Type 3275 Pneumatic Piston Actuator

Actuator area: 314, 490, and 804 cm²

Translation of original instructions

Mounting and Operating Instructions

EB 8314 EN

Edition February 2017

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.

➔ 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 Department (aftersalesservice@samson.de).

The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website (www.samson.de) > Product documentation. You can enter the document number or type number in the [Find:] field to look for a document.

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

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1 Safety instructions and measures

Intended use

The Type 3275 Pneumatic Piston Actuator is designed for operating a mounted globe valve. In combination with the valve, the actuator is used to shut off and control the flow of liquids, gases or vapors in the pipeline. The actuator is mainly used in combination with PSA valves (e.g. SAMSON Type 3241-PSA Valve).

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 applications 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, SAMSON must be contacted.

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 in the technical data
– Use outside the limits defined by the accessories mounted on 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 in these instructions

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 are to 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.

Personal protective equipment

We recommend wearing the following personal protective equipment when handling the Type 3275 Pneumatic Piston Actuator:

– Protective gloves when mounting or removing the actuator

➔ Check with the plant operator for details on further protective equipment.

Revisions and other modifications

Revisions, conversions or other modifications to 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 3275 Actuator does 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 actuators by the process medium, the operating pressure, the signal pressure or by moving parts by taking appropriate precautions. They must observe all hazard statements, warning and caution notes in these mounting and operating instructions, especially for installation, start-up, and service work.

Responsibilities of the operator

The operator is responsible for proper operation 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, the operator must ensure that operating personnel or third persons 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 hazard statements, warning and caution notes specified in them. Furthermore, the operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

Referenced standards and regulations

According to the ignition risk assessment performed in accordance with EN 13463-1:2009, section 5.2, 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 section 6.4 of EN 60079-14 (VDE 0165 Part 1).

Referenced documentation

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

– Mounting and operating instructions for the mounted valve
– Mounting and operating instructions for mounted valve accessories (positioner, solenoid valve etc.)
– ▶ 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 concerned and the actuator.

1.2 Notes on possible personal injury

⚠ WARNING

Crush hazard arising from moving parts.

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

➔ Do not insert hands or fingers into the yoke while the valve is in operation.

➔ While working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.

⚠ WARNING

Risk of personal injury when the actuator vents.

While the valve is operating, the actuator may vent during closed-loop control or when the valve opens or closes.

➔ Install the control valve in such a way that the actuator does not vent at eye level.

➔ Use suitable silencers and vent plugs.

➔ Wear eye protection when working in close proximity to the control valve.

1.3 Notes on possible property damage

NOTICE

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

Observe the specified torques on tightening actuator components. Excessively tightened torques lead to parts wearing out quicker. 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 lubricants.

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

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

2 Markings on the device

2.1 Actuator nameplate

The nameplate (A18) is attached to the base (A4) with rivets (A19). It includes all details required to identify the device:

1 Actuator area
2 Permissible supply pressure p_{max} in bar or psi
3 Operating travel in mm
4 Permissible temperature range
5 Configuration ID
6 Serial number
7 Bar code
8 Date of manufacture (month and year)

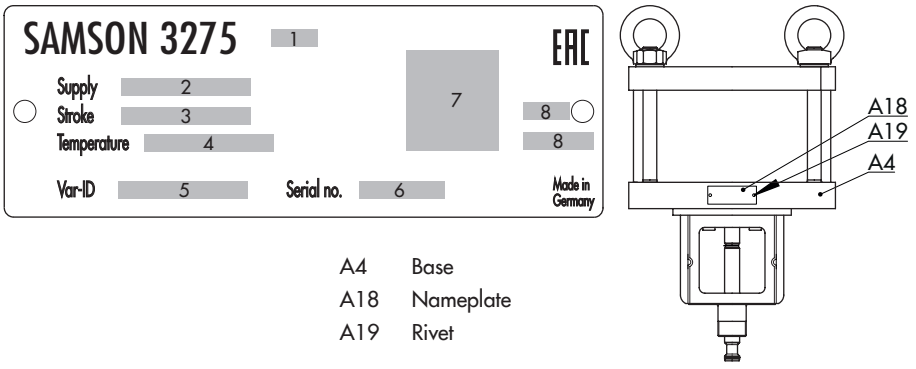


Fig. 1: *Nameplate of Type 3275 Actuator*

3 Design and principle of operation

The double-acting Type 3275 Pneumatic Piston Actuator with 314, 490, and 804 cm² actuator areas is mainly mounted on PSA valves (e.g. Type 3241-PSA).

The actuator mainly consists of the base (A4), cover (A10), and piston (A9). The stem connector clamps connect the actuator's piston rod (A1) with the plug stem of the globe valve.

The signal pressure p_{st} creates the force $F = p_{st} \cdot A$ at the piston surface A, which is opposed by the corresponding counterpressure. The piston is pressurized with the supply air over the two connections (S, G ⅜ or G ½).

The actuators with 314 and 490 cm² actuator areas are fixed to a yoke, which is designed to accommodate a pneumatic or electropneumatic positioner. See Fig. 2.

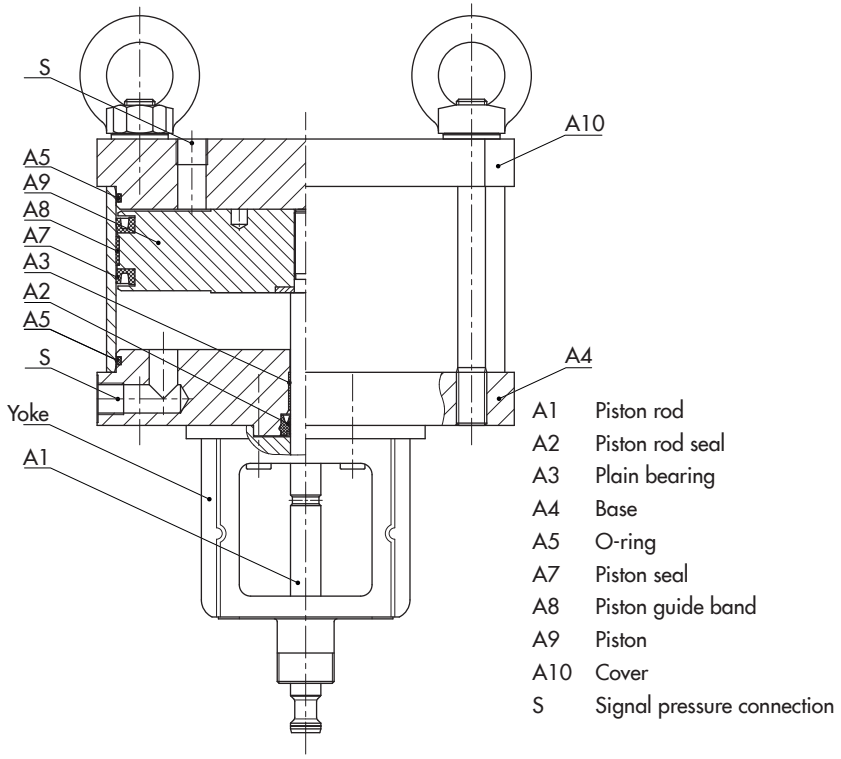


Fig. 2: *Type 3275 Actuator (314 and 490 cm²)*

The actuator with 804 cm² area does need a yoke (see Fig. 3). The valve accessories are mounted over the NAMUR interface.

Refer to the mounting and operating instructions of the valve accessories to be mounted for more details on their attachment and the accessories required.

3.1 Fail-safe action

The double-acting piston actuator has no springs. A defined final position is not reached when the signal pressure is reduced or the air supply fails.

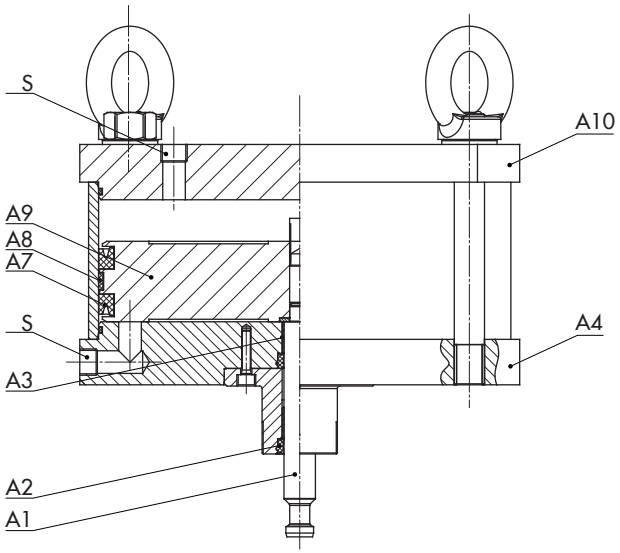


Fig. 3: *Type 3275 Actuator (804 cm²)*

3.2 Versions

Type 3275 Pneumatic Piston Actuator with 314, 490 or 804 cm² actuator area:

- **Standard version**
  Base and cover are coated with an aluminum alloy (3.3547, anodized).
- **Version with side-mounted handwheel**
  The actuator can be combined with a Type 3273 Side-mounted Handwheel with max. 30 mm travel (▶ T 8312).
- **Special version with auxiliary spring**
  The actuator can be fitted with an auxiliary spring to move the actuator to a defined end position in the depressurized state (e.g. upon supply air failure).
- **Special version for temperatures down to –40 °C**

3.3 Technical data

The nameplate provide information on the actuator version (see section 2.1).

i ***Note***

More information is available in Data Sheet ▶ T 8314.

Table 1: *Technical data*

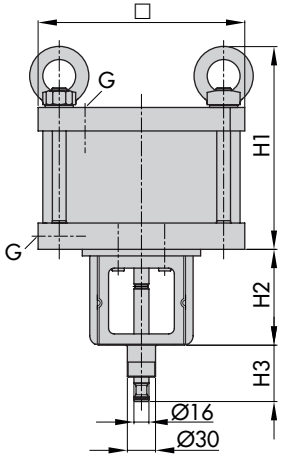
Version	**Type**	**3275**					
Actuator area	**cm²**	**314**		**490**		**804**	
Supply pressure	Max.	6 bar		6 bar		6 bar	
Rated travel	mm	15	30	15	30	15	30
Travel volume	cm³	471	942	735	1470	1206	2412
Air connection		G ⅜		G ½		G ½	
Max. permissible leakage (t ≥ 0 °C)		50 cm³/min		58 cm³/min		70 cm³/min	
Perm. temperature range for continuous operation		–30 to +80 °C					
Compliance		EAC					

Table 2: *Dimensions in mm and weights in kg*

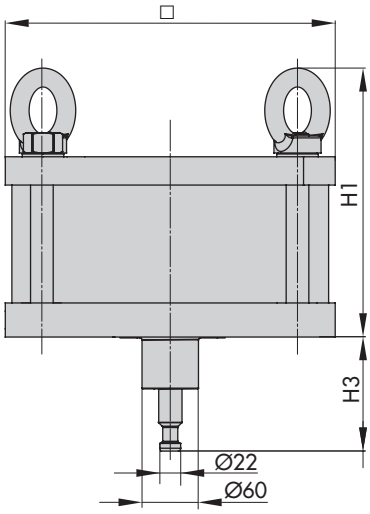
Actuator	Type	3275					
Actuator area	**cm²**	**314**		**490**		**804**	
Rated travel	mm	15	30	15	30	15	30
Travel volume	cm³	471	942	735	1470	1206	2412
□	mm	220		280		350	
H1 including lifting eyelet	mm	225[1)]		250[1)]		286	
H2	mm	102		102		–	
H3 (rod retracted)	mm	60		y60		60	
Air connection		G ⅜		G ½		G ½	
Weight	kg	10		17		21	

1) Different dimensions may arise with the special version (e.g. for low temperatures)

Dimensional drawings



Type 3275 with 314 and 490 cm² actuator areas



Type 3275 with 804 cm² actuator area

4 Measures for preparation

After receiving the shipment, proceed as follows:

1. Check the scope of delivery. Compare the shipment received against the delivery note.
2. Check the shipment for transportation damage. Report any damage to SAMSON and the forwarding agent (refer to delivery note).

4.1 Unpacking

Note

Do not remove the packaging until immediately before mounting.

Proceed as follows to lift and mount the actuator:

1. Remove the packaging from the actuator.
2. Dispose of the packaging in accordance with the valid regulations.

4.2 Transporting and lifting

DANGER

Hazard due to suspended loads falling.
Stay clear of suspended or moving loads.

WARNING

Risk of lifting equipment tipping 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.*
– *Refer to section 3.3 for weights.*

NOTICE

Risk of actuator damage due to incorrectly attached slings.
– *The lifting eyelets on the cover are intended for mounting and removing the actuator as well as lifting the actuator without valve. Do not lift the entire control valve assembly using the lifting eyelets.*
– *Observe lifting instructions (see section 4.2.2).*

Tip

SAMSON's After-sales Service department can provide more detailed transport and lifting instructions on request.

4.2.1 Transporting

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.
– Observe permissible temperatures (see section 3.3).

4.2.2 Lifting

To mount a large actuator, use lifting equipment (e.g. crane or forklift) to lift it.

Lifting instructions

– Secure slings against slipping.
– Make sure the slings can be removed from the actuator once it has been mounted onto the valve.
– Prevent the actuator from tilting or tipping.
– Do not leave loads suspended when interrupting work for longer periods of time.
– Make sure that the additional sling between the lifting eyelet and rigging equipment (hook, shackle etc.) does not bear any load when lifting valves. The sling only protects the control valve from tilting while being lifted. Before lifting the control valve, tighten the sling. The slings attached to the valve body must bear the entire load (see Fig. 4).

Lifting the actuator (without valve)

NOTICE

Risk of actuator damage due to incorrectly attached slings.
The lifting eyelets on the cover are intended for mounting and removing the actuator as well as lifting the actuator without valve. Do not lift the entire control valve assembly using the lifting eyelets.

1. Attach a sling to the lifting eyelets of the actuator and to the rigging equipment (e.g. hook) of the crane or forklift (see Fig. 4).
2. Carefully lift the actuator. Check whether the lifting equipment and accessories can bear the weight.
3. Move the actuator at an even pace to the mounting site.
4. Mount the actuator to the valve. See section 5.1.
5. Remove slings after mounting.

Tip

We recommend using a hook with safety latch (see Fig. 4). The safety latch prevents the slings from slipping during lifting and transporting.

Lifting the entire control valve assembly

➔ See associated valve documentation for instructions on how to lift a control valve.

4.3 Storage

NOTICE

Risk of actuator damage due to improper storage.
– Observe storage instructions.
– Avoid long storage times.
– Contact SAMSON in case of different storage conditions or long storage periods.

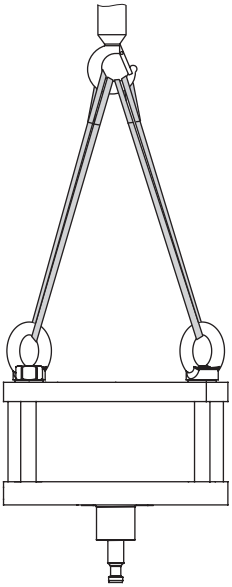


Fig. 4: *Lifting points on the actuator*

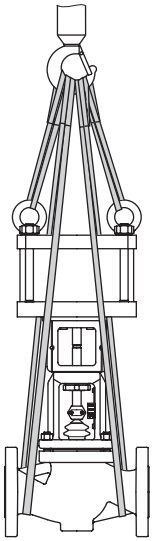


Fig. 5: *Lifting points on the control valve (example)*

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).
- 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 section 3.3).
- Do not place any objects on the actuator.

Tip

SAMSON's After-sales Service department can provide more detailed storage instructions on request.

4.4 Preparation for installation

Proceed as follows:

➔ Check the actuator for damage.

➔ Check to make sure that the type designation, material and temperature range of the actuator match the ambient conditions (temperatures etc.).

➔ Check the pressure gauge installed on valve accessories to make sure it functions.

➔ When the valve and actuator are already assembled, check the tightening torques of the bolted joints (▶ AB 0100). Components may loosen during transport.

5 Mounting and start-up

SAMSON control valves are delivered ready for use. In special cases, the valve and actuator are delivered separately and must be assembled on site. The procedure to mount and start up the actuator are described in following.

NOTICE

Risk of actuator damage due to excessively high or low tightening torques.
Observe the specified torques on tightening actuator components. Excessively tightened torques lead to parts wearing out quicker. Parts that are not tightened far enough may loosen.
Observe the specified tightening torques (▶ AB 0100).

Note

See associated valve documentation for additional mounting instructions.

5.1 Mounting the actuator onto the valve

Proceed as follows if the valve and actuator have not been assembled by SAMSON:

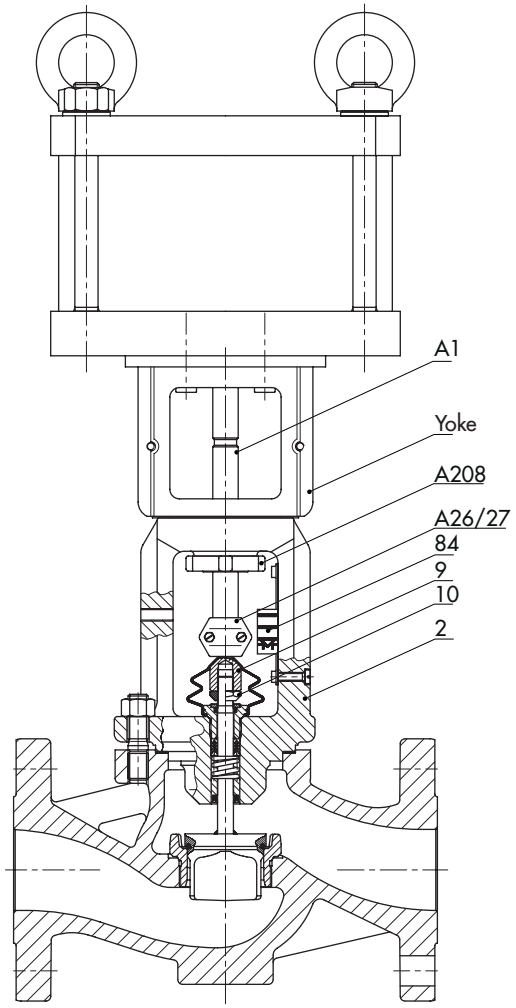
Note

Remove the mounted actuator before mounting the other actuator (see section 9.2).

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 section 2.1).

1. Loosen the lock nut (10) and stem connector nut (9) on the valve.
2. Press the plug together with the plug stem firmly 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 (A208) 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. Apply a signal pressure to the actuator to extend the piston rod.
8. Screw on the stem connector nut (9) by hand until it touches the piston rod (A1).
9. Turn the stem connector nut a further quarter turn and secure this position with the lock nut (10).
10. Position clamps of the stem connector (A26/27) and screw them tight.
11. Align the travel indicator (84) with the tip of the stem connector clamp.



2	Valve bonnet
9	Stem connector nut
10	Lock nut
84	Travel indicator scale
A1	Piston rod
A26/27	Stem connector clamps
A208	Ring nut

Fig. 6: *Type 3275 Piston Actuator with 490 cm² actuator area mounted on a Type 3241-PSA Valve*

5.2 Additional fittings

Valve accessories

Valve accessories are either mounted on the yoke (314 and 490 cm²) or over the NAMUR interface (804 cm² only).

Refer to the mounting and operating instructions of the valve accessories to be mounted for more details on their attachment and the accessories required.

Auxiliary spring

The actuator can be fitted with an auxiliary spring to move the actuator to a defined end position in the depressurized state (e.g. upon supply air failure).

6 Operation

⚠ WARNING

Crush hazard arising from moving parts.
The actuator contains moving parts (piston rod), which can injure hands or fingers if inserted into the actuator.
– Do not insert hands or fingers into the yoke while the valve is in operation.
– While working on the actuator, disconnect and lock the pneumatic air supply as well as the control signal.

⚠ WARNING

Risk of personal injury when the actuator vents.
Wear eye protection when working in close proximity to the control valve.

! *NOTICE*

Operation disturbed by a blocked piston rod.
Do not impede the movement of the piston rod by inserting objects into their path.

Supply pressure

The Type 3275 Pneumatic Piston Actuator is designed for a maximum supply pressure of 6 bar.

7 Servicing

⚠ 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 concerned and the actuator.

NOTICE

Risk of actuator damage due to incorrect service or repair.
– *Do not perform any service or repair work other than the activities described in this section on your own. Contact SAMSON's After-sales Service department.*
– *Service and repair work must only be performed by staff trained for this purpose.*

NOTICE

Risk of actuator damage due to excessively high or low tightening torques.
Observe the specified torques on tightening actuator components. Excessively tightened torques lead to parts wearing out quicker. 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 lubricants.
Only use lubricants approved by SAMSON (▶ AB 0100).

Note

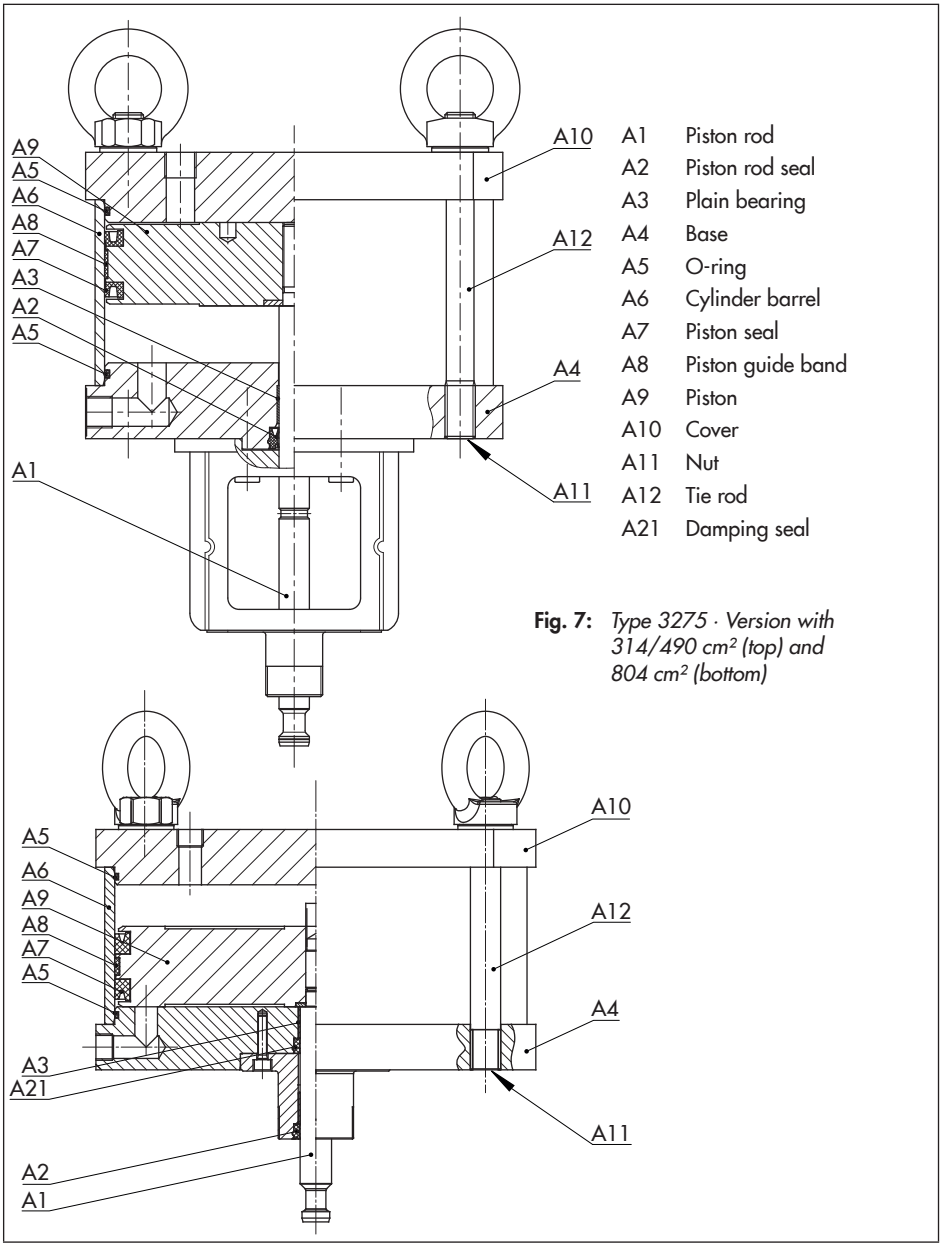
– *The product warranty becomes void if service or repair work not described in these instructions is performed without prior agreement by SAMSON's After-sales Service department.*
– *Only use original spare parts by SAMSON, which comply with the original specifications.*

7.1 Replacing parts subject to wear

Parts subject to wear

– Piston rod seal (A2)
– O-ring (A5)
– Damping seal (A21)
– Piston seal (A7)
– Piston guide band (A8)
– **For actuator with 314 and 490 cm² only:** wiper ring (A241) and dry bearing (A242). See Fig. 8.

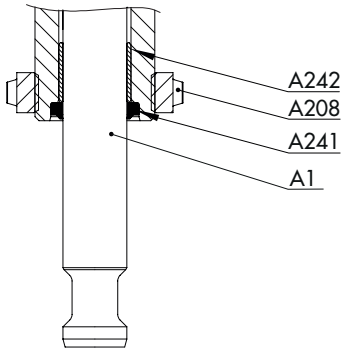
1. Lift the actuator off the valve. See section 9.2.
2. Unscrew collar nuts (A11) on the cylinder cover.
3. Pull off the tie rods (A12) towards the side with the piston rod.
4. Remove the base (A4).



A1	Piston rod
A2	Piston rod seal
A3	Plain bearing
A4	Base
A5	O-ring
A6	Cylinder barrel
A7	Piston seal
A8	Piston guide band
A9	Piston
A10	Cover
A11	Nut
A12	Tie rod
A21	Damping seal

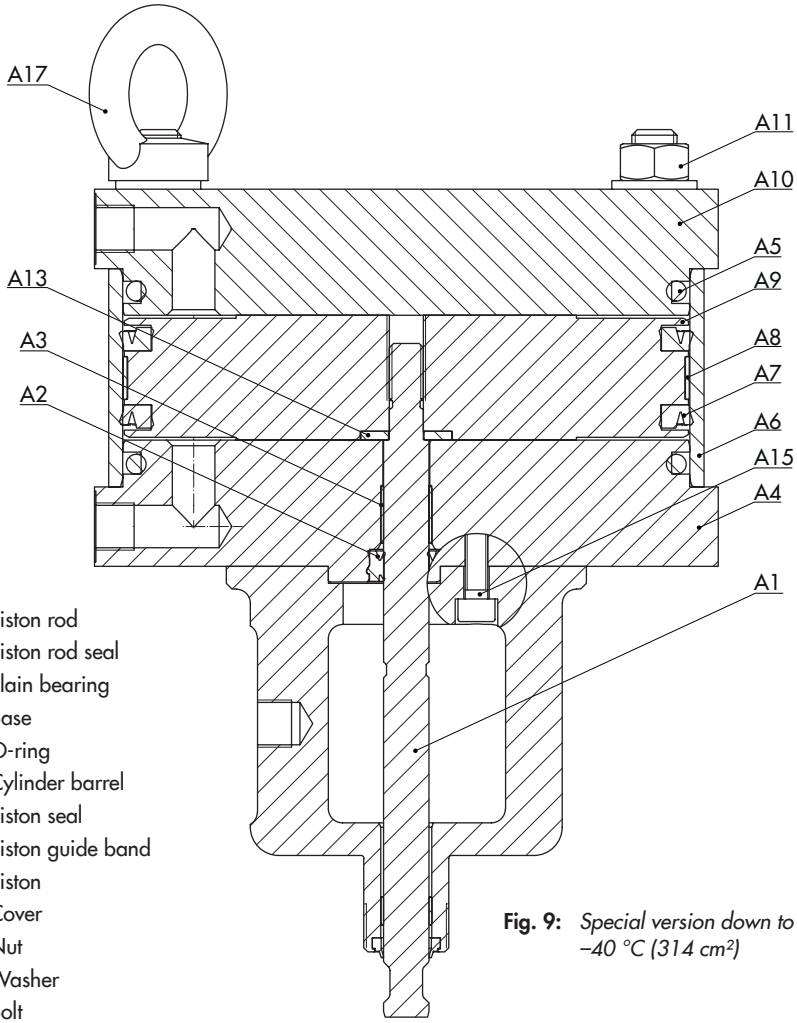
Fig. 7: *Type 3275 · Version with 314/490 cm² (top) and 804 cm² (bottom)*

5. Pull the piston rod (A1) and piston (A9) from the cylinder barrel (A6).
6. Separate the cylinder barrel (A6) and cover (A10).
7. Use a suitable tool to remove parts subject to wear. Make sure that the facings are not damaged.
8. Carefully clean the affected places and apply a suitable lubricant to them.
9. Apply a suitable lubricant to the parts subject to wear.
10. Mount the parts subject to wear. Make sure that the parts and facings are not damaged. If necessary, use an assembly tool.
11. Apply a suitable lubricant evenly to the face in the cylinder barrel (A6) and piston rod (A1).
12. Fill the grease chambers at the piston seal (A7) and piston rod seal (A2) with a suitable grease.
13. Center the cylinder barrel (A6) on the cover (A10).
14. Insert the piston (A9) with piston rod (A1) into the cylinder barrel (A6). Make sure that the parts subject to wear are not damaged.
15. Carefully slide the base (A4) over the piston rod (A1).
16. Screw the tie rods (A12) from side with the piston rod with the short thread side into the collar nuts (A11) on the cylinder base. Tighten the collar nuts in a criss-cross pattern. Observe tightening torques.
17. Leak-test the actuator (see section 7.2).
18. Mount the actuator on the valve (see section 5.1).



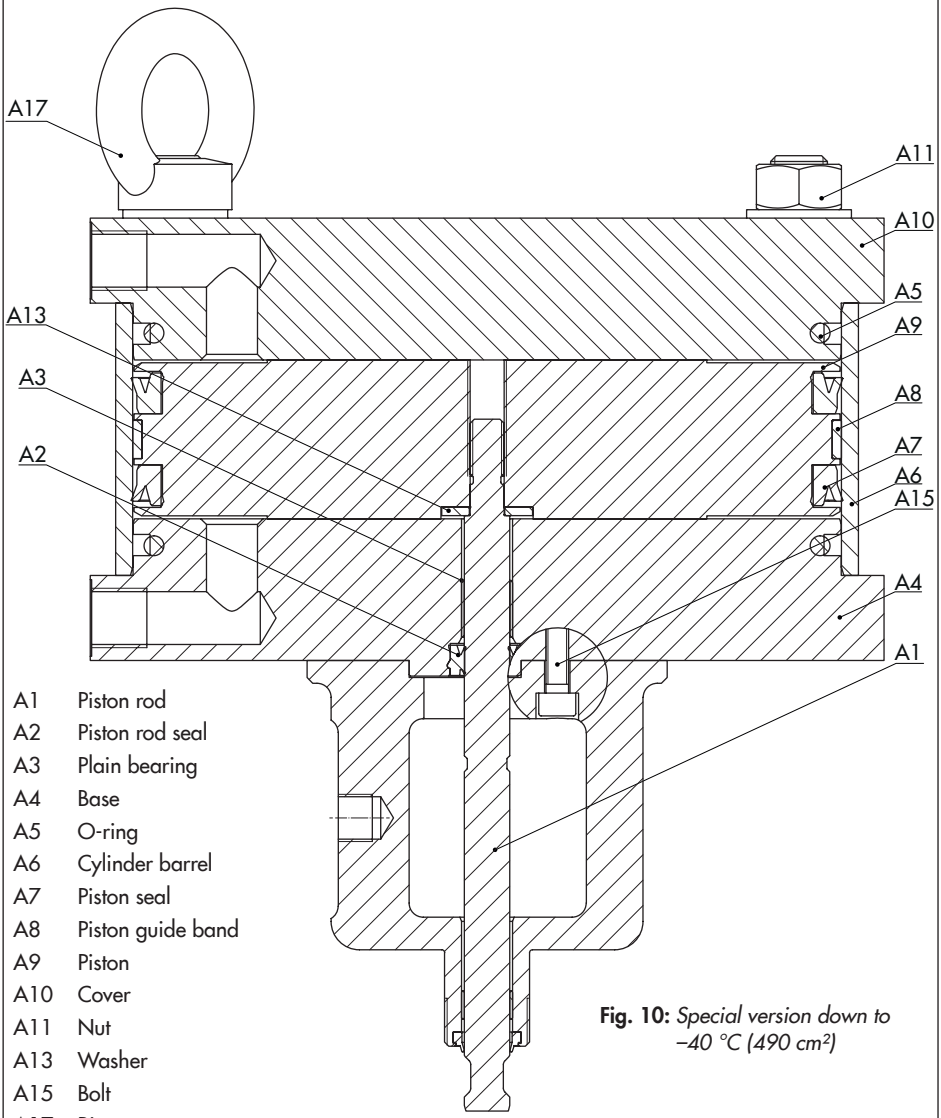
A1	Piston rod
A208	Ring nut
A241	Wiper ring
A242	Dry bearing

Fig. 8: *Piston rod seal in the yoke for actuator with 314 and 490 cm² actuator areas*



A1	Piston rod
A2	Piston rod seal
A3	Plain bearing
A4	Base
A5	O-ring
A6	Cylinder barrel
A7	Piston seal
A8	Piston guide band
A9	Piston
A10	Cover
A11	Nut
A13	Washer
A15	Bolt
A17	Ring nut

Fig. 9: *Special version down to –40 °C (314 cm²)*



A1	Piston rod
A2	Piston rod seal
A3	Plain bearing
A4	Base
A5	O-ring
A6	Cylinder barrel
A7	Piston seal
A8	Piston guide band
A9	Piston
A10	Cover
A11	Nut
A13	Washer
A15	Bolt
A17	Ring nut

Fig. 10: *Special version down to –40 °C (490 cm²)*

7.2 Leak-testing the actuator

After replacing the parts subject to wear (see section 7.1), the actuator must be tested for leakage at the following places:

– Connection of base (A4), cover (A10), and cylinder barrel (A6)
– Piston rod seal (A2)

7.3 Preparation for return shipment

Defective actuators can be returned to SAMSON for repair.

Proceed as follows to return valves to SAMSON:

1. Put the control valve out of operation. See associated valve documentation.
2. Remove the actuator from the valve (see section 9.2).
3. Send the actuator to your nearest SAMSON subsidiary. SAMSON subsidiaries are listed on our website at ▶ www.samson.de > Contact.

7.4 Ordering spare parts and operating supplies

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

Spare parts

Details on spare parts are available on request.

Lubricant

Details on suitable lubricants can be found in the document ▶ AB 0100.

8 Malfunctions

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

Troubleshooting

Malfunction	Possible reasons	Recommended action
Piston rod does not move on demand.	Actuator is blocked.	Check attachment. Unblock the actuator.
	Insufficient signal pressure	Check the signal pressure. Check the signal pressure line for leakage.
	Signal pressure not connected properly.	Check the signal pressure routing. See section 3.
Piston rod does not stroke through its complete travel range.	Insufficient signal pressure	Check the signal pressure. Check the signal pressure line for leakage.
	Valve accessories incorrectly set.	Check the actuator without valve accessories. Check the settings of the valve accessories.

9 Decommissioning and disassembly

⚠ 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 concerned and the actuator.

9.1 Decommissioning

To decommission the actuator for service and repair work or disassembly, 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.

9.2 Removing the actuator from the valve

1. Put the control valve out of operation. See associated valve documentation.
2. Remove external piping.
3. Remove the stem connector clamps (A26/27).
4. Unscrew the stem connector nut (9) and lock nut (10) from the valve.
5. Unscrew the ring nut (A8) on the valve bonnet (2).
6. Remove the ring nut (A8) and actuator from the valve.
7. Fasten the lock nut (10) and stem connector nut (9) on the valve.

9.3 Disposal

➔ Observe local, national, and international refuse regulations.

➔ Do not dispose of components, lubricants, and hazardous substances together with your other household waste.

10 Appendix

10.1 After-sales service

Contact SAMSON's After-sales Service department for support concerning service or repair work or when malfunctions or defects arise.

E-mail

You can reach the After-sales Service Department at aftersalesservice@samson.de.

Addresses of SAMSON AG and its subsidiaries

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on the SAMSON website, in all SAMSON product catalogs or on the back of these Mounting and Operating Instructions.

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.
- Installation drawing

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EB 8314 EN

2017-02-20 · English