Type 2406 Excess Pressure Valve
Self-operated Pressure Regulators

Edition February 2020
Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

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

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

The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is 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 Type 2406 Excess Pressure Valve is used to control the pressure of flammable gases used as a source of energy, e.g. in boilers, driers, vaporizers, heat exchangers or industrial ovens. Alternatively, it can control the compressed air supply in process engineering applications.

The device is designed to operate under exactly defined conditions (e.g. operating pressure, process medium, temperature). Therefore, operators must ensure that the device is only used in operating conditions that meet the specifications used for sizing the device at the ordering stage. In case operators intend to use the device 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 device is not suitable for use outside the limits defined during sizing and by the technical data. Furthermore, the following activities do not comply with the intended use:

− Use as safety valve
− Use of non-original spare parts
− Performing service and repair work not described in these instructions

Qualifications of operating personnel
The device must be mounted, started up, serviced and repaired by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible hazards due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
Safety instructions and measures

Safety features
The Type 2406 Regulator does not have any special safety features. When relieved of pressure, the regulator is closed by the force of the set point springs.

Personal protective equipment
We recommend checking the hazards posed by the process medium being used (e.g. GESTIS (CLP) hazardous substances database).

- Provide protective equipment (e.g. safety gloves, eye protection) appropriate for the process medium used.
- Wear hearing protection when working near the regulator.
- 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.

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 regulator by the process medium, the operating pressure or by moving parts by taking appropriate precautions. They must observe all hazard statements, warning and caution notes in these mounting and operating instructions, especially for installation, start-up and service work.

We also recommend checking the hazards posed by the process medium being used (e.g. GESTIS (CLP) hazardous substances database).

- Observe safety measures for handling the device as well as fire prevention and explosion protection measures.

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.
**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 devices comply with the requirements of the European Pressure Equipment Directive 2014/68/EU. Devices with a CE marking have an EU declaration of conformity, which includes information about the applied conformity assessment procedure. The EU declaration of conformity is included in the annex of these instructions (see section 9.2).

Non-electric valve versions whose bodies are not lined with an insulating material coating do not have their own potential ignition source according to the risk assessment stipulated in EN 13463-1: 2009, section 5.2, even in the rare incident of an operating fault. Therefore, such valve versions 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).

**Referenced documentation**

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

- Mounting and operating instructions for
  - e.g. **Type 2 N/Ni Strainer**

- Data sheets for
Safety instructions and measures

- Mounting and operating instructions as well as data sheets for additional components (e.g. shut-off valves, pressure gauges etc.).

1.1 Notes on possible severe personal injury

⚠️ DANGER

Risk of bursting in pressure equipment.
Valves and pipelines are pressure equipment. Improper opening can lead to valve components bursting.

⇒ Observe the maximum permissible pressure for valve and plant.
⇒ Before starting any work on the valve, depressurize all plant sections affected as well as the valve.
⇒ To prevent uncontrolled excess pressure, make sure that suitable overpressure protection is installed on site in the plant section.
⇒ Drain the process medium from all the plant sections affected as well as the valve.
⇒ Wear personal protective equipment.

1.2 Notes on possible personal injury

⚠️ WARNING

Risk of personal injury due to residual process medium in the valve.
While working on the valve, residual process medium can escape and, depending on its properties, may lead to personal injury, e.g. (chemical) burns.

⇒ If possible, drain the process medium from all the plant sections affected and the valve.
⇒ Wear protective clothing, safety gloves and eye protection.

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 heat up.
⇒ Wear protective clothing and safety gloves.
**WARNING**

Damage to health relating to the REACH regulation.

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


### 1.3 Notes on possible property damage

**NOTICE**

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 on tightening valve components.

Excessively tightened torques lead to parts wearing out quicker. Parts that are too loose may cause leakage.

➤ Observe the specified tightening torques.

Risk of regulator damage due to incorrectly attached lifting equipment.

➤ Do not attach lifting equipment to mounting parts (e.g. adjusting screw or control line).
Safety instructions and measures

**NOTICE**

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

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

➤ Only use lubricants approved by SAMSON.
   When in doubt, consult SAMSON.

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

Certain tools are required to work on the regulator.

➤ Only use tools approved by SAMSON.
   When in doubt, consult SAMSON.
2  Markings on the device

2.1  Regulator nameplate

![Image of nameplate]

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type designation (2406)</td>
</tr>
<tr>
<td>2</td>
<td>Max. perm. operating pressure at the actuator (p_{\text{max}})</td>
</tr>
<tr>
<td>3</td>
<td>Configuration ID</td>
</tr>
<tr>
<td>4</td>
<td>Order number or date</td>
</tr>
<tr>
<td>5</td>
<td>(K_{\text{VS}}) coefficient</td>
</tr>
<tr>
<td>6</td>
<td>Set point range/spring force</td>
</tr>
<tr>
<td>7</td>
<td>Valve size</td>
</tr>
<tr>
<td>8</td>
<td>Pressure rating</td>
</tr>
<tr>
<td>9</td>
<td>Permissible differential pressure (across the valve)</td>
</tr>
<tr>
<td>10</td>
<td>Perm. temperature</td>
</tr>
<tr>
<td>11</td>
<td>Body material</td>
</tr>
</tbody>
</table>

**Fig. 1:** Nameplate

**Note**

The CE marking only exists for versions in valve sizes DN 32 to 50.

2.2  Material numbers

See the nameplate (11, body material). For more details on the nameplate, see section 2.1.
3 Design and principle of operation

The medium flows through the valve in the direction indicated by the arrow. The position of the plug (3) determines the cross-sectional area of flow between the plug and the seat (2). In the pressureless state (control line not connected and no pressure applied) the valve is closed by the force of the set point springs (7). The upstream pressure \( p_1 \) to be controlled is tapped upstream of the regulator and transmitted over an external control line to the control line connection (9) on the actuator housing (6) where it is converted into a positioning force by the diaphragm plate with operating diaphragm (5). The diaphragm moves the plug over the plug stem (4) depending on the force of the set point springs. The spring force can be adjusted at the set point adjuster (8). When the force resulting from the upstream pressure \( p_1 \) rises above the spring force adjusted at the set point springs, the valve opens proportionally to the change in pressure.

In the version with pressure balancing, the forces produced by the upstream and downstream pressures acting on the plug are eliminated by the balancing diaphragm (10). The plug is fully balanced.

![Fig. 2: Type 2406 Excess Pressure Valve without pressure balancing](image-url)
Design and principle of operation

**Fig. 3:** Type 2406 Excess Pressure Valve with pressure balancing

<table>
<thead>
<tr>
<th></th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Valve body</td>
</tr>
<tr>
<td>2</td>
<td>Seat</td>
</tr>
<tr>
<td>3</td>
<td>Plug</td>
</tr>
<tr>
<td>4</td>
<td>Plug stem</td>
</tr>
<tr>
<td>5</td>
<td>Diaphragm plate with operating diaphragm</td>
</tr>
<tr>
<td>6</td>
<td>Actuator housing</td>
</tr>
<tr>
<td>7</td>
<td>Set point spring</td>
</tr>
<tr>
<td>8</td>
<td>Set point adjuster (screw SW 27)</td>
</tr>
<tr>
<td>9</td>
<td>Control line connection, G ¼ fitting</td>
</tr>
<tr>
<td>10</td>
<td>Balancing diaphragm</td>
</tr>
<tr>
<td>11</td>
<td>Leakage line connection (special version), G ¼ fitting</td>
</tr>
<tr>
<td>12</td>
<td>Cap</td>
</tr>
</tbody>
</table>
3.1 Technical data

The valve and actuator nameplates provide information on the valve and actuator versions (see section 2.1).

Process medium and scope of application

The Type 2406 Excess Pressure Valve is used to maintain the pressure upstream of the regulator to an adjusted set point.

- For gases
- Temperature range from $-20$ to $+60$ °C
- Set points from 5 mbar to 10 bar
- Valve size DN 15 to 50
- Pressure ratings from PN 16 to 40

The regulator is closed when relieved of pressure. The valve opens when the upstream pressure rises.

Temperature range

Depending on how the regulator is configured, it can be used up to temperatures of 60 °C (Table 1).

Temperature range from 0 to 150 °C for unbalanced versions with FKM diaphragm and FKM soft seal

Leakage class

The soft-seated regulator has the leakage class IV according to IEC 60534-4.

Noise emissions

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

**WARNING**

Risk of hearing loss or deafness due to loud noise.
Wear hearing protection when working near the regulator.

**Note**

The Type 2406 Regulator is not a safety valve. If necessary, a suitable overpressure protection must be installed on site in the plant section.

Options

- With pressure balancing (see Fig. 3)
- Pressure tapping directly at the valve instead of over an external control line with 0.8 to 2.5 bar, 2 to 5 bar and 4.5 to 10 bar

Dimensions and weights

Table 2 and Table 3 provide a summary of the dimensions and weights. The lengths and heights in the dimensional drawings are shown on page 17.
## Design and principle of operation

### Table 1: Technical data

<table>
<thead>
<tr>
<th>Valve size</th>
<th>DN 15</th>
<th>DN 20</th>
<th>DN 25</th>
<th>DN 32, 40, 50 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure rating</td>
<td>PN 16 · PN 25 · PN 40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(valve)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$K_{VS}$ coefficients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>4</td>
<td>6.3</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>Reduced $K_{VS}$ coefficients</td>
<td></td>
<td></td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>0.1 · 0.25 · 0.4 · 1 · 1.6 · 2.5</td>
<td>0.1 · 0.25 · 0.4 · 1 · 1.6 · 2.5</td>
<td>0.1 · 0.25 · 0.4 · 1 · 1.6 · 2.5 · 4 · 6.3</td>
<td>6.3 · 8 · 16 · 20</td>
</tr>
<tr>
<td>Max. permissible temperature range</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(medium temperature)</td>
<td></td>
<td>-20 to +60 °C (0 to +150 °C) 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leakage class according to IEC 60534-4</td>
<td></td>
<td>Soft-seated, minimum Class IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set point ranges</td>
<td>5 to 15 mbar · 10 to 30 mbar · 25 to 60 mbar · 50 to 200 mbar · 0.1 to 0.6 bar · 0.2 to 1 bar · 0.8 to 2.5 bar · 2 to 5 bar · 4.5 to 10 bar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. permissible pressure at operating diaphragm 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1200 cm²</td>
<td>0.5 bar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>640 cm²</td>
<td>1 bar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>320 cm²</td>
<td>2 bar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>160 cm²</td>
<td>3 bar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80 cm²</td>
<td>5 bar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 cm²</td>
<td>1.5 bar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure balancing</td>
<td>$K_{VS} = 0.1$ to 4</td>
<td>Without balancing diaphragm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$K_{VS} = 6.3$ to 32</td>
<td>With balancing diaphragm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure tapping</td>
<td>External control line · Direct at the valve body (special version)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control line connection</td>
<td>G 1/4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Larger valve sizes on request
2) For unbalanced version with FKM diaphragm and FKM soft seal
3) Corresponds to the maximum differential pressure
### Table 2: Dimensions in mm

<table>
<thead>
<tr>
<th>Valve size</th>
<th>DN 15</th>
<th>DN 20</th>
<th>DN 25</th>
<th>DN 32</th>
<th>DN 40</th>
<th>DN 50</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length L</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>130</td>
<td>150</td>
<td>160</td>
<td>180</td>
<td>200</td>
<td>230</td>
</tr>
<tr>
<td><strong>Height H2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forged steel</td>
<td>53</td>
<td>–</td>
<td>70</td>
<td>–</td>
<td>92</td>
<td>98</td>
</tr>
<tr>
<td>Other materials</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Set point range</strong></th>
<th><strong>Height H</strong></th>
<th><strong>Actuator</strong></th>
<th><strong>Height H</strong></th>
<th><strong>Actuator</strong></th>
<th><strong>Height H</strong></th>
<th><strong>Actuator</strong></th>
<th><strong>Height H</strong></th>
<th><strong>Actuator</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5 to 15 mbar</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without balancing</td>
<td>325</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With balancing</td>
<td>352</td>
<td></td>
<td>377</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10 to 30 mbar</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without balancing</td>
<td>318</td>
<td>ØD = 380 mm, A = 640 cm²</td>
<td>366</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
</tr>
<tr>
<td>With balancing</td>
<td>345</td>
<td>ØD = 380 mm, A = 640 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
</tr>
<tr>
<td><strong>25 to 60 mbar</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Without balancing</td>
<td>318</td>
<td>ØD = 380 mm, A = 640 cm²</td>
<td>366</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
</tr>
<tr>
<td>With balancing</td>
<td>345</td>
<td>ØD = 380 mm, A = 640 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
</tr>
<tr>
<td><strong>50 to 200 mbar</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without balancing</td>
<td>318</td>
<td>ØD = 380 mm, A = 640 cm²</td>
<td>366</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
</tr>
<tr>
<td>With balancing</td>
<td>345</td>
<td>ØD = 380 mm, A = 640 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
</tr>
<tr>
<td><strong>0.1 to 0.6 bar</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Without balancing</td>
<td>318</td>
<td>ØD = 285 mm, A = 320 cm²</td>
<td>366</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
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<tr>
<td>With balancing</td>
<td>345</td>
<td>ØD = 285 mm, A = 320 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>370</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
</tr>
<tr>
<td><strong>0.2 to 1 bar</strong></td>
<td></td>
<td></td>
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<td></td>
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<td>345</td>
<td>ØD = 285 mm, A = 320 cm²</td>
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<td>ØD = 490 mm, A = 1200 cm²</td>
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<td>ØD = 490 mm, A = 1200 cm²</td>
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<td><strong>0.8 to 2.5 bar</strong></td>
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<td>Without balancing</td>
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<td>ØD = 490 mm, A = 1200 cm²</td>
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<tr>
<td>With balancing</td>
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<td>ØD = 170 mm, A = 80 cm²</td>
<td>369</td>
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<td>369</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>369</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
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<tr>
<td><strong>2 to 5 bar</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without balancing</td>
<td>333</td>
<td>ØD = 170 mm, A = 40 cm²</td>
<td>368 mm</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>373 mm</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>373 mm</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
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<tr>
<td>With balancing</td>
<td>359</td>
<td>ØD = 170 mm, A = 40 cm²</td>
<td>373 mm</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>373 mm</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>373 mm</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without balancing</td>
<td>437</td>
<td>ØD = 170 mm, A = 40 cm²</td>
<td>485</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
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<td>ØD = 490 mm, A = 1200 cm²</td>
<td>489</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
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<tr>
<td>With balancing</td>
<td>463</td>
<td>ØD = 170 mm, A = 40 cm²</td>
<td>489</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>489</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
<td>489</td>
<td>ØD = 490 mm, A = 1200 cm²</td>
</tr>
</tbody>
</table>
Design and principle of operation

Dimensional drawings

**DN 15 to 25**

- **H**
- **ØD**
- **L**
- **H2**

- Min. 150 mm

**DN 32 to 50**

- **H**
- **ØD**
- **L**
- **H2**

- Min. 150 mm

Control line connection G ¼, for A = 40, 80, 160 and 320 cm²

The control line connection is turned by 90° in the drawing. The connection is normally located opposite the side with the arrow indicating the direction of flow.

Control line connection at the side of the actuator housing

Control line connection on the bottom of the actuator housing

Fig. 4: Dimensions of Type 2406
Design and principle of operation

### Table 3: Weights in kg

<table>
<thead>
<tr>
<th>Valve size</th>
<th>DN 15</th>
<th>DN 20</th>
<th>DN 25</th>
<th>DN 32</th>
<th>DN 40</th>
<th>DN 50</th>
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<tr>
<td>5 to 15 mbar</td>
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<tr>
<td>10 to 30 mbar</td>
<td>18</td>
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<tr>
<td>25 to 60 mbar</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>50 to 200 mbar</td>
<td>14</td>
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<tr>
<td>0.1 to 0.6 bar</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.2 to 1 bar</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.8 to 2.5 bar</td>
<td>8</td>
<td></td>
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<tr>
<td>2 to 5 bar</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5 to 10 bar</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Body made of cast steel 1.0619: +10 %
4 Measures for preparation

After receiving the shipment, proceed as follows:

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

4.1 Unpacking

Do not remove the packaging until immediately before installing the valve into the pipeline.

Proceed as follows to lift and install the device:

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

4.2 Transporting and lifting

Due to the low service weight, lifting equipment is not required to lift and transport the device (e.g. to install it into the pipeline).

**NOTICE**

Risk of valve damage due to incorrectly attached lifting equipment.
Do not attach lifting equipment to mounting parts (e.g. adjusting screw or control line).

Transport instructions

- Protect the device against external influences (e.g. impact).
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the device against moisture and dirt.
- Observe the permissible ambient temperatures (see section Table 1).
### Measures for preparation

#### 4.3 Storage

**NOTICE**

Risk of regulator 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.

**Note**

We recommend regularly checking the device and the prevailing storage conditions during long storage periods.

**Storage instructions**

- Protect the device against external influences (e.g. impact).
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the device against moisture and dirt. Store it at a relative humidity of less than 75 %. In damp spaces, prevent condensation. If necessary, use a drying agent or heating.
- Make sure that the ambient air is free of acids or other corrosive media.
- Observe the permissible ambient temperatures (see section Table 1).
- Do not place any objects on the device.

#### 4.4 Preparation for installation

- Flush the pipelines.

**Note**

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

- Ensure that there is no liquid, e.g. condensed water, inside the regulator. If necessary, blow out the connecting parts with clean compressed air.
- Check the valve to make sure that it is clean.
- Check the valve for damage.
- Check to make sure that the type designation, valve size, material, pressure rating and temperature range of the valve match the plant conditions (size and pressure rating of the pipeline, medium temperature etc.).
5 Mounting and start-up

5.1 Installing the valve into the pipeline

5.1.1 Installation conditions

− Choose a place of installation that allows you to freely access the regulator even after the entire plant has been completed.

− The type and dimensions of the pipeline and tank connections must suit the regulator.

− Make sure the direction of flow matches the direction indicated by the arrow on the body.

− Install the regulator free of stress and with the least amount of vibrations as possible. If necessary, support the pipeline near to the connecting flanges. Do not attach supports directly to the valve or actuator.

− Protect the regulator from icing up when controlling media that can freeze. Unless the regulator is installed in locations where no frost occurs, remove the regulator from the pipeline when the plant is shut down.

− Observe the permissible ambient temperatures (see section Table 1).

![Diagram of pipeline installation](image-url)
5.1.2 Mounting orientation

Standard

Preferably install the regulator in a horizontal pipeline. The actuator housing with set point adjuster must face upwards.

![Fig. 6: Installation in horizontal pipelines](image)

Install the control line to the tapping point with an approx. 10% slope to allow any condensing liquid to flow back into the tank or pipe.

Options

Alternatively, the valve can be installed in a vertical pipeline. The actuator housing with set point adjuster must face sideways.

![Fig. 7: Installation in vertical pipelines](image)

5.1.3 Additional fittings

Strainers

We recommend installing a strainer (e.g. SAMSON Type 2 N) upstream of the regulator. It prevents solid particles in the process medium from damaging the valve.

- Install the strainer upstream of the temperature regulator. The arrow on the valve indicates the direction of flow.
- For installation in vertical pipeline: install the strainer with the filter element facing downwards.
- Install the filter with sufficient space available to remove the filter.
- Check the strainer at regular intervals and clean it, if necessary.

Shut-off valve

Install a hand-operated shut-off valve both upstream of the strainer and downstream of the regulator. This allows the plant to be shut down for cleaning and maintenance, and when the plant is not used for longer periods of time.

Pressure gauges

Install a pressure gauge both upstream and downstream of the regulator to monitor the pressures prevailing in the plant.

⚠️ NOTICE

Control deviations due to alternative installation.
System deviations may arise when the regulator is installed in vertical pipelines.
Control line

Fitting with G ¼ female thread (9) on the actuator housing. Route the control line on site preferably using a 6 mm or ¼” (stainless) steel pipe.

Always connect the control line connection for pressure tapping (see Fig. 5) directly to the tank or vessel as the medium is in the expanded state and no turbulence occurs at this point.

If the pressure is to be tapped at a straight pipeline section, the largest possible distance to the regulator must be kept (at least 2 x DN). Connect the control line at the side or on top of the horizontally running main pipeline. If possible, place the point of pressure tapping in a pipe expansion.

Install any pipe fittings (e.g. restrictions, bends, manifolds or branches), that may cause turbulence in the flow, sufficiently far away from the control line connection (at least 3 x DN).

Optionally, a ready-mounted control line is available. This option must be specified in the order (see Fig. 8).

NOTICE

Regulator damage due to condensed water. In applications in which the gas can liquefy, condensate may form in the control line, causing damage to the regulator. To allow condensate to run back into the tank, install the control line with an approximate 10 % slope to the pressure tapping point at the tank or pipeline (see Fig. 5).

Leakage line connection

The regulator in the special version is delivered with a leakage line connection. In this version, the opening to the set point adjustment is additionally sealed by a cap.

Connect the leakage line to the G ¼ female thread fitting on top of the actuator housing.

In the event of a defective diaphragm (diaphragm rupture) in the actuator, any process medium that escapes is fed through a leakage line to a safe location.

Fig. 8: Control line

Fig. 9: Leakage line connection G ¼
Mounting and start-up

5.2 Quick check

Pressure test
A pressure test of the plant with the regulator already installed is only permissible up to the nominal pressure of the valve (see Table 1). The pressure at the operating diaphragm must not exceed the maximum permissible pressure. If this cannot be guaranteed, proceed as follows: unscrew the control line at the actuator and seal the open control line. All plant components must be designed for the test pressure.

5.3 Putting the regulator into operation

1. Make sure the control line is correctly connected and free of dirt. The cross-sectional area of flow must be open.
2. Slowly open the shut-off valves on the upstream pressure side.
3. Open all the valves on the consumer side (downstream of the regulator). Avoid pressure surges.
5.4 Adjusting the set point

The regulator in the delivered state does not have a defined pressure set point. The set point spring is released of tension. The set point must be adjusted on starting up the plant.

![Adjusting screw (8), SW 27](image)

**Fig. 10: Set point adjustment (view from above)**

Adjust the required set point (see Fig. 10) by tensioning the set point springs (7) at the set point adjuster (8) using a suitable socket wrench (width across flats 27).

1. Remove the cap (12).
2. Use a socket wrench (SW 27) to turn the screw (8).
   - Turn clockwise (↻) to increase the pressure set point (the upstream pressure increases).
   - Turn counterclockwise (↺) to reduce the pressure set point (the upstream pressure drops).
3. Remount the cap (12).

The pressure gauge (Fig. 5) installed on the upstream side on site allows the adjusted set point to be monitored.

---

**NOTICE**

Incorrect control due to a set point adjuster being turned too far.

If the set point adjuster is turned too far, the regulator becomes blocked and closed-loop control is no longer possible.

Only screw the set point adjuster up to the point where the spring tension can still be felt.
6 Servicing

The regulators do not require any maintenance. Nevertheless, they are subject to natural wear, particularly at the seat, plug and operating diaphragm.

⚠️ DANGER
Risk of bursting in pressure equipment. Valves and pipelines are pressure equipment. Improper opening can lead to valve components bursting.
- Before starting any work on the valve, de-pressurize all plant sections affected as well as the valve.
- Drain the process medium from all the plant sections affected as well as the valve.
- Wear personal protective equipment.

⚠️ 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 heat up.
- Wear protective clothing and safety gloves.

ℹ️ Note
The device 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.
6.1 Preparation for return shipment

Defective valves can be returned to SAMSON for repair.

Proceed as follows to return devices to SAMSON:

1. Put the control valve out of operation (see section 8).
2. Decontaminate the valve. Remove any residual process medium.
3. Fill in the Declaration on Contamination. The declaration form can be downloaded from our website at www.samsongroup.com > SERVICE & SUPPORT > After-sales Service.
4. Continue as described on our website at www.samsongroup.com > Service & Support > After-sales Service > Returning goods.

6.2 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.
7 Malfunctions

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

**Tip**

SAMSON’s After-sales Service can support you in drawing up an inspection and test plan for your plant.

### 7.1 Troubleshooting

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible reasons</th>
<th>Recommended action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure fluctuations and vibrations</td>
<td>Pressure tapping incorrectly routed.</td>
<td>Check the pressure tapping of the control line (see section 5.1.3 on “Control line”). If necessary, relocate the point of tapping.</td>
</tr>
</tbody>
</table>
| Insufficient throttling.         | Screw SAMSON Venturi nozzle into the fitting for the control line connection (9). Order no.: | 1991-7114 for A = 1200 or 640 cm²  
1991-7113 for A = 320 or 160 cm² |
| Improper sizing of the regulator. | Check the sizing data used for the regulator. If necessary, change the $K_{VS}$ coefficient, seat diameter or actuator area. |

**Note**

Contact SAMSON’s After-sales Service for malfunctions not listed in the table.
8 Decommissioning and removal

⚠️ DANGER
Risk of bursting in pressure equipment. Valves and pipelines are pressure equipment. Improper opening can lead to bursting of the valve.
- 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 affected as well as the valve.
- Wear personal protective equipment.

⚠️ WARNING
Risk of personal injury due to residual process medium in the valve. While working on the valve, residual process medium can escape and, depending on its properties, may lead to personal injury, e.g. (chemical) burns. Wear protective clothing, safety gloves and eye protection.

⚠️ 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 heat up.
- Wear protective clothing and safety gloves.

8.1 Decommissioning
To decommission the control valve for service and repair work or disassembly, proceed as follows:
1. Close the shut-off valve on the upstream side.
2. Close the shut-off valve on the downstream side.
3. Completely drain the pipelines and valve.
4. Depressurize the plant.
5. If necessary, allow the pipeline and regulator components to cool down or heat up.

8.2 Removing the valve from the pipeline
1. Put the regulator out of operation (see section 8.1).
2. Unbolt the flange joint.
3. Remove the valve from the pipeline.

8.3 Disposal
➡️ Observe local, national and international refuse regulations.
➡️ Do not dispose of components, lubricants and hazardous substances together with your household waste.
9 Annex

9.1 After-sales service

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

E-mail address

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

Addresses of SAMSON AG and its subsidiaries

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

Required specifications

Please submit the following details:

- Order number and position number in the order
- Type, model number, nominal size and valve version
- Upstream and downstream pressure
- Temperature and process medium
- Min. and max. flow rate in m³/h
- Is a strainer installed?
- Installation drawing showing the exact location of the regulator and all the additionally installed components (shut-off valves, pressure gauge etc.)

9.2 Certificates

The EU declaration of conformity is provided on the next page.
SAMSON erklärt in alleiniger Verantwortung für folgende Produkte:

Valves for pressure, differential pressure, volume flow and temperature regulators

2333 (Erz.-Nr./Model No. 2333), 2334 (2334), 2335 (2335), 2336, 2366, 2367, 2373, 2375, 44-0B, 44-1B, 44-2, 44-3, 44-4, 45-1, 45-2, 45-3, 45-4, 45-5, 45-6, 2468, 2478 (2720), 45-9, 46-5, 46-6, 46-7, 46-9, 47-1, 47-4, 47-5, 47-9, 2487, 2488, 2489, 2491, 2494, 2495 (2730), 2405, 2406, 2421 (2811), 2392, 2412 (2812), 2114 (2814), 2417 (2817), 2422 (2814), 2423 (2823)

die Konformität mit nachfolgender Anforderung:

Richtlinie des Europäischen Parlaments und des Rates zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung von Druckgeräten auf dem Markt.

2014/68/EU vom 15.05.2014

Angewandtes Konformitätsbewertungsverfahren für Fluide nach Art. 4(1)(c.ii) und (c.i) zweiter Gedankenstrich.

Conformity assessment procedure applied for fluids according to Article 4(1)(c.ii) and (c.i), second indent

Geräte, denen laut Tabelle das Konformitätsbewertungsverfahren Modul H zugrunde liegt, beziehen sich auf die „Zulassungsbescheinigung eines Qualitätssicherungssystems“ ausgestellt durch die benannte Stelle.

Devices whose conformity has been assessed based on Module H refer to the certificate of approval for the quality management system issued by the notified body.

Dem Entwurf zu Grunde gelegt sind Verfahren aus:
The design is based on the procedures specified in the following standards:

DIN EN 12516-2, DIN EN 12516-3 bzw./or ASME B16.1, ASME B16.24, ASME B16.34, ASME B16.42

Das Qualitätssicherungssystem des Herstellers wird von folgender benannter Stelle überwacht:
The manufacturer’s quality management system is monitored by the following notified body:

Bureau Veritas S.A. Nr./No. 0062, Newtime, 52 Boulevard du Parc, Ile de la Jatte, 92200 Neuilly sur Seine, France

Hersteller/Manufacturer: SAMSON AG, Weismüllerstraße 3, 60314 Frankfurt am Main, Germany

Frankfurt am Main, 08. Februar 2017

Klaus Hörschken
Zentralabteilungsleiter/Head of Central Department
Entwicklung Ventile und Antriebe/R&D, Valves and Actuators

Dr. Michael Heß
Zentralabteilungsleiter/Head of Central Department
Product Management & Technical Services

SAMSON AKTIENGESELLSCHAFT
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Telefono: 069 4009-0 · Telefax: 069 4009-1507
E-Mail: samson@samson.de

Revision 03

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