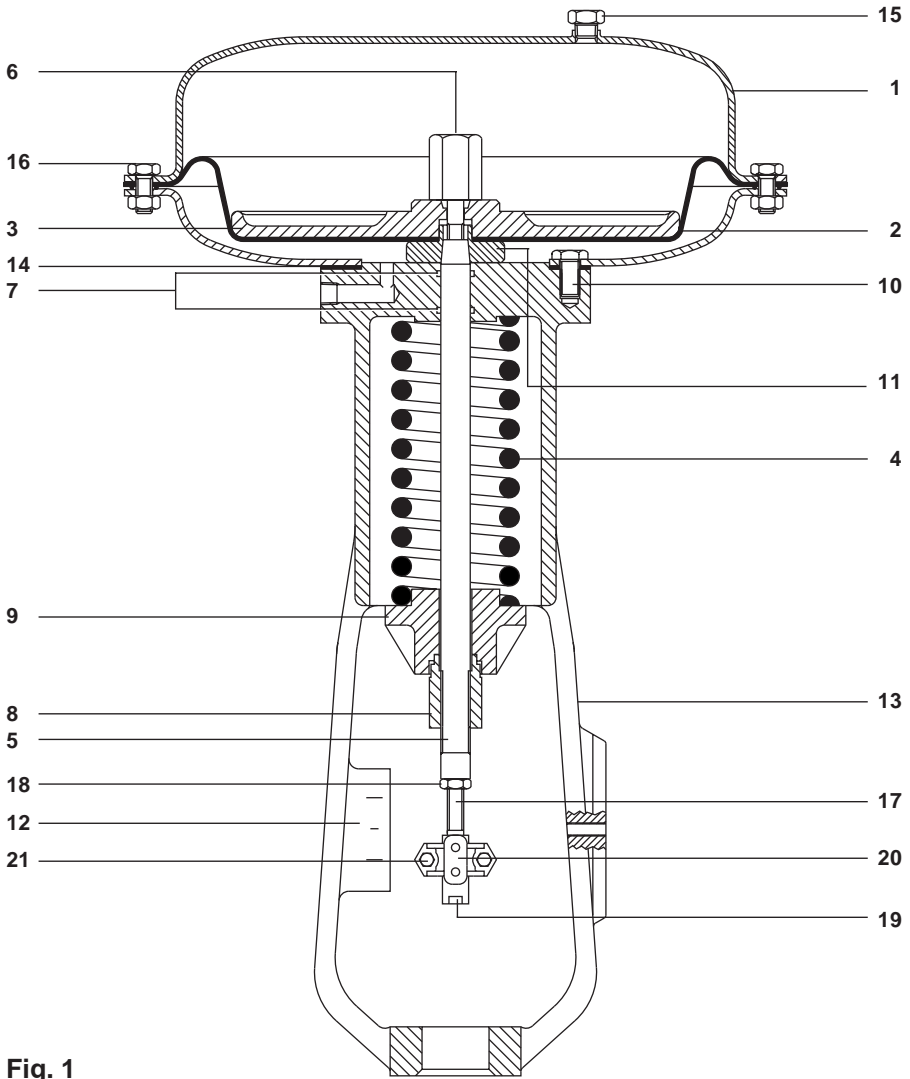


Fig. 1

— 2. PN8000 - General information —

PN8000 series, spring retract pneumatic actuators

Available types

Spring retract spindle, single spring, yoke mounted actuators: PN8200, PN8300, PN8400, PN8500, and PN8600 series.

Description

A range of compact linear actuators having 5 diaphragm sizes for matching the requirements of different 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. These actuators are designed to operate with 2-port KE and 3-port QL valves as detailed below.

| Actuator type | Valve type |
|---------------|--------------------------------|
| 20 mm travel | KE and QL series DN15 - DN50 |
| 30 mm travel | KE and QL series DN65 - DN100 |
| 50 mm travel | KE and QL series DN125 - DN200 |

Technical data

| | |
|----------------------------|----------------|
| Temperature range | -20° to +100°C |
| Maximum operating pressure | 2.5 bar g |

Air supply connection

| Actuator type | Connection |
|-------------------------|------------|
| PN8200 to PN8600 series | ¼" NPT |

Actuator capacities

| Actuator type | Travel | Volume (Litres) |
|---------------|--------|-----------------|
| PN8200 series | 20 mm | 0.6 |
| | 30 mm | 1.0 |
| PN8300 series | 20 mm | 1.4 |
| | 30 mm | 2.1 |
| PN8400 series | 20 mm | 2.4 |
| | 30 mm | 3.6 |
| PN8500 series | 20 mm | 3.8 |
| | 30 mm | 5.7 |
| PN8600 series | 30 mm | 5.7 |
| | 50 mm | 8.5 |

Spring ranges

| Actuator type | | Spring range | Travel |
|---------------|--------|--------------|--------|
| PN8200 series | PN8220 | 0.2 to 1 bar | 20 mm |
| | PN8225 | 0.4 to 2 bar | 20 mm |
| PN8300 series | PN8320 | 0.2 to 1 bar | 20 mm |
| | PN8325 | 0.4 to 2 bar | 20 mm |
| PN8400 series | PN8420 | 0.2 to 1 bar | 20 mm |
| | PN8425 | 0.4 to 2 bar | 20 mm |
| | PN8430 | 0.2 to 1 bar | 30 mm |
| | PN8435 | 0.4 to 2 bar | 30 mm |
| PN8500 series | PN8520 | 0.2 to 1 bar | 20 mm |
| | PN8525 | 0.4 to 2 bar | 20 mm |
| | PN8530 | 0.2 to 1 bar | 30 mm |
| | PN8535 | 0.4 to 2 bar | 30 mm |
| PN8600 series | PN8620 | 0.2 to 1 bar | 20 mm |
| | PN8625 | 0.4 to 2 bar | 20 mm |
| | PN8630 | 0.2 to 1 bar | 30 mm |
| | PN8635 | 0.4 to 2 bar | 30 mm |
| | PN8650 | 0.2 to 1 bar | 50 mm |
| | PN8655 | 0.4 to 2 bar | 50 mm |

Materials

| No | Part | Material |
|----|-----------------------------|---------------------------|
| 1 | Diaphragm housing | Pressed steel |
| 2 | Diaphragm | Reinforced nitrile rubber |
| 3 | Diaphragm plate | Cast iron |
| 4 | Spring | Spring steel |
| 5 | Spindle | Stainless steel |
| 6 | Lock-nut | Zinc plated steel |
| 8 | Spring setting nut | Zinc plated steel |
| 9 | Spring holder | Cast iron |
| 10 | Fixing screws | Steel |
| 12 | Travel indicator | Aluminium |
| 13 | Yoke | Cast Iron |
| 14 | Gasket | Non asbestos fibre |
| 15 | Cap (with vent hole) | Plastic |
| 16 | Housing (bolts and nuts) | Steel |
| 17 | Top adaptor | Steel |
| 18 | Lock-nut | Steel |
| 19 | Bottom adaptor | Steel |
| 20 | Connectors | Stainless steel |
| 21 | Connectors (bolts and nuts) | Stainless steel |

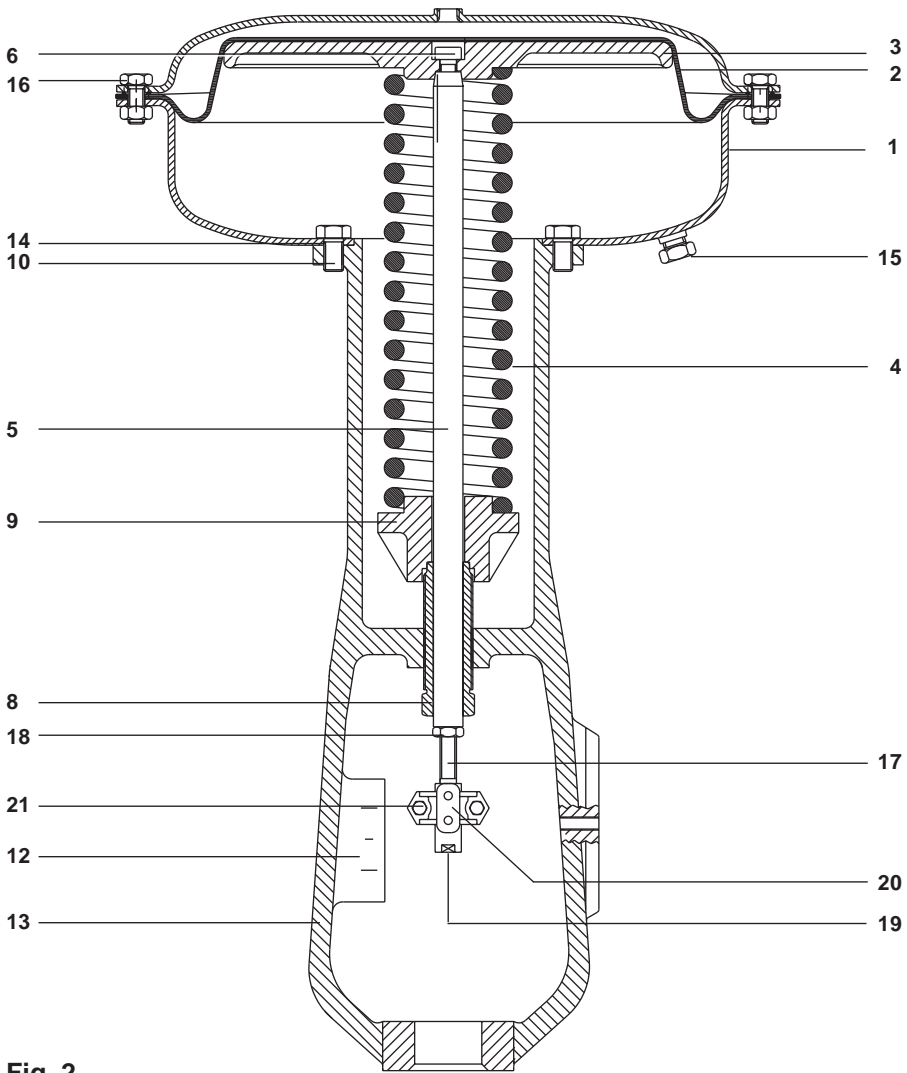


Fig. 2

3. Installation

See also separate Installation and Maintenance Instructions for the control valves.

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 actuator to the valve

PN7000 (refer to figures 3a, 3b and 3c)

Loosen and remove connectors locking screws and nuts (21) and remove connectors (20).

Fit the valve spindle adaptor (19) onto the valve spindle and push the valve plug manually to its closed position.

Adjust the distance of the adaptor (19) from the bonnet shoulder at the value indicated in Table 1.

Apply the control signal pressure required to bring the spindle to the mid-travel position.

Place actuator yoke over valve spindle and locate on bonnet shoulder. Locate and tighten valve mounting nut to the right torque (see Table 1).

Release the control air signal. Fit the connectors (20) across the adaptors (17) and (19).

Fit connectors locking screws and nuts (21) and tighten to 2 N m.

Follow the spring adjust procedure as described in Section 4.

PN8000 (Refer to figures 3a, 3b and 3c)

Loosen and remove connector locking screws and nuts (21) and remove connector (20).

Fit the valve spindle adaptor (19) onto the valve spindle and push the valve plug manually to its closed position.

Adjust the distance of the adaptor (19) from the bonnet shoulder at the value indicated in Table 1.

Place actuator yoke over valve spindle and locate on bonnet shoulder. Locate and tighten valve mounting nut to the right torque (see Table 1).

Apply the control air signal to bring the actuator spindle against the valve spindle.

Fit the connector (20) across the adaptors (17) and (19).

Fit connector locking screws and nuts (21) and tighten to 2 N m. Release the control air signal.

Follow the spring adjust procedure as described in Section 4.

Table 1 refer to figure 3a

| Actuator type | Travel | Dimension 'A' (mm) | Mounting nut Size | Mounting size tightening torque (N m) |
|---------------|--------|-----------------------|----------------------|--|
| PN7200 series | 20 mm | 100 | M30 | 15 - 20 |
| PN7300 series | 20 mm | 100 | M30 | 15 - 20 |
| PN7400 series | 20 mm | 130 | M30 | 15 - 20 |
| | 30 mm | 140 | M50 | 45 - 50 |
| PN7500 series | 20 mm | 140 | M30 | 15 - 20 |
| | 30 mm | 150 | M50 | 45 - 50 |
| PN7600 series | 20 mm | 140 | M30 | 15 - 20 |
| | 30 mm | 150 | M50 | 45 - 50 |
| | 50 mm | 150 | M70 | 65 - 70 |

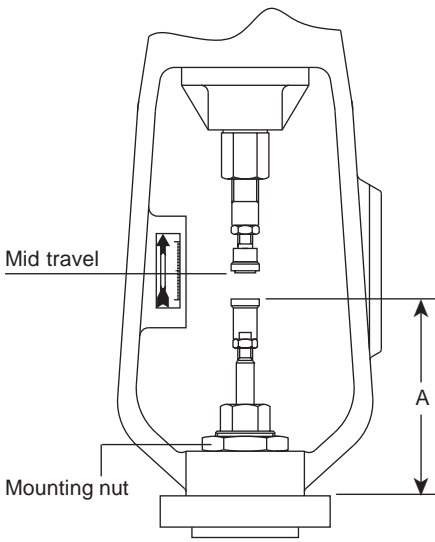


Fig. 3a

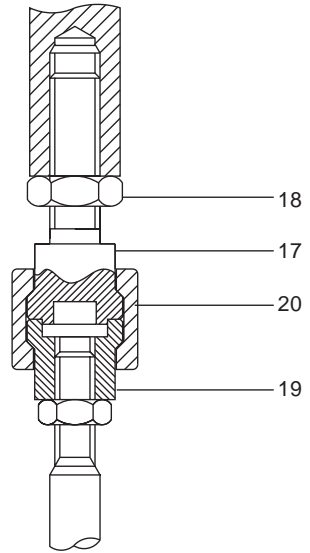


Fig. 3b

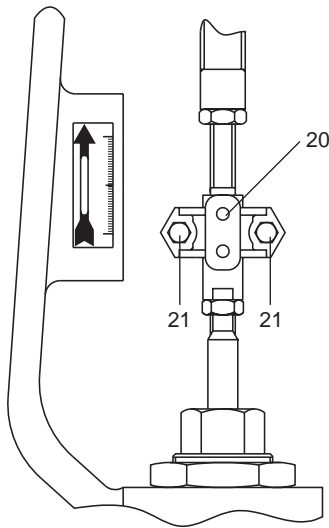


Fig. 3c

4. Commissioning

If the actuator/valve has been supplied with a positioner, reference should be made to the separate Installation and Maintenance Instructions for this product.

4.1 Adjusting spring

The actuator spring range and lift off pressure will be indicated on the nameplate. Should it be necessary to check or adjust the lift off pressure the procedure is described in paragraphs 4.2 and 4.3.

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.

4.2 PN7000 spring extend actuators

Note: Adjustment of the spring will only alter the pressure of the control signal air at which the valve commences to move off its seat (set point) and will not alter the spring pressure 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 air pressure (0.4 + 0.8) to obtain valve full travel.

To adjust set point refer to fig. 1 and proceed as follows:-

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

Increase the control signal pressure until the actuator commences lifting the actuator spindle. Check whether the signal pressure corresponds to the desired starting value.

Release completely the air signal pressure.

Tighten (loosen) slightly the spring set nut to increase (decrease) the actual signal pressure starting value.

Recheck that the valve just commences to move off its seat at the right spring range minimum pressure and is fully open at the spring range maximum pressure.

After the test check the position of the travel indicator against the "arrow" of the connector and adjust its position accordingly.

4.3 PN8000 spring retract actuators

Note: Adjustment of the spring will only alter the pressure of the control signal air at which the valve commences to move off its seat (set point) and will not alter the spring pressure 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 air pressure (0.4 + 0.8) to obtain valve full travel.

To adjust set point refer to fig. 2 and proceed as follows:-

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

Apply the control signal pressure required to complete the full travel of the actuator spindle.

Check whether the signal pressure corresponds to the desired full travel value.

Release completely the air signal pressure.

Tighten (loosen) slightly the spring set nut to increase (decrease) the actual signal pressure full travel value.

Release the air control pressure and recheck that the valve just commences to move toward the seat at the right spring range minimum pressure and is fully closed at the spring range maximum pressure.

After the test check the position of the travel indicator against the "arrow" of the connector and adjust its position accordingly.

Table 2: PN7000/PN8000 spring details

| Actuator type | Spring Range | Travel | Number of springs | Ins. Dia. (mm) | Length (mm) | Identification (Vertical stripe) |
|----------------------|---------------------|---------------|--------------------------|-----------------------|--------------------|---|
| PN7220 / PN8220 | 0.2 to 1 bar | 20 mm | 1 | 41.0 | 102 | Black |
| PN7225 / PN8225 | 0.4 to 2 bar | 20 mm | 1 | 41.0 | 102 | Yellow |
| PN7320 / PN8320 | 0.2 to 1 bar | 20 mm | 1 | 44.5 | 165 | Black |
| PN7325 / PN8325 | 0.4 to 2 bar | 20 mm | 1 | 44.5 | 165 | Yellow |
| PN7420 / PN8420 | 0.2 to 1 bar | 20 mm | 1 | 44.5 | 210 | Black |
| PN7425 / PN8425 | 0.4 to 2 bar | 20 mm | 1 | 44.5 | 210 | Yellow |
| PN7430 / PN8430 | 0.2 to 1 bar | 30 mm | 1 | 44.5 | 210 | Black |
| PN7435 / PN8435 | 0.4 to 2 bar | 30 mm | 1 | 44.5 | 210 | Yellow |
| PN7520 / PN8520 | 0.2 to 1 bar | 20 mm | 1 | 57.5 | 285 | Black |
| PN7525 / PN8525 | 0.4 to 2 bar | 20 mm | 1 | 57.5 | 285 | Yellow |
| PN7530 / PN8530 | 0.2 to 1 bar | 30 mm | 1 | 57.5 | 285 | Black |
| PN7535 / PN8535 | 0.4 to 2 bar | 30 mm | 1 | 57.5 | 285 | Yellow |
| PN7620 / PN8620 | 0.2 to 1 bar | 20 mm | 1 | 57.5 | 285 | Black |
| PN7625 / PN8625 | 0.4 to 2 bar | 20 mm | 1 | 57.5 | 285 | Yellow |
| PN7630 / PN8630 | 0.2 to 1 bar | 30 mm | 1 | 57.5 | 285 | Black |
| PN7635 / PN8635 | 0.4 to 2 bar | 30 mm | 1 | 57.5 | 285 | Yellow |
| PN7650 / PN8650 | 0.2 to 1 bar | 50 mm | 1 | 57.5 | 285 | Black |
| PN7655 / PN8655 | 0.4 to 2 bar | 50 mm | 1 | 57.5 | 285 | Yellow |

5. Spare parts

The spare parts available are indicated by capital letters. The other parts are not supplied as spares.

Available spares

| | |
|---|---------------|
| Stem seal kit (not for PN8000) | A |
| Diaphragm kit (diaphragm, 'O' ring) | A, B |
| Travel indicator kit | C |
| Spring kit | D |
| Linkage kit (Lock-nut, top adaptor, bottom adaptor, connectors, bolts and nuts) | E, F, G, H, I |

How to order

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

Example: 1 - Stem seal kit for PN7220 pneumatic actuator.

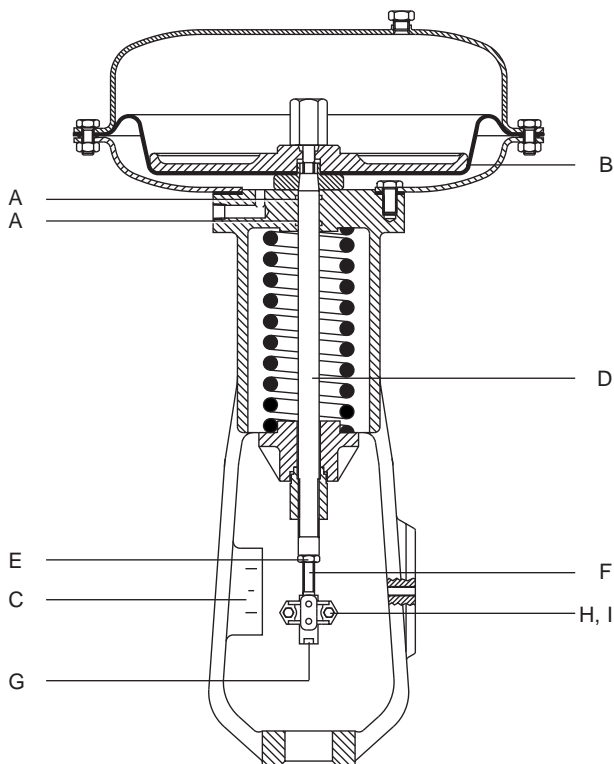


Table 2 Recommended tightening torques

| Actuator series | Housing bolts (16) | | Lock-nut (6) | |
|--------------------------------|--------------------|------------|--------------|------------|
| | Size | Torque N m | Size | Torque N m |
| PN7200/PN8200 | M6 | 5 +/- 0.5 | M12 | 40 +/- 3 |
| PN7300/PN8300 to PN7600/PN8600 | M10 | 15 +/- 2 | M12 | 40 +/- 3 |

6. Maintenance

The PN7000 and PN8000 series pneumatic actuators are maintenance free. To ensure satisfactory operation it is strongly recommended that the control signal air is filtered and supplied free of oil and water.

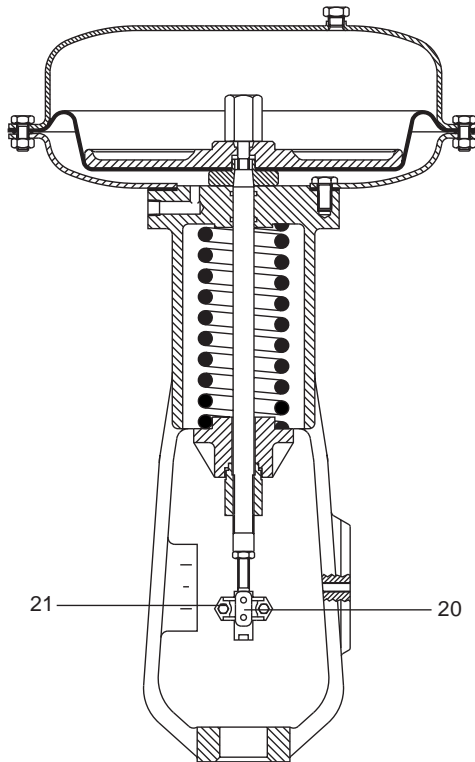
Should it be necessary to replace spare parts the following procedure should be used.

6.1 Removing actuator from valve

Drive actuator into approximately mid-travel position with the air supply. Loosen and remove connectors nuts and screws (21) and remove connectors (20).

Loosen and remove yoke mounting nut and lift actuator off the valve.

Reduce air supply pressure until housing is pressure free. Disconnect air supply from the actuator.



6.2 PN7000 series

6.2.1 Stem seal kit - How to fit

Remove actuator from valve as described in Section 6.1.

Loosen and remove housing screws (16) and remove housing lid (1).

Loosen top adaptor lock-nut (18) and remove top adaptor (17).

Loosen completely spring setting nut (8) and remove spring holder (9) and spring (4).

Pulling diaphragm/plate/spindle assembly withdraw actuator spindle.

Remove 'O' rings (7) taking care not to damage the grooves.

Smear new 'O' rings with silicon grease and replace.

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

Reassemble components in reverse order. Refit top housing and securing nuts and bolts (16).

Refit actuator as described in Section 3 and recommission as described in Section 4.

6.2.2 Diaphragm kit - How to fit

Loosen spring setting nut until the spring is completely unloaded.

Loosen and remove housing screws (16) and remove housing lid (1).

Using two spanners whilst holding actuator spindle (5), loosen plate lock-nut (6).

Remove diaphragm plate (3) and diaphragm (2).

Refit new diaphragm taking care that the outer holes are aligned with the corresponding holes of the bottom housing. Refit the diaphragm plate and the plate lock-nut. Using two spanners, whilst holding actuator spindle tighten plate lock-nut. Refer to Table 1 for torque ratings.

Refit top housing and securing nuts and bolts (16).

Note: To avoid distortion of the diaphragm do not fully tighten housing bolts until all bolts have been fitted. Final tightening should then be carried out evenly. Refer to Table 1 for torque ratings.

6.2.3 Spring kit - How to fit

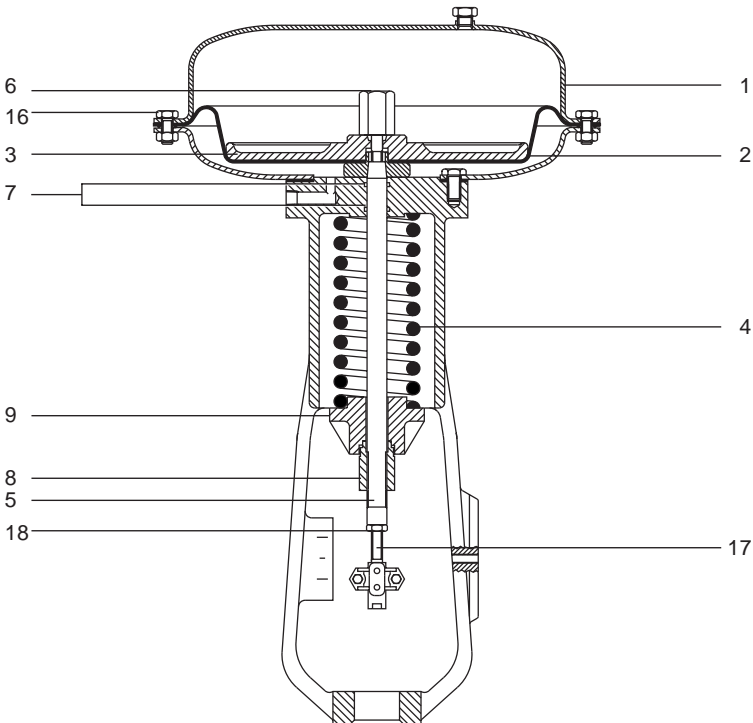
Remove actuator from valve as described in Section 6.1.

Loosen top adaptor lock-nut (18) and remove top adaptor (17).

Loosen completely spring setting nut (8) and remove spring holder (9) and spring (4).

Replace new spring. Reassemble components in reverse order.

Refit actuator as described in Section 3 and recommission as described in Section 4.



6.3 PN8000 Series

6.3.1 Diaphragm Kit - How to fit

Remove actuator from valve as described in Section 6.1.

Loosen top adaptor lock-nut (18) and remove top adaptor (17).

Loosen completely spring setting nut (8).

Loosen and remove housing screws (16) and remove housing lid (1).

Remove diaphragm (2).

Replace new diaphragm.

Refit top housing and securing nuts and bolts.

6.3.2 Spring kit - How to fit

Remove actuator from valve as described in Section 6.1.

Loosen and remove housing screws (16) and remove housing lid (1).

Remove diaphragm (2). Using two spanners whilst holding actuator spindle (5), loosen plate lock-nut (6).

Remove diaphragm plate (3) and spring (4). Replace new spring.

Refit all other items in reverse order. Using two spanners, whilst holding actuator spindle tighten plate lock-nut. Refer to Table 1 for torque ratings.

Refit top housing and securing nuts and bolts.

Note: To avoid distortion of the diaphragm do not fully tighten housing bolts until all bolts have been fitted. Final tightening should then be carried out evenly. Refer to Table 1 for torque rating.

