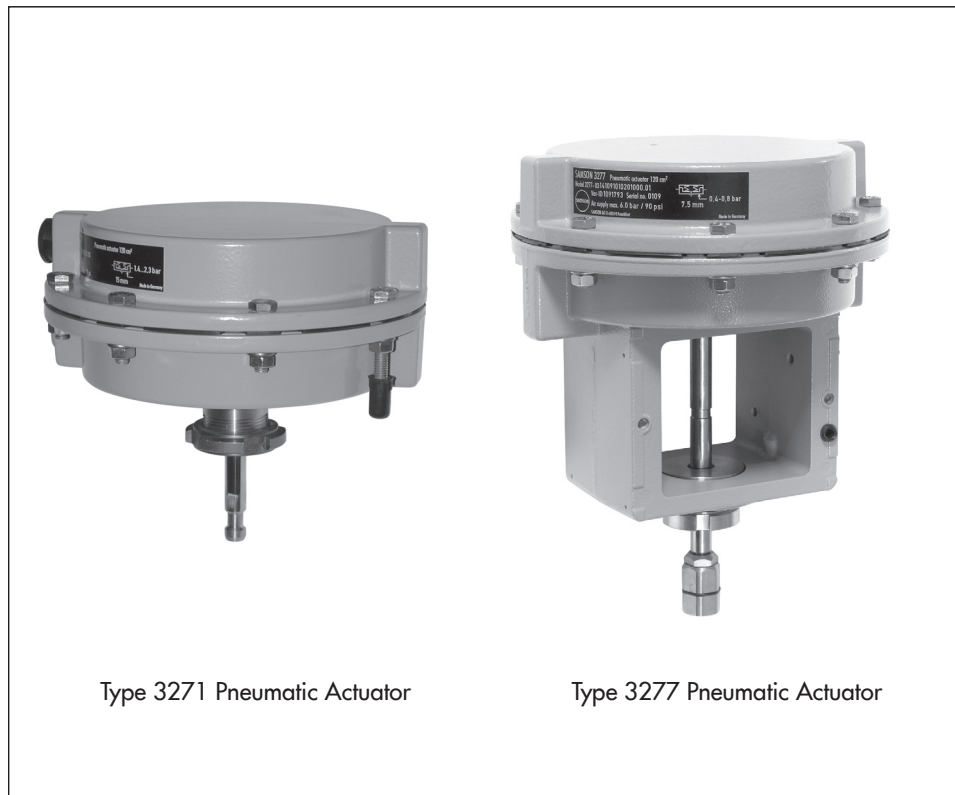


# MOUNTING AND OPERATING INSTRUCTIONS



## EB 8310-1 EN

### Translation of original instructions



Type 3271 Pneumatic Actuator

Type 3277 Pneumatic Actuator

**Type 3271-5 (120 cm<sup>2</sup>)**

**Type 3277-5 (120 cm<sup>2</sup>)**

**Pneumatic Actuators**

Edition November 2022

## Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices. The images shown in these instructions are for illustration purposes only. The actual product may vary.

- For the safe and proper use of these instructions, read them carefully and keep them for later reference.
- If you have any questions about these instructions, contact SAMSON's After-sales Service (aftersaleservice@samsongroup.com).



Documents relating to the device, such as the mounting and operating instructions, are available on our website at [www.samsongroup.com](http://www.samsongroup.com) > **Downloads > Documentation.**

## Definition of signal words

### **DANGER**

*Hazardous situations which, if not avoided, will result in death or serious injury*

### **WARNING**

*Hazardous situations which, if not avoided, could result in death or serious injury*

### **NOTICE**

*Property damage message or malfunction*

### **Note**

*Additional information*

### **Tip**

*Recommended action*

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# 1 Safety instructions and measures

## Intended use

The SAMSON Type 3271 and Type 3277 Actuators are designed for operating a mounted globe valve. In combination with the valve, the actuator is used to shut off the flow of liquids, gases or vapors in the pipeline. Depending on the version, the actuator is suitable for throttling or on/off service. The actuator can be used in processing and industrial plants.

The actuator is designed to operate under exactly defined conditions (e.g. thrust, travel). Therefore, operators must ensure that the actuator is only used in operating conditions that meet the specifications used for sizing the actuator at the ordering stage. In case operators intend to use the actuator in other applications or conditions than specified, contact SAMSON.

SAMSON does not assume any liability for damage resulting from the failure to use the device for its intended purpose or for damage caused by external forces or any other external factors.

→ Refer to the technical data and nameplate for limits and fields of application as well as possible uses.

## Reasonably foreseeable misuse

The actuator is not suitable for the following applications:

- Use outside the limits defined during sizing and by the technical data
- Use outside the limits defined by the accessories connected to the actuator

Furthermore, the following activities do not comply with the intended use:

- Use of non-original spare parts
- Performing service and repair work not described

## Qualifications of operating personnel

The actuator must be mounted, started up, serviced and repaired by fully trained and qualified personnel only; the accepted industry codes and practices must be observed. 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 hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

## **Safety instructions and measures**

### **Personal protective equipment**

We recommend wearing the following personal protective equipment when handling the Type 3271 and Type 3277 Pneumatic Actuators:

- Protective gloves and safety footwear when mounting or removing the actuator
  - Eye protection and hearing protection while the actuator is operating.
- ➔ Check with the plant operator for details on further protective equipment.

### **Revisions and other modifications**

Revisions, conversions or other modifications of the product are not authorized by SAMSON. They are performed at the user's own risk and may lead to safety hazards, for example. Furthermore, the product may no longer meet the requirements for its intended use.

### **Safety devices**

The Type 3271 and Type 3277 Actuators do not have any special safety equipment.

### **Warning against residual hazards**

To avoid personal injury or property damage, plant operators and operating personnel must prevent hazards that could be caused in the actuator by the signal pressure, stored spring energy or moving parts by taking appropriate precautions. Plant operators and operating personnel must observe all hazard statements, warning and caution notes in these mounting and operating instructions.

### **Responsibilities of the operator**

Operators are responsible for proper use and compliance with the safety regulations. Operators are obliged to provide these mounting and operating instructions as well as the referenced documents to the operating personnel and to instruct them in proper operation. Furthermore, operators must ensure that operating personnel or third parties are not exposed to any danger.

### **Responsibilities of operating personnel**

Operating personnel must read and understand these mounting and operating instructions as well as the referenced documents and observe the specified hazard statements, warnings and caution notes. Furthermore, operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

### Referenced standards, directives and regulations

According to the ignition risk assessment performed in accordance with Clause 5.2 of ISO 80079-36, the non-electrical actuators do not have their own potential ignition source even in the rare incident of an operating fault. As a result, they do not fall within the scope of Directive 2014/34/EU.

→ For connection to the equipotential bonding system, observe the requirements specified in Clause 6.4 of EN 60079-14 (VDE 0165-1).

The Type 3271 and Type 3277 Actuators are partly completed machinery as defined in the Machinery Directive 2006/42/EC or the Directive 2008 No. 1597 Supply of Machinery (Safety) Regulations 2008.

### Referenced documentation

The following documents apply in addition to these mounting and operating instructions:

- Mounting and operating instructions for the valve on which it is mounted
- Mounting and operating instructions for mounted valve accessories (positioner, solenoid valve etc.)
- Safety Manual ► SH 8310 for use in safety-instrumented systems
- ► AB 0100 for tools, tightening torques and lubricant

## 1.1 Notes on possible severe personal injury

### DANGER

#### **Risk of bursting in the actuator.**

Actuators are pressurized. Improper opening can lead to actuator components bursting.

- Before starting any work on the actuator, depressurize all plant sections affected and the actuator.

## 1.2 Notes on possible personal injury

### WARNING

#### **Crush hazard arising from moving parts.**

The actuator contains moving parts (actuator stem), which can injure hands or fingers if inserted into the actuator.

- Do not touch the actuator stem or insert hands or finger into the yoke or beneath the actuator stem while the air supply is connected to the actuator.
- While working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator stem by inserting objects into the yoke.
- Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See 'Relieving the spring compression in the actuator' in the 'Removal' section.

1) If not described otherwise in the valve documentation, the work position for the control valve is the front view looking onto the operating controls (including valve accessories).



**⚠ WARNING****Risk of personal injury when the actuator vents.**

The actuator is operated with air. As a result, air is vented during operation.

- Install the control valve in such a way that vent openings are not located at eye level and the actuator does not vent at eye level in the work position <sup>1)</sup>.
- Use suitable silencers and vent plugs.
- Wear eye and hearing protection when working near the actuator.

**Risk of personal injury due to preloaded springs.**

Actuators with preloaded springs are under tension. These actuators can be identified by several longer bolts with nuts protruding from the bottom diaphragm case. These bolts allow the spring compression to be relieved evenly on disassembling the actuator. Actuators with considerably preloaded springs are also labeled correspondingly (see the 'Markings on the device' section).

- Before starting any work on the actuator, relieve the compression from the preloaded springs. See 'Relieving the spring compression in the actuator' in the 'Removal' section.

**Risk of personal injury through incorrect operation, use or installation as a result of information on the actuator being illegible.**

Over time, markings, labels and nameplates on the actuator may become covered with dirt or become illegible in some other way. As a result, hazards may go unnoticed and the necessary instructions not followed. There is a risk of personal injury.

- Keep all relevant markings and inscriptions on the device in a constantly legible state.
- Immediately renew damaged, missing or incorrect nameplates or labels.

### 1.3 Notes on possible property damage

**NOTICE**

**Risk of actuator damage due to incorrectly attached slings.**

→ Do not attach load-bearing slings to the handwheel or travel stop.

**Risk of actuator damage due to excessively high or low tightening torques.**

Observe the specified torques when tightening actuator components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are not tightened far enough may loosen.

→ Observe the specified tightening torques (▶ AB 0100).

**Risk of actuator damage due to the use of unsuitable tools.**

Certain tools are required to work on the actuator.


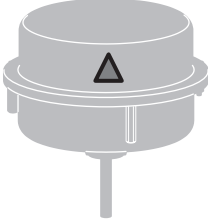
→ Only use tools approved by SAMSON (▶ AB 0100).

**Risk of actuator damage due to the use of unsuitable lubricants.**

The lubricants to be used depend on the actuator material. Unsuitable lubricants may corrode and damage surfaces.

→ Only use lubricants approved by SAMSON (▶ AB 0100).

### 1.4 Warnings on the device

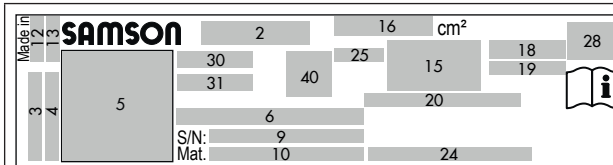
Warning	Meaning of the warning	Location on the device
	<p>Warning to indicate that the springs in the actuator are preloaded.</p> <p>Actuators with preloaded springs are under tension. Incorrect opening of the actuator can lead to personal injury through the sudden and uncontrolled projection of parts.</p> <p>Before starting any work on the actuator, relieve the compression from the preloaded springs. See 'Relieving the spring compression in the actuator' in the 'Removal' section.</p>	

## 2 Markings on the device



The nameplate shown was up to date at the time of publication of this document. The nameplate on the device may differ from the one shown.


### 2.1 Actuator nameplate

The nameplate is stuck to the diaphragm casing. It includes all details required to identify the device.



**Fig. 2-1:** Inscriptions on the nameplate of Type 3271 and 3277 Actuators with 120 cm<sup>2</sup> actuator area

Item	Inscription meaning
2	Type designation
3	Company name
4	Company address (ZIP/postal code and city)
5	Data Matrix code
6	Device designation
9	Serial number
10	Material no.
12	Country of origin
13	Month and year of manufacture
15	Symbol indicating fail-safe action:  Actuator stem extends (FA)  Actuator stem retracts (FE)
16	Actuator area in cm <sup>2</sup>
18	Bench range in bar
19	Bench range in psi
20	Actuator travel in mm
24	Permissible operating pressure $p_{max}$ in bar and/or psi
25	Diaphragm material
26	Type of connecting thread

Item	Inscription meaning
28	Symbol for manual override:  (optional)
30	Version (optional), e.g. SAM001
31	Version (optional), e.g. HW xx.xx.xx



### 3 Design and principle of operation

The Type 3271-5 and Type 3277-5 Actuators have an actuator area of 120 cm<sup>2</sup>. The actuators mainly consist of two diaphragm cases (A1, A2), a rolling diaphragm (A4) and internal springs (A10). See Fig. 3-1 and Fig. 3-2. The actuators are mounted in particular on SAMSON Series 240 Valves and Type 3510 Micro-flow Valves.

The signal pressure  $p_{st}$  creates the force  $F = p_{st} \cdot A$  at the diaphragm surface  $A$  which is opposed by the springs (A10) in the actuator. The bench range is determined by the number of springs used, taking into account the rated travel. The travel is proportional to the signal pressure  $p_{st}$ . The direction of action of the actuator stem (A7) depends on how the springs are installed in the actuator. Several springs may be fitted into one another.

The stem connector clamps (A26/27) of Series 240 Valves connect the actuator stem (A7) with the plug stem of the valve. The actuator stem (A7) and plug stem (5) of the micro-flow valve are connected using a threaded stem connection.

The Type 3277-5 Actuator is fitted with an additional yoke on the bottom diaphragm case (see Fig. 3-2). It permits the direct attachment of a positioner and/or limit switch. The benefit of this design is that the travel pick-off located inside the yoke is protected against external influences.

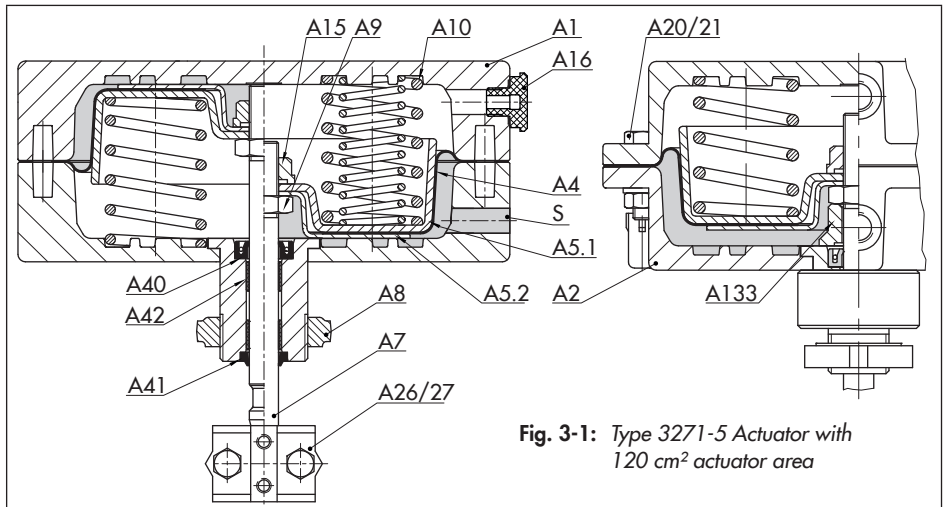
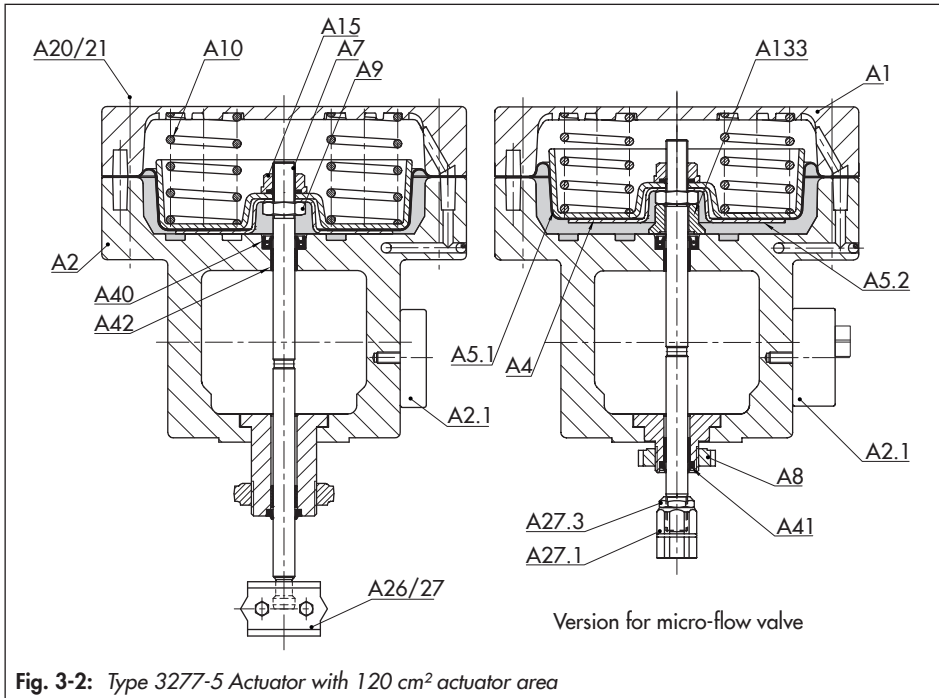


Fig. 3-1: Type 3271-5 Actuator with 120 cm<sup>2</sup> actuator area

## Design and principle of operation



**Fig. 3-2:** Type 3277-5 Actuator with 120 cm<sup>2</sup> actuator area

### Legend for Fig. 3-1 and Fig. 3-2

A1	Top diaphragm case	A5.2	Diaphragm plate	A27.1	Stem connector nut
A2	Bottom diaphragm case	A7	Actuator stem	A27.3	Lock nut
A2.1	Switchover/connecting plate for signal pressure routing	A8	Ring nut	A40	Radial shaft seal
A2.2	Connection for actuator stem extends (FA)	A9	Hex nut	A41	Wiper ring
A2.3	Connection for actuator stem retracts (FE)	A10	Spring	A42	Dry bearing
A4	Diaphragm	A15	Collar nut	A133	Stop bushing
A5.1	Diaphragm plate	A16	Vent plug	S	Signal pressure connection
		A20	Hex bolt		
		A21	Hex nut		
		A26/27	Stem connector clamps		

### 3.1 Direction of action and signal pressure routing

#### Type 3271-5 (see Fig. 3-1)

In the "actuator stem extends" version, the signal pressure is routed through the bottom signal pressure connection (S) to the bottom diaphragm chamber and moves the actuator stem (A7) upward opposing the spring force.

In the "actuator stem retracts" version, the signal pressure is routed through the top signal pressure connection (S) to the top diaphragm chamber and moves the actuator stem (A7) downward opposing the spring force.

#### Type 3277-5 (see Fig. 3-2 and Fig. 3-3)

In the Type 3277-5 Actuator, the signal pressure is transmitted to the diaphragm chamber through the holes on the left or right side of the yoke and over a switchover plate (A2.1, accessories, see Fig. 3-3). The fail-safe action of the actuator ("actuator stem extends" or "actuator stem retracts") determines how the switchover plate must be aligned with the marking (A2.5).

If the actuator is operated without a positioner, a connecting plate (A2.1, accessories, see Fig. 3-3) is required instead of the switchover plate. In this case, the signal pressure is routed directly over the signal pressure connection (A2.9) of the connecting plate to the diaphragm chamber.

#### Reversal of the direction of action

The direction of action for both Type 3271 and Type 3277 can be reversed (see the 'Servicing and conversion' section).

### 3.2 Fail-safe position

#### **i Note**

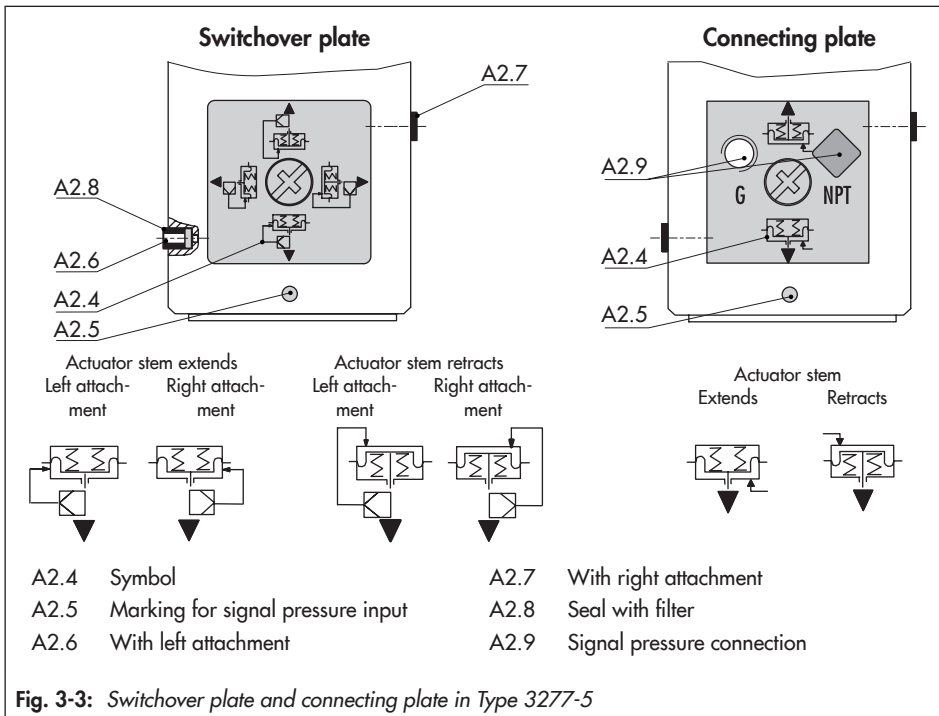
*The listed fail-safe actions apply to SAMSON globe valves.*

When the signal pressure is reduced or the control signal fails, the fail-safe position of the control valve depends on whether the springs are installed in the top or bottom diaphragm chamber.

**Version with handwheel:** in the active manual mode (the handwheel is not in the neutral position), the valve is not moved to the fail-safe position even upon failure of the supply air.

#### 3.2.1 Actuator stem extends

When the signal pressure is reduced or the control signal fails, the springs move the actuator stem downward and close the globe valve. The valve opens when the signal pressure is increased enough to overcome the spring force.



### 3.2.2 Actuator stem retracts

When the signal pressure is reduced or the control signal 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 spring force.

		With index	Order no.
Switchover plate	<b>New</b>	<b>.01</b>	<b>1400-6822</b>
	Old	.00	1400-6819
Connecting plate	<b>New</b>	<b>.01</b>	<b>1400-6823</b>
	G thread	.00	1400-6820
	NPT thread	.00	1400-6821

**i Note**

Actuators with device index .01 are equipped with new connecting plates. Old and new connecting plates are not interchangeable.



### Vent plugs

Vent plugs are screwed into the exhaust air ports of pneumatic and electropneumatic devices. They ensure that any exhaust air that forms can be vented to the atmosphere (to avoid excess pressure in the device). Furthermore, the vent plugs allow air intake to prevent a vacuum from forming in the device.

► AB 07

### Lifting fixture

A special lifting tool is available to lift pneumatic actuators with 120 cm<sup>2</sup> actuator area (► AB 0100).

### Feedback connection (travel pick-off interface) according to IEC 60534-6-1

Various valve accessories according to IEC 60534-6-1 and NAMUR recommendation can be mounted on SAMSON control valves designed according to the modular principle. See associated valve documentation. The travel pick-off interface for these mounted devices can be ordered (accessories):

Type ... Actuator	Actuator area in cm <sup>2</sup>	Accessories for	
		Attachment on one side (item number)	Attachment on both sides (material number)
3271	120	1400-6816 (included in scope of delivery of the actuator)	100029690

Type ... Actuator	Actuator area in cm <sup>2</sup>	Accessories for	
		Attachment on one side (item number)	Attachment on both sides (material number)
3277	120	1400-6816	100029690

## 3.4 Versions

### – Standard version

The housings of Type 3271-5 and Type 3277-5 Pneumatic Actuators have an actuator area of 120 cm<sup>2</sup> and are made of die-cast aluminum.

### – Version with travel stop

The Type 3271-5 and Type 3277-5 Actuators can be fitted with a mechanically adjustable travel stop. The travel is limited in both directions of action (stem extends or retracts).

### – Version with handwheel

The Type 3271-5 and Type 3277-5 Actuators can be fitted with an additional handwheel. The handwheel is mounted on the top diaphragm case and is used to adjust the travel manually.

## 3.5 Technical data

The nameplate provides information on the actuator version (see the 'Markings on the device' section).

## Design and principle of operation

### **i** Note

More information is available in Data Sheet  
► T 8310-1.

### Temperature range

The permissible temperature range is determined by the NBR diaphragm material.

Throttling service:   –35 to +80 °C  
                              –31 to +176 °F

On/off service:       –20 to +80 °C  
                              –4 to +176 °F

### Supply pressure

The maximum permissible supply pressure is specified in the order confirmation for the control valve. However, the supply pressure must not exceed 6 bar in throttling service. See the 'Operation' section for restrictions in on/off service.

### Dimensions and weights

See Table 3-1 and dimensional drawings on page 3-7 and 3-8.

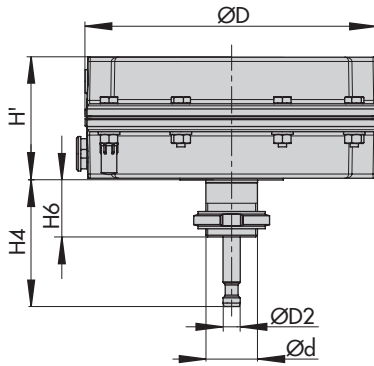
**Table 3-1:** Dimensions in mm and weights in kg

Actuator	Type	3271-5	3277-5
<b>Actuator area</b>	<b>cm<sup>2</sup></b>	<b>120</b>	<b>120</b>
Height	H'	69	70
	H1	205	293
	H4 <sub>rated</sub> FA	75	75
	H4 <sub>max</sub> FA	78	78
	H4 <sub>max</sub> FE	78	78
	H5	–	88
	H6	34	34
	H8	75	75
Diameter	ØD	168	168
	ØD2	10	10
Thread	Ød	M30x1.5 <sup>1)</sup>	M30x1.5 <sup>1)</sup>
Air connection	a	G 1/8 (1/8 NPT)	–
<b>Weight<sup>2)</sup></b>			
Without handwheel		2.5	3.2
With handwheel		4	4.5

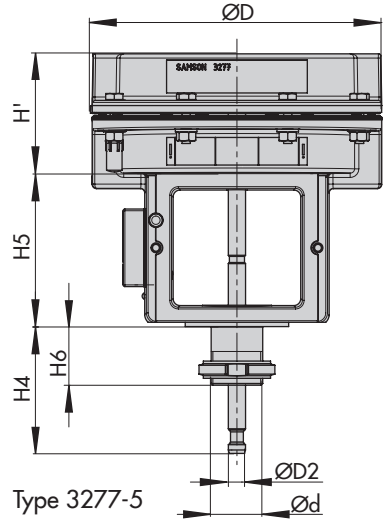
1) In version for micro-flow valve: M20x1.5 thread

2) The weights specified apply to a specific standard device configuration. Weights of other actuator configurations may differ depending on the version (material, number of actuator springs etc.).

Dimensional drawings

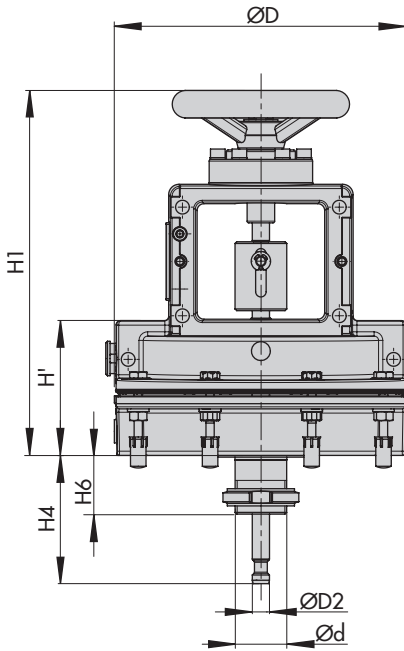


Type 3271-5

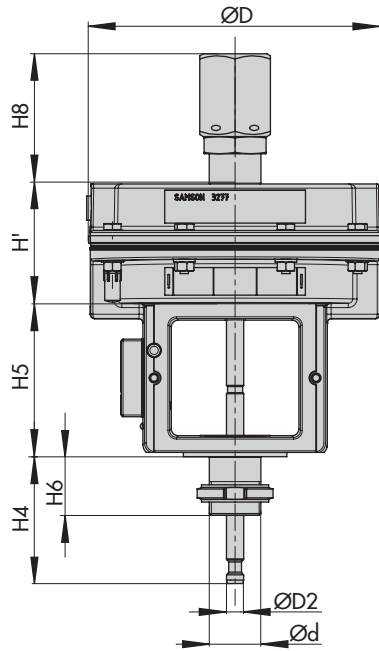


Type 3277-5

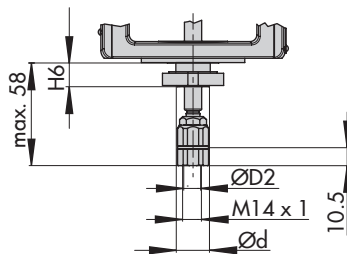
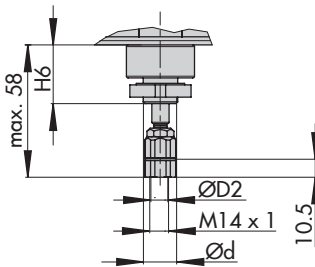
Dimensional drawings



Type 3271-5 with handwheel



Type 3277-5 with travel stop



Versions with 7.5 mm travel for Type 3510 Micro-flow Valve

## 4 Shipment and on-site transport

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### 4.1 Accepting the delivered goods

After receiving the shipment, proceed as follows:

1. Check the scope of delivery. Check that the specifications on the actuator nameplate match the specifications in the delivery note. See the 'Markings on the device' section for nameplate details.
2. Check the shipment for transportation damage. Report any damage to SAMSON and the forwarding agent (refer to delivery note).
3. Determine the weight and dimensions of the units to be lifted and transported in order to select the appropriate lifting equipment and lifting accessories. Refer to the transport documents and the 'Technical data' section.

### 4.2 Removing the packaging from the actuator

Observe the following sequence:

- Do not open or remove the packaging until immediately before mounting the actuator.

- Leave the actuator in its transport container or on the pallet to transport it on site.
- Dispose and recycle the packaging in accordance with the local regulations.

### 4.3 Transporting and lifting the actuator

---

#### **⚠ DANGER**

***Danger due to suspended loads falling.***

- *Stay clear of suspended or moving loads.*
  - *Close off and secure the transport paths.*
- 

#### **⚠ WARNING**

***Risk of lifting equipment tipping over and risk of damage to lifting accessories due to exceeding the rated lifting capacity.***

- *Only use approved lifting equipment and accessories whose minimum lifting capacity is higher than the weight of the actuator (including the packaging, if applicable).*
- 

#### **💡 Tip**

*Our after-sales service can provide more detailed transport and lifting instructions on request.*

---

### 4.3.1 Transporting the actuator

The actuator can be transported using lifting equipment (e.g. crane or forklift).

- Leave the actuator in its transport container or on the pallet to transport it.
- Observe the transport instructions.

#### Transport instructions

- Protect the actuator against external influences (e.g. impact).
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the actuator against moisture and dirt.
- The permissible transportation temperature is between  $-20$  and  $+65$  °C.

### 4.3.2 Lifting the actuator

Due to the low service weight, lifting equipment is not required to lift the actuator (e.g. to mount it onto a valve). If lifting equipment (e.g. crane or forklift) is to be used, we have a gripping device available for the actuator (see 'Accessories' in the 'Design and principle of operation' section).

---

#### **i** Note

See valve documentation for more information on lifting the entire control valve assembly.

---

### 4.4 Storing the actuator

---

#### **i** NOTICE

**Risk of actuator damage due to improper storage.**

- Observe the storage instructions.
  - Avoid long storage times.
  - Contact SAMSON in case of different storage conditions or longer storage times.
- 

---

#### **i** Note

We recommend regularly checking the actuator and the prevailing storage conditions during long storage times.

---

#### Storage instructions

- When the valve and actuator are already assembled, observe the storage conditions for control valves. See associated valve documentation.
- Protect the actuator against external influences (e.g. impact).
- Secure the actuator in the stored position against slipping or tipping over.
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the actuator against moisture and dirt. Store it at a relative humidity of less than 75 %. In damp spaces, prevent condensation. If necessary, use a drying agent or heating.

- Make sure that the ambient air is free of acids or other corrosive media.
- The permissible storage temperature is between  $-20$  and  $+65$  °C.
- Do not place any objects on the actuator.

### **Special storage instructions for elastomers**

Elastomer, e.g. actuator diaphragm

- To keep elastomers in shape and to prevent cracking, do not bend them or hang them up.
- We recommend a storage temperature of  $15$  °C for elastomers.
- Store elastomers away from lubricants, chemicals, solutions and fuels.



#### **Tip**

*Our after-sales service can provide more detailed storage instructions on request.*

---





## 5 Installation

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### 5.1 Preparation for installation

Before mounting, make sure the following conditions are met:

- The actuator is not damaged.
- The type designation, material and temperature range of the actuator match the ambient conditions (temperatures etc.). See the 'Markings on the device' section for nameplate details.

Proceed as follows:

- ➔ Lay out the necessary material and tools to have them ready during mounting.
- ➔ Check that the vent plugs to be used are not blocked.
- ➔ Check any pressure gauges mounted on valve accessories to make sure they function properly.
- ➔ When the valve and actuator are already assembled, check the tightening torques of the bolted joints (▶ AB 0100). Components may loosen during transport.

### 5.2 Mounting the device

Depending on the version, SAMSON control valves are either delivered with the actuator already mounted on the valve or the valve and actuator are delivered separately. When delivered separately, the valve and actuator

must be assembled together on site. Proceed as follows to mount the actuator and before start-up.

---

#### **⚠ WARNING**

**Risk of personal injury due to exhaust air being vented.**

*The actuator is operated with air. As a result, air is vented during operation.*

- ➔ *During mounting make sure that vent openings are not located at eye level in the work position of the control valve and the actuator does not vent at eye level in the work position.*
  - ➔ *Wear eye and hearing protection when working near the actuator.*
- 

#### **⚠ WARNING**

**Crush hazard arising from the moving actuator stem.**

- ➔ *Do not touch the actuator stem or insert hands or finger into the yoke while the air supply is connected to the actuator.*
  - ➔ *Before working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.*
  - ➔ *Do not impede the movement of the actuator stem by inserting objects into the yoke.*
  - ➔ *Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See 'Relieving the spring compression in the actuator' in the 'Removal' section.*
-

---

### NOTICE

#### **Risk of actuator damage due to excessively high or low tightening torques.**

Observe the specified torques when tightening actuator components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are not tightened far enough may loosen.

→ Observe the specified tightening torques (▶ AB 0100).

---

---

### NOTICE

#### **Risk of actuator damage due to the use of unsuitable tools.**

→ Only use tools approved by SAMSON (▶ AB 0100).

---

## 5.2.1 Mounting the actuator onto the valve

---

### NOTICE

#### **Risk of valve damage or malfunction due to an incorrectly aligned V-port plug.**

On mounting the actuator onto valves fitted with a V-port plug, make sure that the V-shaped port uncovered first faces toward the valve outlet.

→ Read the 'Mounting the actuator onto the valve' section in the associated valve documentation.

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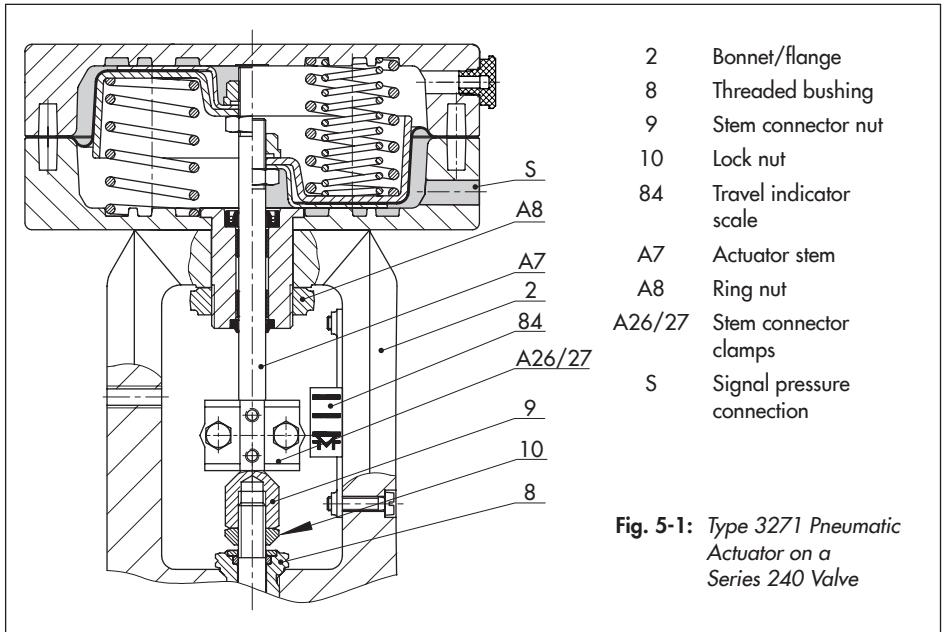
### Tip

The valve and actuator are assembled with special attention paid to the actuator's bench range and direction of action. These details are specified on the actuator nameplate (see the 'Markings on the device' section).

---

## a) Mounting onto Series 240 Valves without anti-rotation fixture

1. Loosen the lock nut (10) and stem connector nut (9) on the valve.
2. Firmly press the plug together with the plug stem into the seat ring.
3. Thread down the lock nut and stem connector nut.
4. Remove the clamps of the stem connector (A26/27) and the ring nut (A8) from the actuator.
5. Slide the ring nut over the plug stem.
6. Place the actuator onto the valve bonnet (2) and secure it with the ring nut.
7. Connect the signal pressure. See section 5.2.2.
8. Screw on the stem connector nut (9) by hand until it touches the actuator stem (A7).
9. Turn the stem connector nut a further quarter turn and secure this position with the lock nut (10).
10. Position the stem connector clamps (A26/27) and screw them tight.

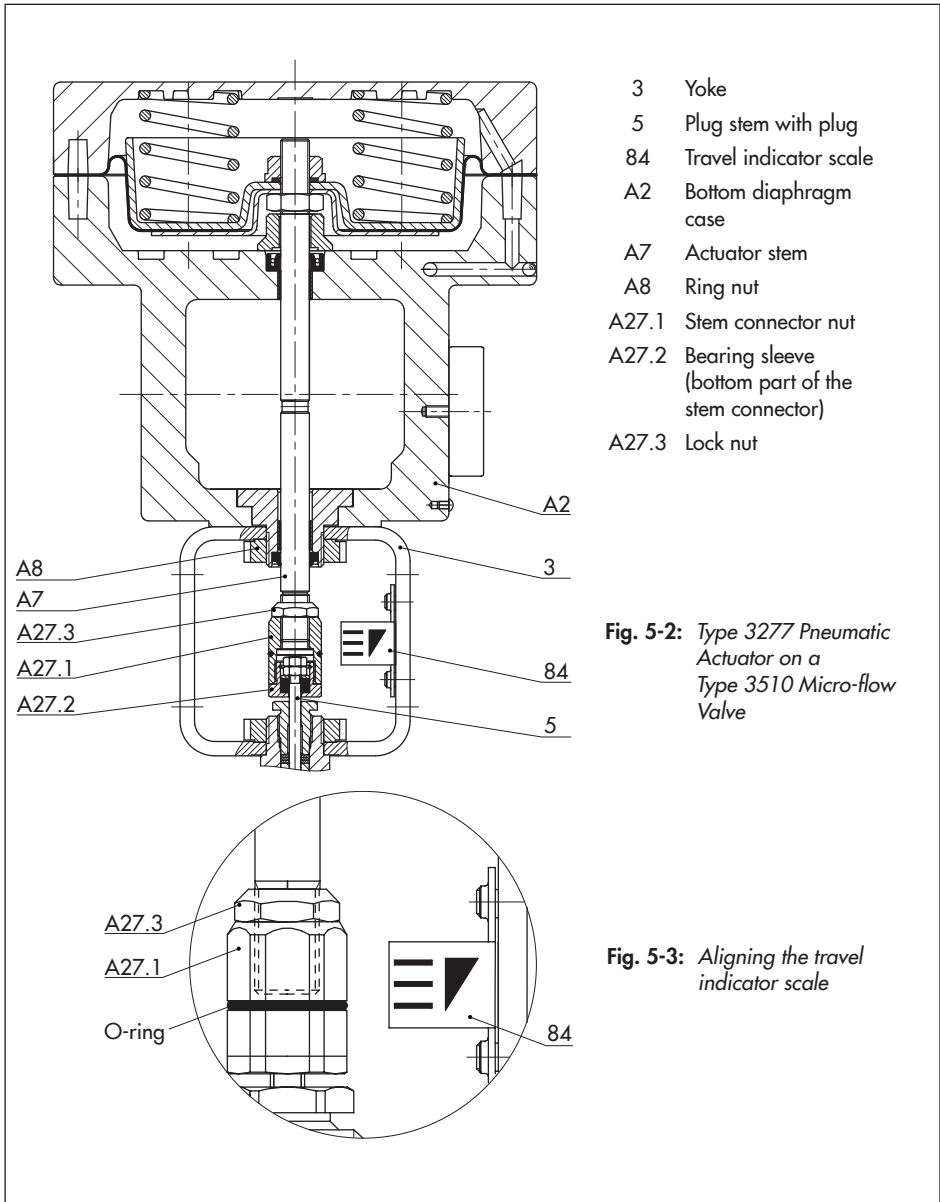


**Fig. 5-1:** *Type 3271 Pneumatic Actuator on a Series 240 Valve*

1. Align the travel indicator scale (84) with the tip of the stem connector clamp.

## b) Attachment to Type 3510 Micro-flow Valve

1. Remove the ring nut (A8) from the actuator.
2. Loosely thread the lock nut (A27.3) and stem connector nut (A27.1) upward on the actuator.
3. Place the actuator on the yoke (3).
4. Slide the ring nut (A8) over the stem connector nut (A27.1) and the lock nut (A27.3) onto the actuator stem (A7) and screw tight. Observe tightening torques.
5. Connect the signal pressure. See section 5.2.2.
6. **In the "actuator stem extends" version:** to retract the actuator stem, apply a signal pressure corresponding to approx. 50 % of the bench range to the actuator. Fasten tight the stem connector nut (A27.1) at the bottom end of the actuator stem (A7) to the bearing sleeve (A27.2) on the plug stem (5). Disconnect the signal pressure.
- In the "actuator stem retracts" version:** fasten tight the stem connector nut (A27.1) at the bottom end of the actuator stem (A7) to the bearing sleeve (A27.2) on the plug stem (5).



7. In the "actuator stem extends" version: apply a signal pressure that corresponds to the lower bench range value to the actuator. Turn the stem connector (A27.1 and A27.2) on the actuator stem until the plug (5) starts to move out of the seat.

**In the "actuator stem retracts" version:** apply a signal pressure that corresponds to the upper bench range value to the actuator. Turn the stem connector (A27.1 and A27.2) on the actuator stem until the plug (5) starts to move out of the seat.

---

**i Note**

*If necessary, repeat the action described in 7 until the stem connector is correctly adjusted.*

8. Lock the position of the stem connector with the lock nut (A27.3).
9. Align the travel indicator scale (84) so that the bottom line on the scale is at the same level as the O-ring on the stem connector nut. See Fig. 5-3.

### c) Mounting on valve versions with anti-rotation fixture

1. Firmly press the plug together with the plug stem into the seat ring.
2. **Anti-rotation fixture not yet mounted onto the valve:**

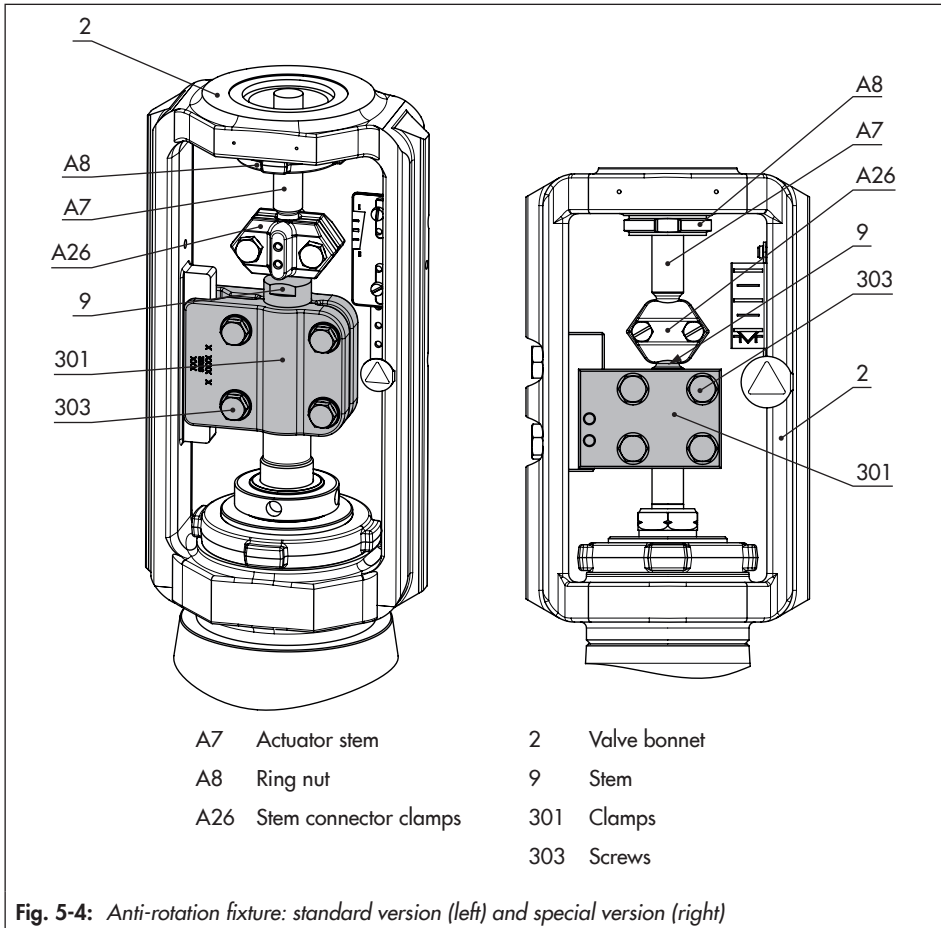
Follow the instructions described under 'Mounting the external anti-rotation fixture' in the associated valve documentation up to the point where the actuator is to be mounted.

#### **Anti-rotation fixture already mounted onto the valve:**

Slightly loosen the screws (303) and turn the stem (9) inside the stem connector clamps (301) by a few turns to move it downward.

3. Remove the clamps of the stem connector (A26) and the ring nut (A8) from the actuator.
4. Slide the ring nut over the plug stem.
5. Place the actuator onto the valve bonnet (2) and secure it with the ring nut.
6. Connect the signal pressure. See section 5.2.2.
7. Continue following the instructions described under 'Mounting the external anti-rotation fixture' in the associated valve documentation from the point where the stem (9) is threaded upwards until the head of the stem rests on the extended actuator stem.
8. Align and fasten the travel indicator scale as described in the 'Mounting the actuator onto the valve' section in the associated valve documentation.

## Installation



## 5.2.2 Pneumatic connection

The maximum permissible supply pressure is specified in the order confirmation for the control valve. It is, however, restricted to 6 bar in throttling service. See the 'Operation' section for restrictions in on/off service.

How and with which accessories the air supply is connected depends on the actuator model and its direction of action. See 'Direction of action and signal pressure routing' in the 'Design and principle of operation' section.

Determine the lower and upper signal pressure range values before connecting the supply air:

- The lower signal pressure range value corresponds to the minimum value of the bench range or operating range (when the travel range is adapted, see 'Adapting the travel range' in the 'Start-up' section).
- The upper signal pressure range value corresponds to the maximum value of the bench range or operating range (when the travel range is adapted, see 'Adapting the travel range' in the 'Start-up' section).

### a) Type 3271-5

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

- ➔ Connect the signal pressure to the bottom signal pressure connection (S). See Fig. 5-1.

The signal pressure is routed to the bottom diaphragm chamber and moves the actuator stem (A7) upward opposing the spring force.

- ➔ Screw the vent plug into the connection on the top diaphragm case.

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

- ➔ Connect the signal pressure to the top signal pressure connection (S).  
The signal pressure is routed to the top diaphragm chamber and moves the actuator stem (A7) downward opposing the spring force.
- ➔ Screw the vent plug into the connection on the bottom diaphragm case.

### b) Type 3277-5

#### Operation with positioner (switchover plate)

- ➔ Turn the switchover plate to align the symbol (A2.4) matching the fail-safe action and attachment side with the marking (A2.5). See Fig. 5-5.

#### Operation without positioner (connecting plate)

- ➔ Turn the connecting plate to align the symbol (A2.4) matching the fail-safe action with the marking (A2.5). See Fig. 5-5.
- ➔ Make sure that the gasket for the connecting plate is correctly inserted.
- ➔ The connecting plate has threaded holes with NPT and G threads. Seal the connection that is not used with the rubber seal and square plug.

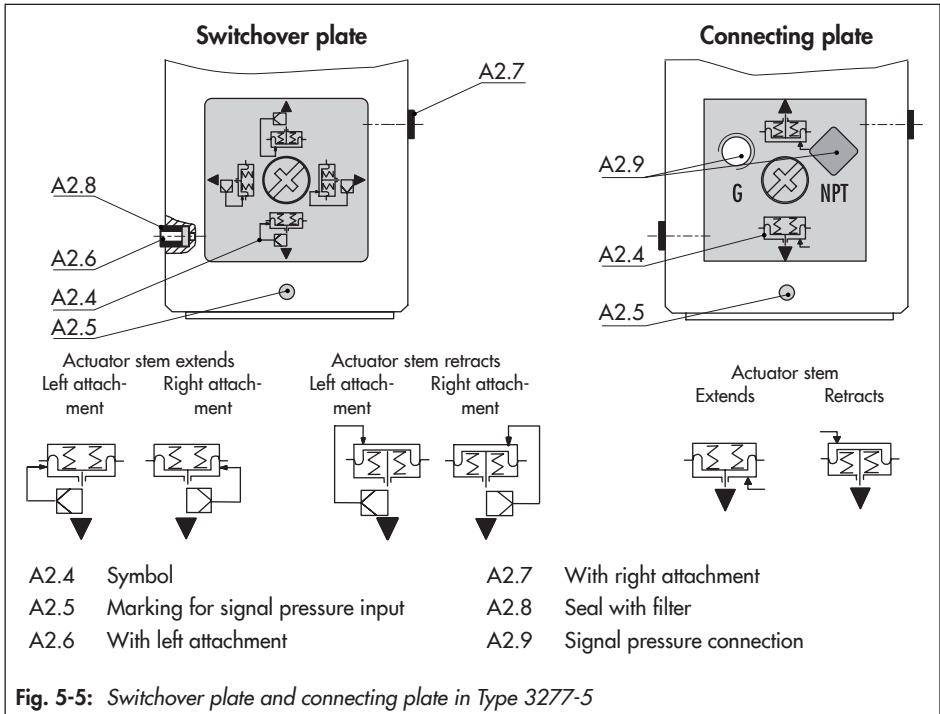


Fig. 5-5: Switchover plate and connecting plate in Type 3277-5



## 6 Start-up

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### **⚠ DANGER**

#### **Risk of bursting due to incorrect opening of pressurized equipment or components.**

Pneumatic actuators are pressure equipment that may burst when handled incorrectly.

Flying projectile fragments or components can cause serious injury or even death.

Before working on the actuator:

- Depressurize all plant sections concerned and the actuator. Release any stored energy.

### **⚠ WARNING**

#### **Risk of personal injury due to preloaded springs.**

Actuators with preloaded springs are under tension. These actuators can be identified by several longer bolts with nuts protruding from the bottom diaphragm case. Actuators with considerably preloaded springs are also labeled correspondingly (see the 'Markings on the device' section).

- Only open the actuator following the instructions in this document. See 'Relieving the spring compression in the actuator' in the 'Removal' section.

### **⚠ WARNING**

#### **Risk of personal injury due to exhaust air being vented.**

The actuator is operated with air. As a result, air is vented during operation.

- Wear eye and hearing protection when working near the actuator.

### **⚠ WARNING**

#### **Crush hazard arising from the moving actuator stem.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator stem by inserting objects into the yoke.
- Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See 'Relieving the spring compression in the actuator' in the 'Removal' section.

### **⚠ WARNING**

#### **Risk of personal injury through incorrect operation, use or installation as a result of incorrect information on the actuator.**

After any adjustment or conversion work, the details on the actuator nameplate may no

longer be correct. This may apply, for example, to the configuration ID or the symbol after reversal of the direction of action.

- Immediately renew any nameplates or labels with incorrect or outdated information.
- Add any new values to the nameplate. If necessary, contact SAMSON to obtain a new nameplate.

---

### ! NOTICE

#### **Risk of actuator damage due to excessively high or low tightening torques.**

Observe the specified torques when tightening actuator components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are not tightened far enough may loosen.

- Observe the specified tightening torques (▶ AB 0100).

---

### ! NOTICE

#### **Risk of actuator damage due to the use of unsuitable tools.**

- Only use tools approved by SAMSON (▶ AB 0100).

## 6.1 Adapting the travel range

In some cases, the valve and actuator have different rated travels. Depending on the direction of action, proceed as follows:

### Actuator stem extends

When a SAMSON valve is combined with an oversized actuator (i.e. the rated actuator travel is larger than rated valve travel), the bench range is shifted.

**Example:** DN 25 valve with 7.5 mm rated travel and 120 cm<sup>2</sup> actuator with 15 mm rated travel; 0.4 to 1.2 bar bench range.

The signal pressure for half the actuator travel (7.5 mm) is 0.8 bar. Adding it to the lower signal pressure range value of 0.4 bar results in a signal pressure of 1.2 bar required for adapting the travel range. The new lower signal range value is 1.2 bar and the new upper signal range value 2.0 bar.

- Write the new signal pressure range of 1.2 to 2.0 bar on the nameplate as the operating range with adapted travel range.

### Actuator stem retracts

When a SAMSON valve is combined with an oversized actuator (e.g. the rated travel of the actuator is larger than the rated travel of the valve), only the first half of the actuator's bench range can be used.

**Example:** DN 25 valve with 7.5 mm rated travel and 120 cm<sup>2</sup> actuator with 15 mm rated travel; 0.2 to 1 bar bench range.

At half the valve travel, the operating range is between 0.2 and 0.6 bar.

- Write the new signal pressure range of 0.2 to 0.6 bar on the nameplate as the operating range with adapted travel range.

## 6.2 Travel stop

In the version with travel stop, the maximum and minimum actuator travel can be limited (see Fig. 6-1).

### 6.2.1 Bottom travel stop (minimum travel)

1. Loosen lock nut (A70) and remove cover (A73).
2. Unscrew lock nut (A74) and turn the adjustment nut (A72) to adjust the travel stop.
3. Tighten lock nut (A74).

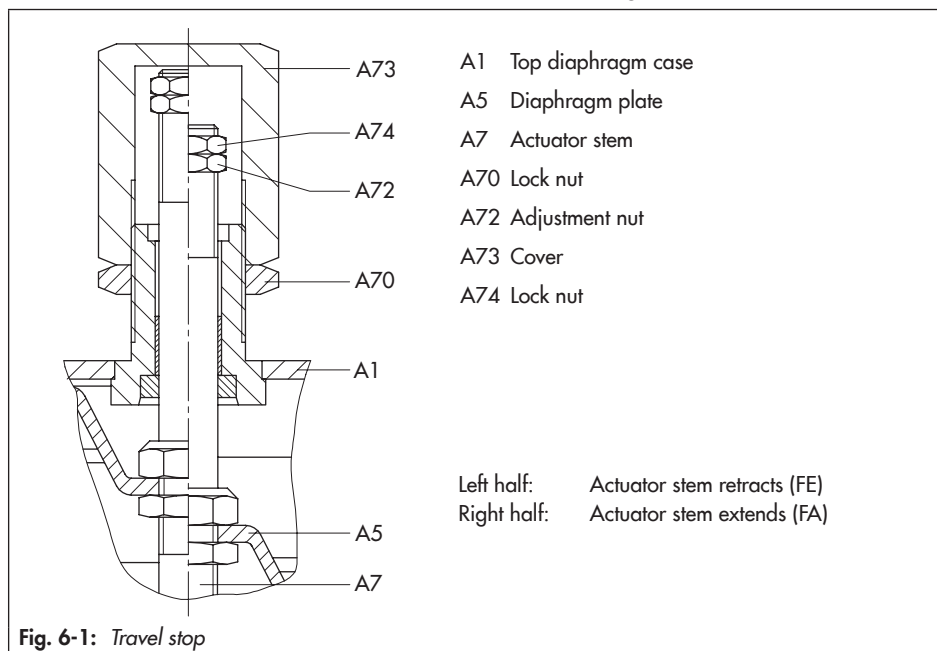
4. Attach the cover (A73) and retighten the lock nut (A70).

### 6.2.2 Top travel stop (maximum travel)

1. Loosen the lock nut (A70).
2. Adjust the cover (A73) to the required travel stop.
3. Retighten lock nut (A70).

## 6.3 Version with handwheel

A stem connector (A51) links the handwheel and actuator stem. The actuator stem position can be adjusted using the handwheel (A60). See Fig. 6-2.



## Start-up

To change from manual to automatic operation, put the handwheel into the neutral position by aligning the dot on the stem connector (A51) within the window on the plastic cover with the horizontal marking on the housing. To change from manual to automatic operation, put the handwheel into the neutral position.

### **i** Note

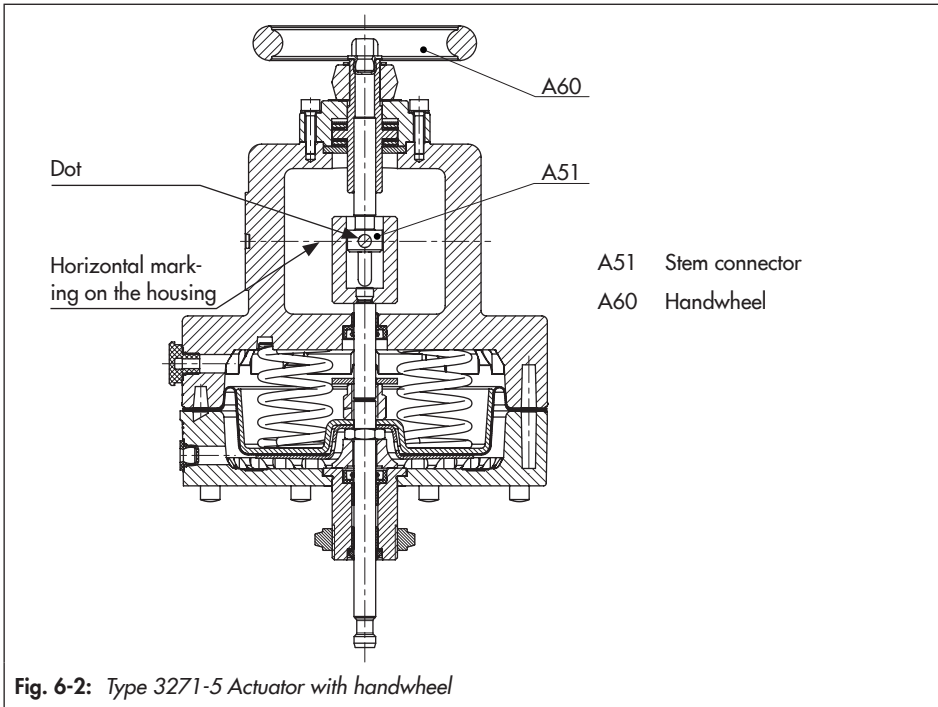
If you want to fit a handwheel to an actuator, contact our after-sales service.

## 6.3.1 Extending the actuator stem manually

1. Turn the handwheel clockwise until the bottom stop position is reached.
2. Extend the actuator stem up to the required position.

## 6.3.2 Retracting the actuator stem manually

1. Turn the handwheel counterclockwise until the top stop position is reached.
2. Retract the actuator stem up to the required position.



## 7 Operation

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### **⚠ WARNING**

**Risk of personal injury due to exhaust air being vented.**

The actuator is operated with air. As a result, air is vented during operation.

- Wear eye and hearing protection when working near the actuator.

### **⚠ WARNING**

**Crush hazard arising from the moving actuator stem.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator stem by inserting objects into the yoke.
- Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See 'Relieving the spring compression in the actuator' in the 'Removal' section.

### **⚠ WARNING**

**Risk of personal injury through incorrect operation, use or installation as a result of incorrect information on the actuator.**

After any adjustment or conversion work, the details on the actuator nameplate may no longer be correct. This may apply, for example, to the configuration ID or the symbol after reversal of the direction of action.

- Immediately renew any nameplates or labels with incorrect or outdated information.
- Add any new values to the nameplate. If necessary, contact SAMSON to obtain a new nameplate.

## 7.1 Throttling service

The maximum permissible supply pressure is specified in the order confirmation for the control valve. It is, however, restricted to 6 bar in throttling service for Type 3271-5 and Type 3277-5 Pneumatic Actuators.

## 7.2 On/off service

In on/off service, the supply pressure must be limited depending on the bench range or operating range of the actuator. The applicable bench range or operating range which the actuator can move through is written on the nameplate (see the 'Markings on the device' section).

## Operation

### Actuator stem retracts

With fail-safe action "actuator stem retracts", the permissible supply pressure must not exceed the upper bench range value by more than 3 bar:

Rated signal 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

### Actuator stem extends

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

## 7.3 Manual mode (versions with handwheel only)

In the manual mode, the valve is opened and closed by the handwheel. The valve position is independent of the signal pressure or actuator springs.

The handwheel must be in the neutral position to allow the actuator to move through its entire travel range in throttling or on/off service.

## 7.4 Additional notes concerning operation

- Label actuators with reduced supply pressure with a sticker ("Max. supply pressure limited to ... bar").
- Only apply the signal pressure to the signal pressure connection (S) on the diaphragm chamber of the actuator which does not contain any springs (see Fig. 3-1 in the 'Design and principle of operation' section).
- Only use vent plugs that let air through them (A16 in Fig. 3-1 in the 'Design and principle of operation' section).

## 8 Malfunctions

Read hazard statements, warnings and caution notes in the 'Safety instructions and measures' section.

### 8.1 Troubleshooting

Malfunction	Possible reasons	Recommended action
Actuator stem does not move on demand.	Actuator is blocked.	Put the control valve out of operation (see the 'Decommissioning' section) and remove the blockage. <b>WARNING!</b> A blocked actuator (e.g. due to seizing up after remaining in the same position for a long time) can suddenly start to move uncontrollably. Injury to hands or fingers is possible if they are inserted into the actuator or valve. Before trying to unblock the actuator stem, disconnect and lock the pneumatic air supply as well as the control signal. Before unblocking the actuator stem, release any stored energy in the actuator (e.g. spring compression). See 'Relieving the spring compression in the actuator' in the 'Removal' section.
	Insufficient signal pressure	Check the signal pressure. Check the signal pressure line for leakage.
	Signal pressure not connected to the correct diaphragm chamber.	See 'Signal pressure routing' in the 'Design and principle of operation' section.
	Diaphragm in the actuator defective	See 'Replacing the diaphragm' in the 'Servicing' section.
Actuator stem does not stroke through its complete travel range.	Travel stop active	See 'Adjusting the travel stop' in the 'Start-up' section.
	Insufficient signal pressure	Check the signal pressure. Check the signal pressure line for leakage.
	Incorrect setting of valve accessories.	Check the actuator without valve accessories. Check the settings of the valve accessories.

#### **i** Note

Contact our after-sales service for malfunctions not listed in the table.

## **8.2 Emergency action**

Plant operators are responsible for emergency action to be taken in the plant.



## 9 Servicing and conversion

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

The following documents are also required for servicing the valve:

- ► AB 0100 for tools, tightening torques and lubricant

### **⚠ DANGER**

#### **Risk of bursting due to incorrect opening of pressurized equipment or components.**

Pneumatic actuators are pressure equipment that may burst when handled incorrectly.

Flying projectile fragments or components can cause serious injury or even death.

Before working on the actuator:

- Depressurize all plant sections concerned and the actuator. Release any stored energy.

### **⚠ WARNING**

#### **Risk of personal injury due to preloaded springs.**

Actuators with preloaded springs are under tension. These actuators can be identified by several longer bolts with nuts protruding from the bottom diaphragm case. Actuators with considerably preloaded springs are also labeled correspondingly (see the 'Markings on the device' section).

- Only open the actuator following the instructions in this document. See 'Relieving the spring compression in the actuator' in the 'Removal' section.

### **⚠ WARNING**

#### **Risk of personal injury due to exhaust air being vented.**

The actuator is operated with air. As a result, air is vented during operation.

- Wear eye and hearing protection when working near the actuator.

### **⚠ WARNING**

#### **Crush hazard arising from the moving actuator stem.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator stem by inserting objects into the yoke.
- Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See 'Relieving the spring compression in the actuator' in the 'Removal' section.

### **⚠ WARNING**

#### **Risk of personal injury through incorrect operation, use or installation as a result of incorrect information on the actuator.**

After any adjustment or conversion work, the details on the actuator nameplate may no

## Servicing and conversion

longer be correct. This may apply, for example, to the configuration ID or the symbol after reversal of the direction of action.

- Immediately renew any nameplates or labels with incorrect or outdated information.
- Add any new values to the nameplate. If necessary, contact SAMSON to obtain a new nameplate.

---

### **!** NOTICE

#### **Risk of actuator damage due to excessively high or low tightening torques.**

Observe the specified torques when tightening actuator components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are not tightened far enough may loosen.

- Observe the specified tightening torques (▶ AB 0100).

---

### **!** NOTICE

#### **Risk of actuator damage due to the use of unsuitable tools.**

- Only use tools approved by SAMSON (▶ AB 0100).

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### **!** NOTICE

#### **Risk of valve damage due to the use of unsuitable lubricants.**

- Only use lubricants approved by SAMSON (▶ AB 0100).

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### **i** Note

- The product warranty becomes void if service or repair work not described in these instructions is performed without prior agreement by SAMSON's After-sales Service.
- Only use original spare parts by SAMSON, which comply with the original specifications.

---

## 9.1 Periodic testing

Depending on the operating conditions, check the actuator at certain intervals to prevent possible failure before it can occur. Plant operators are responsible for drawing up an inspection and test plan.

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### **💡** Tip

Our after-sales service can support you in drawing up an inspection and test plan for your plant.

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## 9.2 Preparation for servicing or conversion work

1. Lay out the necessary material and tools to have them ready for the intended work.
2. Put the actuator out of operation (see the 'Decommissioning' section).
3. Remove the actuator from the valve (see the 'Removal' section).

**i Note**

To remove an actuator with "stem extends" fail-safe action and/or with preloaded springs, a certain signal pressure must be applied to the actuator (see the 'Removal' section). Afterwards, the signal pressure must be removed and the air supply disconnected again and locked.

4. Relieve the compression from the preloaded springs. See 'Relieving the spring compression in the actuator' in the 'Removal' section.
5. Unthread and remove the nuts and bolts (including the washers) from around the actuator casing.

The following service and/or conversion work can be performed after preparation is completed:

- Replace the diaphragm (see section 9.4.1)
- Replace the actuator stem seals (see section 9.4.2)
- Reverse the direction of action (see section 9.5.1)

### 9.3 Mounting the actuator on the valve after service or conversion work

1. Mount the actuator (see the 'Installation' section).
2. Adjust the upper or lower bench range values (see the 'Start-up' section).

## 9.4 Service work

See Fig. 9-1

### 9.4.1 Replacing the diaphragm

 **Tip**

We recommend to also replace the actuator stem seal on replacing the diaphragm. See section 9.4.2.

#### a) Actuator stem extends

1. Lift off the top diaphragm case (A1) and remove springs (A10).
2. Pull the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) out of the bottom diaphragm case (A2).
3. Unscrew the collar nut (A15).

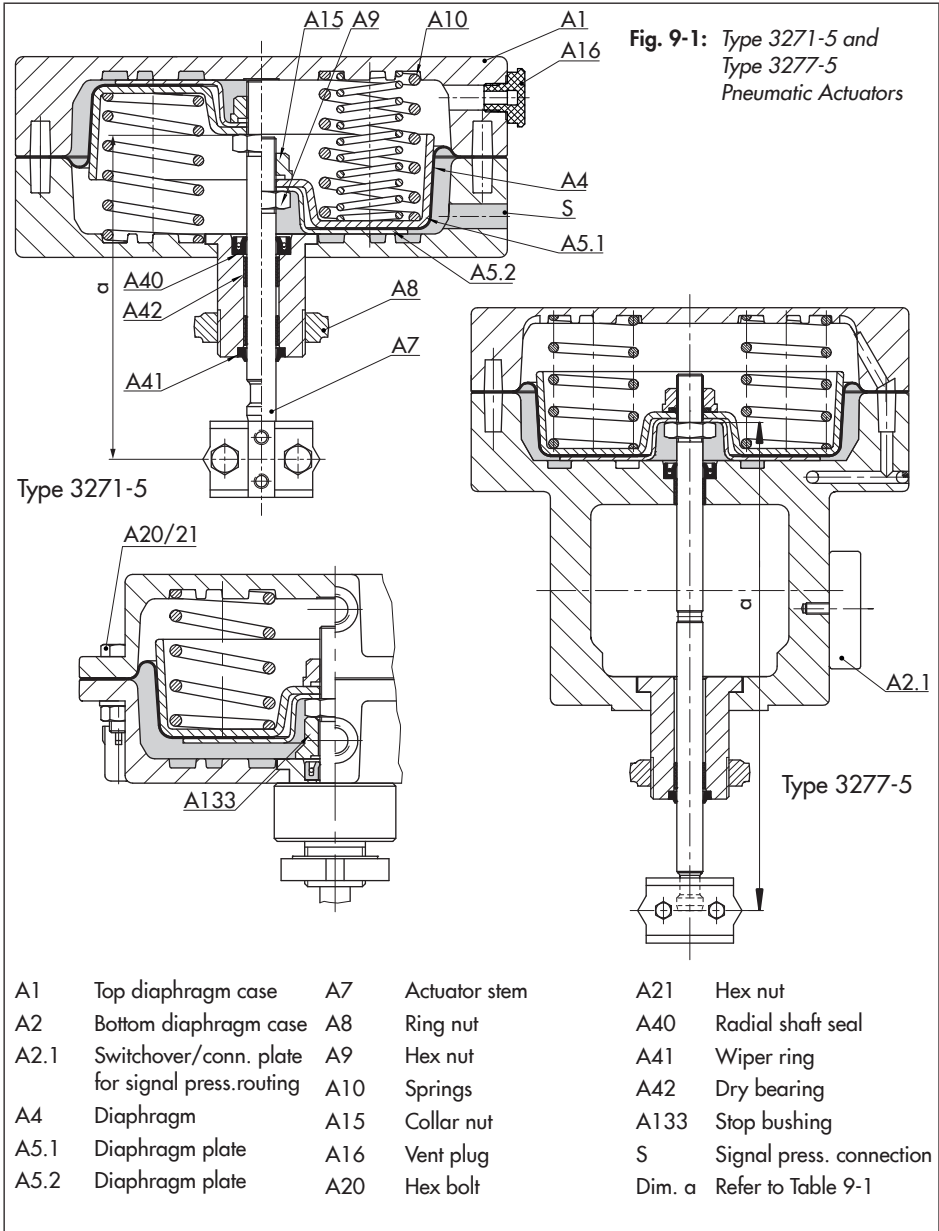
 **NOTICE**

**Malfunction due to loosened nut.**

The nut (A9) on the actuator stem serves to adjust the dimension a.

- ➔ Do not undo the nut (A9).
- ➔ If the nut has been loosened, readjust the dimension a as specified in Table 9-1.

4. Remove the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) from the actuator stem (A7).
5. Place the new diaphragm on the diaphragm plate (A5.2). Place on the other diaphragm plate (A5.1).



6. Check the sealing element of the collar nut (A15). If necessary, renew it (order no. 8353-0533).
  7. Apply a suitable lubricant to the actuator stem (A7).
  8. Place the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) in the bottom diaphragm case (A2).
  9. Tighten the collar nut (A15).
  10. Place the springs (A10) into the bottom diaphragm case, centering them in the intended recesses.
  11. Place on the top diaphragm case (A1).
  12. Fasten the top and bottom diaphragm cases (A1, A2) together using the nuts (A21) and bolts (A20). Observe tightening torques.
4. Remove the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) from the actuator stem (A7).
  5. Place the new diaphragm on the diaphragm plate (A5.2). Place on the other diaphragm plate (A5.1).
  6. Check the sealing element of the collar nut (A15). If necessary, renew it (order no. 8353-0533).
  7. Check whether the springs (A10) rest correctly in the bottom diaphragm case (A2).
  8. Apply a suitable lubricant to the actuator stem (A7).
  9. Place the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) in the bottom diaphragm case (A2).
  10. Tighten the collar nut (A15).
  11. Place on the top diaphragm case (A1).
  12. Fasten the top and bottom diaphragm cases (A1, A2) together using the nuts (A21) and bolts (A20). Observe tightening torques.

## b) Actuator stem retracts

1. Lift off the top diaphragm case (A1).
2. Pull the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) out of the bottom diaphragm case (A2).
3. Unscrew the collar nut (A15).

### NOTICE

#### **Malfunction due to loosened nut.**

The nut (A9) on the actuator stem serves to adjust the dimension *a*.

- Do not undo the nut (A9).
- If the nut has been loosened, readjust the dimension *a* as specified in Table 9-1.

## 9.4.2 Replacing the actuator stem seals

### Tip

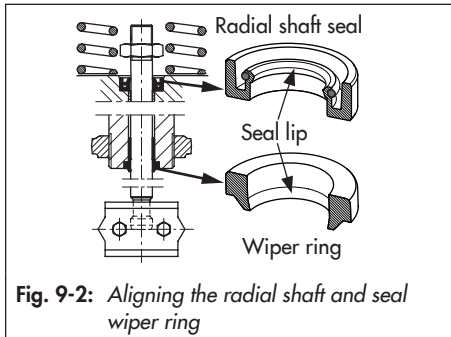
We recommend to also replace the actuator stem seal on replacing the diaphragm. See section 9.4.1.

### a) Actuator stem extends

1. Lift off the top diaphragm case (A1) and remove springs (A10).
2. Pull the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) out of the bottom diaphragm case (A2).
3. Remove the radial shaft seal (A40).
4. Check the dry bearing (A42) and wiper (A41) and renew them, if necessary.
5. Apply a suitable lubricant to the seal lip of the new radial shaft seal.
6. Use a suitable tool to mount the radial shaft seal. Observe the correct alignment of the radial shaft seal (see Fig. 9-2).
7. Fill the cavity of the radial shaft seal, in which the spring is seated, with lubricant.
8. Apply a suitable lubricant to the actuator stem (A7).
9. Place the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) in the bottom diaphragm case (A2).
10. Place the springs (A10) into the bottom diaphragm case, centering them in the intended recesses.
11. Place on the top diaphragm case (A1).
12. Fasten the top and bottom diaphragm cases (A1, A2) together using the nuts (A21) and bolts (A20). Observe tightening torques.

### b) Actuator stem retracts

1. Lift off the top diaphragm case (A1).
2. Pull the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) out of the bottom diaphragm case (A2).
3. Remove the radial shaft seal (A40).
4. Check the dry bearing (A42) and wiper (A41) and renew them, if necessary.
5. Apply a suitable lubricant to the seal lip of the new radial shaft seal.
6. Use a suitable tool to mount the radial shaft seal. Observe the correct alignment of the radial shaft seal (see Fig. 9-2).
7. Fill the cavity of the radial shaft seal, in which the spring is seated, with lubricant.
8. Apply a suitable lubricant to the actuator stem (A7).
9. Place the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) in the bottom diaphragm case (A2).
10. Place on the top diaphragm case (A1).
11. Fasten the top and bottom diaphragm cases (A1, A2) together using the nuts (A21) and bolts (A20). Observe tightening torques.

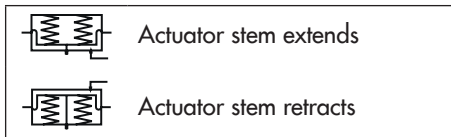


## 9.5 Conversion work

See Fig. 9-1

### 9.5.1 Reversing the direction of action (fail-safe action)

The direction of action (and fail-safe action) of pneumatic actuators can be changed. The fail-safe action is indicated on the nameplate by a symbol:



#### a) Reversal of the direction of action from stem extends to stem retracts

1. Lift off the top diaphragm case (A1) and remove springs (A10).
2. Pull the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm

(A4) and diaphragm plate (A5.2) out of the bottom diaphragm case (A2).

3. Unscrew the collar nut (A15).

#### NOTICE

##### **Malfunction due to loosened nut.**

The nut (A9) on the actuator stem serves to adjust the dimension *a*.

- ➔ Do not undo the nut (A9).
- ➔ If the nut has been loosened, readjust the dimension *a* as specified in Table 9-1.

4. Remove the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) from the actuator stem (A7) and place them back on again in the reverse order.
5. Tighten the collar nut (A15).
6. Apply a suitable lubricant to the actuator stem (A7).
7. Place the springs (A10) in the bottom diaphragm case (A2), centering them in the intended recesses.
8. Place the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) in the bottom diaphragm case (A2).
9. Place on the top diaphragm case (A1).
10. Fasten the top and bottom diaphragm cases (A1, A2) together using the nuts (A21) and bolts (A20). Observe tightening torques.
11. **Type 3271-5:** connect the signal pressure as described in 'Pneumatic connection' in the 'Installation' section. Unscrew

the vent plug (A16) from the top signal pressure connection and screw it into the bottom connection (S).

**Type 3277-5:** connect the signal pressure as described in 'Pneumatic connection' in the 'Installation' section.

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 top connection (S) on the top diaphragm case. As a result, the actuator stem extends opposing the spring force as the signal pressure increases.

12. Affix a new nameplate with changed symbol and new configuration ID to the actuator.

### b) Reversal of the direction of action from stem retracts to stem extends

1. Lift off the top diaphragm case (A1).
2. Pull the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) out of the bottom diaphragm case (A2).
3. Remove the springs (A10).
4. Unscrew the collar nut (A15).

#### ⚠ NOTICE

##### **Malfunction due to loosened nut.**

The nut (A9) on the actuator stem serves to adjust the dimension *a*.

→ Do not undo the nut (A9).

→ If the nut has been loosened, readjust the dimension *a* as specified in Table 9-1.

5. Remove the diaphragm plate (A51), diaphragm (A4) and diaphragm plate (A5.2) from the actuator stem (A7) and place them back on again in the reverse order.
6. Tighten the collar nut (A15).
7. Apply a suitable lubricant to the actuator stem (A7).
8. Place the actuator stem (A7) together with the diaphragm plate (A5.1), diaphragm (A4) and diaphragm plate (A5.2) in the bottom diaphragm case (A2).
9. Place the springs (A10) in the bottom diaphragm case (A2), centering them in the intended recesses.
10. Place on the top diaphragm case (A1).
11. Fasten the top and bottom diaphragm cases (A1, A2) together using the nuts (A21) and bolts (A20). Observe tightening torques.
12. **Type 3271-5:** connect the signal pressure as described in 'Pneumatic connection' in the 'Installation' section. Unscrew the vent plug (A16) from the bottom signal pressure connection and screw it into the top connection (S).

**Type 3277-5:** connect the signal pressure as described in 'Pneumatic connection' in the 'Installation' section.

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 bottom connection (S) on the bottom diaphragm case. As a result, the actuator stem retracts opposing the spring force as the signal pressure increases.

13. Affix a new nameplate with changed symbol and new configuration ID to the actuator.

## 9.6 Determining dimension a

If the nut (A9) has come undone at the actuator stem (A7) during service and conversion work, the dimension a (see Fig. 9-1) must be readjusted.

**Table 9-1:** *Dimension a*

Type/version	Travel [mm]	Dimension a [mm]
3271-5	15	100.75
Type 3271-5 for micro-flow valve	7.5	86
3277-5	15	188.5
3277-5	20	185.5
Type 3277-5 for micro-flow valve	7.5	158.5

## 9.7 Ordering spare parts and operating supplies

Contact your nearest SAMSON subsidiary or SAMSON's After-sales Service for information on spare parts, lubricants and tools.

### Spare parts

See Annex for details on spare parts.

### Lubricant

See document ► AB 0100 for details on suitable lubricants.

### Tools

See document ► AB 0100 for details on suitable tools.



## 10 Decommissioning

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### **⚠ DANGER**

#### **Risk of bursting due to incorrect opening of pressurized equipment or components.**

Pneumatic actuators are pressure equipment that may burst when handled incorrectly.

Flying projectile fragments or components can cause serious injury or even death.

Before working on the actuator:

- Depressurize all plant sections concerned and the actuator. Release any stored energy.

### **⚠ WARNING**

#### **Risk of personal injury due to preloaded springs.**

Actuators with preloaded springs are under tension. These actuators can be identified by several longer bolts with nuts protruding from the bottom diaphragm case. Actuators with considerably preloaded springs are also labeled correspondingly (see the 'Markings on the device' section).

- Only open the actuator following the instructions in this document. See 'Relieving the spring compression in the actuator' in the 'Removal' section.

### **⚠ WARNING**

#### **Risk of personal injury due to exhaust air being vented.**

The actuator is operated with air. As a result, air is vented during operation.

- Wear eye and hearing protection when working near the actuator.

### **⚠ WARNING**

#### **Crush hazard arising from the moving actuator stem.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator stem by inserting objects into the yoke.
- Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See 'Relieving the spring compression in the actuator' in the 'Removal' section.

To decommission the actuator for service work or before removing it from the valve, proceed as follows:

1. Put the control valve out of operation. See associated valve documentation.
2. Disconnect the pneumatic air supply to depressurize the actuator.



## 11 Removal

The work described in this section is only to be performed by personnel appropriately qualified to carry out such tasks.

### **⚠ DANGER**

#### **Risk of bursting due to incorrect opening of pressurized equipment or components.**

Pneumatic actuators are pressure equipment that may burst when handled incorrectly.

Flying projectile fragments or components can cause serious injury or even death.

Before working on the actuator:

- Depressurize all plant sections concerned and the actuator. Release any stored energy.

### **⚠ WARNING**

#### **Risk of personal injury due to preloaded springs.**

Actuators with preloaded springs are under tension. These actuators can be identified by several longer bolts with nuts protruding from the bottom diaphragm case. Actuators with considerably preloaded springs are also labeled correspondingly (see the 'Markings on the device' section).

- Only open the actuator following the instructions in this document. See 'Relieving the spring compression in the actuator' in the 'Removal' section.

### **⚠ WARNING**

#### **Risk of personal injury due to exhaust air being vented.**

The actuator is operated with air. As a result, air is vented during operation.

- Wear eye and hearing protection when working near the actuator.

### **⚠ WARNING**

#### **Crush hazard arising from the moving actuator stem.**

- Do not touch the actuator stem or insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator stem by inserting objects into the yoke.
- Before unblocking the actuator stem after it has become blocked (e.g. due to seizing up after remaining in the same position for a long time), release any stored energy in the actuator (e.g. spring compression). See 'Relieving the spring compression in the actuator' in the 'Removal' section.

Before removing the valve, make sure the following conditions are met:

- The actuator is put out of operation (see the 'Decommissioning' section).

## Removal

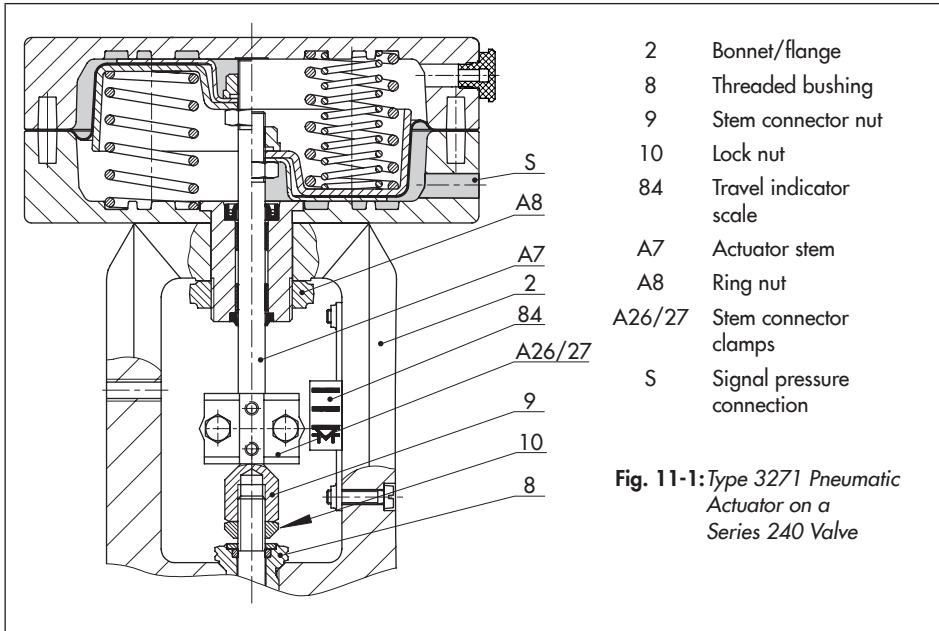
### 11.1 Removing the actuator from the valve

#### a) Series 240 Valves

1. Undo the clamps of the stem connector (A26/27).
2. Loosen the stem connector nut (9) and lock nut (10).
3. **In the "actuator stem extends" version:** to retract the actuator stem, apply a signal pressure corresponding to approx. 50 % of the bench range to the actuator. Loosen the ring nut (A8). Disconnect the signal pressure.

**In the "actuator stem retracts" version:** undo ring nut (A8).

4. Lift the actuator off the valve.
5. Fasten the lock nut (10) and stem connector nut (9) on the valve.
6. Fasten ring nut (A8) on the actuator.



**Fig. 11-1:** Type 3271 Pneumatic Actuator on a Series 240 Valve

## b) Type 3510 Micro-flow Valve

1. Loosen the lock nut (A27.3).
2. **In the "actuator stem extends" version:** to retract the actuator stem, apply a signal pressure corresponding to approx. 50 % of the bench range to the actuator. Use a suitable tool to hold the stem connector nut (A27.1) and bearing sleeve (A27.2) stationary and unscrew them. Disconnect the signal pressure.

**In the "actuator stem retracts" version:** use a suitable tool to hold the stem con-

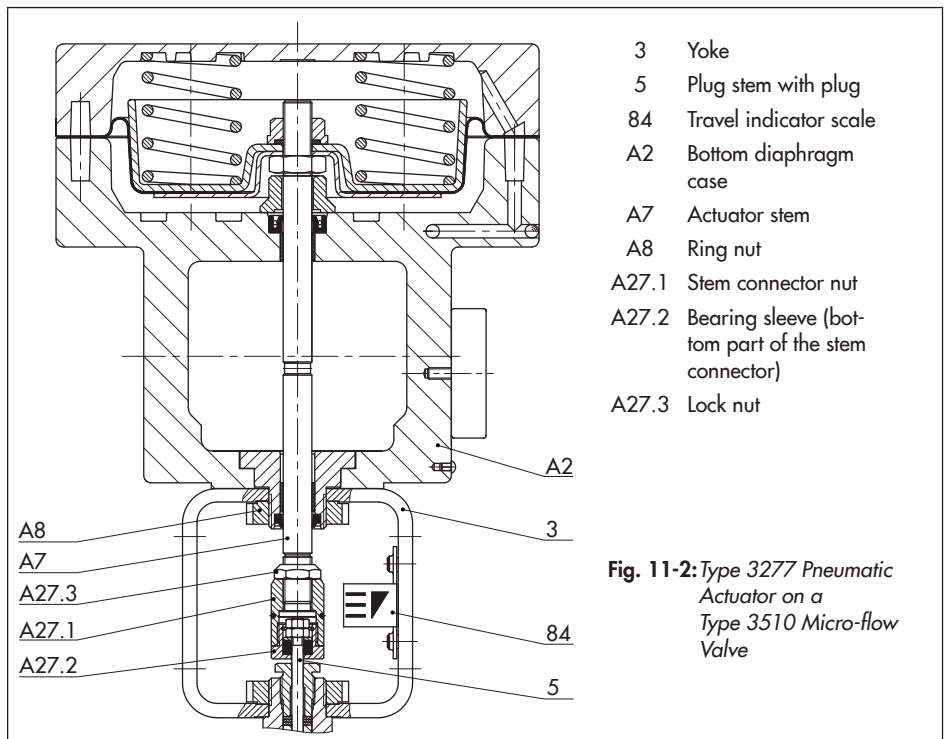
necter nut (A27.1) and bearing sleeve (A27.2) stationary and unscrew them.

3. Loosen the ring nut (A8).
4. Lift the actuator off the valve.
5. Loosely thread the lock nut (A27.3) and stem connector nut (A27.1) on the actuator.

**i Note**

*The bearing sleeve (A27.2) remains on the valve.*

6. Fasten ring nut (A8) on the actuator.



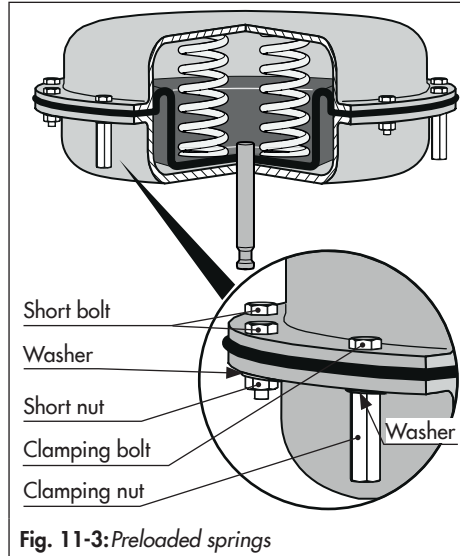
**Fig. 11-2:** Type 3277 Pneumatic Actuator on a Type 3510 Micro-flow Valve

## 11.2 Relieving the spring compression in the actuator

The long clamping bolts with long clamping nuts and the short bolts with short nuts are arranged evenly around the circumference of the actuator housing to fasten the top and bottom diaphragm cases together. The springs in the actuator are compressed using the long clamping nuts and bolts.

To relieve the compression of the springs in the actuator, proceed as follows:

1. Unthread and remove the short nuts and bolts (including the washers) on the diaphragm cases.
2. Loosen the long clamping nuts and bolts on the diaphragm cases evenly in a crisscross pattern to gradually relieve the spring compression. Hold the bolt head stationary with a suitable tool and apply the torque to the nuts.



**Fig. 11-3:** Preloaded springs



## 12 Repairs

If the actuator does not function properly according to how it was originally sized or does not function at all, it is defective and must be repaired or exchanged.

### ! NOTICE

**Risk of actuator damage due to incorrect service or repair work.**

- ➔ Do not perform any repair work on your own.
- ➔ Contact SAMSON's After-sales Service for repair work.

### 12.1 Returning devices to SAMSON

Defective devices can be returned to SAMSON for repair.

Proceed as follows to return devices:

1. Exceptions apply concerning some special device models
  - ▶ [www.samsongroup.com](http://www.samsongroup.com) > Service > After-sales Service.
2. Send an e-mail
  - ▶ [returns-de@samsongroup.com](mailto:returns-de@samsongroup.com) to register the return shipment including the following information:
    - Type
    - Article no.
    - Configuration ID
    - Original order

- Completed Declaration on Contamination, which can be downloaded from our website at
  - ▶ [www.samsongroup.com](http://www.samsongroup.com) > Service > After-sales Service.

**After checking your registration, we will send you a return merchandise authorization (RMA).**

3. Attach the RMA (together with the Declaration on Decontamination) to the outside of your shipment so that the documents are clearly visible.
4. Send the shipment to the address given on the RMA.

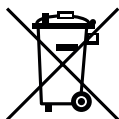
### i Note

*Further information on returned devices and how they are handled can be found at*

- ▶ [www.samsongroup.com](http://www.samsongroup.com) > Service > After-sales Service.



## 13 Disposal



SAMSON is a producer registered at the following European institution  
 ► <https://www.ewrn.org/national-registers/national-registers>.  
 WEEE reg. no.: DE 62194439/  
 FR 02566

- ➔ Observe local, national and international refuse regulations.
- ➔ Do not dispose of components, lubricants and hazardous substances together with your household waste.

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### **i** Note

*We can provide you with a recycling passport according to PAS 1049<sup>1)</sup> on request. Simply e-mail us at [offersaleservice@samsongroup.com](mailto:offersaleservice@samsongroup.com) giving details of your company address.*

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### Tip

*On request, we can appoint a service provider to dismantle and recycle the product as part of a distributor take-back scheme.*

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<sup>1)</sup> PAS 1049 is relevant to electrical and electronic equipment (e.g. electric actuators). This PAS specification does not apply to non-electrical equipment.



## 14 Certificates

The declarations of incorporation in compliance with Machinery Directive 2006/42/EC and the Directive 2008 No. 1597 Supply of Machinery (Safety) Regulations 2008 for Type 3271-5 and Type 3277-5 Pneumatic Actuators with 120 cm<sup>2</sup> actuator areas are provided on the following pages.

The certificates shown were up to date at the time of publishing. The latest certificates can be found on our website:

- ► [www.samsongroup.com](http://www.samsongroup.com) > *Products* > *Actuators* > *3271*
- ► [www.samsongroup.com](http://www.samsongroup.com) > *Products* > *Actuators* > *3277*

Other optional certificates are available on request.

# DECLARATION OF INCORPORATION TRANSLATION



## Declaration of Incorporation in Compliance with Machinery Directive 2006/42/EC

For the following products:

### Type 3271 and Type 3277 Actuators

We certify that the Type 3271 and Type 3277 Actuators are partly completed machinery as defined in the Machinery Directive 2006/42/EC and that the safety requirements stipulated in Annex I, 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4 and 1.3.7 are observed. The relevant technical documentation described in Annex VII, part B has been compiled.

Products we supply must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive 2006/42/EC.

Operators are obliged to install the products observing the accepted industry codes and practices (good engineering practice) as well as the mounting and operating instructions. Operators must take appropriate precautions to prevent hazards that could be caused by the signal pressure and moving parts in/on the actuator.

The permissible limits of application and mounting instructions for the products are specified in the associated data sheets as well as the mounting and operating instructions; the documents are available in electronic form on the Internet at [www.samson.de](http://www.samson.de).

For product descriptions of the actuators, refer to:

- Types 3271 and 3277 Actuators: Mounting and Operating Instructions EB 8310-X

Referenced technical standards and/or specifications:

- VCI, VDMA, VGB: "Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen, Mai 2018" [German only]
- VCI, VDMA, VGB: "Zusatzdokument zum „Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen vom Mai 2018" [German only], based on DIN EN ISO 12100:2011-03

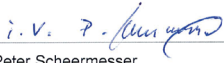
Comments:

- See mounting and operating instructions for residual hazards.
- Also observe the referenced documents listed in the mounting and operating instructions.

Persons authorized to compile the technical file:

SAMSON AG, Weismüllerstraße 3, 60314 Frankfurt am Main, Germany  
Frankfurt am Main, 1 October 2019

  
\_\_\_\_\_  
Dr. Michael Heß  
Director  
Product Management and Technical Sales

  
\_\_\_\_\_  
Peter Scheermesser  
Director  
Product Upgrades and ETO Valves and Actuators

Revision no. 00



### Declaration of Incorporation of Partly Completed Machinery

in accordance with Schedule 2 Part 2 Annex II, section 1.B. of the Directive 2008 No. 1597 Supply of Machinery (Safety) Regulations 2008

For the following product:  
**Type 3271 and Type 3277 Actuators**

We certify that the Type 3271 and Type 3277 Actuators are partly completed machinery as defined in the in Directive 2008 No. 1597 Supply of Machinery (Safety) Regulations 2008 and that the safety requirements stipulated in Annex I, 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4 and 1.3.7 are observed. The relevant technical documentation described in Annex VII, (Part 7 of Schedule 2) part B has been compiled.

Products we supply must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive 2008 No. 1597 Supply of Machinery (Safety) Regulations 2008.

Operators are obliged to install the products observing the accepted industry codes and practices (good engineering practice) as well as the mounting and operating instructions. Operators must take appropriate precautions to prevent hazards that could be caused by the process medium and operating pressure in the valve as well as by the signal pressure and moving parts.

The permissible limits of application and mounting instructions for the products are specified in the associated mounting and operating instructions; the documents are available in electronic form on the Internet at [www.samsongroup.com](http://www.samsongroup.com).

For product descriptions refer to:  
- Types 3271 and 3277 Actuators: Mounting and Operating Instructions EB 8310-X

Referenced technical standards and/or specifications:  
- VCI, VDMA, VGB: "Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen, Mai 2018" [German only]  
- VCI, VDMA, VGB: "Zusatzdokument zum Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen vom Mai 2018" [German only], based on DIN EN ISO 12100:2011-03

Comments:  
- See mounting and operating instructions for residual hazards.  
- Also observe the referenced documents listed in the mounting and operating instructions.

Persons authorized to compile the technical file:

SAMSON AG, Weismüllerstraße 3, 60314 Frankfurt am Main, Germany  
Frankfurt am Main, 13 December 2021

Stephan Giesen  
Director  
Product Management

Peter Scheermesser  
Director  
Product Life Cycle Management and ETO  
Development for Valves and Actuators

Revision 00





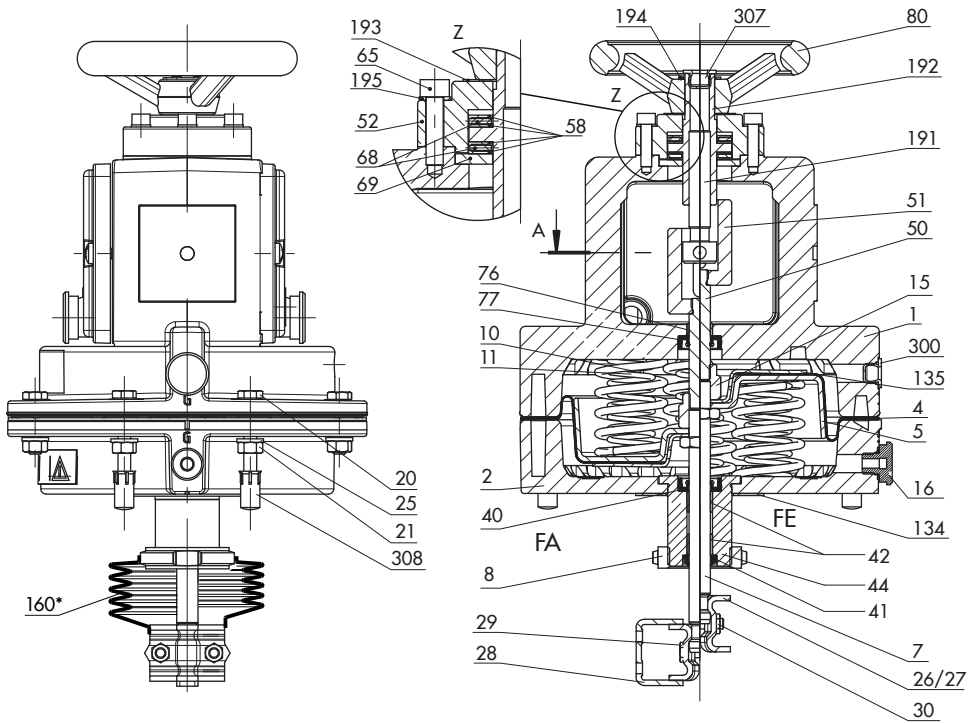
## 15 Annex

### 15.1 Tightening torques, lubricants and tools

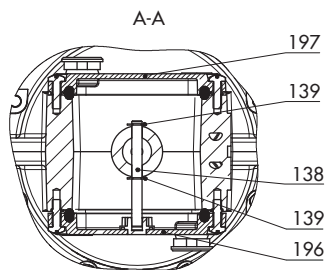
▶ AB 0100 for tools, tightening torques and lubricants

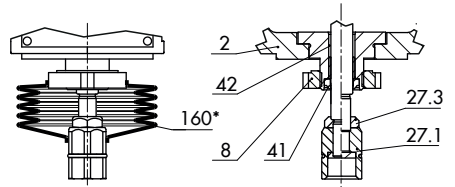
### 15.2 Spare parts

1	Top diaphragm case	68	Axial needle seal
2	Bottom diaphragm case	69	Shim
2.1	Switchover or connecting plate <sup>1)</sup>	76	Radial shaft seal
4	Diaphragm	77	Dry bearing
5	Diaphragm plate (two-piece)	80	Handwheel
7	Actuator stem	134	Washer
8	Ring nut	135	Diaphragm plate (two-piece)
10	Spring	138	Pin
11	Spring	139	Retaining washer
15	Collar nut	160*	Dust shield (option)
16	Vent plug	191	Pin
20	Hex bolt	192	Threaded bushing
21	Hex nut	193	Sliding washer
25	Washer	194	Retaining ring
26/27	Stem connector clamps	195	Washer
27.1	Stem connector nut <sup>2)</sup>	196	Diaphragm case
27.3	Lock nut <sup>2)</sup>	197	Diaphragm case
28	Clamp with bracket	206	Seal
29	Hex bolt	207	Filter
30	Hex nut	300	Screw plug
40	Radial shaft seal	307	Screw plug
41	Wiper ring	308	Protective cap
42	Dry bearing	FA	Actuator stem extends
44	Stop bushing	FE	Actuator stem retracts
50	Shaft	<sup>1)</sup>	Type 3277 only
51	Sleeve	<sup>2)</sup>	Only in version for micro-flow valve
52	Bearing sleeve		
58	Sliding washer		
65	Cap screw		

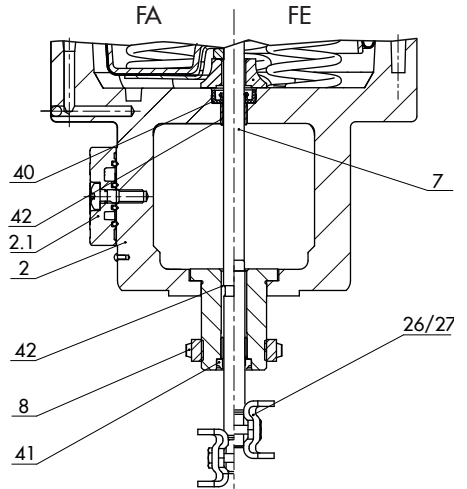
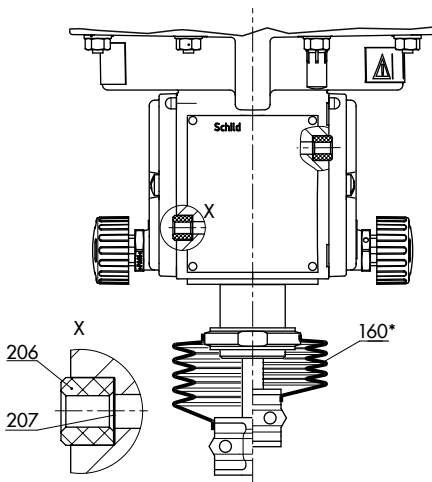


Type 3271-5 Actuator





Micro-flow valve version



Type 3277-5 Actuator

### 15.3 After-sales service

Contact our after-sales service for support concerning service or repair work or when malfunctions or defects arise.

#### E-mail address

You can reach our after-sales service at [aftersalesservice@samsongroup.com](mailto:aftersalesservice@samsongroup.com).

#### Addresses of SAMSON AG and its subsidiaries

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on our website ([www.samsongroup.com](http://www.samsongroup.com)) or in all SAMSON product catalogs.

#### Required specifications

Please submit the following details:

- Order number and position number in the order
- Type, model number, actuator area, travel, direction of action and bench range (e.g. 0.2 to 1 bar) or the operating range of the actuator
- Type designation of mounted valve (if applicable)
- Installation drawing

### 15.4 Information on the UK sales region

The following information corresponds to the 2016 Regulations No. 1105 Pressure Equipment (Safety) Regulations 2016, STATUTORY INSTRUMENTS, 2016 No. 1105 (UKCA marking). It does not apply to Northern Ireland.

#### Importer

SAMSON Controls Ltd  
Perrywood Business Park  
Honeycrock Lane  
Redhill, Surry RH1 5JQ

Phone: +44 1737 766391

E-mail: [sales-uk@samsongroup.com](mailto:sales-uk@samsongroup.com)

Website: [uk.samsongroup.com](http://uk.samsongroup.com)



**EB 8310-1 EN**



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