

MOUNTING AND OPERATING INSTRUCTIONS



EB 8317 EN

Translation of original instructions



Type 3371 with 120 cm² actuator area



Type 3371 with 350 cm² actuator area

Type 3371 Pneumatic Actuator

Actuator area: 120 and 350 cm²

Edition April 2021

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 (aftersalesservice@samsongroup.com).



Documents relating to the device, such as the mounting and operating instructions, are available on our website at www.samsongroup.com > **Service & Support > 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 3371 Actuator is 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. The actuator is suitable for on/off service. The actuator can be used in processing and industrial plants.

The actuators are designed to operate under exactly defined conditions (e.g. thrust, travel). Therefore, operators must ensure that the actuators are only used in operating conditions that meet the specifications used for sizing the actuators at the ordering stage. In case operators intend to use the actuators 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 3371 Actuator does not have any special safety features.

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

Furthermore, the actuators are partly completed machinery as defined in the Machinery Directive 2006/42/EC. The declaration of incorporation is included in the 'Certificates' section.

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).

Referenced documentation

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

- Mounting and operating instructions for the mounted valve e.g. ► EB 8111 for SAMSON Type 3321 Valve
- Mounting and operating instructions for mounted valve accessories (positioner, solenoid valve etc.)
- ► AB 0100 for tools, tightening torques and lubricant
- When a substance is used in the device, which is listed as being a substance of very high concern on the candidate list of the REACH regulation:
Information on safe use of the part affected
► www.samsongroup.com > About SAMSON > Material Compliance > REACH

If a device contains a substance which is listed as being a substance of very high concern on the candidate list of the REACH regulation, this circumstance is indicated on the SAMSON delivery note.

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 ¹⁾.
- ➔ 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 section 1.4).

- ➔ 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.

Exposure to hazardous substances poses a serious risk to health.

Certain lubricants and cleaning agents are classified as hazardous substances. These substances have a special label and a material safety data sheet (MSDS) issued by the manufacturer.

- ➔ Make sure that an MSDS is available for any hazardous substance used. If necessary, contact the manufacturer to obtain an MSDS.
- ➔ Inform yourself about the hazardous substances and their correct handling.

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 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.


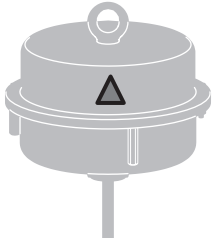
→ Only use tools approved by SAMSON (▶ AB 0100).

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

2.1 Actuator nameplate

The nameplate is stuck on the diaphragm casing (see Fig. 2-1). The nameplate of the Type 3371 with 120 cm² actuator area is located on the bottom diaphragm case. The nameplate of the Type 3371 with 350 cm²

actuator area is located on the top diaphragm case.

It includes all details required to identify the device (see Fig. 2-2):

- | | |
|---|---|
| 1 Type number | 7 Operating travel in mm |
| 2 Configuration ID | 8 Symbol indicating fail-safe action |
| 3 Serial number |  Actuator stem extends (FA) |
| 4 Permissible supply pressure p_{\max} in bar/psi |  Actuator stem retracts (FE) |
| 5 Bench range in bar | 9 Date of manufacture (month and year) |
| 6 Bench range in psi | 10 Actuator area |

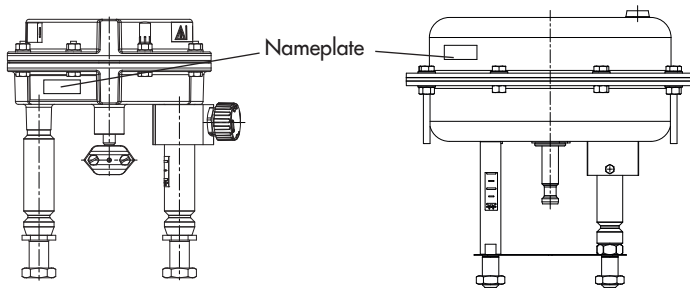


Fig. 2-1: Nameplate on actuator housing


SAMSON 3371 Pneumatic Actuator		10	8	5
⚠ See technical data for ambient temperature				6
	Model	1	7	
	Var.-ID	2		
	Serial no.	3		
Air supply max.		4		
SAMSON AG D-60314 Frankfurt		9	Made in Germany	

Fig. 2-2: Example for nameplate

3 Design and principle of operation

The Type 3371 Pneumatic Actuators have an actuator area of either 120 or 350 cm².

They are mainly used for attachment to SAMSON Series V2001 Valves:

- Type 3321 Globe Valve
- Type 3323 Three-way Valve
- Type 3531 Globe Valve for Heat Transfer Oil
- Type 3535 Three-way Valve for Heat Transfer Oil

Table 3-1 provides an overview of the possible combinations and how the actuator is mounted on the valve.

The pneumatic actuators mainly consist of two diaphragm cases, a diaphragm and internal springs. The actuator is connected to the valve bonnet using a rod-type yoke. The stem connector clamps connect the actuator stem with the plug stem of the valve.

The signal pressure p_{st} creates the force $F = p_{st} \cdot A$ at the diaphragm surface A , which is opposed by the springs in the actuator. The bench range is determined by the number of springs used and their compression, taking into account the rated travel. The travel is proportional to the signal pressure p_{st} .

3.1 Direction of action

The direction of action is determined by how the springs and diaphragm plate are arranged in the actuator. With direction of action "actuator stem retracts", the compressed air is applied to the signal pressure connec-

tion on the top diaphragm case. With direction of action "actuator stem extends", the compressed air is applied to the signal pressure connection on the bottom diaphragm case.

The direction of action can be reversed (see the 'Service and conversion work' section).

3.2 Signal pressure routing

3.2.1 120 cm² actuator area

See Fig. 3-1

In the "actuator stem extends" version, the signal pressure is routed through the bottom signal pressure connection (A35) to the bottom diaphragm chamber and moves the actuator stem (A3) upward opposing the spring force.

In the "actuator stem retracts" version, the signal pressure is routed through the top signal pressure connection to the top diaphragm chamber and moves the actuator stem (A3) downward opposing the spring force.

3.2.2 350 cm² actuator area

See Fig. 3-2

In the "actuator stem extends" version, a signal pressure connection (S) is located on the side of the yoke which is connected to the bottom diaphragm chamber over an internal hole. The signal pressure moves the actuator stem upward opposing the spring force. A positioner can be connected using a connection block at this point. No additional piping

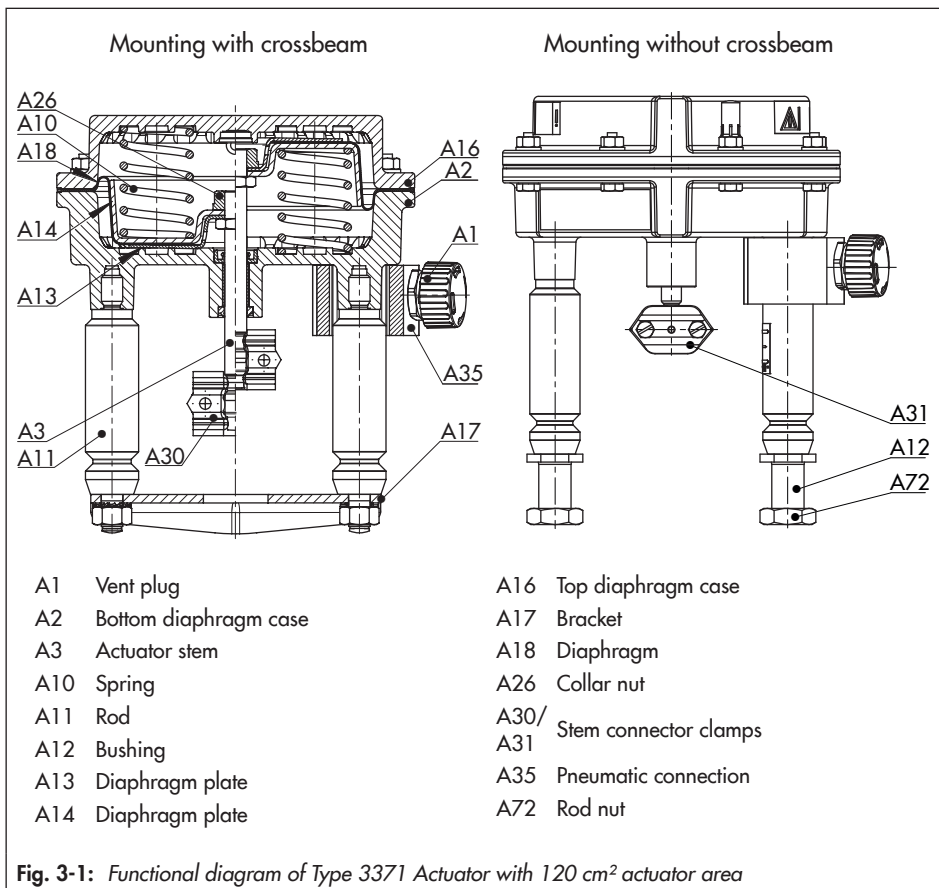
Design and principle of operation

to the actuator is required. Refer to the associated positioner documentation for more details.

In the "actuator stem retracts" version, similar to Type 3271, 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.

3.3 Fail-safe action

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.



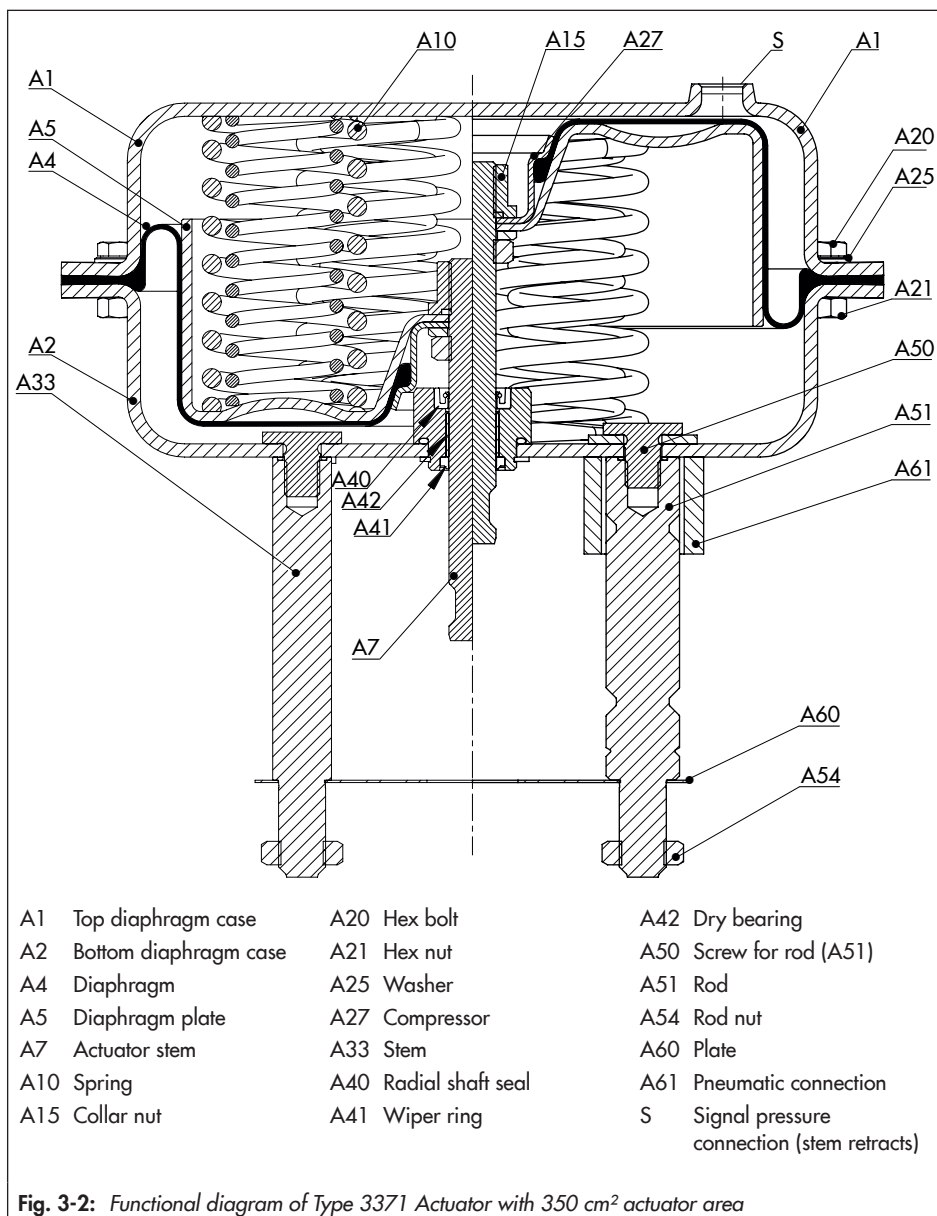


Fig. 3-2: Functional diagram of Type 3371 Actuator with 350 cm² actuator area

3.3.1 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.

3.3.2 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.

3.4 Mounting types

There are two types of mounting depending on the valve/actuator combination: mounting using a crossbeam or mounting using rods (see Table 3-1).

When the actuator is mounted to the valve using a crossbeam (form B, Fig. 3-3), the actuator is fastened to the valve bonnet using a central nut.

When the actuator is mounted using rods (form C, Fig. 3-4 and Fig. 3-5), the actuator is connected to the valve bonnet using rods. In this case, a crossbeam is not required for mounting the actuator. A plate keeps the correct distance between rods in the 350 cm² version.

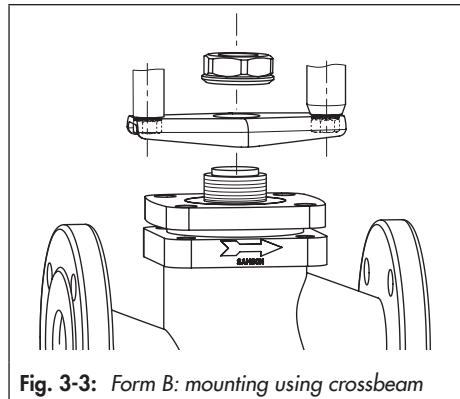


Fig. 3-3: Form B: mounting using crossbeam

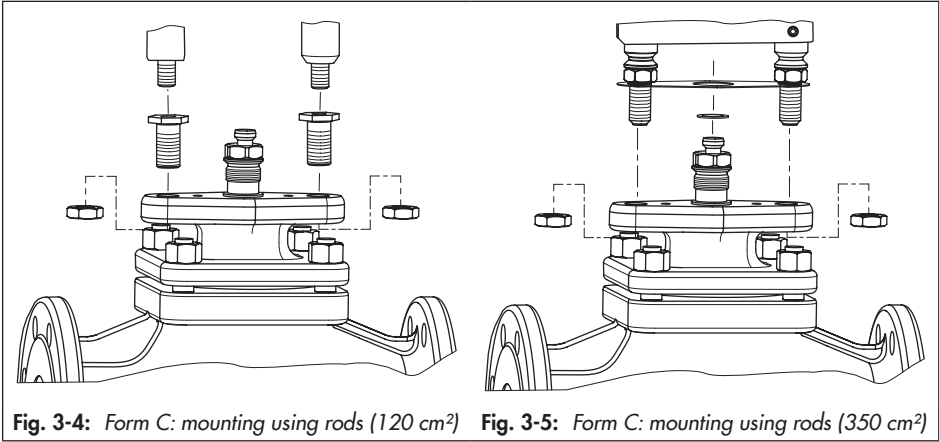


Table 3-1: Mounting types (see Fig. 3-3, Fig. 3-4 and Fig. 3-5)

	Actuator area	120 cm²	350 cm²	
	Travel	15 mm	15 mm	30 mm
Type ... Valve	Valve size DN			
3321	15 to 50	Form B	–	–
3321	65 to 100	Form C	Form C	–
3321	100	–	–	Form C
3323	15 to 50	Form B	–	–
3323	65 to 80	–	Form C	–
3323	100	–	–	Form C
3531	15 to 80	Form B	–	–
3535	15 to 80	Form B	–	–

3.5 Versions

- **Standard version of Type 3371 (120 cm²)**

The housings of Type 3371 Pneumatic Actuators have an actuator area of 120 cm² and are made of die-cast aluminum.

- **Standard version of Type 3371 (350 cm²)**

The housings of Type 3371 Pneumatic Actuators have an actuator area of 350 cm² and are made of sheet steel.

i Note

*More information is available in Data Sheet
▶ T 8317.*

3.6 Accessories

Lifting fixture for small actuators

A special lifting tool is available to lift pneumatic actuators with 120 and 350 cm² actuator areas (▶ AB 0100).

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.

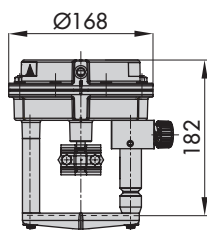
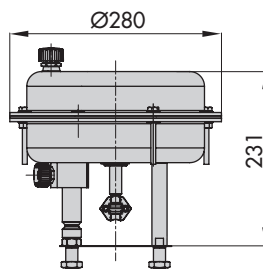
▶ AB 07

3.7 Technical data

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

Table 3-2: Technical data for Type 3371 Pneumatic Actuator

Actuator area	120 cm²				350 cm²			
Rated travel	15 mm						30 mm	
Fail-safe action	Stem retracts (FE)	Stem retracts (FE)	Stem extends (FA)	Stem extends (FA)	Stem retracts (FE)	Stem extends (FA)	Stem retracts (FE)	Stem extends (FA)
Bench range in bar	0.4 to 1.4	1.4 to 2.3		2.1 to 3.3	1.5 to 2.1	2.1 to 2.7	1.5 to 2.7	2.2 to 3.8
Supply pressure	See the 'Operation' section for restrictions							
Ambient temperature range	-35 to +90 °C				-35 to +90 °C			
Dimensions	Refer to Fig. 3-6				Refer to Fig. 3-7			
Approx. weight	3.3 kg				15 kg			
Materials								
Actuator housing	GD-ALSi10Mg				1.0332			
Diaphragm	NBR				NBR			
Actuator stem	1.4305				1.4401/1.4404			

**Fig. 3-6:** Dimensional drawing of 120 cm² version**Fig. 3-7:** Dimensional drawing of 350 cm² version

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).*
-

⚠ WARNING

Risk of personal injury due to the actuator tipping.

- ➔ *Observe the actuator's center of gravity.*
 - ➔ *Secure the actuator against tipping over or turning.*
-

WARNING

Risk of injury due to incorrect lifting without the use of lifting equipment.

Lifting the actuator without the use of lifting equipment may lead to injuries (back injury in particular) depending on the weight of the actuator.

- *Observe the occupational health and safety regulations valid in the country of use.*
-

NOTICE

Risk of actuator damage due to incorrectly attached slings.

- *Do not attach load-bearing slings to mounting parts.*
- *Observe lifting instructions (see section 4.3.2).*
-

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).

Note

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

Lifting instructions using lifting equipment

- Use a hook with safety latch to secure the slings from slipping off the hook during lifting and transporting.
- Secure slings on the object to be transported against slipping.
- Make sure the slings can be removed from the actuator once it has been mounted on the valve.

- Prevent the actuator from tilting or tipping.
- Do not leave loads suspended when interrupting work for longer periods of time.

4.4 Storing the actuator

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.

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.
- Observe permissible temperatures (see 'Technical data' in the 'Design and principle of operation' section).
- 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.*
 - ➔ *After 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.

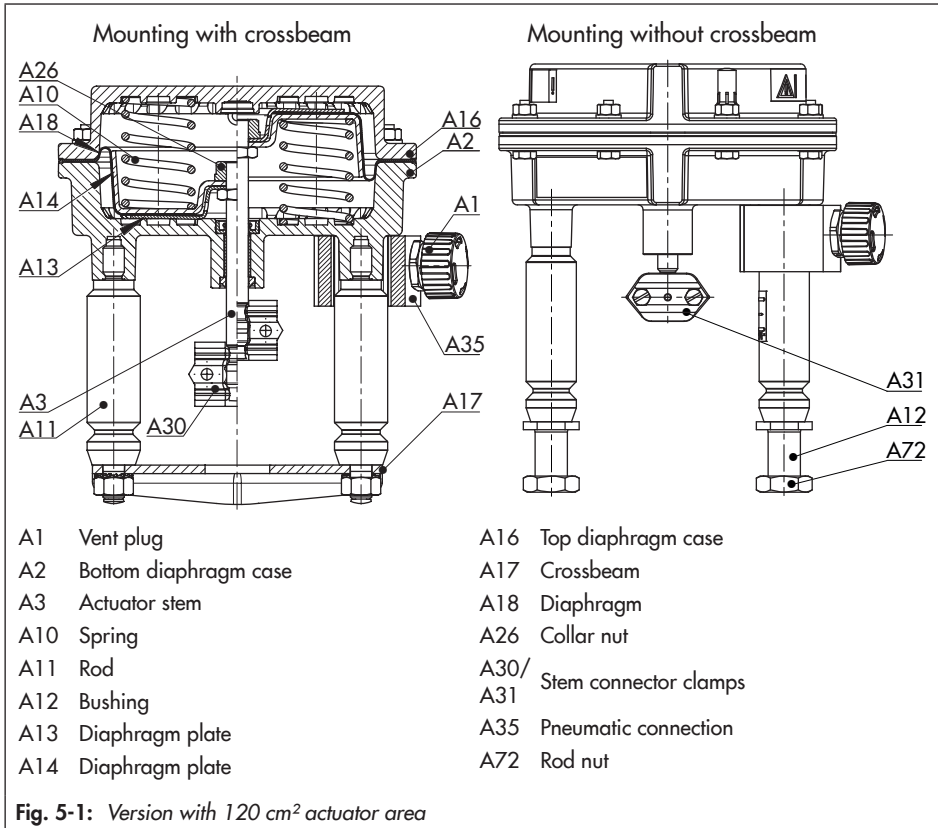
Observe the specified torques when tightening actuator components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are not tightened far enough may loosen.

→ 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



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) 120 cm² actuator area

Mounting using crossbeam (form B, see Fig. 5-2)

NOTICE

Incorrect removal will damage the actuator.

→ Do not loosen the rod nuts (A72) that hold the crossbeam (A17) on the rods (A11).

1. Remove the clamps of the stem connector (A30) from the actuator.
2. Unscrew the central nut (98) from the valve bonnet (2).
3. Firmly press the plug together with the plug stem into the seat ring.
4. Place the actuator with the crossbeam (A17) onto the thread of the valve bonnet (2), making sure that the central nut (98) is placed over the plug stem and fasten it to the valve bonnet. Observe tightening torques.

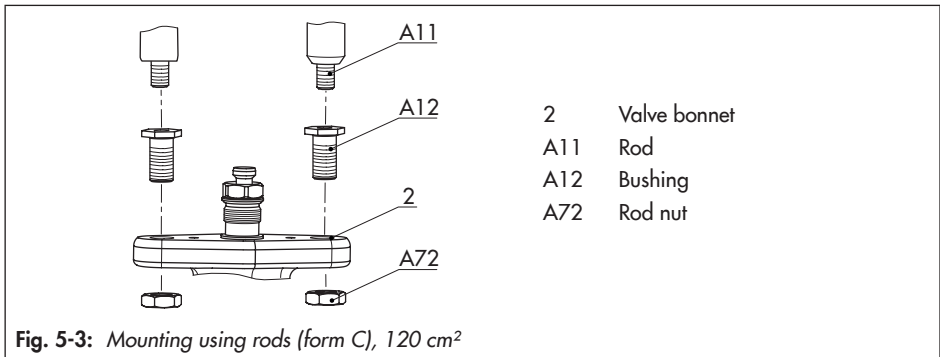
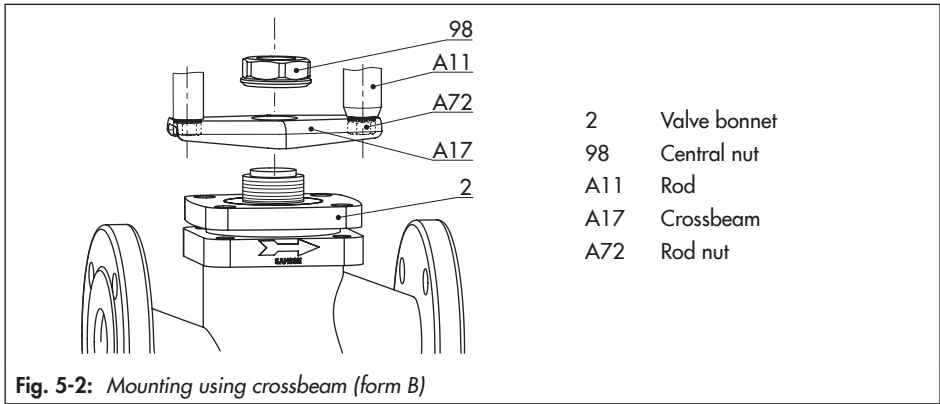
5. **Fail-safe action "stem extends"**: position the stem connector clamps (A30) and screw them tight. Observe tightening torques.

Fail-safe action "stem retracts": apply pressure to the top diaphragm chamber until the actuator stem touches the plug stem. Position the stem connector clamps (A30) and screw them tight. Observe tightening torques.

Mounting using rods (form C, see Fig. 5-3)

1. Remove the stem connector clamps (A31) from the actuator.
2. Screw the bushings (A12) onto the rods (A11) and place them in the corresponding holes on the valve bonnet (2).
3. Tighten the rod nuts (A72) in alternating sequence. Observe tightening torques.
4. **Fail-safe action "stem extends"**: position the stem connector clamps (A31) and screw them tight. Observe tightening torques.

Fail-safe action "stem retracts": apply pressure to the top diaphragm chamber until the actuator stem touches the plug stem. Position the stem connector clamps (A31) and screw them tight. Observe tightening torques.



b) 350 cm² actuator area

Mounting using rods (form C, see Fig. 5-4)

1. Remove the clamps of the stem connector from the actuator.
2. Unscrew the rod nuts (A54) from the rods (A33, A51). Leave the plate (A60) attached to the rods.
3. Place the actuator with the rod ends on the valve bonnet (2).
4. Tighten the rod nuts (A54) in alternating sequence. Make sure that the rods on the

bottom case do not turn. Observe tightening torques.

5. **Fail-safe action "stem extends":** position the stem connector clamps and screw them tight. Observe tightening torques.

Fail-safe action "stem retracts": apply pressure to the top diaphragm chamber until the actuator stem touches the plug stem. Position the clamps of the stem connector and screw them tight. Observe tightening torques.

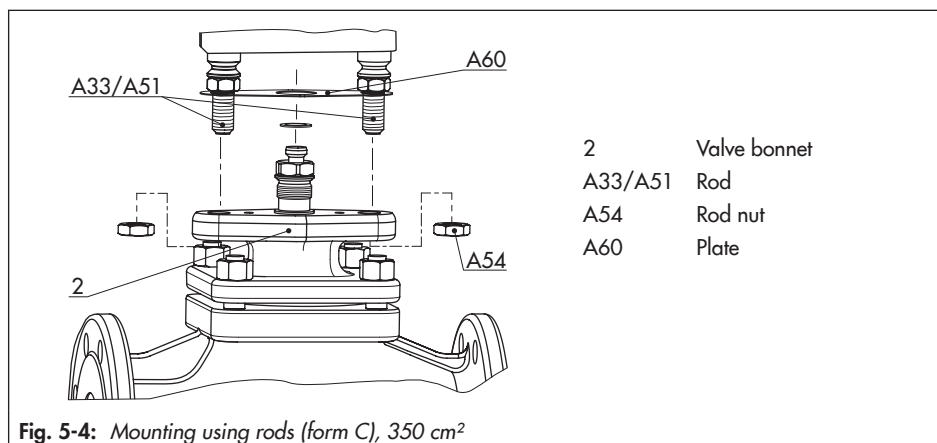


Fig. 5-4: Mounting using rods (form C), 350 cm²

5.3 Changing the mounting type

The mounting type of actuators with 120 cm² actuator area can be changed subsequently.

i Note

The table in 'Mounting types' in the 'Design and principle of operation' section provides an overview of the possible combinations (form B and form C).

5.3.1 Changing the mounting type to mounting using rods (form B to form C)

i Note

For mounting the rods, two bushings (A12) are required to adapt it to the rod diameter.

1. Remove the clamps of the stem connector.
2. Unscrew the central nut (98).
3. Lift the actuator off the valve bonnet (2).
4. Undo the rod nuts (A72).
5. Remove the crossbeam (A17).
6. Screw bushings (A12) onto the thread of the rods.
7. Place the rods (A11) with the bushings (A12) screwed onto them on the valve bonnet (2). Place the rod nuts (A72) on the bushings (A12) and tighten in alternating sequence. Observe tightening torques.
8. **Fail-safe action "stem extends"**: position the stem connector clamps and screw them tight. Observe tightening torques.

Fail-safe action "stem retracts": apply pressure to the top diaphragm chamber until the actuator stem touches the plug stem. Position the clamps of the stem con-

nector and screw them tight. Observe tightening torques.

5.3.2 Changing the mounting type to mounting using a crossbeam (form C to form B)

i Note

To mount the crossbeam, a crossbeam (A17), two serrated lock washers and two caps are required.

1. Remove the clamps of the stem connector.
2. Undo the rod nuts (A72) from the bushings (A12).
3. Lift the actuator off the valve bonnet (2).
4. Undo the bushings (A12) from the rod nuts.
5. Place the crossbeam (A17) on the rods (A11) in such a way that the bent side of the actuator housing faces away. Fasten the crossbeam using the rod nuts (A72) and serrated lock washers. Observe tightening torques.
6. Place the caps from below on the rod nuts (A72).
7. Unscrew the central nut (98) from the valve bonnet (2).
8. Place the actuator on the valve bonnet (2). Tighten the central nut (98). Observe tightening torques.

9. **Fail-safe action "stem extends"**: position the stem connector clamps and screw them tight. Observe tightening torques.

Fail-safe action "stem retracts": apply pressure to the top diaphragm chamber until the actuator stem touches the plug stem. Position the clamps of the stem connector and screw them tight. Observe tightening torques.

5.4 Pneumatic connection

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

- The lower signal pressure range value is the same as the minimum value of the bench range or operating range (with preloaded springs).
- The upper signal pressure range value is the same as the maximum value of the bench range or operating range (with preloaded springs).
- For actuator springs that are to be preloaded subsequently, determine the upper and lower signal pressure range as described under 'Spring compression' in the 'Start-up' section.

a) Actuator stem extends

1. Apply a signal pressure that corresponds to the lower signal pressure range value to the connection on the bottom diaphragm case.
2. Screw the vent plug into the connection on the top diaphragm case.

b) Actuator stem retracts

1. Apply a signal pressure that corresponds to the upper signal pressure range value to the connection on the top diaphragm case.
2. Screw the vent plug into the connection on the bottom diaphragm case.

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 'Warnings on the device' in the 'Safety instructions and measures' 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 Spring compression

By preloading the springs in the actuator, the following can be achieved:

- The thrust is increased (only actuators with "stem extends")
- In combination with a SAMSON valve: the actuator travel range can be adapted to a smaller valve travel range

6.1.1 Tensioning the springs

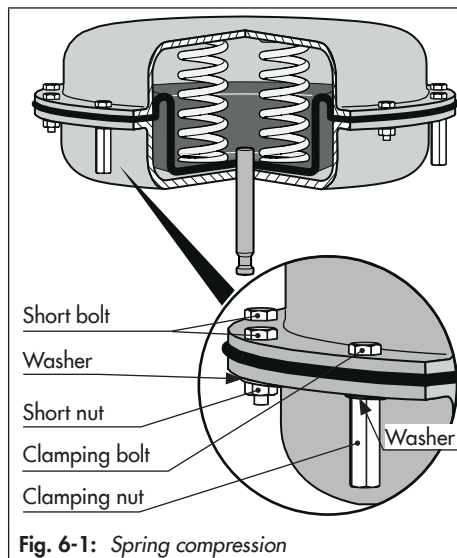
ⓘ NOTICE

Risk of actuator damage due to the springs being tensioned unevenly.

- ➔ Distribute clamping bolts and nuts evenly around the circumference.
 - ➔ Tighten the nuts gradually in a crisscross pattern.
-

1. Distribute the long clamping bolts evenly around the circumference of the actuator.
2. Screw the long clamping nuts together with washers onto the clamping bolts until they rest on the bottom diaphragm case.
3. To tension the springs evenly, tighten the clamping nuts gradually in a crisscross pattern until both diaphragm cases rest on the diaphragm. Hold the bolt head stationary with a suitable tool and apply the tightening torque to the nuts. Observe tightening torques.
4. Insert the short bolts through the intended holes in the diaphragm cases.

5. Screw the short nuts together with washers onto the bolts. Observe tightening torques.



6.1.2 Increasing the actuator thrust

The thrust can only be increased in actuators with "stem extends" direction of action. To achieve this, the springs of the actuators can be preloaded by up to 25 % of their travel or bench range.

Example: Preloading is required for a bench range of 1.4 to 2.3 bar. 25 % of this span is 0.2 bar. Therefore, the signal pressure range is shifted by 0.2 bar to 1.6 to 2.5 bar. The new lower signal range value is 1.6 bar and the new upper signal range value 2.5 bar.

- Write the new signal pressure range of 1.6 to 2.5 bar on the actuator nameplate

as the operating range with preloaded springs.

6.1.3 Adapting the travel range

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

Direction of action: actuator stem extends

Always use actuators with preloaded springs when the valve's rated travel is smaller than the rated travel of the actuator.

Example: DN 15 valve with 7.5 mm rated travel and 120 cm² actuator with 15 mm rated travel; 1.4 to 2.3 bar bench range.

The signal pressure for half the actuator travel (7.5 mm) is 1.85 bar. Adding it to the lower signal pressure range value of 1.4 bar results in a signal pressure of 3.25 bar required for spring compression. The new lower signal range value is 3.25 bar and the new upper signal range value 4.15 bar.

- Write the new signal pressure range of 3.25 to 4.15 bar on the actuator nameplate as the operating range with preloaded springs.

Direction of action: actuator stem retracts

The springs of actuators with "stem retracts" action cannot be preloaded. 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.

Start-up

Example: DN 15 valve with 7.5 mm rated travel and 120 cm² actuator with 15 mm rated travel; 1.4 to 2.3 bar bench range.

At half the valve travel, the operating range is between 1.4 and 1.85 bar.

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 Type 3371 Pneumatic Actuator with 120 and 350 cm² actuator areas is designed for a maximum supply pressure of 6 bar when used for throttling service.

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).

Actuator stem retracts (FE)

For the direction of action "actuator stem retracts", the permissible supply pressure must

Operation

not exceed the upper bench range value by more than 3 bar:

Rated signal range	Fail-safe action	Max. supply pressure
0.4 to 1.4 bar	Actuator stem retracts	4.4 bar
1.4 to 2.3 bar		5.3 bar
1.5 to 2.1 bar		5.1 bar

Actuator stem extends (FA)

With direction of action "actuator stem extends", the supply pressure must not exceed the upper bench range value by more than 1.5 bar.

7.3 Additional notes concerning operation

- Label actuator 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 and Fig. 3-2 in the 'Design and principle of operation' section).
- Only use vent plugs that let air through them (A1 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.	Check attachment. Remove the blockage. WARNING! 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.	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.

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 'Warnings on the device' in the 'Safety instructions and measures' 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 exam-

ple, 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).

NOTICE

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

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

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.

Tip

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

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)
- 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 and Fig. 9-2

9.4.1 Replacing the diaphragm

a) 120 cm² actuator area

Actuator stem extends

1. Lift off the top diaphragm case (A16) and remove springs (A10).
2. Pull the actuator stem (A3) together with the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) out of the bottom diaphragm case (A2).
3. Unscrew the collar nut (A26).
4. Remove the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) from the actuator stem (A3).
5. Place the new diaphragm on the diaphragm plate (A13). Place on the diaphragm plate (A14).
6. Check the sealing element on the collar nut (A26). If necessary, renew it.
7. Tighten the collar nut (A26). Observe tightening torques.
8. Apply a suitable lubricant to the actuator stem (A3).
9. Place the actuator stem (A3) together with the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) in the bottom diaphragm case (A2). Make sure that the radial shaft seal (A40) is not damaged.
10. Place the springs (A10) into the bottom diaphragm case, centering them in the intended recesses.

11. Place on the top diaphragm case (A16).
12. If necessary, preload the springs (see the 'Start-up' section).
13. Fasten the top and bottom diaphragm cases (A16, A2) together using the nuts (A24) and bolts (A22). Observe tightening torques.

Actuator stem retracts

1. Lift off the top diaphragm case (A16).
2. Pull the actuator stem (A3) together with the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) out of the bottom diaphragm case (A2).
3. Unscrew the collar nut (A26).
4. Remove the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) from the actuator stem (A3).
5. Place the new diaphragm on the diaphragm plate (A13). Place on the diaphragm plate (A14).
6. Check the sealing element on the collar nut (A26). If necessary, renew it.
7. Tighten the collar nut (A26). Observe tightening torques.
8. Check whether the springs (A10) rest correctly in the bottom diaphragm case (A2).
9. Apply a suitable lubricant to the actuator stem (A3).
10. Place the actuator stem (A3) together with the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) in the bottom diaphragm case (A2). Make sure that the radial shaft seal (A40) is not damaged.

11. Place on the top diaphragm case (A16).
12. Fasten the top and bottom diaphragm cases (A16, A2) together using the nuts (A24) and bolts (A22). Observe tightening torques.

b) 350 cm² actuator area



Tip

Before dismantling the actuator, mark both diaphragm cases (A1, A2) to ensure that the pneumatic connections are mounted correctly later on reassembling the actuator.

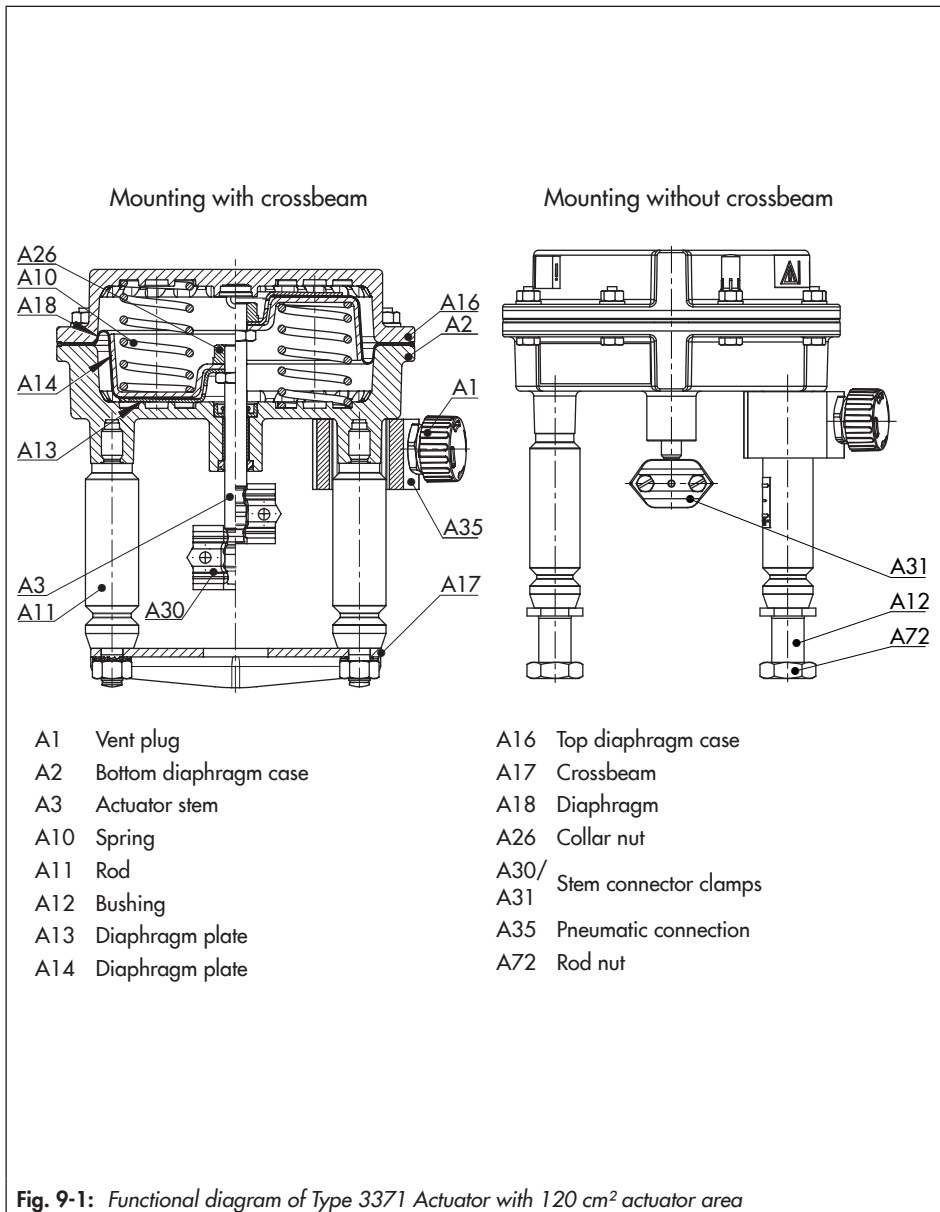
Actuator stem extends

1. Lift off the top diaphragm case (A1) and remove springs (A10).
2. Pull the actuator stem (A7) together with the diaphragm plate (A5) and diaphragm (A4) out of the bottom diaphragm case (A2).
3. Unscrew the collar nut (A15).
4. Take the compressor (A27), diaphragm plate (A5) and diaphragm (A4) off the actuator stem (A7).
5. Place the new diaphragm on the diaphragm plate (A5).
6. Place the compressor (A27) onto the actuator stem (A7).
7. Check the sealing element on the collar nut (A15). If necessary, renew it.

8. Tighten the collar nut (A15). Observe tightening torques.
9. Apply a suitable lubricant to the actuator stem (A7).
10. Insert the actuator stem (A7) together with the diaphragm plate (A5) and diaphragm (A4) into the bottom diaphragm case (A2). Make sure that the radial shaft seal (A40) is not damaged.
11. Place the springs (A10) into the bottom diaphragm case, centering them in the intended recesses.
12. Place on the top diaphragm case (A1). Ensure that the compressed air connections on the cases (A1, A2) are correctly aligned with each other.
13. If necessary, preload the springs (see the 'Start-up' section).
14. Fasten the top and bottom diaphragm cases (A1, A2) together using the nuts (A21) and bolts (A20). Observe tightening torques.

Actuator stem retracts

1. Lift off the top diaphragm case (A1).
2. Pull the actuator stem (A7) together with the diaphragm plate (A5) and diaphragm (A4) out of the bottom diaphragm case (A2).
3. Unscrew the collar nut (A15).
4. Take the compressor (A27), diaphragm plate (A5) and diaphragm (A4) off the actuator stem (A7).
5. Place the new diaphragm on the diaphragm plate (A5).
6. Place the compressor (A27) onto the actuator stem (A7).
7. Check the sealing element on the collar nut (A15). If necessary, renew it.
8. Tighten the collar nut (A15). Observe tightening torques.
9. Check whether the springs (A10) rest correctly in the bottom diaphragm case (A2).
10. Apply a suitable lubricant to the actuator stem (A7).
11. Insert the actuator stem (A7) together with the diaphragm plate (A5) and diaphragm (A4) into the bottom diaphragm case (A2). Make sure that the radial shaft seal (A40) is not damaged.
12. Place on the top diaphragm case (A1).
13. Fasten the top and bottom diaphragm cases (A1, A2) together using the nuts (A21) and bolts (A20). Observe tightening torques.



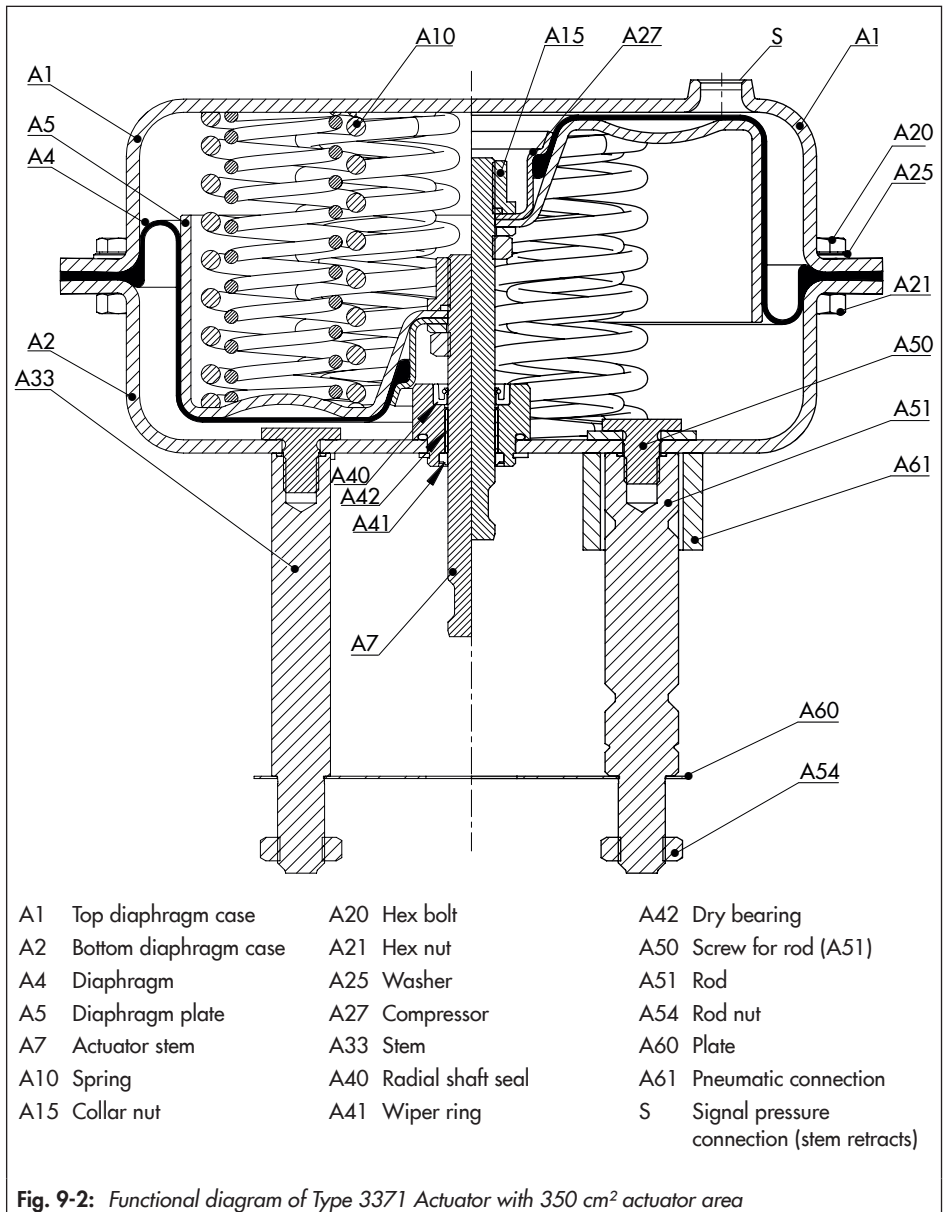


Fig. 9-2: Functional diagram of Type 3371 Actuator with 350 cm² actuator area

9.5 Conversion work

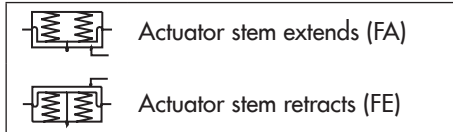
See Fig. 9-1 and Fig. 9-2

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

The direction of action (and fail-safe action) of pneumatic actuators with 120 cm² actuator area can be changed.

The direction of action (and fail-safe action) of the pneumatic actuator with 350 cm² actuator area is determined at the ordering stage and cannot be changed. If necessary, contact our after-sales service.

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 for 120 cm² actuator area

1. Lift off the top diaphragm case (A16) and remove springs (A10).
2. Pull the actuator stem (A3) together with the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) out of the bottom diaphragm case (A2).
3. Unscrew the collar nut (A26).

4. Remove the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) from the actuator stem (A3) and place them back on again in the reverse order.
 5. Tighten the collar nut (A26). Observe tightening torques.
 6. Apply a suitable lubricant to the actuator stem (A3).
 7. Place the springs (A10) in the bottom diaphragm case (A2), centering them in the intended recesses.
 8. Place the actuator stem (A3) together with the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) in the bottom diaphragm case (A2). Make sure that the radial shaft seal (A40) is not damaged.
 9. Place on the top diaphragm case (A16).
 10. Fasten the top and bottom diaphragm cases (A16, A2) together using the nuts (A24) and bolts (A22). Observe tightening torques.
- 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.
11. 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 for 120 cm² actuator area

1. Lift off the top diaphragm case (A16).
2. Pull the actuator stem (A3) together with the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) out of the bottom diaphragm case (A2).
3. Remove the springs (A10).
4. Unscrew the collar nut (A26).
5. Remove the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) from the actuator stem (A3) and place them back on again in the reverse order.
6. Tighten the collar nut (A26). Observe tightening torques.
7. Apply a suitable lubricant to the actuator stem (A3).
8. Place the actuator stem (A3) together with the diaphragm plate (A14), diaphragm (A18) and diaphragm plate (A13) in the bottom diaphragm case (A2). Make sure that the radial shaft seal (A40) is not damaged.
9. Place the springs (A10) in the bottom diaphragm case (A2), centering them in the intended recesses.
10. Place on the top diaphragm case (A16).
11. If necessary, preload the springs (see the 'Start-up' section).

12. Fasten the top and bottom diaphragm cases (A16, A2) together using the nuts (A24) and bolts (A22). Observe tightening torques.

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 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 'Warnings on the device' in the 'Safety instructions and measures' 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 'Warnings on the device' in the 'Safety instructions and measures' 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).

11.1 Removing the actuator from the valve

a) 120 cm² actuator area

For mounting using crossbeam (form B)

NOTICE

Incorrect removal will damage the actuator.

→ Do not loosen the rod nuts (A72) that hold the crossbeam (A17) on the rods (A11).

1. Remove the clamps of the stem connector (A30) from the actuator.

Removing actuators with "stem extends" action with/without preloaded springs: to undo the central nut (98), apply approx. 50 % signal pressure to open the valve.

2. Unscrew the central nut (98) from the plug stem.
3. Disconnect the signal pressure again.
4. **In the "actuator stem retracts" version:** detach the external piping.
5. Lift the central nut (98) and actuator off the valve.
6. Screw tight the central nut (98) on the valve.
7. Screw tight the stem connector clamps (A30) onto the actuator.

For mounting using rods (form C)

1. Remove the stem connector clamps (A31) from the actuator.

2. Undo the rod nuts (A72) in alternating sequence.
3. Pull the rods (A11) with bushings (A12) out of the holes in the valve bonnet (2).
4. Remove the bushings (A12) from the actuator and thread the rod nuts (A72) onto the rods (A11).
5. Screw tight the stem connector clamps (A31) onto the actuator.

b) 350 cm² actuator area

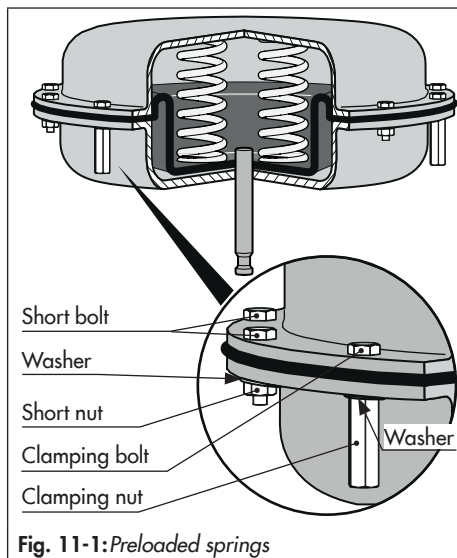
1. **In the "actuator stem retracts" version:** detach the external piping.
2. Remove the clamps of the stem connector (A12) from the actuator.
3. Undo the rod nuts (A54) in alternating sequence.
4. Pull the rods (A33, A51) out of the holes in the valve bonnet (2).
5. Thread the rod nuts (A54) onto the rods (A33, A51) on the actuator.
6. Screw tight the stem connector clamps (A12) onto the actuator.

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.



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.

- Completed Declaration on Contamination, which can be downloaded from our website at
 ► www.samsongroup.com > Service & Support > 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.

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 > Service & Support > After-sales Service.
2. Send an e-mail
 ► retouren@samsongroup.com to register the return shipment including the following information:
 - Type
 - Article no.
 - Configuration ID
 - Original order

i Note

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

- www.samsongroup.com > Service & Support > After-sales Service.

13 Disposal

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

14 Certificates

The declaration of incorporation in compliance with Machinery Directive 2006/42/EC for Type 3371 Pneumatic Actuators with 120 and 350 cm² actuator areas is provided on the next page.

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

► www.samsongroup.com > Products & Applications > Product selector > Actuators > 3371

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 3371 Actuators

We certify that the Type 3371 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 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 data sheets as well as the mounting and operating instructions; the documents are available in electronic form on the Internet at www.samsongroup.com.

For product descriptions of the valve, refer to:

- Type 3371 Actuator: Mounting and Operating Instructions EB 8317

Referenced technical standards and/or specifications:

- VCI, VDMA, VGB: Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen, May 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, 04 March 2021



Peter Arzbach
Director
Product Management



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

Revision no. 00

15 Annex

15.1 Tightening torques, lubricants and tools

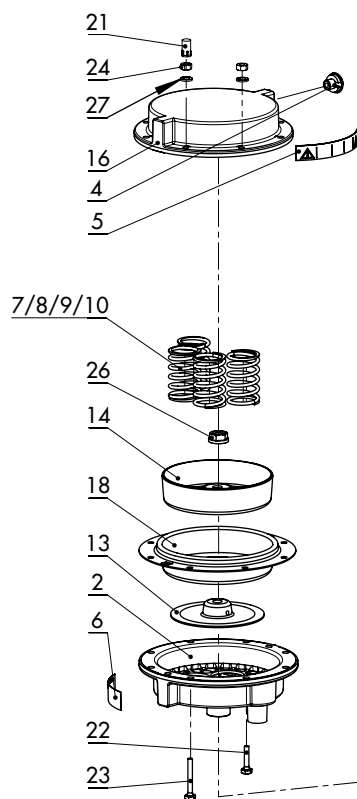
► AB 0100 for tools, tightening torques and lubricants

15.2 Spare parts

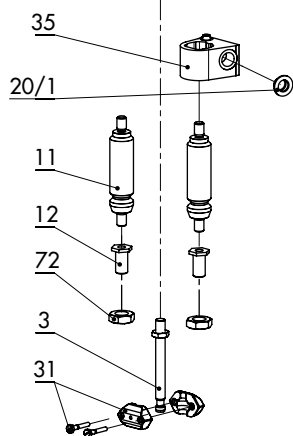
Type 3371 Actuator with 120 cm² actuator area

1	Vent plug	35	Pneumatic connection
2	Bottom diaphragm case	37	Rod
2.2	Radial shaft seal	70	Protective cap
2.3	Wiper ring	72	Rod nut (hex nut)
2.4	Dry bearing		
3	Actuator stem		
4	Stopper		
5	Label (preloading)		
6	Nameplate		
7/8/9/10	Spring		
11	Rod		
12	Bushing		
13	Diaphragm plate		
14	Diaphragm plate		
16	Top diaphragm case		
17	Crossbeam		
18	Diaphragm		
20	Screw plug		
21	Screw-on cap		
22	Hex bolt		
23	Hex bolt		
24	Hex nut		
25	Hex nut		
26	Collar nut		
27	Washer		
28	Serrated lock washer		
30/31	Stem connector clamps		

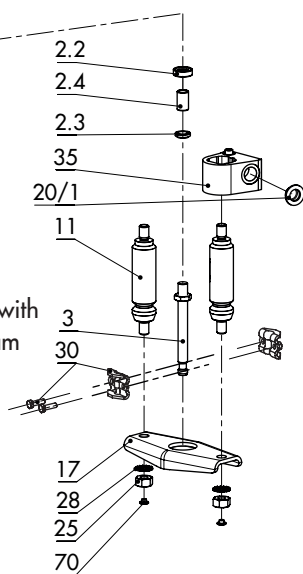
**Type 3371 Actuator with
120 cm² actuator area**



Mounting
without
crossbeam



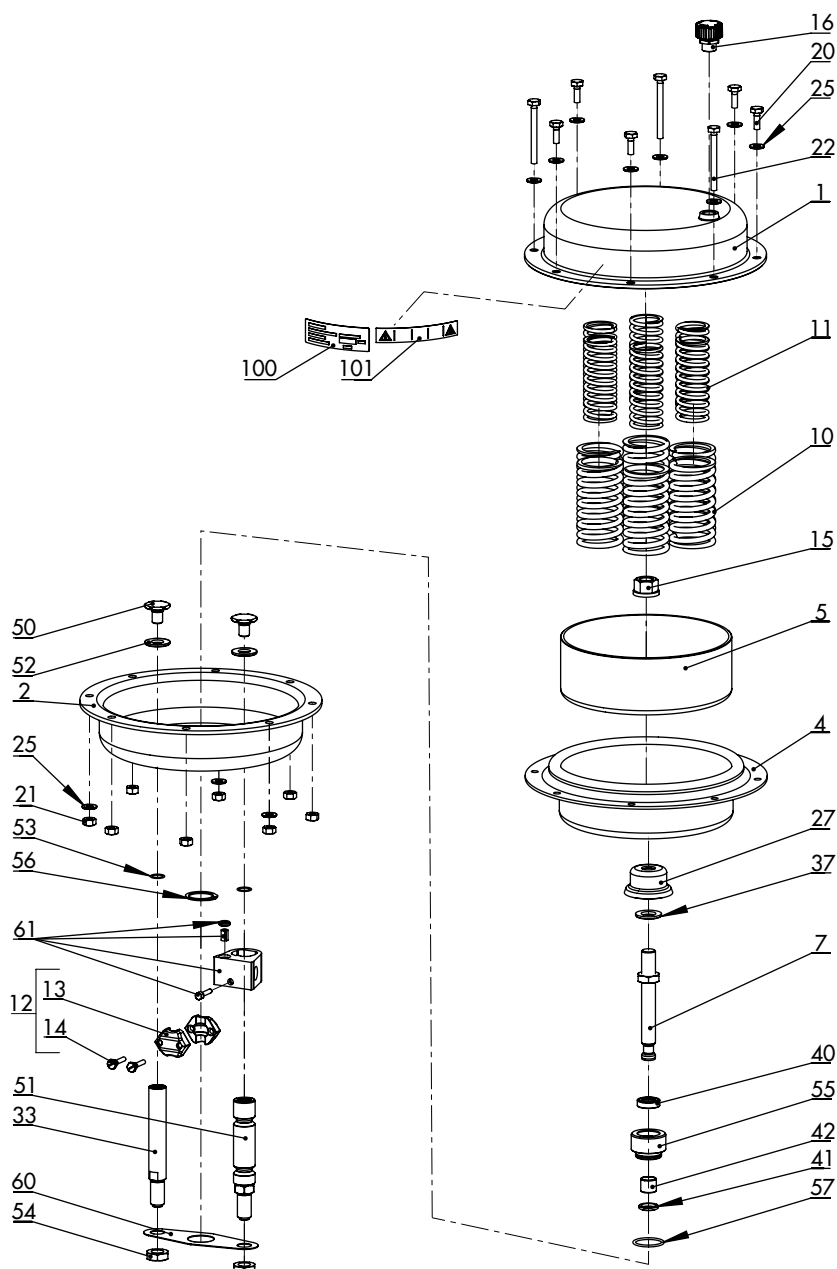
Mounting with
crossbeam



Type 3371 Actuator with 350 cm² actuator area

- 1 Top diaphragm case
- 2 Bottom diaphragm case
- 4 Diaphragm
- 5 Diaphragm plate
- 7 Actuator stem
- 10/11 Spring
- 12 Stem connector clamp
- 13 Stem connector clamp
- 14 Screw
- 15 Collar nut
- 16 Vent plug
- 20 Hex bolt
- 21 Hex nut
- 22 Hex bolt (preloading)
- 25 Washer
- 27 Compressor
- 33 Rod
- 37 Washer
- 40 Radial shaft seal
- 41 Wiper ring
- 42 Dry bearing
- 50 Screw for rod (51)
- 51 Rod
- 52 Washer (version with "actuator stem retracts" only)
- 53 O-ring
- 54 Rod nut
- 55 Bushing
- 56 Retaining ring
- 57 O-ring
- 60 Plate
- 61 Pneumatic connection
- 100 Nameplate
- 101 Label (preloading)

Type 3371 Actuator with 350 cm² actuator area



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.

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) 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



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