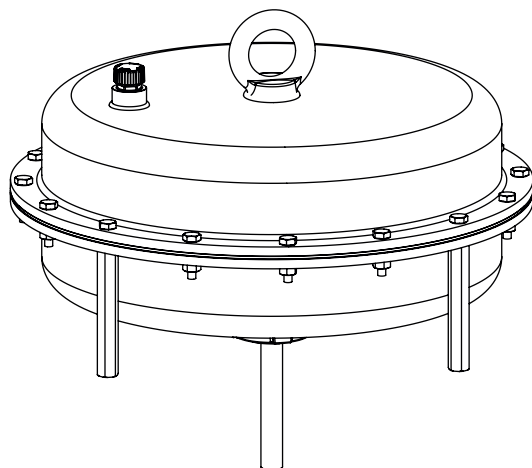


# Type 3271 Pneumatic Actuator



Actuator area: 1400-60 cm<sup>2</sup>



## Mounting and Operating Instructions

**EB 8310-3 EN**

Edition January 2014

## Definition of the signal words used in these mounting and operating instructions



### **DANGER!**

*indicates a hazardous situation which, if not avoided, will result in death or serious injury.*



### **NOTICE**

*indicates a property damage message.*



### **WARNING!**

*indicates a hazardous situation which, if not avoided, could result in death or serious injury.*



### **Note:**

*Supplementary explanations, information and tips*

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# 1 General safety instructions

For your own safety, follow these instructions concerning the mounting, start up and operation of the actuator:

- The actuator is to be mounted, started up or operated only by trained and experienced personnel familiar with the product.
- According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
- Any hazards that could be caused by the signal pressure or moving parts of the actuator are to be prevented by taking appropriate precautions.

To avoid damage to any equipment, the following also applies:

- Proper shipping and storage are assumed.



## **WARNING!**

*The lifting ring on the top diaphragm case is only intended for **assembling and dismantling the pneumatic actuator**. Do not use it to lift the entire control valve assembly.*

---

## 2 Design and principle of operation

The Type 3271 Pneumatic Actuator with 1400-60 cm<sup>2</sup> diaphragm area contains a rolling diaphragm and internal springs. It is mounted on SAMSON Series 240, 250, 280 and 290 Valves.

The signal pressure  $p_{st}$  generates a force  $F = p_{st} \times A$  on the diaphragm area  $A$ . This force is balanced by the actuator springs (10). Taking into account the rated travel, the number of springs and their compression deter-

mine the bench range. The travel is proportional to the signal pressure  $p_{st}$ . The operating direction of the actuator stem (7) depends on how the springs are installed in the actuator.

The stem connector (51) connects the actuator stem (7) with the plug stem of the valve.

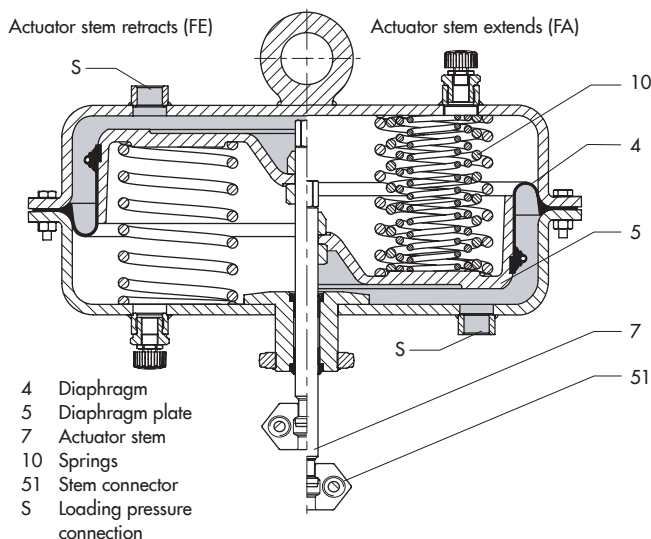


Fig. 1: Sectional drawing of Type 3271, 1400-60 cm<sup>2</sup>

## 2.1 Operating direction

The operating direction is determined by how the springs and diaphragm plate are arranged in the actuator. With operating direction "actuator stem retracts", the compressed air is applied to the loading pressure connection on the top diaphragm case. With operating direction "actuator stem extends", the compressed air is applied to the loading pressure connection on the bottom diaphragm case.

The operating direction of the actuator is reversible. The actuator must be removed from the valve before reversing the operating direction (see section 6 on page 13).

### 2.1.1 Signal pressure routing

In the "actuator stem extends" version of Type 3271 Actuator (1400-60 cm<sup>2</sup>) (Fig. 1, right), the signal pressure is routed through the bottom loading pressure connection (S) to the bottom diaphragm chamber and moves the actuator stem (7) upward opposing the spring force.

In "actuator stem retracts" version (Fig. 1, left), the signal pressure is routed through the top loading pressure connection (S) to the top diaphragm chamber and moves the actuator stem (7) downward opposing the spring force.

## 2.2 Fail-safe action

When the signal pressure fails, the fail-safe action of the actuator depends on whether the springs are installed in the top or bottom diaphragm chamber.

### 2.2.1 Version with fail-safe action "actuator stem extends" (FA)

When the signal pressure is reduced or the air supply fails, the springs move the actuator stem downward and close a mounted globe valve. The valve opens when the signal pressure is increased enough to overcome the force exerted by the springs.

### 2.2.2 Version with fail-safe action "actuator stem retracts" (FE)

When the signal pressure is reduced or the air supply fails, the springs move the actuator stem upward and open a mounted globe valve.

The valve closes when the signal pressure is increased enough to overcome the force exerted by the springs.

### 3 Application

#### ! NOTICE

To mount the actuator on the valve or to remove it from the valve, follow the instructions written in the mounting and operating instructions of the corresponding valve.

#### 3.1 Throttling service

The Type 3371 Pneumatic Actuator (1400-60 cm<sup>2</sup>) is designed for a maximum supply pressure of 6 bar when used for throttling service.

#### 3.2 On/off service

To prevent the actuator from being damaged, the supply pressure must not exceed the upper spring range value by more than 3 bar at the maximum when the actuator with fail-safe action "actuator stem retracts" is used for on/off service. Example:

Bench range	Fail-safe action	Max. supply pressure
0.2 to 1.0 bar	Actuator stem retracts	4 bar
0.4 to 2.0 bar		5 bar
0.6 to 3.0 bar		6 bar

#### ! NOTICE

– Label actuators with reduced supply pressure with a sticker ("**Max. supply pressure limited to ... bar**").

– With fail-safe action "actuator stem extends" and travel stop, the supply pressure must **not exceed** the upper bench range value by **more than 1.5 bar**.

### 3.3 Versions

#### – Standard version

The Type 3271 Pneumatic Actuator (1400-60 cm<sup>2</sup>) has a diaphragm area of 1400 cm<sup>2</sup>. The diaphragm cases are made of plastic-coated sheet steel.

#### – Travel stop

The actuator as a special version can be fitted with a mechanically adjustable travel stop. The actuator travel can be limited by up to 50 %.

#### – Pneumatic actuator with Type 3273 Side-mounted Handwheel for travels up to 80 mm

– Versions for other control media (e.g. water)



## 4 Operation



### **WARNING!**

*The lifting ring on the top diaphragm case is only intended for **assembling and dismantling the pneumatic actuator**. Do not use it to lift the entire control valve assembly.*



### **NOTICE**

*Only apply the signal pressure to the loading pressure connection (S) on the diaphragm chamber of the actuator which does not contain any springs.*

The applicable bench or operating range which the actuator can move through is written on the nameplate.

It is essential that the vent plug (16, Fig. 3 on page 11) lets air through it to allow the actuator to work properly.



### **Note:**

*Actuators with preloaded springs are labeled correspondingly and can also be identified by the long nuts and bolts used to fasten the diaphragm cases together.*

## 4.1 Travel stop

In the special version of Type 3271 (1400-60 cm<sup>2</sup>), the actuator travel can be adjusted by up to 50 % upward or downward.

### 4.1.1 Bottom travel stop (for "actuator stem extends" version)

1. Undo lock nut (70) and remove cover (73).
2. Unscrew lock nut (74) and turn the adjustment nut (72) to adjust the travel stop.
3. Tighten lock nut (74).
4. Attach the cover (73) and retighten the lock nut (70).

### 4.1.2 Top travel stop (for "actuator stem retracts" version)

1. Undo the lock nut (70).
2. Adjust the cover (73) to the required travel stop.
3. Retighten lock nut (70).

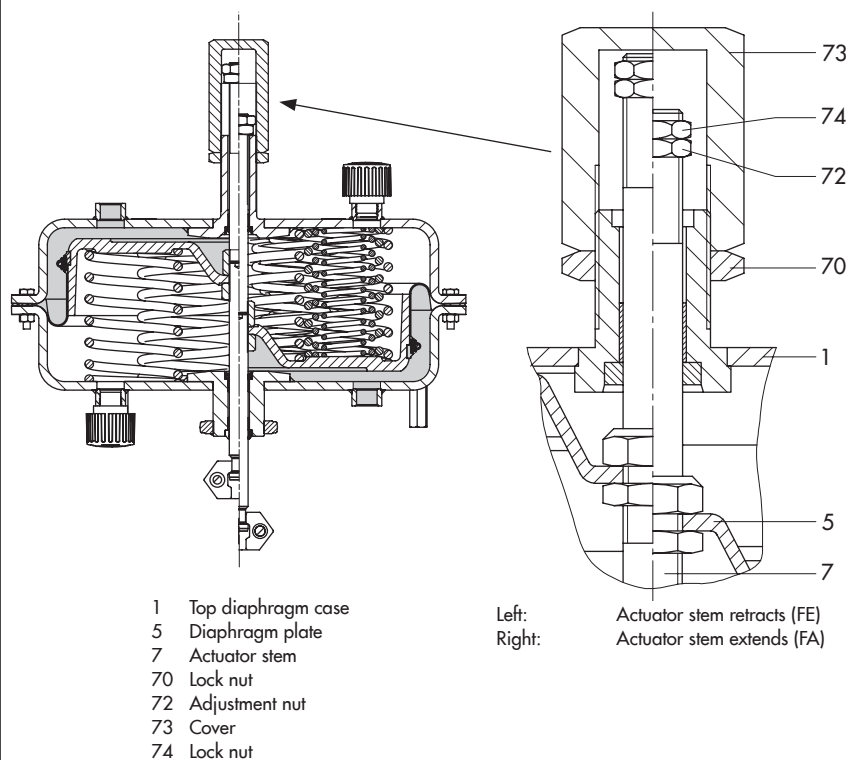


Fig. 2: Travel stop

## 5 Maintenance



### WARNING!

Special care needs to be taken on dismantling actuators with preloaded springs (labeled accordingly and identifiable by three long bolts protruding from the bottom of the actuator).

If the actuator fails to work, the spring compression must be released before removing the actuator from the valve!

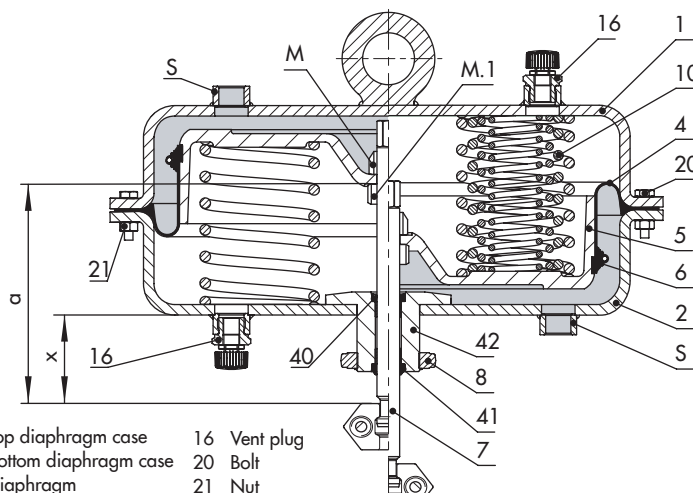
## 5.1 Releasing the spring preloading



### Note

Before performing the following maintenance work, remove the pneumatic actuator from the valve.

1. Unscrew and remove the nuts (21) on the short bolts (20) on the diaphragm casing.
2. Unthread the nuts on the long bolts a few turns, alternating between them to gradually release the spring preloading.



- |                         |                               |
|-------------------------|-------------------------------|
| 1 Top diaphragm case    | 16 Vent plug                  |
| 2 Bottom diaphragm case | 20 Bolt                       |
| 4 Diaphragm             | 21 Nut                        |
| 5 Diaphragm plate       | 40 Radial shaft seal          |
| 6 Adjustable clamp      | 41 Wiper ring                 |
| 7 Actuator stem         | 42 Plain bearing              |
| 8 Nut                   | S Loading pressure connection |
| 10 Spring               |                               |

Fig. 3: Opening Type 3271 Pneumatic Actuator (1400-60 cm<sup>2</sup>)

## 5.2 Replacing the diaphragm

If the diaphragm does not work reliably and must be renewed, we recommend renewing the plain bearing and seal as well.

1. Undo the nuts (21) and remove the bolts (20) from the diaphragm casing.
2. Lift off the top diaphragm case (1) and remove springs (10).
3. Take the diaphragm plate (5) together with the diaphragm (4) and actuator stem (7) out of the bottom diaphragm case (2).
4. Undo the adjustable clamp (6) and pull the diaphragm off the diaphragm plate.
5. Pull the new diaphragm onto the diaphragm plate. Insert the adjustable clamp (6) evenly into the intended groove and tighten screw with 6 to 7 Nm at the maximum. Make sure that the part to protect the diaphragm is inserted where the clamping screw is located.
6. Reassemble actuator.

### NOTICE

*Make sure that the actuator stem in the area where the plain bearing (42) and seals (40, 41) are located does not get damaged.*

7. Apply sealant/lubricant (order no. 8152-0043) to the actuator stem. Insert it together with the diaphragm plate and diaphragm into the bottom diaphragm case (2).
8. Insert springs (10) and place on the top diaphragm case (1).

9. Fasten the top and bottom diaphragm cases together with the nuts and bolts.

Mount the actuator onto the valve following the instructions in the mounting and operating instructions of the valve.

## 5.3 Replacing the actuator stem seals

1. Take the diaphragm plate (5) together with the actuator stem (7) out of the bottom diaphragm case (2) as described in section 5.2.
2. Apply sealant/lubricant (8152-0043) to the new radial shaft seal (40) and carefully install it.
3. Replace the plain bearing (42) and wiper ring (41) as well, if necessary.
4. Reassemble actuator as described in section 5.2.

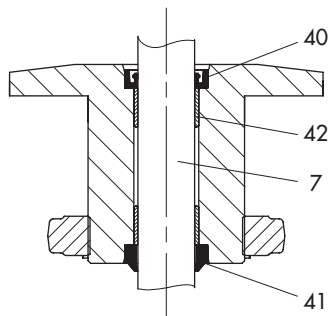
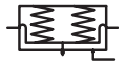


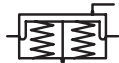
Fig. 4: Actuator stem seals

## 6 Reversing the operating direction

The operating direction and fail-safe action of pneumatic actuators can be changed. Remove the actuator from the valve before proceeding. The fail-safe action is indicated on the nameplate by a symbol:



Actuator stem extends (FA)



Actuator stem retracts (FE)



### WARNING!

*Special care needs to be taken on dismantling actuators with preloaded springs (labeled accordingly and identifiable by three long nuts and bolts protruding from the bottom of the actuator.)*

*If the actuator fails to work, the spring compression must be released before removing the actuator from the valve (see section 5.1).*

## 6.1 Reversal of the operating direction from stem extends to stem retracts

➔ See Fig. 3 on page 11

1. Undo the nuts (21) and remove the bolts (20) from the diaphragm casing.
2. Lift off the top diaphragm case (1) and remove springs (10).
3. Pull the actuator stem (7) together with the diaphragm plate (5) and diaphragm (4) out of the bottom diaphragm case (2).
4. Unscrew the nut (M) while holding the nut (M.1) in place.



### NOTICE

*Do not undo the nut (M.1) from the actuator stem. It is stuck in place using thread-locking fluid. However, if it does become undone, adjust the **dimension a** from the top of the nut to the end of the actuator stem to **230 mm** as shown in Fig. 3:*

5. Lift off the diaphragm plate together with the diaphragm, turn them over and reinsert them.
6. Apply sealant/lubricant (order no. 8152-0043) to the actuator stem.
7. Place the diaphragm plate together with the diaphragm into the top diaphragm case. Insert springs and slide the bottom diaphragm case over the actuator stem.
8. Fasten the top and bottom diaphragm cases together with the nuts and bolts.

9. Remove the vent plug (16) from the top loading pressure connection (S) and screw it into the bottom connection.

→ The actuator springs, which now push against the diaphragm plate from below, cause the actuator stem to retract. The signal pressure is connected to the connection (S) on the top diaphragm case. As a result, the actuator stem extends opposing the spring force as the signal pressure increases.

10. Write down the changed fail-safe position on the nameplate.

## 6.2 Reversal of the operating direction from stem retracts to stem extends

→ See Fig. 3 on page 11

1. Undo the nuts (21) and remove the bolts (20). Lift off the top diaphragm case (1).
2. Pull the diaphragm plate (5) and diaphragm (4) together with the actuator stem (7) out of the bottom diaphragm case (2). Remove the springs (10).
3. Unscrew the nut (M) while holding the nut (M.1) in place.
4. Take care not to damage the actuator stem at the locations where the seals are located.
5. Lift off the diaphragm plate together with the diaphragm, turn them over and reinsert them.
6. Apply sealant/lubricant (order no. 8152-0043) to the actuator stem. Insert it to-

gether with the diaphragm plate and diaphragm into the bottom diaphragm case.

7. Insert springs and place on the top diaphragm case.

8. Fasten the top and bottom diaphragm cases together with the nuts and bolts.

9. Remove the vent plug (16) from the bottom loading pressure connection (S) and screw it into the top connection.

→ The actuator springs, which now push against the diaphragm plate from above, cause the actuator stem to extend. The signal pressure is connected to the connection (S) on the bottom diaphragm case. As a result, the actuator stem retracts opposing the spring force as the signal pressure increases.

10. Write down the changed fail-safe position on the nameplate.

## 7 Appendix

### 7.1 Nameplate

The plastic nameplate for the Type 3271 Pneumatic Actuator (1400-60 cm<sup>2</sup>) is stuck on the diaphragm casing. It includes all details required to identify the actuator:

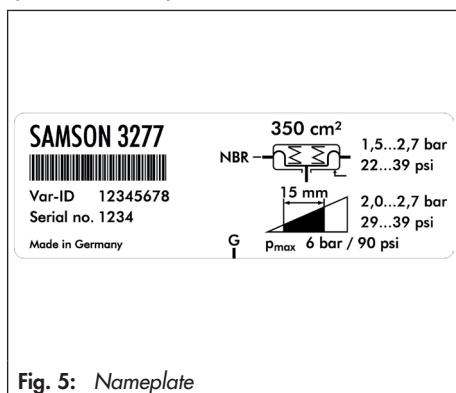


Fig. 5: Nameplate

- Manufacturer and type number
- Configuration ID (Var-ID) as bar code and plain text
- Serial number
- Country of origin
- Diaphragm area in cm<sup>2</sup>
- Diaphragm material: NBR or EPDM
- Symbol indicating fail-safe action: stem extends or retracts (stem extends in this example)
- Bench range in bar and psi
- Symbol for operating travel in mm
- Bench range with preloaded springs
- Thread for pneumatic connection in G, NPT or Rc
- Permissible supply pressure  $p_{\max}$

### 7.2 Dimensions and weights

Refer to Data Sheet ► T 8310-3 EN for details on dimensions and weights of the actuator versions.

### 7.3 Customer inquiries

Submit the following details when making inquiries:

- Type designation and model number
- Effective area
- Bench range (spring range) in bar
- Actuator version and fail-safe action



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