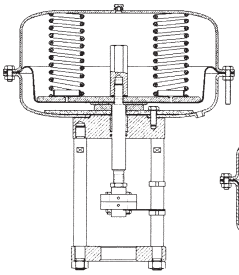
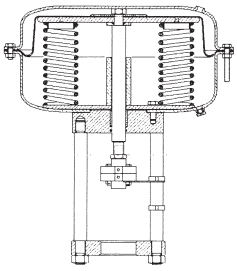
Types PN5700 PN6700 Series Pneumatic Actuators Installation and Maintenance Instructions

The PED Directive 97/23/EC is repealed and replaced by the new **PED Directive 2014/68/EU** with effect from 19 July 2016.

The ATEX Directive 94/9/EC is repealed and replaced by the new **ATEX Directive 2014/34/EU** with effect from 20 April 2016.



PN5700



PN6700

ATTENZIONE

Lavorare in sicurezza con apparecchiature in ghisa e vapore
Working safely with cast iron products on steam

Informazioni di sicurezza supplementari - *Additional Informations for safety*

Lavorare in sicurezza con prodotti in ghisa per linee vapore

I prodotti di ghisa sono comunemente presenti in molti sistemi a vapore.

Se installati correttamente, in accordo alle migliori pratiche ingegneristiche, sono dispositivi totalmente sicuri.

Tuttavia la ghisa, a causa delle sue proprietà meccaniche, è meno malleabile di altri materiali come la ghisa sferoidale o l'acciaio al carbonio.

Di seguito sono indicate le migliori pratiche ingegneristiche necessarie per evitare i colpi d'ariete e garantire condizioni di lavoro sicure sui sistemi a vapore.

Working safely with cast iron products on steam

Cast iron products are commonly found on steam and condensate systems.

If installed correctly using good steam engineering practices, it is perfectly safe.

However, because of its mechanical properties, it is less forgiving compared to other materials such as SG iron or carbon steel.

The following are the good engineering practices required to prevent waterhammer and ensure safe working conditions on a steam system.

Movimentazione in sicurezza

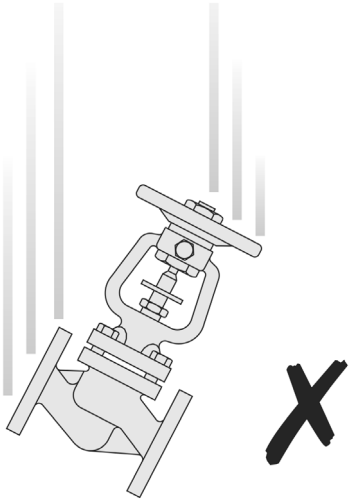
La ghisa è un materiale fragile: in caso di caduta accidentale il prodotto in ghisa non è più utilizzabile. Per informazioni più dettagliate consultare il manuale d'istruzioni del prodotto.

Rimuovere la targhetta prima di effettuare la messa in servizio.

Safe Handling

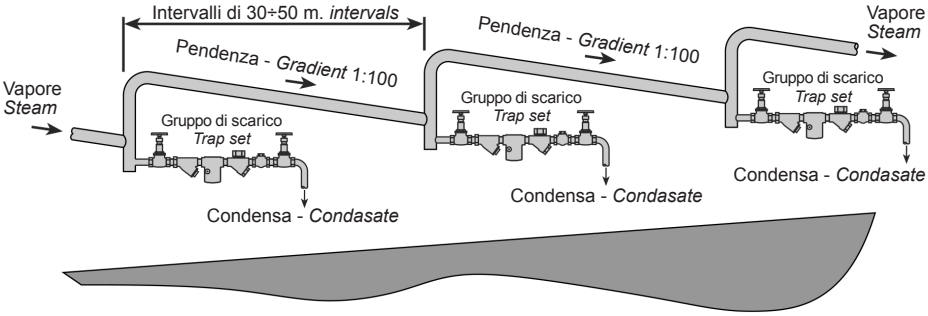
Cast Iron is a brittle material. If the product is dropped during installation and there is any risk of damage the product should not be used unless it is fully inspected and pressure tested by the manufacturer.

Please remove label before commissioning

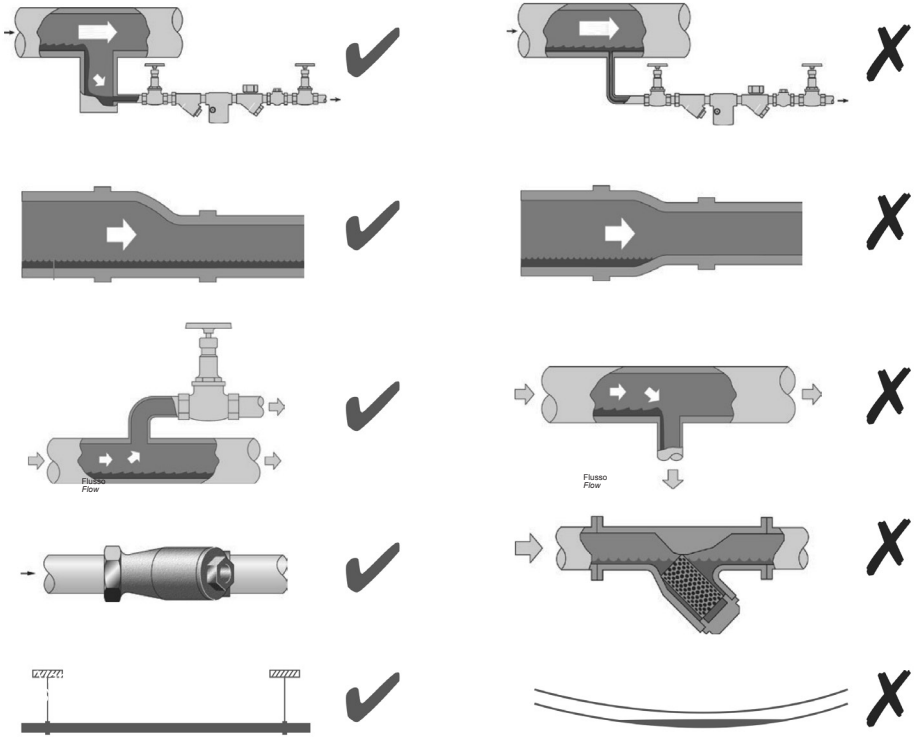


Prevenzione dai colpi d'ariete - *Prevention of water hammer*

Scarico condensa nelle linee vapore - *Steam trapping on steam mains:*



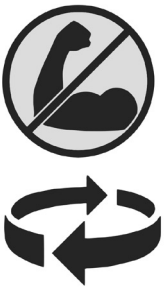
Esempi di esecuzioni corrette (✔) ed errate (✗) sulle linee vapore: *Steam Mains - Do's and Dont's:*



Prevenzione delle sollecitazioni di trazione
Prevention of tensile stressing

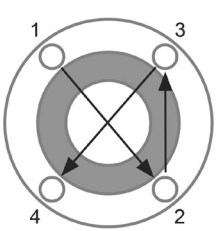
Evitare il disallineamento delle tubazioni - *Pipe misalignment:*

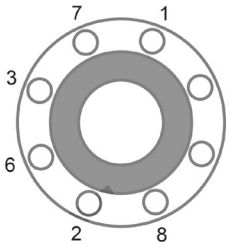
Installazione dei prodotti o loro rimontaggio post-manutenzione:
Installing products or re-assembling after maintenance:



Evitare l'eccessivo serraggio. Utilizzare le coppie di serraggio raccomandate.

Do not over tighten. Use correct torque figures.





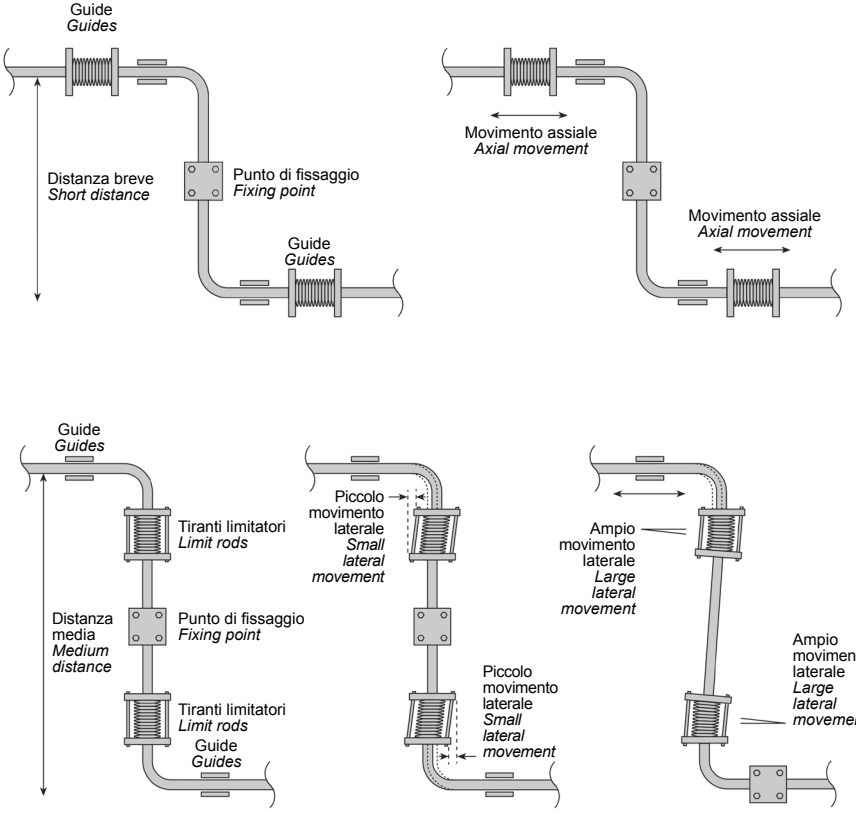
Per garantire l'uniformità del carico e dell'allineamento, i bulloni delle flange devono essere serrati in modo graduale e in sequenza, come indicato in figura.

Flange bolts should be gradually tightened across diameters to ensure even load and alignment.

Dilatazioni termiche - *Thermal expansion:*

Gli esempi mostrano l'uso corretto dei compensatori di dilatzione. Si consiglia di richiedere una consulenza specialistica ai tecnici dell'azienda che produce i compensatori di dilatazione.

Examples showing the use of expansion bellows. It is highly recommended that expert advise is sought from the bellows manufacturer.



IMPORTANT

SAFETY INFORMATION:
PLEASE READ CAREFULLY

Hazards to be considered when installing/ using/maintaining

1. Access
Ensure safe access and if necessary a safe working platform before attempting to work on the product.
Arrange suitable lifting gear if required.

2. Lighting
Ensure adequate lighting, particularly where detailed or intricate work is required e.g. electrical wiring.

3. Hazardous liquids or gases in the pipeline
Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardaous to health, extremes of temperature.

4. Hazardous environment around the product
Consider, explosion risk areas, lack of oxygen (e.g. tanks, pits) dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

5. The system
Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolating valves, electrical isolation) put any other part of the system or any other workers at risk? Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

6. Pressure systems
Ensure that any pressure is isolated and safety vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking and/or labelling of valve shut. Do not assume the system is de-pressurized even when the pressure gauge indicates zero.

7. Temperature
Allow time for temperature to normalise after isolation to avoid the danger of burns.

8. Tools and consumables
Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

9. Protective clothing
Consider whether any protective clothing is required, to protect against the hazards of, for example, chemicals, high/low temperature, noise, falling objects, dangers to eyes/face.

10. Permits to work
All works must be carried out or be supervised by a suitable competent person.
Where a formal permit to work system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person knows what work is going on and where necessary arrange to have an assistant whose primary responsibility is safety. Post warning notices if necessary.

11. Electrical work
Before starting work study the wiring diagram and wiring instructions and note any special requirements. Consider particularly:
mains supply voltage and phase, local mains isolation, fuse requirements, earthing, special cables, cable entries/cable glands, electrical screening.

12. Commissioning
After installation or maintenance ensure that the system is fully functioning. Carry out tests on any alarms or protective devices.

13. Disposal
Unwanted equipment should be disposed of in a safe manner.

14. Returning products
Customers and stockists are reminded that under EC Health, Safety and Environmental Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety and environmental risk.
This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous.

Note: The products supplied by Spirax Sarco are classified as components and are not generally affected by the Machinery Directive 89/392/EEC.

1. Operation

Available types

Spring extend spindle, multi-spring, pillar mounted actuators PN 5700 Series.
Spring retract spindle, multi-spring, pillar mounted actuators PN 6700 Series.

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

Actuator Type	Valve Type
50 mm travel*	DN 125, 150 and 200 KE Series
	DN 125, 150 and 200 QL Series

* Can also be used for 30 mm travel reduced Kv trims on KE Series 2 port valves.

Technical Data

Temperature Range	-20° to 100°C
Max operating pressure	4.5 barg

Air Supply Connection

Actuator Type	Connection
PN 5700/PN 6700 Series	¼" NPT

Compressed Air Consumption

Actuator Type	Volume (NLitres)
PN 5700/PN 6700 Series	8.5

Spring ranges

Actuator Types	Spring Range	Travel
5750	0.2 (0.4) to 1(1.2) bar	50mm
5756	1.0 to 3.0 bar	50mm
5757	0.8 to 2.4 bar	50mm
6750	0.2 (0.4) to 1(1.2) bar	50mm
6757	0.8 to 2.4 bar	50mm

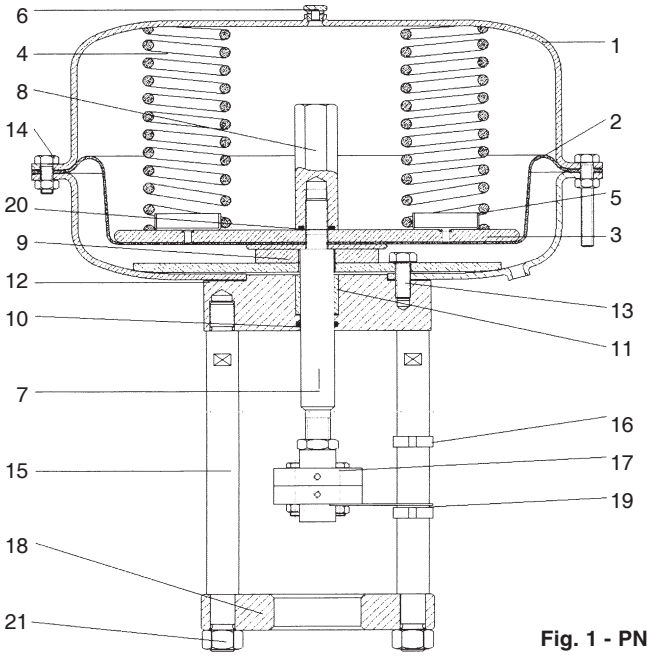


Fig. 1 - PN 5700 Series

Materials

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 & 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

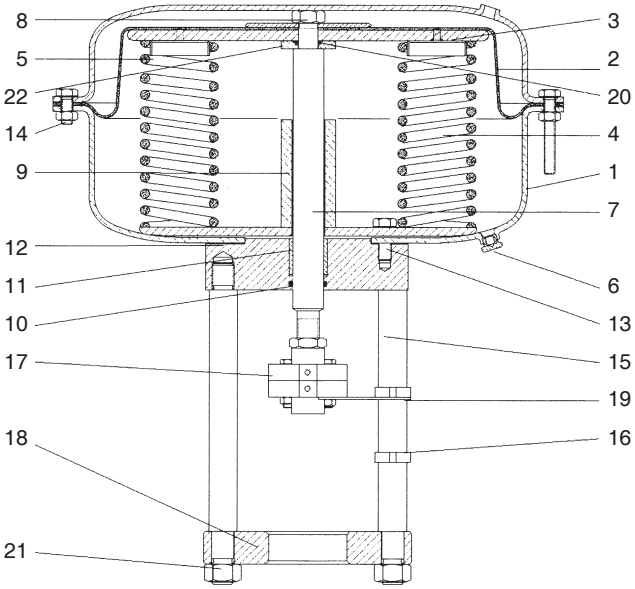


Fig. 2 - PN 6700 Series

Materials

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 & 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

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 left be unrestricted.

2.1 Fitting Actuator to Valve

(Refer to fig. 3a,3b)

PN5700/6700
On actuator:
Loosen actuator half-coupling locknut (17a).
Remove coupling locking screws & nuts (17e) and antirotation plate (19).
Screw actuator half-coupling locknut and actuator half-coupling (17b) up actuator spindle (7) until flush with bottom of spindle.
Remove pillar nuts (21) and remove mounting plate (18).

On valve:
Remove slotted mounting nut (23).
Fit mounting plate (18) over threaded spigot of valve bonnet and align with axis of valve.
Re-fit slotted mounting nut and tighten to the correct torque (see table 1).
Screw valve half-coupling (17c) onto valve spindle. Adjust valve half-coupling position so that it is positioned 125 mm +/- 1 mm above the actuator mounting face, with the M6 threaded hole facing the front of the valve (Fig. 3a).
Screw the lock nut on the valve stem finger tight to set the valve half-coupling in this position.
Using lifting eyes provided, lift the actuator and position it over the valve.

Apply air pressure to the actuator to position the spindle at aboyt 50% of travel.
Gently lower the actuator onto the valve, locating the pillars (15) into the two holes on the mounting plate (18), fit the pillar nuts (21) and tighten to the correct torque (Table 1).

Follow the spring adjust procedure as described in Section 3.

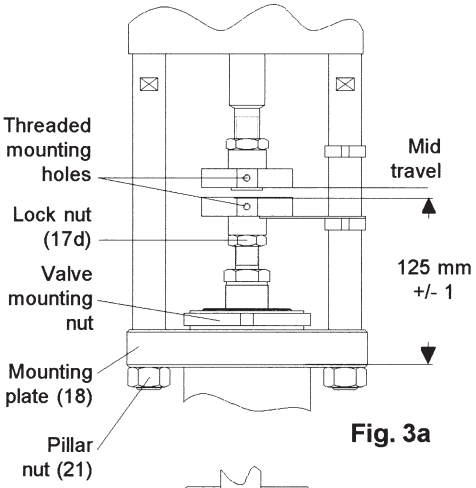


Fig. 3a

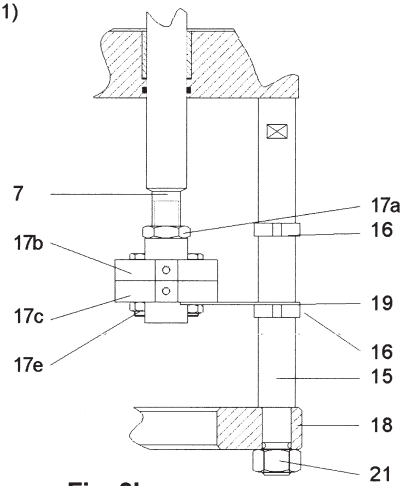


Fig. 3b

Table 1 - Recommended tightening torques

Part	Tightening Torque (Nm)
Valve Mounting Nut	140-150
Pillar Nut (21)	40-50
Half Coupling Lock Nuts (17a,d)	60-70
Coupling Locking Screws (17e)	35-40
Plate Lock Nut (8)	25-30
Housing Bolts (14)	15+/- 2

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

3.1 Adjusting Springs

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 3.2 and 3.3.

Note: Adjustment of the springs will only alter the pressure of the control signal air at which the valve commences to move off or against 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.

3.2 PN5700 Spring Extend Actuators

(Refer to fig. 3a,3b)

Ensure the control valve has been isolated and the actuator housing is pressure free.
Loosen and remove coupling locking screws and nuts (17e). Remove the anti-rotation plate (19).

Set the air pressure to the actuator to be equal to minimum pressure signal for for the actuator.
Screw the actuator half-coupling down until it touches the valve half-coupling. Ensure that the two M6 threaded holes are aligned, *increasing* actuator pressure slightly above the minimum if required to achieve this.
Re-fit coupling locking screws and nuts (17e) and anti-rotation plate (19), and tighten to the correct torque (Table 1).
Increase the air pressure to open the valve to 50%.
Tighten actuator half-coupling locknut (17a) and valve half-coupling locknut (17d) to the correct torque.
Release air pressure checking that the valve is closed at the minimum pressure signal required.
Apply the control signal pressure required to complete the full travel of valve spindle and check whether the signal pressure corresponds to the desired end value (within a tolerance of -10%).

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.

3.3 PN6700 Spring Retract Actuators

(Refer to fig. 3a,3b)

Ensure the control valve has been isolated and the actuator housing is pressure free.
Loosen and remove coupling locking screws and nuts (17e). Remove the anti-rotation plate (19).

Set the air pressure to the actuator to be equal to the upper limit of the signal rangefor for the actuator.
Screw the actuator half-coupling down until it touches the valve half-coupling. Ensure that the two M6 threaded holes are aligned, *reducing* actuator pressure slightly below the maximum if required to achieve this.
Re-fit coupling locking screws and nuts (17e) and anti-rotation plate (19), and tighten to the correct torque (Table 1).
Decrease the air pressure to open the valve to 50%.
Tighten actuator half-coupling locknut (17a) and valve half-coupling locknut (17d) to the correct torque.
Increase air pressure checking that the valve is fully closed at the maximum pressure signal required.
Release the control signal pressure required to complete the full travel of valve spindle and check whether the signal pressure corresponds to the desired minimum value (within a tolerance of +10%).

4. Spare Parts

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

Available Spares

Stem seal kit (packet of 3) (Spindle "O" ring, sealing "O" ring)	10,20
Diaphragm kit (Diaphragm, spindle "O" ring, sealing "O" ring)	2,10, 20
Spring kit (Set of springs - includes 3 off longer Hex. Head bolts and nuts)	4,14
Linkage set (Lock nut, Valve & actuator half coupling, anti-rotation plate, screws and nuts)	16,17a,17b,17c,17d,17e,19

How to order

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

Example: Stem seal kit for PN5756 pneumatic actuator

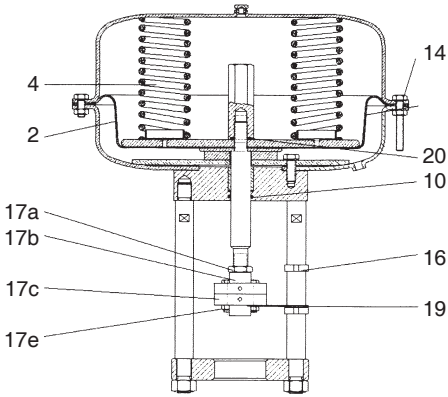


Table 2: PN5700/PN6700 Spring Identification

Actuator Type	Spring Range	Travel	Number of Springs	Inside Dia. (mm)	Length (mm)	Identification (Vert.Stripe)
5750/6750	0.2-1.0 bar	50 mm	7	57.5	135	Black
5756	1.0-3.0 bar	50 mm	8	57.5	210	Black
			8	47	210	Black
5757/6757	0.8-2.4 bar	50 mm	8	57.5	210	Black
			4	47	210	Black

The PN5700 and PN6700 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.

5.1 Removing Actuator from Valve

Drive actuator into approximately mid-travel position with the air supply. Loosen and remove coupling nuts and screws (17e).
Loosen and remove pillar monting nuts (21) and lift actuator off the valve.
Reduce air supply pressure until housing is pressure free. Disconnect air supply from the actuator.

5.2 PN5700 Series

5.2.1 Stem Seal Kit - How to Fit

Remove actuator from valve as described in Section 5.1.
Loosen actuator half coupling lock nut (17a) and remove actuator half coupling(17b).
Loosen and remove housing nuts and bolts (14) and remove housing lid (1).

Note 1 - 3 off longer hosing bolts are fitted (14). These should be removed after all other bolts are removed and should be loosened evenly to prevent distortion.
Remove springs.
Pulling diaphragm/plate/spindle assembly withdraw actuator spindle. Remove spindle "O" ring (10) taking care not to damage the groves. Smear new "O" ring with silicon grease and replace. Refit actuator spindle taking care not to damage "O" ring or spindle surface. Re-assemble components in reverse order.
Refit top housing and securing nuts and bolts (14). Refit actuator as described in Section 2 and recommission as described in Section 3.

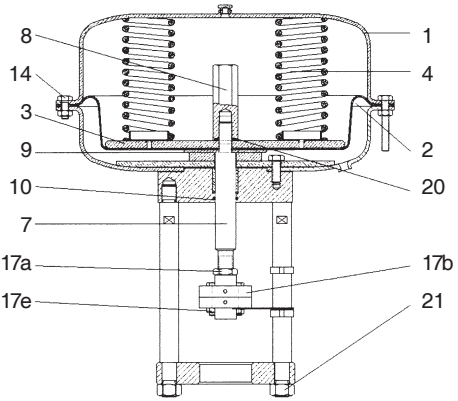
Note 2 - To avoid distortion of the diaphragm do not fully tighten housing bolts until all bolts have been fitted. Final tightening should then be carried out evenly. Refer to Table 1 for torque rating.

5.2.2 Diaphragm Kit - How to Fit

Remove the diaphragm/plate/spindle assembly as described in para 5.2.1.
Loosen plate locknut (8) by using the two coupling lock nuts secured to the spindle (7) to prevent rotation. Remove springs (4), spacer (9), "O" ring (20), diaphragm plate (3) and diaphragm (2).
Refit new diaphragm and "O" ring reassembling all items in reverse order. Using two spanners, whilst holding actuator spindle tighten plate lock nut. Refer to Table 1 for torque rating.
Re-assemble components in reverse order. Refit top housing and securing nuts and bolts (14).

5.2.3 Spring Kit - How to Fit

Remove actuator from valve as described in Section 5.1.
Loosen and remove housing nuts and bolts (14) and remove housing lid (1), as described in para 5.2.1.
Remove springs (4).
Replace new spring. Re-assemble components in reverse order.
Refit actuator as described in Section 2 and recommission as described in Section 3.



5.3 PN6700 Series

5.3.1 Diaphragm Kit - How to Fit

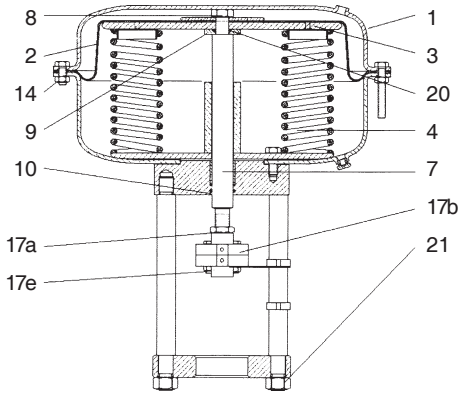
Remove actuator from valve as described in Section 5.1.
Loosen actuator half coupling lock nut (17a) and remove actuator half coupling (17b).
Loosen and remove housing nuts and bolts (14) and remove housing lid (1).

Note 1 - 3 off longer hosing bolts are fitted (14). These should be removed after all other bolts are removed and should be loosened evenly to prevent distortion.
Pulling diaphragm/plate/spindle assembly withdraw actuator spindle.
Loosen plate locknut (8) by using the two coupling lock nuts secured to the spindle (7) to prevent rotation. Remove springs (4), spacer (9), "O" ring (20), diaphragm plate (3) and diaphragm (2).
Refit new diaphragm and "O" ring reassembling all items in reverse order. Using two spanners, whilst holding actuator spindle tighten plate lock nut. Refer to Table 1 for torque rating.
Re-assemble components in reverse order.
Refit housing lid and securing nuts and bolts (14). Refit 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 housing bolts until all bolts and nuts have been fitted. Final tightening should then be carried out evenly. Refer to Table 1 for torque rating.

5.3.2 Spring Kit - How to Fit

Remove actuator from valve as described in Section 5.1.
Loosen and remove housing nuts and bolts (14) and remove housing lid (1), remove the diaphragm/plate/spindle assembly as described in paragraph 5.2.1.
Remove springs.
Replace new springs. Re-assemble components in reverse order.
Refit actuator as described in Section 2 and recommission as described in Section 3.



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