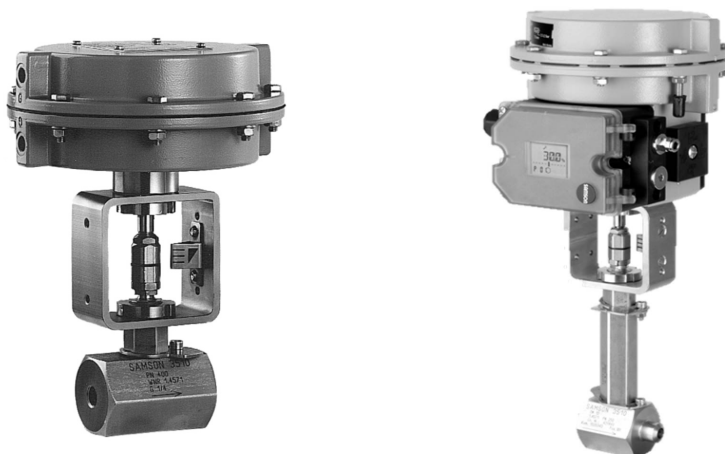


# MOUNTING AND OPERATING INSTRUCTIONS

SAMSON

## EB 8091-1 EN

### Translation of original instructions



Type 3510-1 (left) and Type 3510-7 (right) Pneumatic Control Valves

### **Type 3510 Micro-flow Valve · ANSI version**

In combination with an actuator,  
e.g. a Type 3271 or Type 3277 Pneumatic Actuator

Edition November 2024

CE UK  
CA

## Note on these mounting and operating instructions

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

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



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

### Definition of signal words

#### **DANGER**

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

#### **WARNING**

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

#### **NOTICE**

*Property damage message or malfunction*

#### **Note**

*Additional information*

#### **Tip**

*Recommended action*

<b>1</b>	<b>Safety instructions and measures</b> .....	<b>1-1</b>
1.1	Notes on possible severe personal injury .....	1-4
1.2	Notes on possible personal injury .....	1-5
1.3	Notes on possible property damage .....	1-7
1.4	Warnings on the device.....	1-8
<b>2</b>	<b>Markings on the device</b> .....	<b>2-1</b>
2.1	Valve body inscription .....	2-1
2.2	Actuator nameplate.....	2-1
2.3	Material identification number .....	2-1
2.4	Label when an adjustable packing is installed .....	2-2
<b>3</b>	<b>Design and principle of operation</b> .....	<b>3-1</b>
3.1	Versions .....	3-3
3.2	Additional fittings.....	3-4
3.3	Valve accessories .....	3-4
3.4	Technical data .....	3-5
<b>4</b>	<b>Shipment and on-site transport</b> .....	<b>4-1</b>
4.1	Accepting the delivered goods .....	4-1
4.2	Removing the packaging from the valve.....	4-1
4.3	Transporting and lifting the valve.....	4-1
4.3.1	Transporting the valve .....	4-2
4.3.2	Lifting the valve.....	4-2
4.4	Storing the valve .....	4-2
<b>5</b>	<b>Installation</b> .....	<b>5-1</b>
5.1	Installation conditions .....	5-1
5.2	Preparation for installation.....	5-2
5.3	Mounting the device.....	5-3
5.3.1	Mounting the actuator onto the valve.....	5-4
5.3.2	Installing the valve into the pipeline .....	5-4
5.4	Testing the installed valve.....	5-5
5.4.1	Leak test .....	5-6
5.4.2	Travel motion .....	5-7
5.4.3	Fail-safe position.....	5-7
5.4.4	Pressure test.....	5-7
<b>6</b>	<b>Start-up</b> .....	<b>6-1</b>
6.1	Supply pressures .....	6-2
6.2	Putting the control valve (back) into operation.....	6-2

## Contents

<b>7</b>	<b>Operation</b> .....	<b>7-1</b>
7.1	Normal operation .....	7-2
7.2	Manual operation .....	7-2
<b>8</b>	<b>Malfunctions</b> .....	<b>8-1</b>
8.1	Troubleshooting .....	8-1
8.2	Emergency action .....	8-2
<b>9</b>	<b>Servicing</b> .....	<b>9-1</b>
9.1	Periodic testing .....	9-3
9.2	Service work preparations .....	9-6
9.3	Installing the valve after service work .....	9-6
9.4	Service work.....	9-6
9.4.1	Replacing the gasket .....	9-7
9.4.2	Replacing the packing .....	9-11
9.4.3	Replacing the seat and plug.....	9-13
9.5	Ordering spare parts and operating supplies .....	9-16
<b>10</b>	<b>Decommissioning</b> .....	<b>10-1</b>
<b>11</b>	<b>Removal</b> .....	<b>11-1</b>
11.1	Removing the valve from the pipeline.....	11-2
11.2	Removing the actuator from the valve .....	11-2
<b>12</b>	<b>Repairs</b> .....	<b>12-1</b>
12.1	Returning devices to SAMSON .....	12-1
<b>13</b>	<b>Disposal</b> .....	<b>13-1</b>
<b>14</b>	<b>Certificates</b> .....	<b>14-1</b>
<b>15</b>	<b>Appendix</b> .....	<b>15-1</b>
15.1	Tightening torques, lubricants and tools .....	15-1
15.2	Spare parts .....	15-1
15.3	After-sales service .....	15-3
15.4	Information on the UK sales region.....	15-3



# 1 Safety instructions and measures

## Intended use

The SAMSON Type 3510 Micro-flow Valve in combination with an actuator (e.g. Type 3271 or Type 3277 Pneumatic Actuator) is designed to regulate the flow rate, pressure or temperature of liquids, gases or vapors. The micro-flow valve is suitable for controlling low flow rates, e.g. in pilot plants and technical research facilities. The valve with its actuator is designed to operate under exactly defined conditions (e.g. operating pressure, process medium, temperature). Therefore, operators must ensure that the control valve is only used in operating conditions that meet the specifications used for sizing the valve at the ordering stage. In case operators intend to use the control valve in applications or conditions other than those 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 control valve 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 valve accessories connected to the valve

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 control valve 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.

Welding operations are to be performed only by personnel who has the necessary qualification to perform the applied welding procedure and handle the materials used.

## Safety instructions and measures

Explosion-protected versions of this device must be operated only by personnel who has undergone special training or instructions or who is authorized to work on explosion-protected devices in hazardous areas.

### Personal protective equipment

SAMSON recommends checking the hazards posed by the process medium being used (e.g. ► GESTIS (CLP) hazardous substances database). Depending on the process medium and/or the activity, the protective equipment required includes:

- Protective clothing, gloves, eye protection and respiratory protection in applications with hot, cold and/or corrosive media
  - Wear hearing protection when working near the valve
  - Hard hat
  - Safety harness, e.g. when working at height
  - Safety footwear, if applicable ESD (electrostatic discharge) footwear
- ➔ 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 features

The fail-safe position of the control valve upon air supply or control signal failure depends on the actuator used (see associated actuator documentation). When the valve is combined with a SAMSON Type 3271 or Type 3277 Pneumatic Actuator, the valve moves to a certain fail-safe position (see the 'Design and principle of operation' chapter) upon supply air or control signal failure. The fail-safe action of the actuator is the same as its direction of action and is specified on the nameplate of SAMSON actuators.

### 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 control valve by the process medium, the operating pressure, the signal pressure or by moving parts by taking appropriate precautions. Plant operators and operating personnel must observe all hazard statements, warnings and caution notes in these mounting and operating instructions.

Hazards resulting from the special working conditions at the installation site of the valve must be identified in a risk assessment and prevented through the corresponding standard operating procedures drawn up by the operator.

### **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.

Operators are additionally responsible for ensuring that the limits for the product defined in the technical data are observed. This also applies to the start-up and shutdown procedures. Start-up and shutdown procedures fall within the scope of the operator's duties and, as such, are not part of these mounting and operating instructions. SAMSON is unable to make any statements about these procedures since the operative details (e.g. differential pressures and temperatures) vary in each individual case and are only known to the operator.

### **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**

The control valves comply with the requirements of the European Pressure Equipment Directive 2014/68/EU, Machinery Directive 2006/42/EC, Directive 2016 No. 1105 Pressure Equipment (Safety) Regulations 2016 and Directive 2008 No. 1597 Supply of Machinery (Safety) Regulations 2008. Valves with a CE marking and/or UKCA marking have a declaration of conformity, which includes information about the applied conformity assessment procedure. The 'Certificates' chapter contains this declaration of conformity.

According to the ignition hazard assessment performed in accordance with Clause 5.2 of ISO 80079-36, the non-electrical control valves 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 documents

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

- Mounting and operating instructions for mounted actuator, e.g. ► EB 8310-1 for Type 3271 and Type 3277 Pneumatic Actuator with 120 cm<sup>2</sup> actuator area
- Mounting and operating instructions for mounted valve accessories (positioner, solenoid valve etc.)
- ► AB 0100 for tools, tightening torques and lubricant
- For oxygen service: Manual ► H 01
- Manual ► H 02: Appropriate Machinery Components for SAMSON Pneumatic Control Valves with a Declaration of Conformity of Final Machinery

## 1.1 Notes on possible severe personal injury

### DANGER

#### **Risk of bursting in pressure equipment.**

Valves and pipelines are pressure equipment. Excessive pressurization or improper opening can lead to valve components bursting.

- Observe the maximum permissible pressure for valve and plant.
- Before starting any work on the control valve, depressurize all plant sections affected as well as the valve.
- Drain the process medium from the plant sections affected as well as from the valve.

## 1.2 Notes on possible personal injury

### WARNING

#### **Risk of burn injuries due to hot or cold components and pipelines.**

Depending on the process medium, valve components and pipelines may get very hot or cold and cause burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

#### **Risk of hearing loss or deafness due to loud noise.**

The noise emissions depend on the valve version, plant facilities and process medium.

- Wear hearing protection when working near the valve.

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

While the valve is operating, air is vented from the actuator, e.g. to change the valve's position or to open or close the valve.

- 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.
- Use suitable mufflers and vent plugs.
- Wear eye protection when working in close proximity to the control valve.

### **WARNING**

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

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

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.
- Before unblocking the actuator and plug stem after they have 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 associated actuator documentation.

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

Valves in combination with pneumatic actuators with preloaded springs are under tension. These control valves with SAMSON pneumatic actuators can be identified by the long bolts protruding from the bottom of the actuator.

- Before starting any work on the actuator, relieve the compression from the preloaded springs (see associated actuator documentation).

#### **Risk of personal injury due to residual process medium in the valve.**

While working on the valve, residual medium can flow out of the valve and, depending on its properties, cause personal injury, e.g. (chemical) burns.

- If possible, drain the process medium from the valve, any dead spaces and all the plant sections affected.
- Thoroughly flush the pipelines. The plant operator is responsible for cleaning the pipelines.
- Wear protective clothing, safety gloves, respiratory protection and eye protection.

**⚠ WARNING**

**Risk of personal injury due to pressurized components and as a result of process medium being discharged.**

Valves with a bellows seal have a test connection on top of the bellows seal.

→ Do not loosen the screw on the test connection while the valve is pressurized.

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

Over time, markings, labels and nameplates on the valve 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**

**Incorrect control performance due to a combination of trim parts that do not match each other.**

The trim parts (seat, plug, anti-rotation fixture and body gasket) are matched to exactly fit each other. The trim parts are delivered together and marked accordingly (see the 'Markings on the device' chapter).

→ Only install matching trim parts.

**Risk of valve damage due to contamination (e.g. solid particles) in the pipeline.**

The plant operator is responsible for cleaning the pipelines in the plant.

→ Flush the pipelines before start-up.

**Risk of valve damage due to unsuitable medium properties.**

The valve is designed for a process medium with defined properties.

→ Only use the process medium specified for sizing the equipment.

### ! NOTICE

#### **Risk of leakage and valve damage due to over- or under-torquing.**

Observe the specified torques when tightening control valve components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are too loose may cause leakage.

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

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

Certain tools are required to work on the valve.

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

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

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


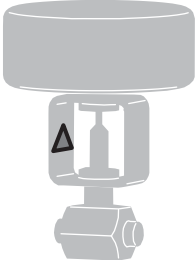
→ Only use lubricants approved by SAMSON (▶ AB 0100).

#### **Risk of the process medium being contaminated through the use of unsuitable lubricants and/or contaminated tools and components.**

→ If necessary, keep the valve and the tools used free from solvents and grease.

→ Make sure that only suitable lubricants are used.

## 1.4 Warnings on the device

Warning symbols	Meaning of the warning	Location on the device
	<p>Warning against moving parts There is a risk of injury to hands or fingers due to the stroking movement of the actuator and plug stem if they are inserted into the yoke while the air supply is connected to the actuator.</p>	



## 2 Markings on the device

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

### 2.1 Valve body inscription

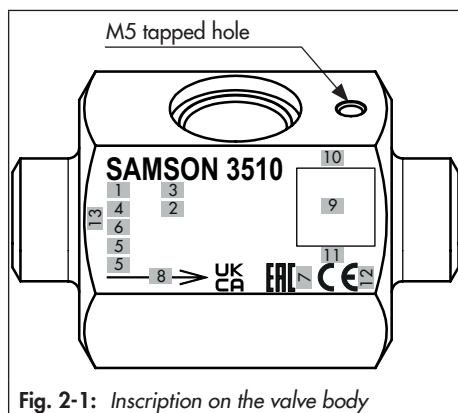


Fig. 2-1: Inscription on the valve body

Item	Inscription meaning
1	Valve size: DIN: DN · ANSI: NPS · JIS: DN ... A/B
2	Pressure rating: DIN: PN · ANSI: CL · JIS: K
3	Flange/end connection type
4	Material
5	Order number and position number in the order
6	Heat number
7	Month and year associated with EAC symbol
8	Arrow indicating the direction of flow <sup>1)</sup>
9	Data Matrix code
10	Country of origin

Item	Inscription meaning
11	Serial number
12	ID of the notified body (EU), for example: – <b>0062</b> for Bureau Veritas Services SAS, 8 Cours du Triangle, 92800 PUTEAUX – LA DEFENSE
13	Tag number (optional specification)

<sup>1)</sup> In addition to the labeling on the valve body, the position of the M5 tapped hole on the body's top plane surface also indicates the direction of flow through the valve (see Fig. 2-1). This tapped hole is always located on the outlet side of the valve body when the standard FTO (flow-to-open) flow direction is used.

### 2.2 Actuator nameplate

See associated actuator documentation.

### 2.3 Material identification number

The trim parts (seat, plug, anti-rotation fixture and body gasket) are matched to exactly fit each other and marked as follows:

#### Seat

- Material no.
- SAMSON consecutive number

#### Plug

- Material no.
- SAMSON consecutive number
- $K_{VS}$  coefficient and characteristic

#### Anti-rotation fixture (on the trim)

- ➔ See Fig. 2-2
- Plug material
  - Seat material
  - $K_{VS}/C_V$

## Markings on the device

- Characteristic
- SAMSON consecutive number

### Anti-rotation fixture (on the bellows seal)

- Bellows material
- Pressure rating

## 2.4 Label when an adjustable packing is installed

An adjustable packing is used to seal the valve stem, which must be adjusted after the valve has been installed in the pipeline (see section 'Leak test' in the 'Installation' chapter). An instructional label is affixed to the outside of the yoke (see Fig. 2-3).

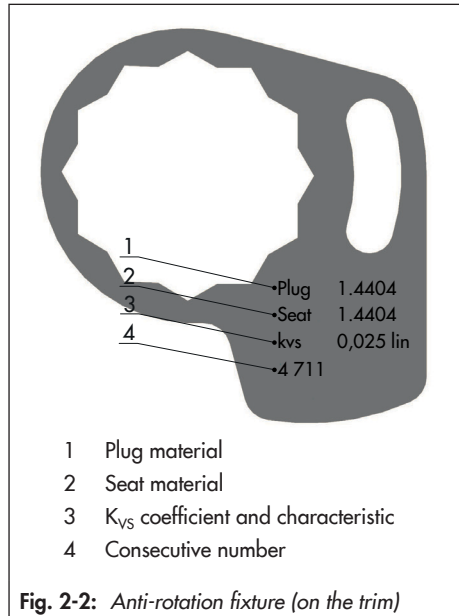


Fig. 2-2: Anti-rotation fixture (on the trim)

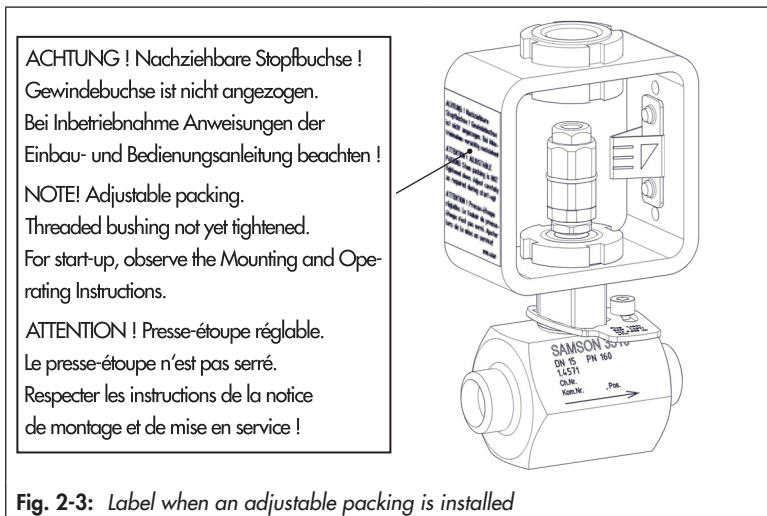


Fig. 2-3: Label when an adjustable packing is installed

### 3 Design and principle of operation

See Fig. 3-1

The Type 3510 Micro-flow Valve is available as either a globe or angle valve. This valve is preferably combined with a SAMSON Type 3271 or Type 3277 Pneumatic Actuator with 120 cm<sup>2</sup> actuator area. It can also be combined with other actuators.

The seat (2.2) and plug (2.1) are installed in the body (1). The plug stem is connected to the actuator stem (A7) by the stem connector and is sealed by an adjustable packing with PTFE seal rings (34).

The anti-rotation fixture (2.4) prevents a loosening of the screw connection between the valve body and intermediate piece (4). Two anti-rotation fixtures are used for versions with an insulating section or bellows seal: One anti-rotation fixture between the body and insulating section/bellows seal as well as one anti-rotation fixture between the insulating section/bellows seal and intermediate piece.

The springs in the pneumatic actuator are located either above or below the diaphragm depending on the selected fail-safe action. A change in the signal pressure acting on the diaphragm causes the plug to move. The actuator size is determined by the diaphragm area.

The medium flows through the valve in the direction indicated by the arrow. A rise in signal pressure causes the force acting on the diaphragm in the actuator to increase. The springs are compressed. Depending on

the selected direction of action, the actuator stem retracts or extends. As a result, the plug position in the seat changes and determines the flow rate through the valve.

---

#### Tip

*SAMSON recommends the use of positioners with integrated diagnostic firmware (see Chapter 3.3) for valves used for on/off service. The partial stroke test included in this software helps prevent a shut-off valve normally in its end position from seizing up or getting jammed.*

---

#### Fail-safe action

The fail-safe position of the control valve upon air supply or control signal failure depends on the actuator used (see associated actuator documentation).

Depending on how the compression springs are arranged in the SAMSON Type 3271 and Type 3277 Pneumatic Actuator, the valve has one of two different fail-safe positions:

- **Actuator stem extends (FA)**

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

- **Actuator stem retracts (FE)**

When the signal pressure is reduced or the air supply fails, the springs move the actuator stem upward and open the valve. The valve closes when the signal



pressure is increased enough to overcome the force exerted by the springs.

**Tip**

The actuator's direction of action can be reversed, if required. Refer to the operating and mounting instructions of the pneumatic actuator, e.g. ► EB 8310-1 for Type 3271 and Type 3277 with 120 cm<sup>2</sup> actuator area.

---

### 3.1 Versions

#### With insulating section/bellows seal

The modular design allows an insulating section or bellows seal to be fitted to the standard valve version.

**Tip**

If valve accessories (e.g. positioner, limit switch etc.) are to be mounted to the valve version with flanges, we recommend mounting an insulating section or bellows seal. This provides more space to mount valve accessories.

---

#### Actuators

In these instructions, the preferable combination with a SAMSON Type 3271 or Type 3277 Pneumatic Actuator is described. The pneumatic actuator (with or without handwheel) can be replaced by another pneumatic actuator in a different size, but with the same travel.

→ Observe the maximum permissible actuator force.

---

**i Note**

If the travel range of the actuator is larger than the travel range of the valve, the spring assembly in the actuator must be preloaded so that the travel ranges match. See associated actuator documentation.

---

The basic pneumatic actuator can be replaced by a pneumatic actuator with additional handwheel or by an electric actuator (see Information Sheet ► T 8300).

### 3.2 Additional fittings

#### Filter

SAMSON recommends installing a filter upstream of the valve depending on the  $K_{VS}$  coefficient. It prevents solid particles in the process medium from damaging the valve.

$K_{VS}$ coefficient	Mesh size
0.0001 to 0.0063	<1 $\mu\text{m}$
0.01 to 0.4	<10 $\mu\text{m}$
0.63 to 1.6	$\leq 20 \mu\text{m}$

#### Bypass and shut-off valves

SAMSON recommends installing a shut-off valve both upstream of the filter and downstream of the valve and installing a bypass line. The bypass ensures that the plant does not need to be shut down for service and repair work on the valve.

#### Insulation

Control valves can be insulated to reduce heat energy transfer.

Refer to the insulation instructions in the 'Installation' chapter.

#### Test connection

Versions with bellows seal fitted with a test connection (G  $\frac{1}{8}$ ) at the top flange allow the sealing ability of the bellows to be monitored.

Particularly for liquids and vapors as well as explosive or hazardous substances, we recommend installing a suitable leakage indicator (e.g. a contact pressure gauge, an outlet to an open vessel or an inspection glass).

#### Safety guard

For operating conditions that require increased safety (e.g. in cases where the valve is freely accessible to untrained staff), a safety guard must be installed to rule out a crush hazard arising from moving parts (actuator and plug stem). Plant operators are responsible for deciding whether a guard is to be used. The decision is based on the risk posed by the plant and its operating conditions.

### 3.3 Valve accessories

Information Sheet ► T 8350

A mounting kit is required to mount positioners, limit switches, solenoid valves etc. The mounting kit (item no. 1400-9031) can be ordered from SAMSON. Refer to the mounting and operating instructions of the corresponding device for a description for details on how to mount it.

### 3.4 Technical data

The nameplates on the valve and actuator provide information on the control valve version. See the 'Markings on the device' chapter.

---

#### **i** Note

More information is available in Data Sheet  
▶ T 8091-1.

---

#### Conformity

The Type 3510 Valve bears the CE, UKCA and EAC marks of conformity.



#### Temperature range

Depending on the version, the control valve is designed for a temperature range from 14 to 428 °F (-10 to +220 °C). The use of an insulating section or bellows seal can extend the temperature range down to -325 and up to +842 °F (-196 and +450 °C) (higher temperatures on request) depending on the properties of the materials used.

#### Leakage class

Depending on the version, the following leakage class according to ANSI/FCI 70-2 or IEC 60534-4 applies:

- Leakage class IV with metal seal
- Leakage class V for high-performance metal seal

#### Noise emissions

SAMSON is unable to make general statements about noise emissions. The noise emissions depend on the valve version, plant facilities and process medium.

## Design and principle of operation

### Dimensions and weights

**Table 3-1:** Dimensions in inch and mm for Type 3510 Valve

Valve	Connection	Female thread G/NPT/Rc 1/8 to 3/4	Welding ends		Flanges		
			NPS 1/2	NPS 1	NPS 1/2	NPS 3/4	NPS 1
L <sup>1)</sup>	Class 150	in	7.25	7.25	7.25	7.25	7.25
		mm	184	184	184	184	184
	Class 300	in	7.50	7.75	7.50	7.62	7.75
		mm	190	197	190	194	197
	Class 600	in	8.00	8.25	8.00	8.12	8.25
		mm	203	210	203	206	210
	Class 900/ Class 1500	in	8.50	10.00	8.50	9.00	10.00
		mm	216	254	216	229	254
Class 2500	in	10.38	12.12	10.38	10.75	12.12	
	mm	264	308	264	273	308	
L1 <sup>1)</sup>	Class 150	in	3.62	3.62	3.62	3.62	3.62
		mm	92	92	92	92	92
	Class 300	in	3.75	3.88	3.75	3.81	3.88
		mm	95	99	95	97	99
	Class 600	in	4.00	4.12	4.00	4.06	4.12
		mm	101	105	101	103	105
	Class 900/ Class 1500	in	4.25	5.00	4.25	4.50	5.00
		mm	108	127	108	114	127
Class 2500	in	5.19	6.06	5.19	5.38	6.06	
	mm	132	154	132	137	154	
H1	120 cm <sup>2</sup>	in	4.80				
		mm	122				



Valve	Connection	Female thread G/NPT/Rc 1/8 to 3/4	Welding ends		Flanges			
			NPS 1/2	NPS 1	NPS 1/2	NPS 3/4	NPS 1	
H4	Insulating section	Up to Class 2500	10.35"/263 mm					
	Bellows seal	Up to Class 600	10.35"/263 mm					
		Class 1500	14.37"/365 mm					
H2 or flange Ø D1	Class 150	in	0.90" <sup>2)</sup> 23 mm <sup>2)</sup>	0.90" <sup>2)</sup> 23 mm <sup>2)</sup>	0.90" <sup>2)</sup> 23 mm <sup>2)</sup>	3.54	3.94	4.33
		mm				90	100	110
	Class 300	in				3.74	4.53	4.91
		mm				95	115	125
	Class 600	in				3.74	4.53	4.91
		mm				95	115	125
	Class 900/ Class 1500	in				4.72	5.12	5.91
		mm				120	130	150
Class 2500	in	5.31	5.51	6.30				
	mm	135	140	160				

1) Face-to-face dimensions of flanges according to DIN EN 558

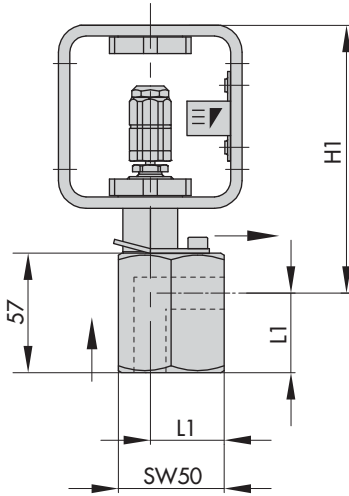
2) H2 = 1.10" (28 mm) with body material B 574 N06455

## Design and principle of operation

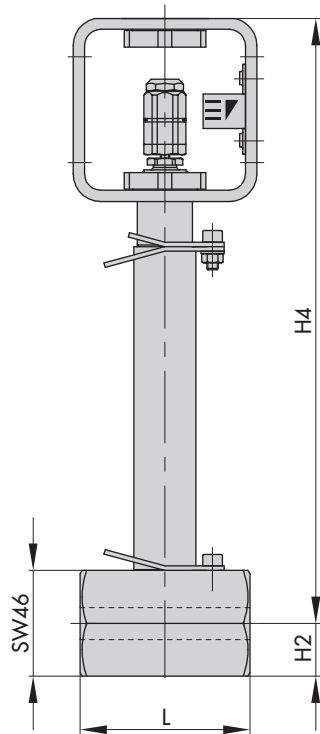
**Table 3-2:** *Weights in lbs and kg for Type 3510 Valve*

Valve	Connection	Female thread G/NPT/Rc 1/8 to 3/4	Welding ends NPS 1/2, NPS 1	Flanges				
				NPS 1/2	NPS 3/4	NPS 1		
Valve without actuator	Class 150	lbs	3.74	4.0	5.8	7.3	8.2	
		kg	1.7	1.8	2.6	3.3	3.7	
	Class 300	lbs	3.74	4.0	7.1	9.3	10.6	
		kg	1.7	1.8	3.2	4.2	4.8	
	Class 600	lbs	3.74	4.0	7.5	10.6	11.5	
		kg	1.7	1.8	3.4	4.8	5.2	
	Class 900/ 1500	lbs	3.74	4.0	14.4	16.8	19.2	
		kg	1.7	1.8	5.2	7.6	8.7	
	Class 2500	lbs			14.4	20	21.7	
		kg			6.5	9.0	9.8	
	Optional	Insulating section	lbs	1.2				
			kg	0.5				
Bellows seal		lbs	1.4					
		kg	0.6					

Dimensional drawings

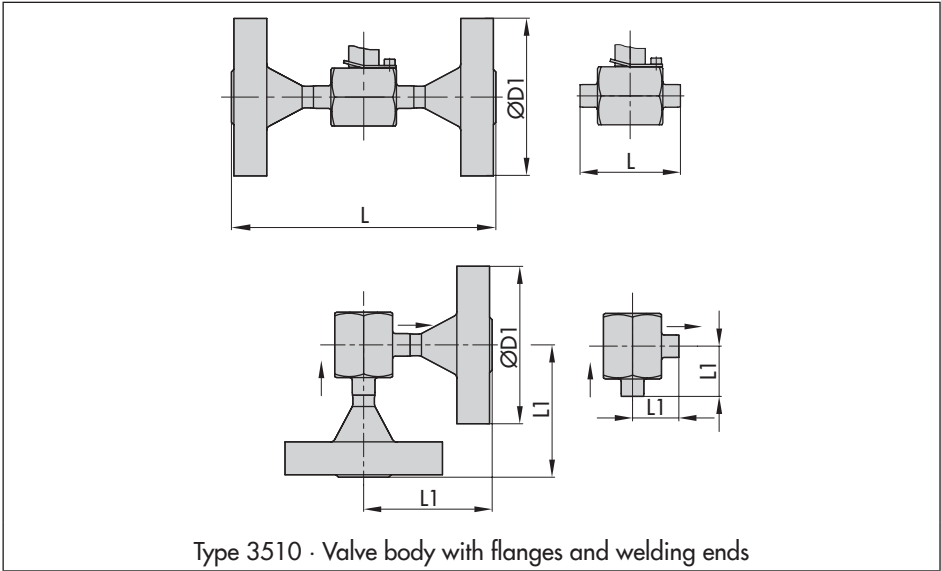


Type 3510 as angle valve with female thread



Type 3510 as globe valve with female thread, with bellows seal or insulating section

## Design and principle of operation



### **i** Note

Dimensions and weights for Type 3271 and Type 3277 Pneumatic Actuators with 120 cm<sup>2</sup> actuator area can be found in the Data Sheet ► T 8310-1.

## 4 Shipment and on-site transport

The work described in this chapter is to be performed only 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 valve nameplate match the specifications in the delivery note. See the 'Markings on the device' chapter 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' chapter.

### 4.2 Removing the packaging from the valve

Observe the following sequence:

- Do not open or remove the packaging until immediately before lifting to install the valve into the pipeline.

- Leave the control valve in its transport container or on the pallet to transport it on site.
- Do not remove the protective caps from the inlet and outlet until immediately before installing the valve into the pipeline. They prevent foreign particles from entering the valve.
- Dispose and recycle the packaging in accordance with the local regulations.

### 4.3 Transporting and lifting the valve

#### 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 valve (including actuator and packaging, if applicable).

#### Tip

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

### 4.3.1 Transporting the valve

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

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

#### Transport instructions

- Protect the control valve against external influences (e.g. impact).
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the piping and any mounted valve accessories against damage.
- Protect the control valve against moisture and dirt.
- The permissible transportation temperature of standard control valves is  $-4$  to  $+149$  °F ( $-20$  to  $+65$  °C).

---

#### **i** Note

Contact our after-sales service for the transportation temperatures of other valve versions.

---

### 4.3.2 Lifting the valve

Due to the low service weight, lifting equipment is not absolutely necessary to lift the control valves (e.g. to install them into the pipeline). To install a large valve into the pipeline, use lifting equipment (e.g. crane or forklift) to lift it.

#### Lifting instructions using lifting equipment and slings

- Use a hook with safety latch to secure the slings from slipping off the hook during lifting and transporting.
- Secure slings against slipping. Secure the slings attached to the body against slipping using a connector.
- Make sure the slings can be removed from the device once it has been installed into the pipeline.
- Prevent the control valve from tilting or tipping over.
- Do not leave loads suspended when interrupting work for longer periods of time.

### 4.4 Storing the valve

---

#### **i** NOTICE

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

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

---

#### **i** Note

SAMSON recommends to regularly check the control valve and the prevailing storage conditions during long storage periods.

---

### Storage instructions

- Protect the control valve against external influences (e.g. impact).
- Secure the valve in the stored position against slipping or tipping over.
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the control valve against moisture and dirt. Store it at a relative humidity of less than 75 %. In damp spaces, prevent condensation. If necessary, use a drying agent or heating.
- Make sure that the ambient air is free of acids or other corrosive media.
- The permissible storage temperature of standard control valves is  $-4$  to  $+149$  °F ( $-20$  to  $+65$  °C). Contact our after-sales service for the storage temperatures of other valve versions.
- Do not place any objects on the control valve.

### 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.
- SAMSON recommends a storage temperature of  $59$  °F ( $15$  °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 chapter is to be performed only by personnel appropriately qualified to carry out such tasks.

### 5.1 Installation conditions

#### Work position

The work position for the control valve is the front view looking onto the operating controls (including valve accessories).

Plant operators must ensure that, after installation of the device, the operating personnel can perform all necessary work safely and easily access the device from the work position.

#### Pipeline routing

The inlet and outlet lengths (see Table 5-1) vary depending on several variables and process conditions and are intended as recommendations. Contact SAMSON if the lengths are significantly shorter than the recommended lengths.

To ensure that the valve functions properly, proceed as follows:

- ➔ Observe the inlet and outlet lengths (see Table 5-1). Contact SAMSON if the valve conditions or states of the medium process deviate.
- ➔ Install the valve free of stress and with the least amount of vibrations as possible. Read sections "Mounting position" and "Support or suspension" in this chapter.

- ➔ Install the valve allowing sufficient space to remove the actuator and valve or to perform service work on them.

#### Mounting position

Generally, SAMSON recommends installing the valve with the actuator upright and on top of the valve.

- ➔ Contact SAMSON if the mounting position is not as specified above.

#### Support or suspension

---

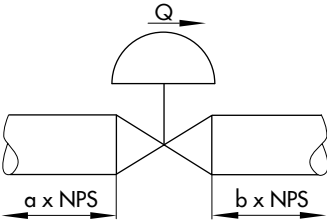
##### **i** Note

*The plant engineering company is responsible for selecting and implementing a suitable support or suspension of the installed control valve and the pipeline.*

---

Depending on the valve version and mounting position, the valve, actuator and pipeline must be supported or suspended.

Table 5-1: Inlet and outlet lengths



Q Flow rate  
a Inlet length  
b Outlet length

State of process medium	Valve conditions	Inlet length a	Outlet length b
Gas	$Ma \leq 0.3$	2	4
	$0.3 \leq Ma \leq 0.7$	2	10
Vapor	$Ma \leq 0.3$ <sup>1)</sup>	2	4
	$0.3 \leq Ma \leq 0.7$ <sup>1)</sup>	2	10
	Wet steam (percentage of condensate > 5%)	2	20
Liquid	Free of cavitation/ $w < 10$ m/s	2	4
	Cavitation producing noise/ $w \leq 3$ m/s	2	4
	Cavitation producing noise/ $3 < w < 5$ m/s	2	10
	Critical cavitation/ $w \leq 3$ m/s	2	10
	Critical cavitation/ $3 < w < 5$ m/s	2	20
Flashing	–	2	20
Multi-phase	–	10	20

<sup>1)</sup> No wet steam

**Valve accessories**

➔ During connection of valve accessories, make sure that they are easily accessible and can be operated safely from the work position.

more, the vent plugs allow air intake to prevent a vacuum from forming in the device.

➔ Locate the vent plug on the opposite side to the work position of operating personnel.

**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). Further-

**5.2 Preparation for installation**

Before installation, make sure the following conditions are met:

- The valve is clean.

- The valve and all valve accessories (including piping) are not damaged.
- The valve data on the nameplate (type designation, nominal size, material, pressure rating and temperature range) match the plant conditions (nominal size and pressure rating of the pipeline, medium temperature etc.). See the 'Markings on the device' chapter for nameplate details.
- The requested or required additional pipe fittings (see the 'Additional fittings' chapter) have been installed or prepared as necessary before installing the valve.

#### **NOTICE**

##### **Risk of control valve damage or impaired functioning due to incorrect insulation.**

- Only insulate control valves up to the top of the valve body. This also applies to versions with bellows seal or insulating section at medium temperatures below 32 °F (0 °C) or above 428 °F (220 °C). If the insulating section is insulated, it will not function properly.
- Do not insulate valves mounted to comply with NACE MR0175 requirements and which have nuts and bolts that are not suitable for sour gas environments.

Proceed as follows:

- Lay out the necessary material and tools to have them ready during installation work.
- Flush the pipelines.

#### **Note**

*The plant operator is responsible for cleaning the pipelines in the plant.*

- For steam applications, dry the pipelines. Moisture will damage the inside of the valve.
- Check any mounted pressure gauges to make sure they function properly.
- When the valve and actuator are delivered already assembled, check the tightening torques of the bolted joints (▶ AB 0100). Components may loosen during transport.

## 5.3 Mounting the device

The activities listed below are necessary to install the valve and before it can be started up.

#### **NOTICE**

##### **Risk of control valve damage due to over- or under-torquing.**

*Observe the specified torques when tightening control valve components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are too loose may cause leakage.*

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

---

### ⓘ NOTICE

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

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

---

### 5.3.1 Mounting the actuator onto the valve

---

### ⚠ WARNING

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

Actuators with preloaded springs are under tension. They can be identified by the long bolts protruding from the bottom of the actuator.

→ Before starting any work on the actuator, relieve the compression from the preloaded springs (see associated actuator documentation).

---

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.

→ To mount the actuator, proceed as described in the associated actuator documentation.

### 5.3.2 Installing the valve into the pipeline

---

### ⓘ NOTICE

**Risk of valve damage due to work being carried out by personnel not qualified for such tasks.**

The plant operator or specialist company performing the welding is responsible for the selection of the welding procedure and the actual welding operations on the valve. This also applies to any required heat treatment to be performed on the valve.

→ Only allow qualified welding personnel to carry out welding operations.

---

#### a) Version with female thread or flanges

1. Close the shut-off valves in the pipeline at the inlet and outlet of the plant section while the valve is being installed.
2. Prepare the relevant section of the pipeline for installing the valve.
3. Remove the protective caps from the valve ports before installing the valve.
4. Lift the valve to the site of installation (see the 'Lifting the valve' chapter). Observe the flow direction through the valve. The arrow on the valve indicates the direction of flow.
5. Make sure that the correct gaskets are used on the end connections.
6. Bolt the pipe to the valve free of stress.

7. Attach a support or suspension on the valve, if necessary.

## b) Version with welding ends

1. Proceed as described above under "Version with female thread or flanges", steps 1 to 4.
2. Completely retract the actuator stem to protect the plug from sparks during welding.
3. Weld the valve free of stress into the pipeline.
4. Attach a support or suspension on the valve, if necessary.

## 5.4 Testing the installed valve

### **⚠ DANGER**

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

Valves and pipelines are pressure equipment that may burst when handled incorrectly.

Flying projectile fragments or the release of process medium under pressure can cause serious injury or even death.

Before working on the control valve:

- Depressurize all plant sections affected and the valve (including the actuator). Release any stored energy.
- Drain the process medium from the plant sections affected as well as from the valve.

### **⚠ WARNING**

**Risk of personal injury due to pressurized components and as a result of process medium being discharged.**

Valves with a bellows seal have a test connection on top of the bellows seal.

- Do not loosen the screw on the test connection while the valve is pressurized.

### **⚠ WARNING**

**Risk of hearing loss or deafness due to loud noise.**

Noise emission (e.g. cavitation or flashing) may occur during operation caused by the process medium and the operating conditions. Additionally, a loud noise may briefly occur through the sudden venting of the pneumatic actuator or pneumatic valve accessories not fitted with noise-reducing elements. Both can damage hearing.

- Wear hearing protection when working near the valve.

### **⚠ WARNING**

**Crush hazard arising from actuator and plug stem moving.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.

→ Before unblocking the actuator and plug stem after they have 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 associated actuator documentation.

---

### **WARNING**

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

While the valve is operating, air is vented from the actuator, e.g. to change the valve's position or to open or close the valve.

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

---

### **WARNING**

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

Actuators with preloaded springs are under tension. They can be identified by the long bolts protruding from the bottom of the actuator.

→ Before starting any work on the actuator, relieve the compression from the preloaded springs (see associated actuator documentation).

---

To test the valve functioning before start-up or putting back the valve into operation, perform the following tests:

## 5.4.1 Leak test

The plant operator is responsible for performing the leak test and selecting the test method. The leak test must comply with the requirements of the national and international standards that apply at the site of installation.

---

### **Tip**

Our after-sales service can support you to plan and perform a leak test for your plant.

---

1. Close the valve.
2. Tighten the threaded bushing of the packing gradually applying the specified tightening torque.
3. Slowly apply the test medium to the inlet space upstream of the valve. A sudden surge in pressure and resulting high flow velocities can damage the valve.
4. Open the valve.
5. Apply the required test pressure.
6. Check the valve for leakage to the atmosphere.
7. Depressurize the pipeline section and valve.
8. Rework any parts that leak (see section "Adjusting the packing") and repeat the leak test.

## Adjusting the packing

### NOTICE

***Impaired valve functioning due to increased friction as a result of the threaded bushing being tightened too far.***

→ *Make sure that the plug stem can still move smoothly after the threaded bushing has been tightened.*

1. Tighten the threaded bushing gradually (by turning it clockwise) until the packing seals the valve.
  2. Open and close the valve several times.
  3. Check the valve for leakage to the atmosphere.
  4. Repeat steps 1 and 2 until the packing completely seals the valve.
- If the adjustable packing does not seal properly, contact our after-sales service.

## 5.4.2 Travel motion

The movement of the actuator stem must be linear and smooth.

- Apply the maximum and minimum control signals to check the end positions of the valve. Open and close the valve, observing the movement of the actuator stem.
- Check the travel reading at the travel indicator scale.

## 5.4.3 Fail-safe position

- Shut off the signal pressure line.
- Check whether the valve moves to the fail-safe position (see the 'Design and principle of operation' chapter).

## 5.4.4 Pressure test

The plant operator is responsible for performing the pressure test.

### Tip

*Our after-sales service can support you to plan and perform a pressure test for your plant.*

During the pressure test, make sure the following conditions are met:

- Retract the plug stem to open the valve.
- Observe the maximum permissible pressure for both the valve and plant.





## 6 Start-up

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

### **⚠ WARNING**

#### **Risk of burn injuries due to hot or cold components and pipeline.**

Valve components and the pipeline may become very hot or cold. Risk of burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

### **⚠ WARNING**

#### **Risk of personal injury due to pressurized components and as a result of process medium being discharged.**

Valves with a bellows seal have a test connection on top of the bellows seal.

- Do not loosen the screw on the test connection while the valve is pressurized.

### **⚠ WARNING**

#### **Risk of hearing loss or deafness due to loud noise.**

Noise emission (e.g. cavitation or flashing) may occur during operation caused by the process medium and the operating conditions. Additionally, a brief loud noise may occur through the sudden venting of the pneumatic actuator (see the 'Fail-safe position' chapter) or pneumatic valve accessories

not fitted with noise-reducing fittings. Both can damage hearing.

- Wear hearing protection when working near the valve.

### **⚠ WARNING**

#### **Crush hazard arising from actuator and plug stem moving.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.
- Before unblocking the actuator and plug stem after they have 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 associated actuator documentation.

### **⚠ WARNING**

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

While the valve is operating, air is vented from the actuator, e.g. to change the valve's position or to open or close the valve.

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

## Start-up

Before start-up or putting the valve back into service, make sure the following conditions are met:

- The control valve is properly installed in the pipeline (see the 'Installation' chapter).
- The leak and function tests have been completed successfully (see the 'Testing the installed valve' chapter).
- The prevailing conditions in the plant section concerned meet the valve sizing requirements (see section 'Intended use' in the 'Safety instructions and measures' chapter).

### 6.1 Supply pressures

The maximum permissible supply pressure depends on the fail-safe position (see the 'Design and principle of operation' chapter):

#### a) Fail-safe position "Actuator stem retracts"

(specifications in bar)

Bench range	Adjusted to	Max. permissible supply pressure
0.2 to 1	0.4 to 0.8	2.5
0.4 to 2.0	0.8 to 1.6	3.3
1.4 to 2.3	1.7 to 2.1	3.8
2.1 to 3.3	2.4 to 3.0	4.7

#### b) Fail-safe position "actuator stem extends"

Max. permissible supply pressure: 4 bar

### 6.2 Putting the control valve (back) into operation

1. Allow the valve to cool down or warm up to reach ambient temperature before start-up when the ambient temperature and process medium temperature differ greatly or the medium properties require such a measure.
2. Slowly open the shut-off valves in the pipeline. Slowly opening these valves prevents a sudden surge in pressure and high flow velocities which may damage the valve.
3. Check the valve to ensure it functions properly.

## 7 Operation

Immediately after completing start-up or putting the valve back into operation, the valve is ready for use.

### **⚠ WARNING**

**Risk of burn injuries due to hot or cold components and pipeline.**

Valve components and the pipeline may become very hot or cold. Risk of burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

### **⚠ WARNING**

**Risk of personal injury due to pressurized components and as a result of process medium being discharged.**

Valves with a bellows seal have a test connection on top of the bellows seal.

- Do not loosen the screw on the test connection while the valve is pressurized.

### **⚠ WARNING**

**Risk of hearing loss or deafness due to loud noise.**

Noise emission (e.g. cavitation or flashing) may occur during operation caused by the process medium and the operating conditions. Additionally, a loud noise may briefly occur through the sudden venting of the pneumatic actuator or pneumatic valve accessories not fitted with noise-reducing elements. Both can damage hearing.

cessories not fitted with noise-reducing elements. Both can damage hearing.

- Wear hearing protection when working near the valve.

### **⚠ WARNING**

**Crush hazard arising from actuator and plug stem moving.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.
- Before unblocking the actuator and plug stem after they have 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 associated actuator documentation.

### **⚠ WARNING**

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

While the valve is operating, air is vented from the actuator, e.g. to change the valve's position or to open or close the valve.

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

### 7.1 Normal operation

The handwheel of valves with actuators fitted with a handwheel must be in the neutral position during normal operation.

### 7.2 Manual operation

Valves with actuators fitted with a handwheel can be manually closed or opened in the event of failure of the auxiliary energy supply.

## 8 Malfunctions

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

### 8.1 Troubleshooting

Malfunction	Possible reasons	Recommended action
Actuator and plug stem does not move on demand.	Actuator is blocked.	Put the control valve out of operation (see the 'Decommissioning' chapter) and remove the blockage. <b>WARNING!</b> A blocked actuator or plug stem (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 or plug stem, disconnect and lock the pneumatic air supply as well as the control signal. Before unblocking the actuator, release any stored energy in the actuator (e.g. spring compression). See associated actuator documentation.
	Diaphragm in the actuator defective	See associated actuator documentation.
	Signal pressure too low	Check the signal pressure. Check the signal pressure line for leakage.
Jolting movement of the actuator and plug stem	Packing tightened too far	Tighten the packing correctly (see section 'Adjusting the packing' in the 'Testing the installed valve' chapter).
Actuator and plug stem does not stroke through the full range.	Signal pressure too low	Check the signal pressure. Check the signal pressure line for leakage.
	Travel stop active	See associated actuator documentation.
	Incorrect setting of valve accessories	Check the settings of the valve accessories.
Increased flow through closed valve (seat leakage)	Dirt or other foreign particles deposited between the seat and plug.	Shut off the section of the pipeline and flush the valve.
	Valve trim, particularly with soft seat, is worn.	Replace seat and plug (see the 'Servicing' chapter) or contact our after-sales service.

## Malfunctions

Malfunction	Possible reasons	Recommended action
The valve leaks to the atmosphere (fugitive emissions).	Defective packing	Replace packing (see the 'Servicing' chapter) or contact our after-sales service.
	Packing tightened incorrectly.	Adjust the packing (see section 'Adjusting the packing' in the 'Testing the installed valve' chapter). Contact our after-sales service when it continues to leak.
	Version with bellows seal: The bellows seal is defective.	Contact our after-sales service.
	Flanged joint loose or gasket worn out	Check the flanged joint. Replace gasket at the flanged joint (see the 'Servicing' chapter) or contact our after-sales service.

### **i** Note

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

## 8.2 Emergency action

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

In the event of a valve malfunction:

1. Close the shut-off valves upstream and downstream of the control valve to stop the process medium from flowing through the valve.
2. Perform troubleshooting (see Chapter 8.1).
3. Rectify those malfunctions that can be remedied following the information given in this document. Contact our after-sales service in all other cases.

### Putting the device back into operation after a malfunction

See the 'Start-up' chapter.

## 9 Servicing

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

The following documents are also required for servicing the valve:

- Mounting and operating instructions for mounted actuator, e.g. ► EB 8310-1 for Type 3271 and Type 3277 Pneumatic Actuator with 120 cm<sup>2</sup> actuator area
- ► AB 0100 for tools, tightening torques and lubricant

### **! DANGER**

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

Valves and pipelines are pressure equipment that may burst when handled incorrectly. Flying projectile fragments or the release of process medium under pressure can cause serious injury or even death.

Before working on the control valve:

- Depressurize all plant sections affected and the valve (including the actuator). Release any stored energy.
- Drain the process medium from the plant sections affected as well as from the valve.

### **! WARNING**

**Risk of burn injuries due to hot or cold components and pipeline.**

Valve components and the pipeline may become very hot or cold. Risk of burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

### **! WARNING**

**Risk of personal injury due to pressurized components and as a result of process medium being discharged.**

Valves with a bellows seal have a test connection on top of the bellows seal.

- Do not loosen the screw on the test connection while the valve is pressurized.

### **! WARNING**

**Risk of hearing loss or deafness due to loud noise.**

Noise emission (e.g. cavitation or flashing) may occur during operation caused by the process medium and the operating conditions. Additionally, a loud noise may briefly occur through the sudden venting of the pneumatic actuator or pneumatic valve accessories not fitted with noise-reducing elements. Both can damage hearing.

- Wear hearing protection when working near the valve.

### **! WARNING**

**Crush hazard arising from actuator and plug stem moving.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.

- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.
- Before unblocking the actuator and plug stem after they have 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 associated actuator documentation.

### **⚠ WARNING**

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

While the valve is operating, air is vented from the actuator, e.g. to change the valve's position or to open or close the valve.

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

### **⚠ WARNING**

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

Actuators with preloaded springs are under tension. They can be identified by the long bolts protruding from the bottom of the actuator.

- Before starting any work on the actuator, relieve the compression from the preloaded springs (see associated actuator documentation).

### **⚠ WARNING**

#### **Risk of personal injury due to residual process medium in the valve.**

While working on the valve, residual medium can flow out of the valve and, depending on its properties, cause personal injury, e.g. (chemical) burns.

- Wear protective clothing, safety gloves, respiratory protection and eye protection.

### **ⓘ NOTICE**

#### **Risk of control valve damage due to over- or under-torquing.**

Observe the specified torques when tightening control valve components. Excessive tightening torques lead to parts wearing out more quickly. Parts that are too loose may cause leakage.

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

### **ⓘ NOTICE**

#### **Risk of valve 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).



**i Note**

The control valve was checked by SAMSON before delivery.

- Certain test results certified by SAMSON lose their validity when the valve is opened. Such testing includes seat leakage and leak tests.
- 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 valve 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.

SAMSON recommends the following inspections and tests:

Inspection and testing	Action to be taken in the event of a negative result:
Check the markings, labels and nameplates on the valve for their readability and completeness.	Immediately renew damaged, missing or incorrect nameplates or labels. Clean any inscriptions that are covered with dirt and are illegible.
External leakage (fugitive emissions) <sup>1)</sup> : Inspect the control valve at the possible points of leakage to ensure there is no leakage.  Versions with bellows seal: <b>WARNING!</b> Risk of personal injury due to pressurized components and as a result of process medium being discharged. Do not loosen the screw on the test connection while the valve is pressurized.	Check the bolted joint (tightening torque). Replace the gasket (see Chapter 9.4) Adjust the packing (see section 'Adjusting the packing' in the 'Testing the installed valve' chapter) or replace it (see Chapter 9.4). If the bellows seal is defective, put the control valve out of operation (see the 'Decommissioning' chapter). To repair the bellows seal, contact our after-sales service (see the 'Repairs' chapter).

## Servicing

Inspection and testing	Action to be taken in the event of a negative result:
Seat leakage <sup>1)</sup> (without testing to check that the leakage class requirements are met)	Shut off the section of the pipeline and flush the valve to remove any dirt and/or deposited foreign particles between the seat and plug.  Replace the seat and plug (see Chapter 9.4)
Check the valve for external damage that could impair the proper functioning of the control valve or even its safe operation.	Repair any damage immediately. If necessary, put the control valve out of operation (see the 'Decommissioning' chapter).
Check the valve accessories to ensure they are mounted properly.	Tighten the connections of the valve accessories.
Check to ensure that the actuator and plug stems move smoothly.	Tighten the packing correctly (see section 'Adjusting the packing' in the 'Testing the installed valve' chapter).  If the actuator stem or plug stem is blocked, put the control valve out of operation (see the 'Decommissioning' chapter) and remove the blockage. <b>WARNING!</b> A blocked actuator or plug stem (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 or plug stem, disconnect and lock the pneumatic air supply as well as the control signal. Before unblocking the actuator, release any stored energy in the actuator (e.g. spring compression). See associated actuator documentation.  SAMSON recommends the use of positioners with integrated diagnostic firmware for valves used for on/off service. The partial stroke test included in this software helps prevent a shut-off valve normally in its end position from seizing up or getting jammed.
If possible, check the valve's fail-safe position by briefly interrupting the air supply.	Put the control valve out of operation (see the 'Decommissioning' chapter). Identify the cause for the malfunction and rectify it (see the 'Troubleshooting' chapter).

<sup>1)</sup> EXPERTplus valve diagnostics can help identify external leakage at dynamic sealing systems (e.g. packing or metal bellows) as well as seat leakage in valve versions without balanced plugs while the valve is in use. EXPERTplus comes as standard in the digital positioners (Type 3730, TROVIS 3730, Type 3731, TROVIS 3793, TROVIS 3797).

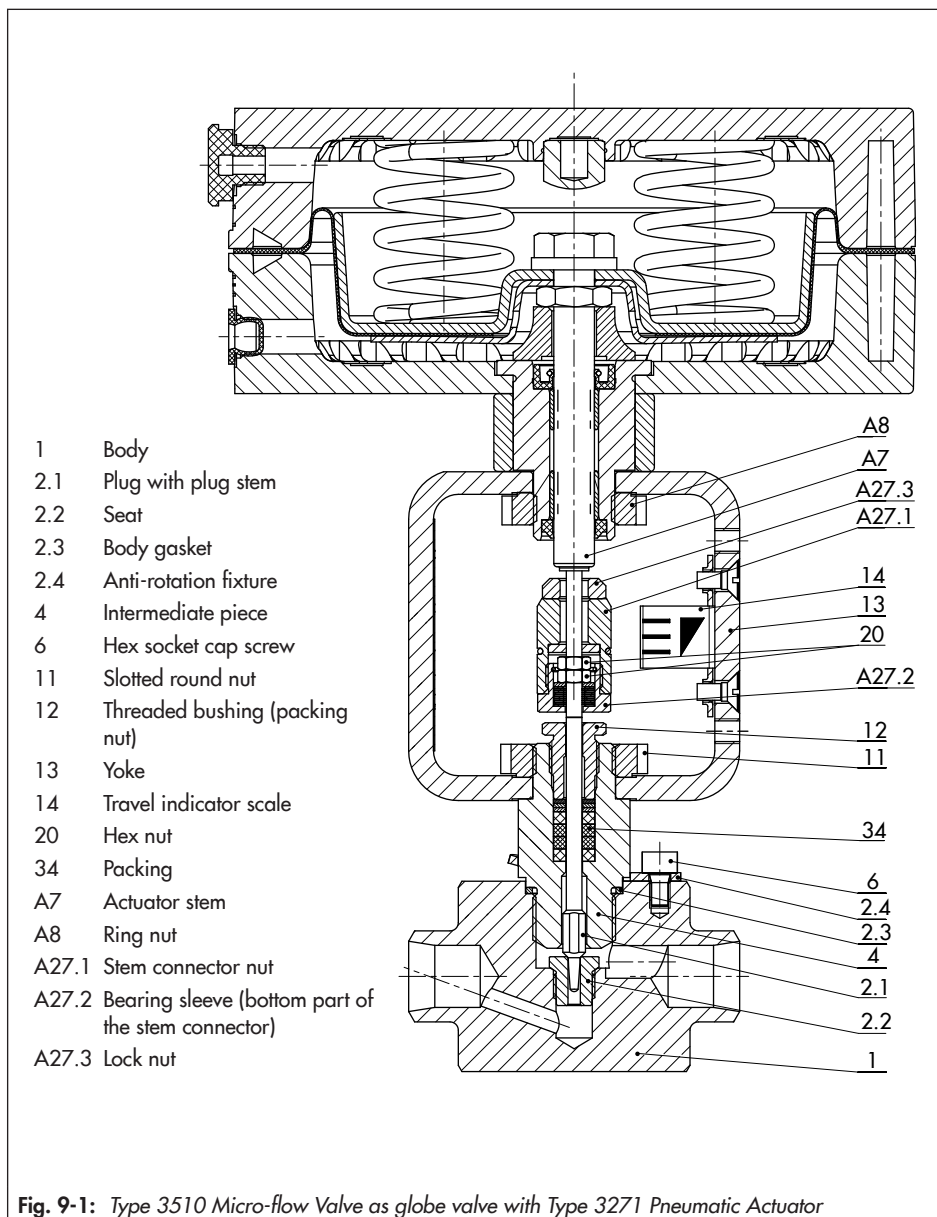


Fig. 9-1: Type 3510 Micro-flow Valve as globe valve with Type 3271 Pneumatic Actuator

### 9.2 Service work preparations

1. Lay out the necessary material and tools to have them ready for the service work.
2. Put the control valve out of operation (see the 'Decommissioning' chapter).
3. Remove the actuator from the valve. See associated actuator documentation.

---

#### **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 associated actuator documentation). Once the work is completed, the signal pressure must be removed and the air supply disconnected again and locked.*

---

---

#### Tip

*SAMSON recommends removing the valve from the pipeline before performing any service work (see the 'Removing the valve from the pipeline' chapter).*

---

The following service work can be performed after preparation is completed:

- Replace the gasket (see Chapter 9.4.1)
- Replace the packing (see Chapter 9.4.2)
- Replace the seat and plug (see Chapter 9.4.3)

### 9.3 Installing the valve after service work

1. Mount actuator. See associated actuator documentation.
2. Adjust lower or upper signal bench range (see associated actuator documentation).
3. Put the control valve back into operation (see the 'Start-up' chapter). Observe the requirements and conditions for start-up or putting the valve back into operation.

### 9.4 Service work

- Before performing any service work, preparations must be made to the control valve (see Chapter 9.2).
- After all service work is completed, check the control valve before putting it back into operation (see section 'Testing the installed valve' in the 'Installation' chapter).

## 9.4.1 Replacing the gasket

### a) Standard version

See Fig. 9-1

1. Loosen the slotted nut (11) at the valve. Remove the yoke (13) from the intermediate piece (4).
2. Unscrew the cap screw (6) on the anti-rotation fixture (2.4). Remove the anti-rotation fixture (2.4) from the intermediate piece (4).
3. Unscrew the intermediate piece (4) from the body (1). Remove the intermediate piece (4) together with plug (2.1) from the body (1).
4. Remove gasket (2.3). Carefully clean the sealing faces in the body (1) and on the intermediate piece (4).
5. Insert a new gasket (2.3) into the body.
6. Apply a suitable lubricant to the thread of the intermediate piece.
7. Place the intermediate piece (4) together with the plug (2.1) onto the body. Use a suitable tool to screw it into the body (1). Observe tightening torques.
8. Push the anti-rotation fixture (2.4) over the intermediate piece (4) and fix it in place with the cap screw (6).
9. Place the yoke (13) onto the intermediate piece (4) and secure with slotted nut (11). Observe tightening torques.

### b) Version with insulating section

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

1. Loosen the slotted nut (11) at the valve. Remove the yoke (13) from the intermediate piece (4).
2. Loosen the cap screw (23) and hex nut (26).
3. Remove the top part of the top anti-rotation fixture (2.4) from the intermediate piece (4).
4. Unscrew the intermediate piece (4) out of the insulating section (28) and carefully lift it off the plug stem extension (22).
5. Remove the washer (27) from the insulating section (28).
6. Remove the bottom part of the top anti-rotation fixture (24.2) from the insulating section (28).
7. Remove the seal (5). Carefully clean the sealing faces in the intermediate piece (4) and insulating section (28).
8. Loosen the cap screw (6) on the bottom anti-rotation fixture (24.1). Remove the anti-rotation fixture from the insulating section (28).
9. Unscrew the insulating section (28) from the body (1). Remove the insulating section (28) together with the plug (2.1) and plug stem extension (22) from the body (1).

## Servicing

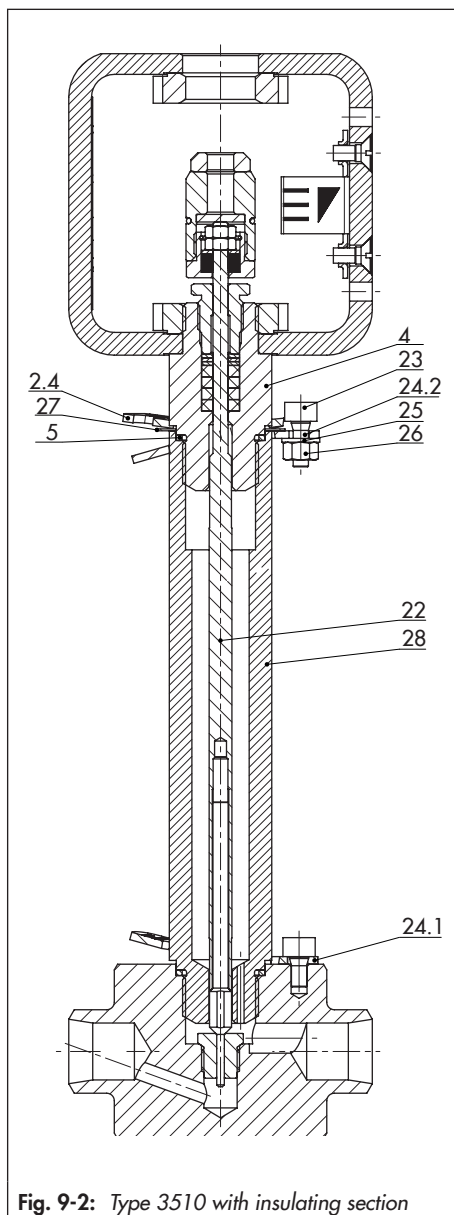
10. Remove gasket (2.3). Carefully clean the sealing faces in the valve body (1) and on the insulating section (28).
11. Insert a new gasket (2.3) into the body.
12. Apply a suitable lubricant to the thread of the insulating section (28).
13. Place the insulating section (28) together with the plug (2.1) and plug stem extension (22) onto the body. Use a suitable tool to screw it into the body (1). Observe tightening torques.
14. Push the anti-rotation fixture (24.1, with "insulating section" inscribed on it) from the top over the insulating section (28) and fix it in place with the cap screw (6).
15. Push the bottom part of the top anti-rotation fixture (24.2, without inscription) with its bent end facing downward onto the insulating section (28).
16. Insert the new seal (5) into the insulating section (28).
17. Place the washer (27) onto the insulating section (28).
18. Apply a suitable lubricant to the thread of the intermediate piece (4).
19. Carefully place the intermediate piece (4) over the plug stem extension (22) onto the insulating section (28). Use a suitable tool to screw it in. Observe tightening torques.
20. Push the top part of the top anti-rotation fixture (2.4, with "plug, seat" etc. inscribed on it) with the bent end facing upward over the intermediate piece (4).
21. Insert the cap screw (23) through both parts of the anti-rotation fixture (2.4 and 24.2). Push the washer (25) from below onto the screw and fix in place with the hex nut (26).
22. Place the yoke (13) onto the intermediate piece (4) and secure with slotted nut (11). Observe tightening torques.

---

### **i** Note

*It must be possible to turn the washer (27) easily after the intermediate piece is fastened tight. It must not be clamped down.*

---



**Legend for Fig. 9-2**

- 4 Intermediate piece
- 5 Seal
- 22 Plug stem extension
- 23 Hex socket cap screw
- 24.1 Bottom anti-rotation fixture
- 2.4 Top anti-rotation fixture (two-piece) and 24.2
- 25 Washer
- 26 Hex nut
- 27 Washer
- 28 Insulating section

**c) Version with bellows seal**

See Fig. 9-1 and Fig. 9-3

1. Loosen the slotted nut (11) at the valve. Remove the yoke (13) from the intermediate piece (4).
2. Loosen the cap screw (23) and hex nut (26).
3. Remove the top part of the top anti-rotation fixture (2.4) from the intermediate piece (4).
4. Unscrew the intermediate piece (4) out of the bellows seal (7) and carefully lift it off the plug stem (3.1).
5. Remove the washer (27) from the bellows seal (7).
6. Remove the bottom part of the top anti-rotation fixture (24.2) from the bellows seal (7).
7. Remove the seal (3.4). Carefully clean the sealing faces in the intermediate piece (4) and bellows seal (7).

## Servicing

8. Loosen the cap screw (6) on the bottom anti-rotation fixture (3.5).
9. **Version without test connection:** Remove the anti-rotation fixture (3.5) from the bellows seal (7).
10. Unscrew the bellows seal (7) from the body (1). Remove the bellows seal (7) including plug (2.1) from the body (1).

**Version with test connection (30):** Pull the anti-rotation fixture (3.5) downward to remove it.

11. Remove gasket (2.3). Carefully clean the sealing faces in the valve body (1) and on the bellows seal (7).
12. Insert a new gasket (2.3) into the body.
13. Apply a suitable lubricant to the thread of the bellows seal (7).
14. **Version with test connection:** Slide the bottom anti-rotation fixture (3.5, with "bellows" inscribed on it) from below onto the bellows seal (7).

---

### **i** Note

*The anti-rotation fixture must be pushed onto the bellows seal in such a way that its fastening hole is located directly above the threaded hole in the body after the bellows seal is bolted on.*

---

15. Place the bellows seal (7) together with the plug (2.1) onto the body. Use a suitable tool to screw it into the body (1). Observe tightening torques.

**Version without test connection:** Slide the anti-rotation fixture (3.5, with "bel-

lows" inscribed on it) from the top over the bellows seal (7).

16. Fix the anti-rotation fixture (3.5) in place with the cap screw (6).
17. Push the bottom part of the top anti-rotation fixture (24.2, without inscription) with its bent end facing downward onto the bellows seal (7).
18. Insert the new seal (3.4) into the bellows seal (4).
19. Place the washer (27) on the bellows seal (7).
20. Apply a suitable lubricant to the thread of the intermediate piece (4).
21. Carefully place the intermediate piece (4) over the plug stem (3.1) onto the bellows seal (7). Use a suitable tool to screw it in. Observe tightening torques.

---

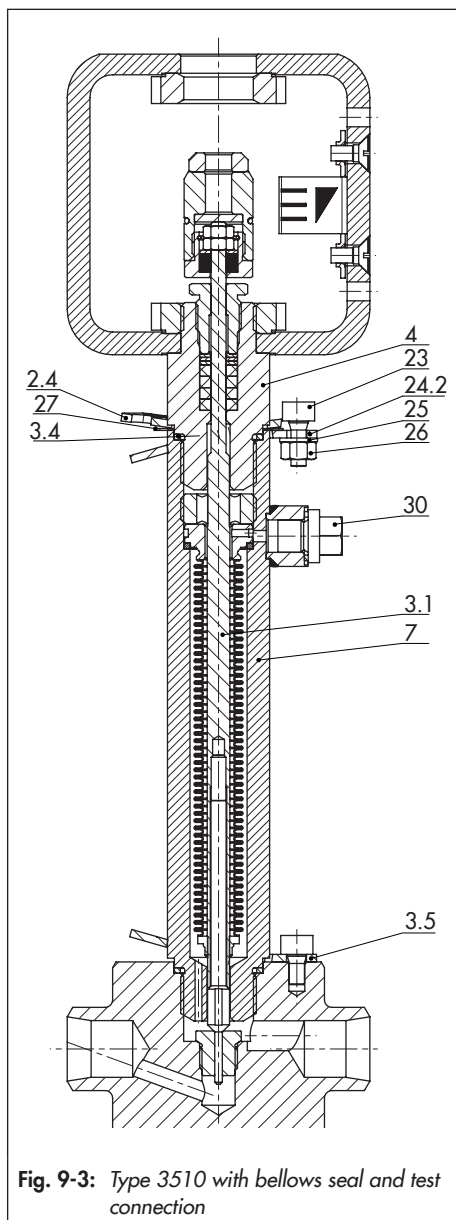
### **i** Note

*It must be possible to turn the washer (27) easily after the intermediate piece is fastened tight. It must not be clamped down.*

---

22. Push the top part of the top anti-rotation fixture (2.4, with "plug, seat" etc. inscribed on it) with the bent end facing upward over the intermediate piece (4).
23. Insert the cap screw (23) through both parts of the anti-rotation fixture (2.4 and 24.2). Push the washer (25) from below onto the screw and fix in place with the hex nut (26).
24. Place the yoke (13) onto the intermediate piece (4) and secure with slotted nut (11). Observe tightening torques.





**Legend for Fig. 9-3**

3.1	Plug stem with metal bellows
3.4	Seal (on intermediate piece)
3.5	Bottom anti-rotation fixture
4	Intermediate piece
7	Bellows seal
23	Hex socket cap screw
2.4	Top anti-rotation fixture (two-piece)
24.2	
25	Washer
26	Hex nut
27	Washer
30	Test connection

## 9.4.2 Replacing the packing

**NOTICE**

**Risk of control valve damage due to incorrect servicing.**

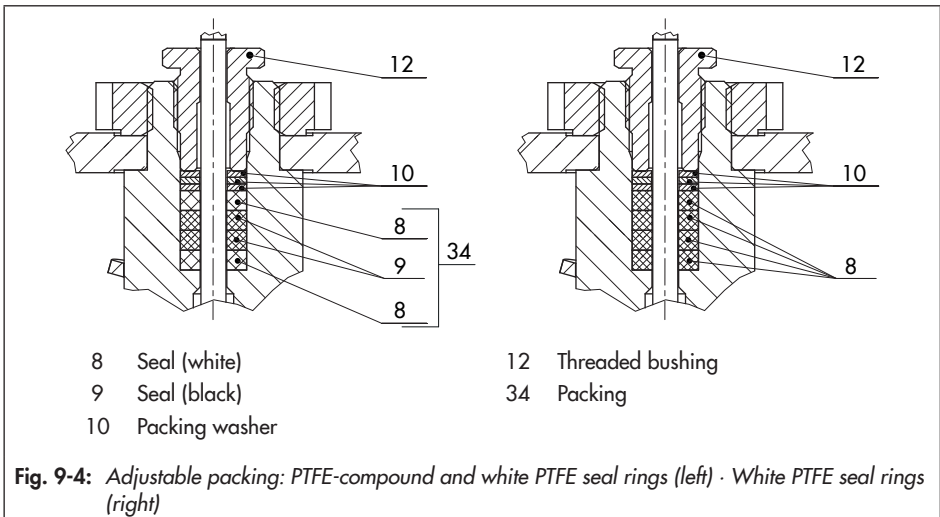
- ➔ Only exchange the packing in valves without bellows seal.
- ➔ To replace the packing in other valve versions, contact our after-sales service.

See Fig. 9-1 and Fig. 9-4

1. Loosen the slotted nut (11) at the valve. Remove the yoke (13) from the intermediate piece (4).
2. Unscrew hex nuts (20) and remove the stem connector parts.
3. Unscrew the threaded bushing (12).
4. Pull the entire packing out of the packing chamber using a suitable tool.

## Servicing

5. Renew damaged parts. Clean the packing chamber thoroughly.
6. Apply a suitable lubricant to all the packing parts.
7. Carefully slide the packing parts over the plug stem into the packing chamber using a suitable tool. Observe the proper sequence (see Fig. 9-4).
8. Screw in the threaded bushing (12) and tighten it. Observe tightening torques.
9. **Version without insulating section:** Place the sleeve (A27.2) on the plug stem (2.1).
- Version with insulating section:** Place the sleeve (A27.2) on the plug stem extension (22).
10. Thread on the hex nuts (20) and tighten them. Observe tightening torques.
11. Place the yoke (13) onto the intermediate piece (4) and secure with slotted nut (11). Observe tightening torques.



### 9.4.3 Replacing the seat and plug

#### ⓘ NOTICE

**Risk of control valve damage due to incorrect servicing.**

- Only exchange the seat and plug in valves without bellows seal.
- To replace seat and plug in other valve versions, contact our after-sales service.

#### ⓘ NOTICE

**Incorrect control performance due to a combination of trim parts that do not match each other.**

The trim parts (seat, plug, anti-rotation fixture and body gasket) are matched to exactly fit each other.

The anti-rotation fixture must also be exchanged on replacing the seat and plug. The trim parts are delivered together and marked accordingly (see the 'Markings on the device' chapter).

- Only install matching trim parts.

#### ⓘ NOTICE

**Risk of damage to the facing of the seat and plug due to incorrect servicing.**

- Always replace both the seat and plug.
- Only install matching trim parts (see the 'Markings on the device' section).

### a) Standard version

See Fig. 9-1

1. Loosen the slotted nut (11) at the valve. Remove the yoke (13) from the intermediate piece (4).
2. Unscrew the cap screw (6) on the anti-rotation fixture (2.4). Remove the anti-rotation fixture (2.4) from the intermediate piece (4).
3. Unscrew the intermediate piece (4) from the body (1). Remove the intermediate piece (4) together with plug (2.1) from the body (1).
4. Replace the gasket (see Chapter 9.4.1)
5. Unscrew the hex nuts (20) from the plug stem (2.1). Remove the stem connector parts.
6. Unscrew the threaded bushing (12).
7. Replace the packing (see Chapter 9.4.2)
8. Unscrew the seat (2.2) using a suitable tool.
9. Apply a suitable lubricant to the thread and sealing cone of the new seat.
10. Screw in the seat (2.2) using a suitable tool. Observe tightening torques.
11. Pull the plug with plug stem (2.1) out of the intermediate piece (4).
12. Apply a suitable lubricant to the new plug stem (2.1) and thread of the intermediate piece (4).
13. Slide the new plug with plug stem (2.1) into the intermediate piece (4).

## Servicing

14. Place the intermediate piece (4) together with the plug (2.1) onto the body. Use a suitable tool to screw it into the body (1). Observe tightening torques.
15. Push the anti-rotation fixture (2.4) over the intermediate piece (4) and fix it in place with the cap screw (6).
16. Place the yoke (13) onto the intermediate piece (4) and secure with slotted nut (11). Observe tightening torques.
17. Screw in the threaded bushing (12) and tighten it. Observe tightening torques.
18. Place sleeve (A27.2) on the plug stem (2.1).
19. Thread on the hex nuts (20) and tighten them. Observe tightening torques.
6. Remove the bottom part of the top anti-rotation fixture (24.2) from the insulating section (28).
7. Replace the packing (see Chapter 9.4.2)
8. Replace seal as described in b) in Chapter 9.4.1.
9. Loosen the cap screw (6) on the bottom anti-rotation fixture (24.1). Remove the anti-rotation fixture from the insulating section (28).
10. Unscrew the insulating section (28) from the body (1). Remove the insulating section (28) together with the plug (2.1) and plug stem extension (22) from the body (1).
11. Replace the gasket (see Chapter 9.4.1)
12. Unscrew the seat (2.2) using a suitable tool.
13. Apply a suitable lubricant to the thread and sealing cone of the new seat.
14. Screw in the seat (2.2) using a suitable tool. Observe tightening torques.
15. Unscrew the plug with plug stem (2.1) from the plug stem extension (22) and pull it out of the insulating section (28).
16. Apply a suitable lubricant to the end of the plug stem of the new plug (2.1).
17. Slide the new plug with plug stem (2.1) into the insulating section (28) and screw it onto the plug stem extension (22). Observe tightening torques.
18. Apply a suitable lubricant to the thread of the insulating section (28).
19. Place the insulating section (28) together with the plug (2.1) and plug stem extension (22) into the body (1).

### b) Version with insulating section

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

1. Loosen the slotted nut (11) at the valve. Remove the yoke (13) from the intermediate piece (4).
2. Loosen the cap screw (23) and hex nut (26).
3. Remove the top part of the top anti-rotation fixture (2.4) from the intermediate piece (4).
4. Unscrew the intermediate piece (4) out of the insulating section (28) and carefully lift it off the plug stem extension (22).
5. Remove the washer (27) from the insulating section (28).
6. Remove the bottom part of the top anti-rotation fixture (24.2) from the insulating section (28).
7. Replace the packing (see Chapter 9.4.2)
8. Replace seal as described in b) in Chapter 9.4.1.
9. Loosen the cap screw (6) on the bottom anti-rotation fixture (24.1). Remove the anti-rotation fixture from the insulating section (28).
10. Unscrew the insulating section (28) from the body (1). Remove the insulating section (28) together with the plug (2.1) and plug stem extension (22) from the body (1).
11. Replace the gasket (see Chapter 9.4.1)
12. Unscrew the seat (2.2) using a suitable tool.
13. Apply a suitable lubricant to the thread and sealing cone of the new seat.
14. Screw in the seat (2.2) using a suitable tool. Observe tightening torques.
15. Unscrew the plug with plug stem (2.1) from the plug stem extension (22) and pull it out of the insulating section (28).
16. Apply a suitable lubricant to the end of the plug stem of the new plug (2.1).
17. Slide the new plug with plug stem (2.1) into the insulating section (28) and screw it onto the plug stem extension (22). Observe tightening torques.
18. Apply a suitable lubricant to the thread of the insulating section (28).
19. Place the insulating section (28) together with the plug (2.1) and plug stem extension (22) into the body (1).

- sion (22) onto the body. Use a suitable tool to screw it into the body (1). Observe tightening torques.
20. Push the anti-rotation fixture (24.1, with "insulating section" inscribed on it) from the top over the insulating section (28) and fix it in place with the cap screw (6).
  21. Push the bottom part of the top anti-rotation fixture (24.2, without inscription) with its bent end facing downward onto the insulating section (28).
  22. Place the washer (27) onto the insulating section (28).
  23. Apply a suitable lubricant to the thread of the intermediate piece (4).
  24. Carefully place the intermediate piece (4) over the plug stem extension (22) onto the insulating section (28). Use a suitable tool to screw it in. Observe tightening torques.
27. Place the yoke (13) onto the intermediate piece (4) and secure with slotted nut (11). Observe tightening torques.

---

**i Note**

*It must be possible to turn the washer (27) easily after the intermediate piece is fastened tight. It must not be clamped down.*

---

25. Push the top part of the top anti-rotation fixture (2.4, with "plug, seat" etc. inscribed on it) with the bent end facing upward over the intermediate piece (4).
26. Insert the cap screw (23) through both parts of the anti-rotation fixture (2.4 and 24.2). Push the washer (25) from below onto the screw and fix in place with the hex nut (26).

### 9.5 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 the Appendix 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 chapter is to be performed only by personnel appropriately qualified to carry out such tasks.

### **⚠ DANGER**

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

Valves and pipelines are pressure equipment that may burst when handled incorrectly.

Flying projectile fragments or the release of process medium under pressure can cause serious injury or even death.

Before working on the control valve:

- Depressurize all plant sections affected and the valve (including the actuator). Release any stored energy.
- Drain the process medium from the plant sections affected as well as from the valve.

### **⚠ WARNING**

#### ***Risk of burn injuries due to hot or cold components and pipeline.***

Valve components and the pipeline may become very hot or cold. Risk of burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

### **⚠ WARNING**

#### ***Risk of personal injury due to pressurized components and as a result of process medium being discharged.***

Valves with a bellows seal have a test connection on top of the bellows seal.

- Do not loosen the screw on the test connection while the valve is pressurized.

### **⚠ WARNING**

#### ***Risk of hearing loss or deafness due to loud noise.***

Noise emission (e.g. cavitation or flashing) may occur during operation caused by the process medium and the operating conditions. Additionally, a loud noise may briefly occur through the sudden venting of the pneumatic actuator or pneumatic valve accessories not fitted with noise-reducing elements. Both can damage hearing.

- Wear hearing protection when working near the valve.

### **⚠ WARNING**

#### ***Crush hazard arising from actuator and plug stem moving.***

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.

## Decommissioning

→ Before unblocking the actuator and plug stem after they have 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 associated actuator documentation.

---

### **WARNING**

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

While the valve is operating, air is vented from the actuator, e.g. to change the valve's position or to open or close the valve.

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

---

### **WARNING**

#### **Risk of personal injury due to residual process medium in the valve.**

While working on the valve, residual medium can flow out of the valve and, depending on its properties, cause personal injury, e.g. (chemical) burns.

→ Wear protective clothing, safety gloves, respiratory protection and eye protection.

---

To decommission the control valve for service work or to remove it from the pipeline, proceed as follows:

1. Close the shut-off valves upstream and downstream of the control valve to stop the process medium from flowing through the valve.

2. Completely drain the pipelines and valve.
3. Disconnect and lock the pneumatic air supply to depressurize the actuator.
4. Release any stored energy.
5. If necessary, allow the pipeline and valve components to cool down or warm up to the ambient temperature.



## 11 Removal

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

### **⚠ WARNING**

#### **Risk of burn injuries due to hot or cold components and pipeline.**

Valve components and the pipeline may become very hot or cold. Risk of burn injuries.

- Allow components and pipelines to cool down or warm up to the ambient temperature.
- Wear protective clothing and safety gloves.

### **⚠ WARNING**

#### **Crush hazard arising from actuator and plug stem moving.**

- Do not insert hands or finger into the yoke while the air supply is connected to the actuator.
- Before working on the control valve, disconnect and lock the pneumatic air supply as well as the control signal.
- Do not impede the movement of the actuator and plug stem by inserting objects into the yoke.
- Before unblocking the actuator and plug stem after they have 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 associated actuator documentation.

### **⚠ WARNING**

#### **Risk of personal injury due to residual process medium in the valve.**

While working on the valve, residual medium can flow out of the valve and, depending on its properties, cause personal injury, e.g. (chemical) burns.

- Wear protective clothing, safety gloves, respiratory protection and eye protection.

### **⚠ WARNING**

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

Actuators with preloaded springs are under tension. They can be identified by the long bolts protruding from the bottom of the actuator.

- Before starting any work on the actuator, relieve the compression from the preloaded springs.

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

- The control valve is put out of operation (see the 'Decommissioning' chapter).

### 11.1 Removing the valve from the pipeline

#### a) Version with female thread or flanges

1. Support the valve to hold it in place when separated from the pipeline (see the 'Shipment and on-site transport' chapter).
2. Unfasten the valve or unbolt the flange joint.
3. Remove the valve from the pipeline (see the 'Shipment and on-site transport' chapter).

#### b) Version with welding ends

1. Support the valve to hold it in place when separated from the pipeline (see the 'Shipment and on-site transport' chapter).
2. Cut the pipeline in front of the weld seam.
3. Remove the valve from the pipeline (see the 'Shipment and on-site transport' chapter).

### 11.2 Removing the actuator from the valve

See associated actuator documentation.

## 12 Repairs

If the valve 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 valve damage due to incorrect service or repair work.**

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

### 12.1 Returning devices to SAMSON

Defective devices can be returned to SAMSON for repair.

Proceed as follows to return devices:

1. Exceptions apply concerning some special device models
  - ▶ [www.samsongroup.com](http://www.samsongroup.com) > Service > After-sales Service > Returning goods.
2. Send an e-mail
  - ▶ [returns-de@samsongroup.com](mailto:returns-de@samsongroup.com) to register the return shipment including the following information:
    - Type
    - Article number
    - Configuration ID
    - Original order

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

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

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

### i Note

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

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



## 13 Disposal



SAMSON is a producer registered in Europe. ► <https://www.samsongroup.com> > About SAMSON > Environment, Social & Governance > Material Compliance > Waste electrical and electronic equipment (WEEE)  
WEEE reg. no.: DE 62194439

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

---

### **i** Note

SAMSON can provide you with a recycling passport according to PAS 1049 on request. Simply e-mail us at [aftersaleservice@samsongroup.com](mailto:aftersaleservice@samsongroup.com) giving details of your company address.

---

### Tip

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

---



## 14 Certificates

The declarations are included on the next pages:

- Declaration of conformity in compliance with Machinery Directive 2006/42/EC for Types 3510-1 and 3510-7 Control Valves on page 14-2
- Declaration of incorporation in compliance with Machinery Directive 2006/42/EC for the Type 3510 Valve with other actuators other than Types 3271 and 3277 Actuators on page 14-3
- Declaration of conformity in compliance with the 2008 Regulations No. 1597 Supply of Machinery (Safety) Regulations 2008:
  - Final machinery, see page 14-4
  - Partly completed machinery, see page 14-5

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

► [www.samsunggroup.com](http://www.samsunggroup.com) > *Products* > *Valves* > *3510*

Other optional certificates are available on request.

# EU DECLARATION OF CONFORMITY TRANSLATION



## Declaration of Conformity of Final Machinery

in accordance with Annex II, section 1.A. of the Directive 2006/42/EC

For the following products:

### Types 3510-1/-7 Pneumatic Control Valves consisting of the Type 3510 Valve and Type 3271/Type 3277 Pneumatic Actuator

We hereby declare that the machinery mentioned above complies with all applicable requirements stipulated in Machinery Directive 2006/42/EC.

For product descriptions of the valve and actuator, refer to:

- Type 3510 Valve (DIN): Mounting and Operating Instructions EB 8091
- Type 3510 Valve (ANSI): Mounting and Operating Instructions EB 8091-1
- Types 3271 and 3277 Actuators: Mounting and Operating Instructions EB 8310-X

Valve accessories (e.g. positioners, limit switches, solenoid valves, lock-up valves, supply pressure regulators, volume boosters and quick exhaust valves) are classified as machinery components in this declaration of conformity and do not fall within the scope of the Machinery Directive as specified in § 35 and § 46 of the Guide to Application of the Machinery Directive 2006/42/EC issued by the European Commission. In the SAMSON Manual H 02 titled "Appropriate Machinery Components for SAMSON Pneumatic Control Valves with a Declaration of Conformity of Final Machinery", SAMSON defines the specifications and properties of appropriate machinery components that can be mounted onto the above specified final machinery.

Referenced technical standards and/or specifications:

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


Comment:

Information on residual risks of the machinery can be found in the mounting and operating instructions of the valve and actuator as well as in 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, 19 Mai 2020

  
\_\_\_\_\_  
Thorsten Muth  
Senior Director  
Sales and After-sales

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

Revision no. 00



# DECLARATION OF INCORPORATION TRANSLATION



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

For the following products:

### Type 3510 Pneumatic Control Valve

We certify that the Type 3510 Pneumatic Control Valves 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](http://www.samsongroup.com).

For product descriptions of the valve, refer to:

- Type 3510 Valve (DIN): Mounting and Operating Instructions EB 8091
- Type 3510 Valve (ANSI): Mounting and Operating Instructions EB 8091-1

Referenced technical standards and/or specifications:

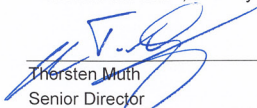
- VCI, VDMA, VGB: Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen, May 2018 [German only]
- VCI, VDMA, VGB: Zusatzdokument zum „Leitfaden Maschinenrichtlinie (2006/42/EG) – Bedeutung für Armaturen“ vom Mai 2018 [German only], based on DIN EN ISO 12100:2011-03

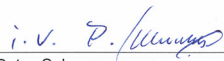
Comments:

- 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, 20 May 2020

  
\_\_\_\_\_  
Thorsten Muth  
Senior Director  
Sales and After-sales

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

Revision no. 00



### Declaration of Conformity of Final Machinery

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

For the following products:

#### **Types 3510-1/-7 Pneumatic Control Valves consisting of the Type 3510 Valve and Type 3271/Type 3277 Pneumatic Actuator**

We hereby declare that the machinery mentioned above complies with all applicable requirements stipulated in Directive 2008 No. 1597 Supply of Machinery (Safety) Regulations 2008.

For product descriptions of the valve and actuator, refer to:

- Type 3510 Valve (DIN): Mounting and Operating Instructions EB 8091
- Type 3510 Valve (ANSI): Mounting and Operating Instructions EB 8091-1
- Types 3271 and 3277 Actuators: Mounting and Operating Instructions EB 8310-X

Valve accessories (e.g. positioners, limit switches, solenoid valves, lock-up valves, supply pressure regulators, volume boosters and quick exhaust valves) are classified as machinery components in this declaration of conformity. Machinery components can be mounted onto the above specified final machinery if they comply with the specifications and properties defined by SAMSON Manual H 02 "Appropriate Machinery Components for SAMSON Pneumatic Control Valves with a Declaration of Conformity of Final Machinery".

Referenced technical standards and/or specifications:

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

Comment:

Information on residual risks of the machinery can be found in the mounting and operating instructions of the valve and actuator as well as in the referenced documents listed in the mounting and operating instructions.

Persons authorized to compile the technical file:

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

i.V. Stephan Giesen  
Director  
Product Management

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

Revision 00



### Declaration of Incorporation of Partly Completed Machinery

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

For the following product:

#### Type 3510 Pneumatic Control Valve

We certify that the Type 3510 Pneumatic Control Valves are partly completed machinery as defined in the in Directive 2008 No. 1597 Supply of Machinery (Safety) Regulations 2008 and that the safety requirements stipulated in Annex I, 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4 and 1.3.7 are observed. The relevant technical documentation described in Annex VII, (Part 7 of Schedule 2) part B has been compiled.

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

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

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

For product descriptions refer to:

- Type 3510 Valve (DIN): Mounting and Operating Instructions EB 8091
- Type 3510 Valve (ANSI): Mounting and Operating Instructions EB 8091-1

Referenced technical standards and/or specifications:

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

Comments:

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

Persons authorized to compile the technical file:

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

Stephan Giesen  
Director  
Product Management

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

Revision 00

Classification: Public · SAMSON AKTIENGESELLSCHAFT · Weismuellerstrasse 3 · 60314 Frankfurt am Main, Germany

Page 1 of 1



## 15 Appendix

### 15.1 Tightening torques, lubricants and tools

► AB 0100 for tools, tightening torques and lubricants

### 15.2 Spare parts

1	Body	22	Plug stem extension
2	Trim	23	Hex socket cap screw
2.1	Plug with plug stem	24.1	Bottom anti-rotation fixture
2.2	Seat	24.2	Top anti-rotation fixture (bottom part)
2.3	Body gasket	25	Washer
2.4	Top anti-rotation fixture (top part)	26	Hex nut
3	Bellows (assembly)	27	Washer
3.1	Plug stem with metal bellows	28	Insulating section
3.2	Seal	29	Seal for test connection
3.3	Bellows nut	30	Screw plug
3.4	Seal (on intermediate piece)	32	Yoke (ready mounted)
3.5	Bottom anti-rotation fixture	34	Packing
4	Intermediate piece	37	Lower part of the stem connector (assembly)
5	Seal		
6	Hex socket cap screw		
7	Bellows seal		
8	Seal		
9	Seal		
10	Packing washer		
11	Slotted round nut		
12	Threaded bushing (packing nut)		
13	Yoke		
14	Travel indicator scale		
15	Retaining plate		
16	Countersunk screw		
17	Bearing sleeve		
18	Spring washer		
19	Packing washer		
20	Hex nut		
21	Snap ring		

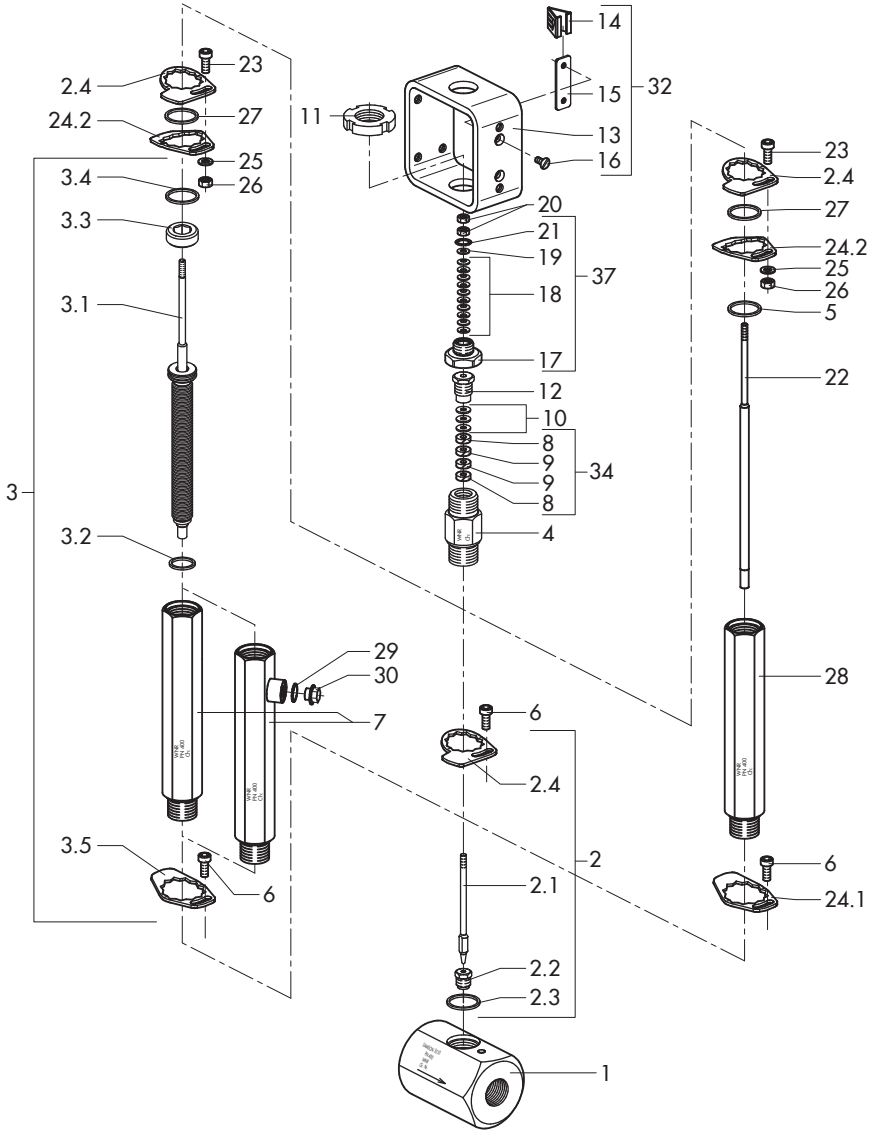
---

#### **i Note**

*Trims (2.1 to 2.4) and metal bellows (3.1 to 3.5) are only available as spare parts as assemblies (2 and 3).*

*The seals (2.3 and 3.4) are also available separately.*

---



### 15.3 After-sales service

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

#### E-mail address

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

#### Addresses of SAMSON AG and its subsidiaries

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

#### Required specifications

Please submit the following details:

- Order number and position number in the order
- Type, model number, nominal size and valve version
- Consecutive number of installed trim
- Pressure, density, viscosity and temperature of the process medium
- Flow rate in cu.ft/min or m<sup>3</sup>/h
- Direction of flow
- Bench range of the actuator (e.g. 0.2 to 1 bar)
- Is a filter installed?
- Installation drawing

### 15.4 Information on the UK sales region

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

#### Importer

SAMSON Controls Ltd  
Perrywood Business Park  
Honeycrock Lane  
Redhill, Surrey RH1 5JQ  
Phone: +44 1737 766391  
E-mail: [sales-uk@samsongroup.com](mailto:sales-uk@samsongroup.com)  
Website: [uk.samsongroup.com](http://uk.samsongroup.com)











**EB 8091-1 EN**



SAMSON AKTIENGESELLSCHAFT  
Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany  
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507  
samson@samsongroup.com · www.samsongroup.com