Type 3510 Micro-flow Valve · ANSI version

In combination with an actuator, e.g. a Type 3271 or Type 3277 Pneumatic Actuator
Note on these mounting and operating instructions

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

» For the safe and proper use of these instructions, read them carefully and keep them for later reference.

» If you have any questions about these instructions, contact SAMSON’s After-sales Service (aftersalesservice@samsongroup.com).

Documents relating to the device, such as the mounting and operating instructions, are available on our website at www.samsongroup.com > Service & Support > Downloads > Documentation.

Definition of signal words

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

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

⚠️ NOTICE
Property damage message or malfunction

ℹ️ Note
Additional information

☀️ Tip
Recommended action
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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 other applications or conditions than specified, contact SAMSON.

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

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

Reasonably foreseeable misuse
The 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 in these instructions

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 must only be performed 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

We recommend 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 when working at height
- Safety footwear, ESD (electrostatic discharge) footwear, if necessary

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' section) 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, warning and caution notes in these mounting and operating instructions.
Safety instructions and measures

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 safety instructions drawn up by the operator.

Responsibilities of the operator

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

The operator is 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, the operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

Referenced standards and regulations

The control valves comply with the requirements of the European Pressure Equipment Directive 2014/68/EU and the Machinery Directive 2006/42/EC. Valves with a CE marking have a declaration of conformity which includes information about the applied conformity assessment procedure. The 'Certificates' section contains this declaration of conformity.

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

Referenced documentation
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 cm² 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. Impermissible pressure 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 all the plant sections concerned as well as 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, the actuator, for example, may vent during closed-loop operation or when the valve opens or closes.

- Install the control valve in such a way that vent holes are not located at eye level and the actuator does not vent at eye level in the work position.
- Use suitable silencers and vent plugs.
- Wear eye protection when working in close proximity to the control valve.

**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.
Safety instructions and measures

**WARNING**

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.

Risk of personal injury through 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' section).

» 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.

Risk of leakage and valve damage due to excessively high or low tightening torques.
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).
Safety instructions and measures

1.4 Warnings on the device

<table>
<thead>
<tr>
<th>Warning</th>
<th>Meaning of the warning</th>
<th>Location on the device</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Warning against moving parts&lt;br&gt;There is a risk of injury to hands or fingers through 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.</td>
<td>![Diagram of a device]</td>
</tr>
</tbody>
</table>

**NOTICE**

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.
2 Markings on the device

2.1 Valve body inscription

Fig. 2-1: Inscription on the valve body

2.2 Actuator nameplate

See associated actuator documentation.

2.3 Material numbers

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

**Seat**
- Material number
- SAMSON consecutive number

**Plug**
- Material number
- SAMSON consecutive number
- $K_{VS}$ coefficient and characteristic

**Anti-rotation fixture (on the trim)**
- Refer to Fig. 2-2
  - Plug material
  - Seat material
  - $K_{VS}/C_V$
  - 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 'Leak test' in the 'Installation' section. An instructional label is affixed to the outside of the yoke (see Fig. 2-3).

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

ACHTUNG ! Nachziehbare Stopfbuchse ! Gewindebuchse ist nicht angezogen. Bei Inbetriebnahme vorsichtig nachziehen!

ATTENTION ! ADJUSTABLE PACKING Stem packing is NOT tightened down. Adjust carefully as required during start-up!

ATTENTION ! Presse-étoupe réglable. Le fouloir du presse-étoupe n’est pas serré. Ajuster lors de la mise en service!

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 cm² 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

We recommend the use of positioners with integrated diagnostic firmware (see section 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 upwards and open the valve. The valve closes when the signal...
Design and principle of operation

Fig. 3-1: Type 3510 Micro-flow Valve as globe valve with Type 3271 Pneumatic Actuator
Design and principle of operation

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 cm² 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.

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).

Tip

Observe the maximum permissible actuator force.
3.2 Additional fittings

**Filter**

We recommend 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.

<table>
<thead>
<tr>
<th>$K_{VS}$ coefficient</th>
<th>Mesh size</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0001 to 0.0063</td>
<td>$&lt;1 \mu m$</td>
</tr>
<tr>
<td>0.01 to 0.4</td>
<td>$&lt;10 \mu m$</td>
</tr>
<tr>
<td>0.63 to 1.6</td>
<td>$\leq 20 \mu m$</td>
</tr>
</tbody>
</table>

**Bypass and shut-off valves**

We recommend 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' section.

**Test connection**

Versions with bellows seal fitted with a test connection (G $\frac{3}{8}$) 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).

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**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 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' section.

**Note**

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

**Compliance**

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

![CE EAC](CE EAC)

**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

<table>
<thead>
<tr>
<th>Valve</th>
<th>Connection</th>
<th>Female thread G/NPT/Rc in &amp; ½ to ¾</th>
<th>Welding ends</th>
<th>Flanges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>NPS ½</td>
<td>NPS ¾</td>
</tr>
<tr>
<td>Class 150</td>
<td>in</td>
<td></td>
<td>7.25</td>
<td>7.25</td>
</tr>
<tr>
<td>Class 300</td>
<td>mm</td>
<td></td>
<td>184</td>
<td>184</td>
</tr>
<tr>
<td>Class 600</td>
<td>in</td>
<td></td>
<td>7.50</td>
<td>7.75</td>
</tr>
<tr>
<td>Class 600</td>
<td>mm</td>
<td></td>
<td>190</td>
<td>197</td>
</tr>
<tr>
<td>Class 900/</td>
<td>in</td>
<td></td>
<td>8.00</td>
<td>8.25</td>
</tr>
<tr>
<td>Class 1500</td>
<td>mm</td>
<td></td>
<td>203</td>
<td>210</td>
</tr>
<tr>
<td>Class 2500</td>
<td>in</td>
<td></td>
<td>8.50</td>
<td>10.00</td>
</tr>
<tr>
<td>Class 2500</td>
<td>mm</td>
<td></td>
<td>216</td>
<td>254</td>
</tr>
<tr>
<td>Class 300</td>
<td>in</td>
<td>2.91&quot; (74 mm)</td>
<td>10.38</td>
<td>12.12</td>
</tr>
<tr>
<td>Class 300</td>
<td>mm</td>
<td></td>
<td>264</td>
<td>308</td>
</tr>
<tr>
<td>Class 600</td>
<td>in</td>
<td>1.33&quot; (34 mm)</td>
<td>3.62</td>
<td>3.62</td>
</tr>
<tr>
<td>Class 600</td>
<td>mm</td>
<td></td>
<td>92</td>
<td>92</td>
</tr>
<tr>
<td>Class 900/</td>
<td>in</td>
<td></td>
<td>3.75</td>
<td>3.88</td>
</tr>
<tr>
<td>Class 1500</td>
<td>mm</td>
<td></td>
<td>95</td>
<td>99</td>
</tr>
<tr>
<td>Class 2500</td>
<td>in</td>
<td></td>
<td>4.00</td>
<td>4.12</td>
</tr>
<tr>
<td>Class 2500</td>
<td>mm</td>
<td></td>
<td>101</td>
<td>105</td>
</tr>
<tr>
<td>Class 900/</td>
<td>in</td>
<td></td>
<td>4.25</td>
<td>5.00</td>
</tr>
<tr>
<td>Class 1500</td>
<td>mm</td>
<td></td>
<td>108</td>
<td>127</td>
</tr>
<tr>
<td>Class 2500</td>
<td>in</td>
<td></td>
<td>5.19</td>
<td>6.06</td>
</tr>
<tr>
<td>Class 2500</td>
<td>mm</td>
<td></td>
<td>132</td>
<td>154</td>
</tr>
<tr>
<td>H1</td>
<td>120 cm²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>mm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Design and principle of operation

<table>
<thead>
<tr>
<th>Valve</th>
<th>Connection</th>
<th>Female thread G/NPT/Rc ¹/₂ to ¾</th>
<th>Welding ends</th>
<th>Flanges NPS ½</th>
<th>Flanges NPS ¾</th>
<th>Flanges NPS 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>H4</td>
<td>Insulating section Class 2500</td>
<td></td>
<td></td>
<td>10.35&quot;/263 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bellows seal Class 600</td>
<td></td>
<td></td>
<td>10.35&quot;/263 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class 1500</td>
<td></td>
<td></td>
<td>14.37&quot;/365 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2 or flange Ø D1</td>
<td>Class 150 in mm</td>
<td>0.90&quot;/23 mm ²</td>
<td>0.90&quot;/23 mm ²</td>
<td>0.90&quot;/23 mm ²</td>
<td>3.54</td>
<td>3.94</td>
</tr>
<tr>
<td></td>
<td>Class 300 in mm</td>
<td></td>
<td></td>
<td>90</td>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>Class 600 in mm</td>
<td></td>
<td></td>
<td>3.74</td>
<td>4.53</td>
<td>4.91</td>
</tr>
<tr>
<td></td>
<td>Class 900/ Class 1500 in mm</td>
<td></td>
<td></td>
<td>95</td>
<td>115</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>Class 2500 in mm</td>
<td></td>
<td></td>
<td>3.74</td>
<td>4.53</td>
<td>4.91</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>95</td>
<td>115</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.72</td>
<td>5.12</td>
<td>5.91</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>120</td>
<td>130</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.31</td>
<td>5.51</td>
<td>6.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>135</td>
<td>140</td>
<td>160</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Valve without actuator</th>
<th>Connection</th>
<th>Female thread G/NPT/Rc ¹⁄₈ to ¾</th>
<th>Welding ends NPS ½, NPS 1</th>
<th>Flanges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class 150</td>
<td>lbs 3.74</td>
<td>4.0</td>
<td>5.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>kg 1.7</td>
<td>1.8</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>Class 300</td>
<td>lbs 3.74</td>
<td>4.0</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>kg 1.7</td>
<td>1.8</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>Class 600</td>
<td>lbs 3.74</td>
<td>4.0</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>kg 1.7</td>
<td>1.8</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>Class 900/1500</td>
<td>lbs 3.74</td>
<td>4.0</td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>kg 1.7</td>
<td>1.8</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>Class 2500</td>
<td>lbs</td>
<td></td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>kg</td>
<td></td>
<td>6.5</td>
</tr>
<tr>
<td>Option-</td>
<td></td>
<td>Insulating section</td>
<td>lbs</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>kg</td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bellows seal</td>
<td>lbs</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>kg</td>
<td></td>
<td>0.6</td>
</tr>
</tbody>
</table>
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

Type 3510 · Valve body with flanges and welding ends

**Note**

Dimensions and weights for Type 3271 and Type 3277 Pneumatic Actuators with 120 cm² actuator area can found in the Data Sheet T 8310-1.
4 Shipment and on-site transport

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

4.1 Accepting the delivered goods

After receiving the shipment, proceed as follows:

1. Check the scope of delivery. Check that the specifications on the valve nameplate match the specifications in the delivery note. See the 'Markings on the device' section for nameplate details.

2. Check the shipment for transportation damage. Report any damage to SAMSON and the forwarding agent (refer to delivery note).

3. Determine the weight and dimensions of the units to be lifted and transported in order to select the appropriate lifting equipment and lifting accessories. Refer to the transport documents and the 'Technical data' section.

4.2 Removing the packaging from the 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).

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 valve 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.

Note

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

⚠️ NOTICE
Risk of valve damage due to improper storage.
- Observe the storage instructions.
- Avoid long storage times.
- Contact SAMSON in case of different storage conditions or long storage periods.

ℹ️ Note
We recommend regularly checking 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.
- We recommend 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 section is only to be performed 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 allowing sufficient space to remove the actuator and valve or to perform service work on them.

Mounting position
Generally, we recommend 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

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.

- Install the valve free of stress and with the least amount of vibrations as possible. Read ‘Mounting position’ and ‘Support or suspension’ in this section.
Table 5-1: *Inlet and outlet lengths*

<table>
<thead>
<tr>
<th>State of process medium</th>
<th>Valve conditions</th>
<th>Inlet length a</th>
<th>Outlet length b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas</td>
<td>Ma ≤ 0.3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>0.3 ≤ Ma ≤ 0.7</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Vapor</td>
<td>Ma ≤ 0.3 ¹¹</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>0.3 ≤ Ma ≤ 0.7</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Saturated steam (percentage of condensate &gt; 5 %)</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Liquid</td>
<td>Free of cavitation/w &lt; 10 m/s</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Cavitation producing noise/w ≤ 3 m/s</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Cavitation producing noise/3 &lt; w &lt; 5 m/s</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Critical cavitation/w ≤ 3 m/s</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Critical cavitation/3 &lt; w &lt; 5 m/s</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Flashing</td>
<td>–</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Multi-phase</td>
<td>–</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

¹¹ No saturated steam

### Valve accessories

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

### Vent plugs

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

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

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, valve size, material, pressure rating and temperature range) match the plant conditions (size and pressure rating of the pipeline, medium temperature etc.). See the 'Markings on the device' section for nameplate details.
- The requested or required additional pipe fittings (see the 'Additional fittings' section) have been installed or prepared as necessary before installing the valve.

Risk of control valve damage or malfunction due to incorrect insulation.

- Only insulate control valves with insulating section or bellows seal up to the top of the valve body for medium temperatures below 32 °F (0 °C) and 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 Installing the device

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

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

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).

### 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' section). 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 all the plant sections concerned as well as the valve.

**WARNING**

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

- Do not loosen the screw of 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 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, the actuator, for example, may vent during closed-loop operation or when the valve opens or closes.
➢ 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).

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. 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.
3. Open the valve.
4. Apply the required test pressure.
5. Check the valve for leakage to the atmosphere.
6. Depressurize the pipeline section and valve.
7. Rework any parts that leak (see information below under ‘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 while 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' section).

5.4.4 Pressure test

The plant operator is responsible for performing the pressure test.

---

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 section is only to be performed 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 process medium being discharged.
- Do not loosen the screw of 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 'Fail-safe position') 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, the actuator, for example, may vent during closed-loop operation or when the valve opens or closes.
- 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 valve is properly installed into the pipeline (see the 'Installation' section).
- The leak and function tests have been completed successfully (see the 'Testing the installed valve' section).
- The prevailing conditions in the plant section concerned meet the valve sizing requirements (see information under 'Intended use' in the 'Safety instructions and measures' section).

6.1 Supply pressures

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

a) Fail-safe position "Actuator stem retracts"

(specifications in bar)

<table>
<thead>
<tr>
<th>Bench range</th>
<th>Adjusted to</th>
<th>Max. permissible supply pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2 to 1</td>
<td>0.4 to 0.8</td>
<td>2.5</td>
</tr>
<tr>
<td>0.4 to 2.0</td>
<td>0.8 to 1.6</td>
<td>3.3</td>
</tr>
<tr>
<td>1.4 to 2.3</td>
<td>1.7 to 2.1</td>
<td>3.8</td>
</tr>
<tr>
<td>2.1 to 3.3</td>
<td>2.4 to 3.0</td>
<td>4.7</td>
</tr>
</tbody>
</table>

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 can 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 process medium being discharged.
➡️ Do not loosen the screw of 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 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, the actuator, for example, may vent during closed-loop operation or when the valve opens or closes.
➡️ Wear eye protection when working in close proximity to the control valve.
Operation

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 case of supply air failure.
## 8 Malfunctions

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

### 8.1 Troubleshooting

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible reasons</th>
<th>Recommended action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator and plug stem does not move on demand.</td>
<td>Actuator is blocked.</td>
<td>Check attachment. Remove the blockage. <strong>WARNING!</strong> 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.</td>
</tr>
<tr>
<td>Diaphragm in the actuator defective</td>
<td></td>
<td>See associated actuator documentation.</td>
</tr>
<tr>
<td>Signal pressure too low</td>
<td></td>
<td>Check the signal pressure. Check the signal pressure line for leakage.</td>
</tr>
<tr>
<td>Jolting movement of the actuator and plug stem</td>
<td>Packing tightened too far</td>
<td>Tighten the packing correctly (see information under 'Adjusting the packing' in the 'Testing the installed valve' section).</td>
</tr>
<tr>
<td>Actuator and plug stem does not stroke through the entire range.</td>
<td>Signal pressure too low</td>
<td>Check the signal pressure. Check the signal pressure line for leakage.</td>
</tr>
<tr>
<td></td>
<td>Travel stop active</td>
<td>See associated actuator documentation.</td>
</tr>
<tr>
<td></td>
<td>Incorrect setting of valve accessories</td>
<td>Check the settings of the valve accessories.</td>
</tr>
<tr>
<td>Increased flow through closed valve (seat leakage)</td>
<td>Dirt or other foreign particles deposited between the seat and plug.</td>
<td>Shut off the section of the pipeline and flush the valve.</td>
</tr>
<tr>
<td></td>
<td>Valve trim, particularly with soft seat, is worn.</td>
<td>Replace seat and plug (see the 'Servicing' section) or contact our after-sales service.</td>
</tr>
</tbody>
</table>
**Malfunctions**

### Emergency action

The plant operator is 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 section 8.1).
3. Rectify those malfunctions that can be remedied based on the instructions provided here. Contact our after-sales service in all other cases.

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

See the 'Start-up' section.
9 Servicing

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

The following documents are also necessary 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 cm² 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 all the plant sections concerned as well as the valve.

⚠️ WARNING
Risk of personal injury due to pressurized components and process medium being discharged.
- Do not loosen the screw of 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 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.

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

- 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, the actuator, for example, may vent during closed-loop operation or when the valve opens or closes.
- 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 valve damage due to excessively high or low tightening torques.
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).
The control valve was checked by SAMSON before it left the factory.
- 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 a possible failure before it can occur. 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.

We recommend the following inspection and testing which can be performed while the process is running:

<table>
<thead>
<tr>
<th>Inspection and testing</th>
<th>Action to be taken in the event of a negative result:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the markings, labels and nameplates on the valve for their readability and completeness.</td>
<td>Immediately renew damaged, missing or incorrect nameplates or labels.</td>
</tr>
<tr>
<td></td>
<td>Clean any inscriptions that are covered with dirt and are illegible.</td>
</tr>
<tr>
<td>Check the pipe connections and gaskets on the valve and actuator for leakage.</td>
<td>Check the bolted joint (tightening torque).</td>
</tr>
<tr>
<td></td>
<td>Replace the gasket (see section 9.4)</td>
</tr>
<tr>
<td></td>
<td>Adjust the packing (see information under 'Adjusting the packing' in the 'Testing the installed valve' section) or replace it (see section 9.4).</td>
</tr>
</tbody>
</table>
## Servicing

<table>
<thead>
<tr>
<th>Inspection and testing</th>
<th>Action to be taken in the event of a negative result:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the test connection and bellows seal (if used) for external leakage. <strong>WARNING!</strong> Risk of personal injury due to pressurized components and process medium being discharged. Do not loosen the screw of the test connection while the valve is pressurized.</td>
<td>Put the control valve out of operation (see the 'Decommissioning' section). To repair the bellows section, contact our after-sales service (see the 'Repairs' section).</td>
</tr>
<tr>
<td>Check the valve’s seat leakage.</td>
<td>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.</td>
</tr>
<tr>
<td>Replace the seat and plug (see section 9.4)</td>
<td></td>
</tr>
<tr>
<td>Check the valve for external damage (e.g. corrosion).</td>
<td>Remove any damage immediately. If necessary, put the control valve out of operation (see the 'Decommissioning' section).</td>
</tr>
<tr>
<td>Check the valve accessories to ensure they are mounted properly.</td>
<td>Tighten the connections of the valve accessories.</td>
</tr>
<tr>
<td>Check to ensure that the actuator and plug stem move smoothly.</td>
<td>Tighten the packing correctly (see information under 'Adjusting the packing' in the 'Testing the installed valve' section).</td>
</tr>
<tr>
<td>Unblock a blocked actuator and plug stem. <strong>WARNING!</strong> 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.</td>
<td></td>
</tr>
<tr>
<td>If possible, check the valve's fail-safe position by briefly interrupting the air supply.</td>
<td>Put the control valve out of operation (see the 'Decommissioning' section). Identify the cause for the malfunction and rectify it (see the 'Troubleshooting' section).</td>
</tr>
</tbody>
</table>
Servicing

Fig. 9-1: Type 3510 Micro-flow Valve as globe valve with Type 3271 Pneumatic Actuator
9.2 Preparing the valve for service work

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' section).
3. Remove the actuator from the valve. See associated actuator documentation.

**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). Afterwards, the signal pressure must be removed and the air supply disconnected again and locked.

**Tip**

We recommend removing the valve from the pipeline before performing any service work (see the 'Removing the valve from the pipeline' section).

The following service work can be performed after preparation is completed:
- Replace the gasket (see section 9.4.1)
- Replace the packing (see section 9.4.2)
- Replace the seat and plug (see section 9.4.3)

9.3 Mounting 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' section). 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 section 9.2).
- After all service work is completed, check the control valve before putting it back into operation (see 'Testing the installed valve' in the 'Installation' section).
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 fillister head 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 fillister head 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 fillister head screw (23) and hex nut (26).
3. Remove the top section 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 section 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 fillister head 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).
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 fillister head screw (6).

15. Push the bottom section 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 section 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 fillister head 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.
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 fillister head screw (23) and hex nut (26).
3. Remove the top section 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 section 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).
8. Loosen the fillister head 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**: 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).

**Version with test connection**: slide the bottom anti-rotation fixture (3.5, with 'bellows' inscribed on it) from below onto the bellows seal (7).

14. **Version with test connection**: slide the bottom anti-rotation fixture (3.5) downward to remove it.

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

16. Fix the anti-rotation fixture (3.5) in place with the fillister head screw (6).

17. Push the bottom section 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.

22. Push the top section 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 fillister head 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.

---

**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.

---

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

---

9-10  EB 8091-1 EN
### 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.
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.

---

**Fig. 9-4:** Adjustable packing: PTFE-compound and white PTFE seal rings (left) · White PTFE seal rings (right)
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' section).

- 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 fillister head 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 section 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 section 9.4.2)
8. Unscrew the seat (2.2) using a suitable tool.
9. Apply a suitable lubricant to the thread and the 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).
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 fillister head 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.

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 fillister head screw (23) and hex nut (26).
3. Remove the top section of the top anti-rotation fixture (24.2) 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 section of the top anti-rotation fixture (24.2) from the insulating section (28).
7. Replace the packing (see section 9.4.2).
8. Replace seal as described in b) in section 9.4.1.
9. Loosen the fillister head 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 section 9.4.1).
12. Unscrew the seat (2.2) using a suitable tool.
13. Apply a suitable lubricant to the thread and the 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 exten-
19. Place the washer (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 fillister head screw (6).

21. Push the bottom section 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.

25. Push the top section 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 fillister head 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).

27. Place the yoke (13) onto the intermediate piece (4) and secure with slotted nut (11). Observe tightening torques.

---

**Note**

It must be possible to turn the washer (27) easily after the intermediate piece is fastened tight. It must not be clamped down.
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 Annex for details on spare parts.

**Lubricant**

See document AB 0100 for details on suitable lubricants.

**Tools**

See document AB 0100 for details on suitable tools.
10 Decommissioning

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

**DANGER**

*Risk of bursting due to incorrect opening of pressurized equipment or components.*
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 all the plant sections concerned as well as the valve.

**WARNING**

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

- Do not loosen the screw of 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 fittings. Both can damage hearing.

- Wear hearing protection when working near 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**

*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...
Decommissioning

(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, the actuator, for example, may vent during closed-loop operation or when the valve opens or closes.

- 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 section is only to be performed 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 pre-loaded springs.

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

- The control valve is put out of operation (see the 'Decommissioning' section).
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' section).
2. Unfasten the valve or unbolt the flange joint.
3. Remove the valve from the pipeline (see the 'Shipment and on-site transport' section).

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' section).
2. Cut the pipeline in front of the weld seam.
3. Remove the valve from the pipeline (see the 'Shipment and on-site transport' section).

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 repair work.

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

12.1 Returning devices to SAMSON

Defective devices can be returned to SAMSON for repair.

Proceed as follows to return devices:

1. Exceptions apply concerning some special device models
   - [www.samsongroup.com > Service & Support > After-sales Service]

2. Send an e-mail
   - retouren@samsongroup.com to register the return shipment including the following information:
     - Type
     - Article no.
     - Configuration ID
     - Original order

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

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

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

4. Send the shipment to the address given on the RMA.

ℹ️ Note

Further information on returned devices and how they are handled can be found at [www.samsongroup.com > Service & Support > After-sales Service].
13 Disposal

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

The 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
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]

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 Muhr
Senior Director
Sales and After-sales

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

Revision no. 00

Classification: Public
SAMSON AKTIENGESELLSCHAFT · Weismüllerstraße 3 · 60314 Frankfurt, Germany

Page 1 of 1
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.

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)

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

[Signatures]

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

Classification: Public - SAMSON AKTIENGESELLSCHAFT · Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany
15 Annex

15.1 Tightening torques, lubricants and tools
- AB 0100 for tools, tightening torques and lubricants

15.2 Spare parts

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<td>34</td>
<td>Packing</td>
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<td>37</td>
<td>Lower part of the stem connector (assembly)</td>
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</tbody>
</table>

**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 contact
You can reach our after-sales service at aftersalesservice@samsongroup.com.

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

Required specifications
Please submit the following details:

- Order number and position number in the order
- Type, model number, 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 m³/h
- Direction of flow
- Bench range of the actuator (e.g. 0.2 to 1 bar)
- Is a filter installed?
- Installation drawing