

# MOUNTING AND OPERATING INSTRUCTIONS



## EB 3009 EN

Translation of original instructions



**Type 42-10 RS Check Valve (backflow protection)**  
Self-operated Regulators

Edition October 2023



## Note on these mounting and operating instructions

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

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



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

## Definition of signal words

### **DANGER**

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

### **WARNING**

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

### **NOTICE**

*Property damage message or malfunction*

### **Note**

*Additional information*

### **Tip**

*Recommended action*

<b>1</b>	<b>Safety instructions and measures</b> .....	<b>1-1</b>
1.1	Notes on possible severe personal injury .....	1-4
1.1	Notes on possible personal injury .....	1-5
1.2	Notes on possible property damage .....	1-7
<b>2</b>	<b>Markings on the device</b> .....	<b>2-1</b>
2.1	Valve nameplate .....	2-1
2.2	Actuator nameplate .....	2-1
2.3	Location of the nameplates .....	2-2
2.4	Material identification number .....	2-2
2.4.1	Type 2421 RS Valve .....	2-2
2.4.2	Type 2420 RS Actuator .....	2-2
<b>3</b>	<b>Design and principle of operation</b> .....	<b>3-1</b>
3.1	Additional fittings .....	3-4
3.2	Technical data .....	3-5
<b>4</b>	<b>Shipment and on-site transport</b> .....	<b>4-1</b>
4.1	Accepting the delivered goods .....	4-1
4.2	Removing the packaging from the regulator .....	4-1
4.3	Transporting and lifting the regulator .....	4-2
4.3.1	Transporting the regulator .....	4-2
4.3.2	Lifting the regulator .....	4-3
4.4	Storing the regulator .....	4-4
<b>5</b>	<b>Installation</b> .....	<b>5-1</b>
5.1	Installation conditions .....	5-1
5.2	Preparation for installation .....	5-3
5.3	Installation .....	5-5
5.3.1	Installing the regulator .....	5-5
5.3.2	Cleaning the pipeline .....	5-6
5.4	Testing the regulator .....	5-6
5.4.1	Leak test .....	5-7
5.4.2	Pressure test .....	5-7
5.5	Proof testing .....	5-8
5.6	Insulation .....	5-8
<b>6</b>	<b>Start-up</b> .....	<b>6-1</b>
6.1	Start-up and putting the device back into operation .....	6-2
6.2	Starting up the plant .....	6-2
6.2.1	Regulation of steam .....	6-2
6.2.2	Regulation of liquids .....	6-2

## Contents

<b>7</b>	<b>Operation .....</b>	<b>7-1</b>
7.1	Set point adjustment .....	7-1
<b>8</b>	<b>Malfunctions .....</b>	<b>8-1</b>
8.1	Troubleshooting .....	8-1
8.2	Emergency action .....	8-2
<b>9</b>	<b>Servicing.....</b>	<b>9-1</b>
9.1	Preparing the valve for service work .....	9-4
9.2	Installing the regulator after service work .....	9-4
9.1	Service work.....	9-4
9.1.1	Replacing the actuator.....	9-5
9.1.2	Replacing the seat and plug.....	9-5
9.1.3	Replacing the actuator's operating diaphragm .....	9-5
9.2	Ordering spare parts and operating supplies .....	9-5
<b>10</b>	<b>Decommissioning .....</b>	<b>10-1</b>
<b>11</b>	<b>Removal .....</b>	<b>11-1</b>
11.1	Removing the regulator from the pipeline .....	11-1
11.2	Removing the actuator from the valve .....	11-1
<b>12</b>	<b>Repairs .....</b>	<b>12-1</b>
12.1	Returning devices to SAMSON .....	12-1
<b>13</b>	<b>Disposal.....</b>	<b>13-1</b>
<b>14</b>	<b>Certificates .....</b>	<b>14-1</b>
<b>15</b>	<b>Annex.....</b>	<b>15-1</b>
15.1	Tightening torques.....	15-1
15.2	Lubricant .....	15-1
15.3	Tools .....	15-1
15.4	Spare parts .....	15-1
15.5	After-sales service .....	15-2

# 1 Safety instructions and measures

## Intended use

The Type 42-10 RS Check Valve is suitable for backflow protection in networks containing water, steam, nitrogen or compressed air up to 220 °C. It consists of a Type 2421 RS Valve and a Type 2420 RS Actuator.

The Type 42-10 RS Check Valve is mainly used in industrial plants.

The regulator is designed to operate under exactly defined conditions (e.g. operating pressure, process medium, temperature). Therefore, operators must ensure that the regulators are only used in operating conditions that meet the specifications used for sizing the devices at the ordering stage. In case operators intend to use the regulators in applications or conditions other than those specified, contact SAMSON.

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

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

## Reasonably foreseeable misuse

The regulators are 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 additional fittings mounted on the regulator

Furthermore, the following activities do not comply with the intended use:

- Use of non-original spare parts
- Performing service and repair work not described

## Qualifications of operating personnel

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

## Safety instructions and measures

### Personal protective equipment

We recommend 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, safety gloves and eye 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.

### 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. Plant operators and operating personnel must observe all hazard statements, warning and caution notes in these mounting and operating instructions.

Hazards resulting from the special working conditions at the installation site of the regulator must be identified in a risk assessment and prevented through the corresponding safety instructions drawn up by the operator.

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.

### Safety features

The Type 42-10 RS Check Valve is a valve with a safety function. When relieved of pressure, the regulator is closed by the force of the set point springs in the actuator.

### Responsibilities of the operator

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

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

### Responsibilities of operating personnel

Operating personnel must read and understand these mounting and operating instructions as well as the referenced documents and observe the specified hazard statements, warnings and caution notes. Furthermore, operating personnel must be familiar with the applicable health, safety and accident prevention regulations and comply with them.

### Referenced standards, directives and regulations

The regulators comply with the requirements of the European Pressure Equipment Directive 2014/68/EU. Regulators with a CE marking have an EU declaration of conformity, which includes information about the applied conformity assessment procedure. This EU declaration of conformity is included in the 'Certificates' section.

According to the ignition hazard assessment performed in accordance with Clause 5.2 of ISO 80079-36, the non-electrical control valves do not have their own potential ignition source even in the rare incident of an operating fault. As a result, they do not fall within the scope of Directive 2014/34/EU.

→ For connection to the equipotential bonding system, observe the requirements specified in Clause 6.4 of EN 60079-14 (VDE 0165-1).

## Safety instructions and measures

### Referenced documentation

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

- Mounting and operating instructions for
  - e.g. **Type 2 N or NI Strainer** ▶ EB 1015
- Data sheets for
  - e.g. **Accessories · Differential pressure and flow regulators** ▶ T 3095

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  - e.g. **Type 2 N or NI Strainer** ▶ T 1015
- Mounting and operating instructions as well as data sheets for additional fittings (e.g. shut-off valves, pressure gauges etc.).

## 1.1 Notes on possible severe personal injury

### DANGER

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

Regulators and pipelines are pressure equipment. Impermissible pressure or improper opening can lead to regulator components bursting.

- Observe the maximum permissible pressure for regulator and plant.
- If necessary, a suitable overpressure protection must be installed on site in the plant section.
- Before starting any work on the regulator, depressurize all plant sections affected as well as the regulator.
- Drain the process medium from all the plant sections affected as well as the regulator.
- Wear personal protective equipment.

## 1.1 Notes on possible personal injury

### WARNING

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

Over time, markings, labels and nameplates on the regulator 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.

**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 pressurized components and process medium being discharged.**

Incorrect opening of pressure equipment or mounting parts may lead to the process medium escaping to the atmosphere.

- Do not loosen the control line while the valve is pressurized.

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

Depending on the process medium, regulator 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.

### **WARNING**

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

While working on the regulator, 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 regulator.
- Wear protective clothing, safety gloves and eye protection.

#### **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.

- Information on safe use of the part affected ► [www.samsongroup.com/en/about-samson/material-compliance/reach-regulation/](http://www.samsongroup.com/en/about-samson/material-compliance/reach-regulation/).

## 1.2 Notes on possible property damage

### ! NOTICE

#### **Risk of regulator damage due to incorrectly attached slings.**

- Do not attach load-bearing slings to the actuator housing.

#### **Risk of regulator damage due to unsuitable medium properties.**

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

- Only use the process medium specified for sizing the valve.

#### **Risk of regulator 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 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 surfaces.

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

#### **Risk of leakage and regulator damage due to excessively high or low tightening torques.**

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

- Observe the specified tightening torques (see 'Tightening torques' in Annex).

#### **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.

### **!** NOTICE

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

- Keep the regulator and the tools used free from solvents and grease.
- Make sure that only suitable lubricants are used.

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### **i** Note

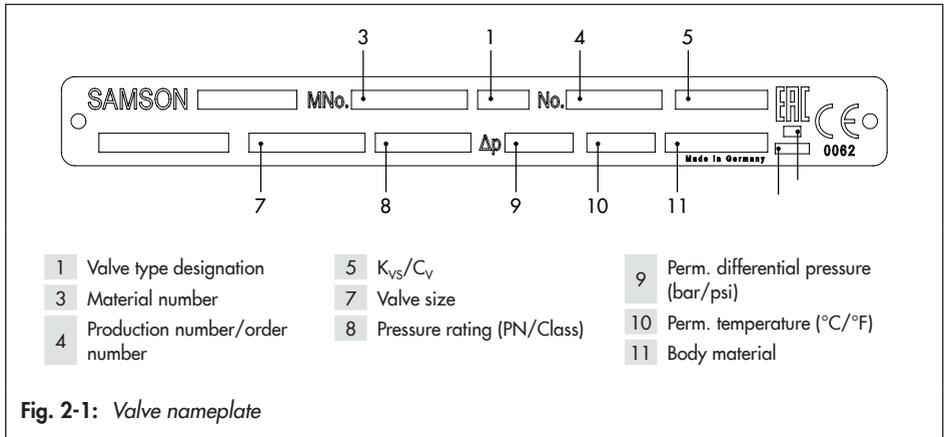
*SAMSON's After-sales Service can support you concerning lubricant, tightening torques and tools approved by SAMSON.*

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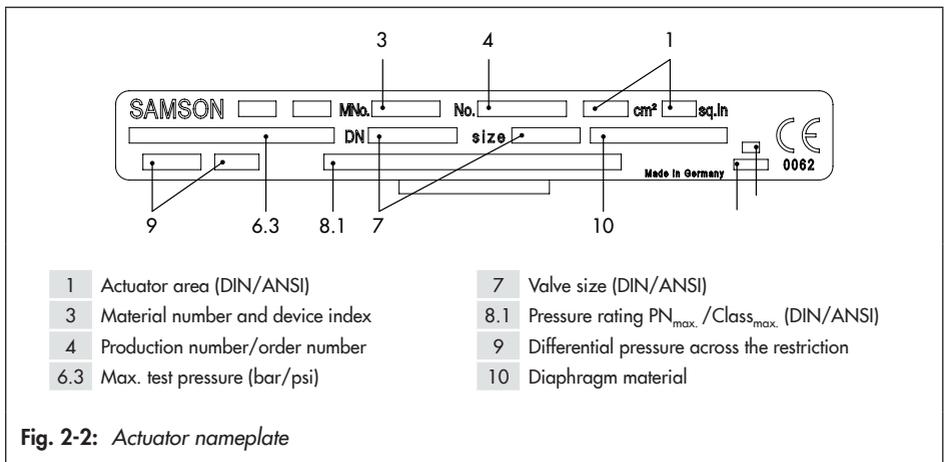
## 2 Markings on the device

Several nameplates are affixed to the device. The nameplates are used to identify the separate regulator components (see section 2.1 and section 2.2).

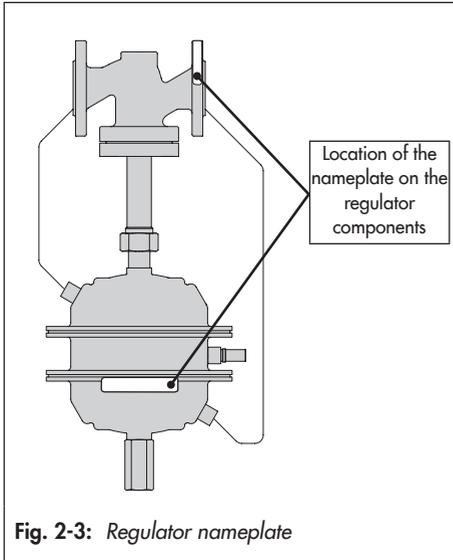
### 2.1 Valve nameplate



### 2.2 Actuator nameplate



## 2.3 Location of the nameplates



## 2.4 Material identification number

### 2.4.1 Type 2421 RS Valve

See the nameplate (11, body material). For more details on the nameplate, see section 2.1.

### 2.4.2 Type 2420 RS Actuator

Specifying the material number, you can contact us to find out which material is used. This is specified on the nameplate in the 'MNo.' field (3). For more details on the nameplate, see section 2.2.

### 3 Design and principle of operation

→ See Fig. 3-1 and Fig. 3-2

The regulator prevents flowback from directly connected systems. Observe the pressure and temperature limits on the nameplate.

The regulator is open, provided the upstream pressure is at least 0.2 bar/3 psi greater than the downstream pressure. It closes automatically when the downstream pressure rises to or above the value of the upstream pressure.

The regulator basically consists of the valve (1) with seat (2) and plug (3) as well as the opening actuator (10) with two diaphragms (11).

The medium flows through the valve in the direction indicated by the arrow. The position of the valve plug (3) determines the differential pressure over the cross-sectional area released between the plug and seat (2).

At a differential pressure of 0.2 bar/3.0 bar, the valve begins to open; at 0.35 bar/0.55 bar, the valve is completely open. At this point, the upstream pressure  $p_1$  must be greater than the downstream pressure  $p_2$ . The regulator closes automatically when the downstream pressure rises to or above the value of the upstream pressure. The standard plug is soft-seated to ensure tight shut-off and to prevent backflow from the plant into the supply network.

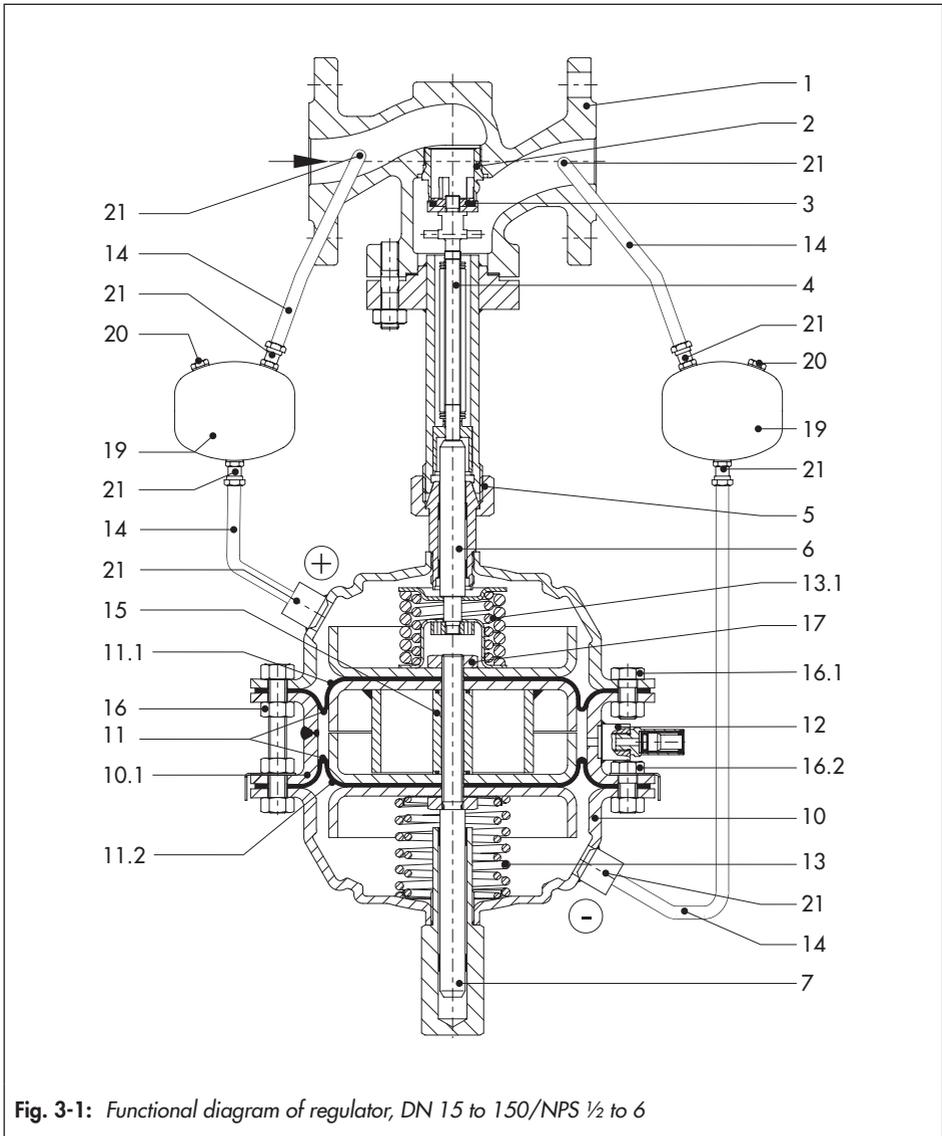
The mounted control lines (14) transmit the upstream and downstream pressures to the actuator.

The actuator with two diaphragms (11) offers increased safety and reliability of functions. The operating diaphragm for upstream pressure (11.1) is connected to the valve input pressure, whereas the operating diaphragm for downstream pressure (11.2) is connected to the valve output pressure. A bore with a mechanical diaphragm rupture indicator (12) is located in the intermediate ring located between the two diaphragms. The pressure of response of the diaphragm rupture indication is approximately 1.5 bar/22 psi.

In the event of a diaphragm rupture, the pressure in the space between the two operating diaphragms starts to increase. This causes the pin in the diaphragm rupture indicator to be pushed outwards and a red ring appears, indicating the diaphragm rupture. The intact operating diaphragm takes on the control task of the ruptured diaphragm.

A pressure switch (18) can be optionally mounted to the actuator to trigger an alarm.

## Design and principle of operation



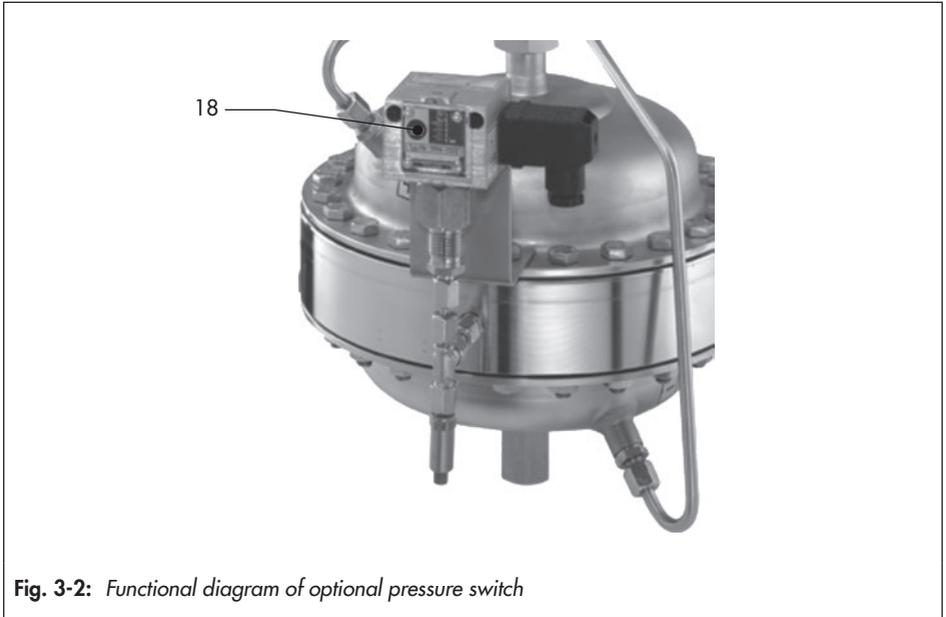


Fig. 3-2: Functional diagram of optional pressure switch

**Legend for Fig. 3-1 and Fig. 3-2**

- |      |   |      |   |
|------|---|------|---|
| 1    | Valve body                                  | 13   | Set point springs   |
| 2    | Seat  | 13.1 | Force limiter   |
| 3    | Plug  | 14   | Control line 8x1 mm   |
| 4    | Plug stem                                   | 15   | Spacer bushing including seal   |
| 5    | Threaded connection for diaphragm actuator  | 16   | Housing bolts (two long bolts opposite each other, DN 15 to 25/NPS 1/2 to 1 only) |
| 6    | Actuator stem                               | 16.1 | Top housing bolts   |
| 7    | Diaphragm stem                              | 16.2 | Bottom housing bolts  |
| 10   | Actuator housing                            | 17   | Diaphragm plate nut   |
| 10.1 | Distance ring                               | 18   | Pressure switch (optional)  |
| 11   | Two diaphragms                              | 19   | Compensation chamber (optional)   |
| 11.1 | Operating diaphragm for upstream pressure   | 20   | Filler plug   |
| 11.2 | Operating diaphragm for downstream pressure | 21   | Screw fitting (control line)  |
| 12   | Diaphragm rupture indicator                 |      |   |

### 3.1 Additional fittings

→ See Fig. 3-3

#### Pressure gauges

Install a pressure gauge (3 and 5) at suitable points to monitor the pressures prevailing in the plant.

#### Shut-off valves

We recommend installing a shut-off valve (1 and 6) both upstream of the strainer and downstream of the regulator.

#### Insulation

Regulators can be insulated to reduce heat energy transfer.

Refer to the instructions in the 'Installation' section.

#### Strainer

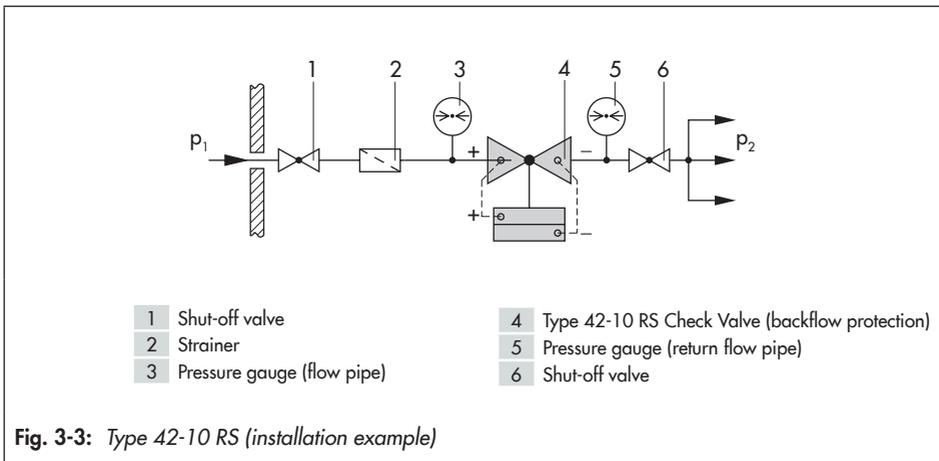
We recommend installing a SAMSON strainer (2) upstream of the valve. It prevents solid particles in the process medium from damaging the regulator.

→ Do not use the strainer to permanently filter the process medium.

→ Select a strainer (mesh size) suitable for the process medium.

#### **i** Note

*Any impurities carried along by the process medium may impair the proper functioning of the regulator. We recommend installing a strainer (e.g. SAMSON Type 2 NI) upstream of the pressure reducing valve (► EB 1015).*



## 3.2 Technical data

The valve and actuator nameplates provide information on the valve and actuator versions (see the 'Markings on the device' section).

### **i** Note

More information is available in Data Sheet  
▶ T 3009.

### Conformity

The Type 42-10 RS Regulator bears both the CE and EAC marks of conformity.



### Process medium and scope of application

The Type 42-10 RS Check Valve is used to prevent the backflow protection of a medium.

- For **liquids, gases and vapors**
- Compressed air and nitrogen up to **80 °C · 150 °C** <sup>1)</sup>/**175 °F · 300 °F** <sup>1)</sup>
- Saturated steam with compensation chamber up to **220 °C/430 °F**
- Liquids up to **80 °C/175 °F**
- Differential pressure set point **Δp = 0.2 bar/3 psi**
- Valve sizes **DN 15 to 150/NPS ½ to 6**
- Pressure rating **PN 16 to 40/Class 150 · 300**

The regulator is closed when relieved of pressure. The regulator is **open** when the upstream pressure is **greater** than the **downstream pressure**. The regulator **closes** when the downstream pressure **rises**.

### Leakage class

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

### Temperature range

Depending on how the regulator is configured, it can be used up to temperatures of 220 °C/430 °F (see Table 3-1). The minimum temperature is limited by the accessories used and the actuator's diaphragm material (▶ T 3009).

### 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.

### Dimensions and weights

Fig. 3-4 provides a summary of the dimensions and weights. The lengths and heights in the dimensional drawings are shown on pages 3-8 to 3-9.

<sup>1)</sup> Version with FKM diaphragm

## Design and principle of operation

**Table 3-1: Technical data · Valves · All pressures in bar**

Type 2421 RS Valve		
Valve size	DN 15 to 150/NPS ½ to 6	
Pressure rating	PN 16, 25 and 40/Class 150 and 300	
Max. constant operating pressure	25 bar/360 psi	
Max. perm. pressure acting on one side	45 bar/650 psi	
Leakage class according to IEC 60534-4 <sup>1)</sup>	Leakage rate VI	
Max. permissible temperature	With EPDM diaphragm in actuator	80 °C/175 °F for air, gases and water 220 °C/430 °F for steam with compensation chamber
	With FKM diaphragm in actuator	150 °C/300 °F for air and gases
Max. ambient temperature	50 °C/120 °F	
Conformity	CE · ENEC	
Type 2420 RS Actuator		
Actuator area	320 cm <sup>2</sup> /50 in <sup>2</sup>	640 cm <sup>2</sup> /100 in <sup>2</sup>
Differential pressure set point $\Delta p$ , fixed	0.2 bar/3 psi	
Max. permissible temperature	With EPDM diaphragm	80 °C/175 °F for air, gases and water 220 °C/430 °F for steam with compensation chamber
	With FKM diaphragm	150 °C/300 °F for air and gases

<sup>1)</sup> Terms for control valve sizing according to IEC 60534:  $F_L = 0.95$ ,  $X_T = 0.75$

**Table 3-2: Materials · Material number according to DIN EN**

Type 2421 RS Valve			
Pressure rating	PN 16, 25 and 40		PN 40
	Class 150/300		Class 300
Valve body	Cast steel 1.0619	Cast stainless steel 1.4408	Forged stainless steel 1.4404 <sup>1)</sup>
Seat and plug	Stainless steel 1.4404 with EPDM soft seal		
Plug stem	Stainless steel 1.4301		
Bottom section	Stainless steel 1.4404/1.4301		
Body gasket	novatec® PREMIUM · UDP®3620 <sup>2)</sup>		

<sup>1)</sup> DN 15, 25, 40 and 50/NPS ½, 1, 1½ and 2 only

<sup>2)</sup> For version free of graphite

**Table 3-2: Materials · Material number according to DIN EN**

Type 2420 RS Actuator		
Diaphragm cases	1.0332	Stainless steel 1.4301
Diaphragm	EPDM with fabric reinforcement · FKM	
Guide bushing	DU bushing	PTFE
Intermediate piece	Sheet steel DD11	Stainless steel 1.4301
Coupling pin	Stainless steel 1.4301	
Seals	EPDM · FKM	

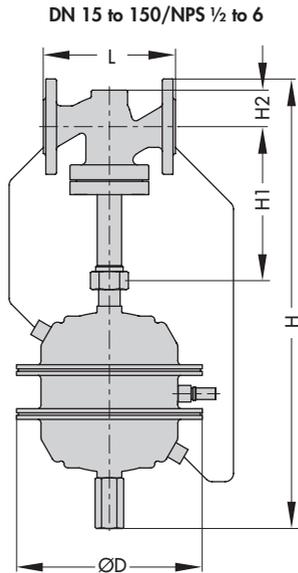
<sup>1)</sup> DN 15, 25, 40 and 50/NPS ½, 1, 1½ and 2 only

<sup>2)</sup> For version free of graphite

**Table 3-3:  $K_{VS}$  coefficients**

Type 2421 RS Valve												
Valve size	DN	15	20	25	32	40	50	65	80	100	125	150
Valve size	NPS	½	¾	1	–	1½	2	2½	3	4	–	6
$K_{VS}$ coefficient		4.0	6.3	8.0	16	20	32	50	80	125	190	280
$C_v$ coefficient		4.5	7.5	9.4	–	24	37	60	94	145	–	330

Dimensions and weights



Dimensions in mm and weights - DIN version

Valve size	DN	15	20	25	32	40	50	65	80	100	125	150
Length L		130	150	160	180	200	230	290	310	350	400	480
Height H1		225						300		355	460	590
Height H2	Forged steel	53	-	70	-	92	98	-				
	Other materials	44			72			100	120	145	175	
Height H <sup>1)</sup>		550			600			800	830	1000		
Actuator ØD		285 mm (A = 320 cm <sup>2</sup> )						390 mm (A = 640 cm <sup>2</sup> )				
Weight for PN 16 <sup>1)</sup> in kg (approx.)		26	26.5	28	35	35.5	39.5	59.5	65.5	75	110	165

<sup>1)</sup> Minimum clearance required to remove the actuator: +100 mm

Fig. 3-4: Dimensions of the regulators

**Dimensions and weights**

Dimensions in inches and weights · ANSI version										
Valve size	NPS	½	¾	1	1½	2	2½	3	4	6
Length L	Class 150	7.25			8.75	10	10.9	11.75	13.9	17.75
	Class 300	7.5	7.6	7.75	9.25	10.5	11.5	12.5	14.5	18.6
Height H <sup>1)</sup>		19.7			23.6		31.5		32.7	39.4
Height H1		8.6					11.8		14	23.2
Height H2		1.8			2.8		3.9		4.5	6.9
Actuator ØD		11.2 in (A = 50 in <sup>2</sup> )					15.4 in (A = 100 in <sup>2</sup> )			
Weight for Class 150 (approx. lbs)		57	58	62	78	87	131	144	165	360
Weight for Class 300 (approx. lbs)		60	61	65	82	91	137	151	173	376

<sup>1)</sup> Minimum clearance required to remove the actuator: +100 mm

**Fig. 3-4:** *Dimensions of the regulators*



## 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 and actuator nameplate match the specifications in the delivery note. See the 'Markings on the device' section for nameplate details.
2. Check the shipment for transportation damage. Report any damage to SAMSON and the forwarding agent (refer to delivery note).
3. Determine the weight and dimensions of the units to be lifted and transported in order to select the appropriate lifting equipment and lifting accessories. Refer to the transport documents and the 'Design and principle of operation' section.

---

#### **i** Note

*Do not remove the packaging until immediately before installation.*

---

### 4.2 Removing the packaging from the regulator

The tested regulator is delivered as an assembled unit.

Proceed as follows to lift and install the valve:

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

---

#### **!** NOTICE

***Risk of regulator damage due to foreign particles entering the valve.***

*The protective caps fitted on the inlet and outlet of the valve with flanged body prevent foreign particles from entering the valve and damaging it.*

*Do not remove the protective caps until immediately before installation.*

---

## 4.3 Transporting and lifting the regulator

### **⚠ 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).
- Refer to the 'Design and principle of operation' section for the weights.

### **⚠ WARNING**

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

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

- Observe the guideline weight for manual handling: 15 to max. 55 kg taking into account age, gender and physical fitness
- Observe the occupational health and safety regulations valid in the country of use.

### **⚠ WARNING**

#### ***Risk of personal injury due to the regulator tipping.***

- Observe the regulator's center of gravity.
- Secure the regulator against tipping over or turning.

### **💡 Tip**

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

### 4.3.1 Transporting the regulator

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

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

#### **Transport instructions**

- Protect the regulator 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 regulator against moisture and dirt.
- The permissible ambient temperature of standard regulators is -20 to +80 °C.

### 4.3.2 Lifting the regulator

To install a large regulator into the pipeline, use lifting equipment (e.g. crane or forklift) to lift it.

#### Lifting instructions

- Use a hook with safety latch to secure the slings from slipping off the hook during lifting and transporting (see Fig. 4-1).
- Secure slings against slipping.
- Make sure the slings can be removed after installation.
- Prevent the regulator from tilting or tipping.
- Do not leave loads suspended when interrupting work for longer periods of time.
- Make sure that the axis of the pipeline is always horizontal during lifting and the axis of the plug stem is always vertical.

#### Lifting

1. Attach one sling to the flange of the body and to the rigging equipment (e.g. hook) of the crane or forklift (see Fig. 4-1).
2. Carefully lift the regulator. Check whether the lifting equipment and accessories can bear the weight.
3. Move the regulator at an even pace to the site of installation.
4. Install the regulator into the pipeline (see the 'Installation' section).
5. After installation in the pipeline, check whether the regulator flanges are bolted tight.
6. Remove slings.

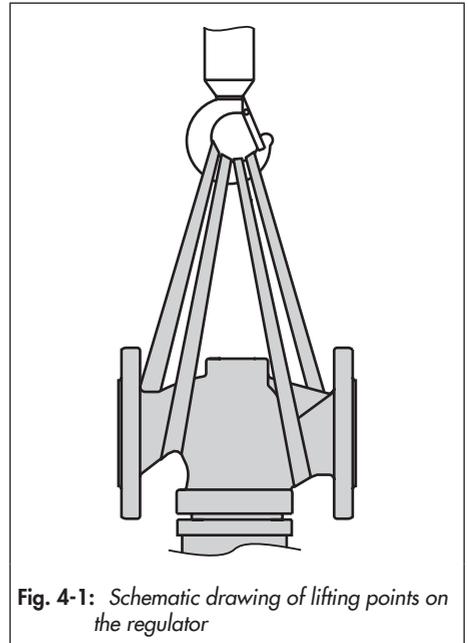


Fig. 4-1: Schematic drawing of lifting points on the regulator

## 4.4 Storing the regulator

### 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 longer storage times.

### Note

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

### Storage instructions

- Protect the regulator against external influences (e.g. impact).
- Secure the regulator in the stored position against slipping or tipping over.
- Do not damage the corrosion protection (paint, surface coatings). Repair any damage immediately.
- Protect the regulator 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 regulators is -20 to +65 °C.

- Do not place any objects on the regulator.

### Special storage instructions for elastomers

Elastomer, e.g. operating diaphragm

- To keep elastomers in shape and to prevent cracking, do not bend them or hang them up.
- Store elastomers away from lubricants, chemicals, solutions and fuels.
- We recommend a storage temperature of 15 °C for elastomers.

### Tip

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

## 5 Installation

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

### 5.1 Installation conditions

#### Work position

The work position for the regulator is the front view onto all operating controls on the regulator (including any additional fittings) seen from the position of operating personnel.

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 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 regulator functions properly, proceed as follows:

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

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

#### Mounting position

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

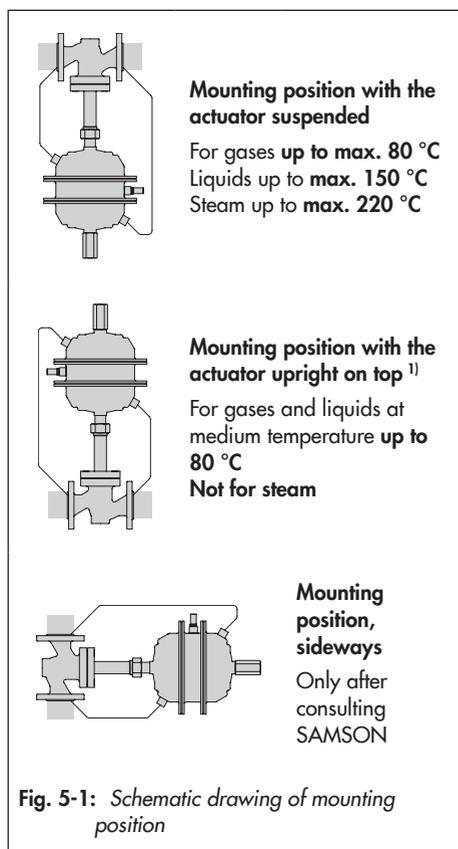
- Install the actuator housing **suspended downward** in horizontal pipelines (see Fig. 5-1).
- Make sure the direction of flow matches the direction indicated by the arrow on the body.
- Contact SAMSON if the mounting position is not as specified above.

---

#### **!** NOTICE

**Possible malfunction and damage due to adverse weather conditions (temperature, humidity).**

- Do not install the regulator outdoors or in rooms prone to frost.
  - Protect the regulator against frost if it is used to control freezing media.
  - Either heat the regulator or remove it from the plant and completely drain the residual medium.
-



<sup>1)</sup> The differential pressure set point is approx. 0.1 bar higher.

## Support or suspension

### **i Note**

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

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

### **! NOTICE**

**Risk of regulator damage due to incorrect support.**

- Do not attach supports to the valve, to moving parts on the actuator or to the control lines.
- Contact SAMSON if the mounting position differs from the standard mounting position.

## Compensation chamber

A compensation chamber (19) is required for liquids above 150 °C as well as for steam.

The mounting position of the compensation chamber is indicated by an adhesive label on the chamber itself as well as by an arrow and the word "top" stamped on the top of the chamber.

This mounting position must be adhered to; otherwise the safe functioning of the regulator cannot be guaranteed.

## 5.2 Preparation for installation

The regulator is delivered ready for connection.

Before installation, make sure the following conditions are met:

- The regulator is clean.
- The regulator and all piping are not damaged.
- Install a strainer upstream of the regulator.
- 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 fittings (see the 'Design and principle of operation' section) have been installed or prepared as necessary before installing the valve.

Proceed as follows:

- ➔ Lay out the necessary material and tools to have them ready during installation work.
- ➔ Flush the pipeline **before** installing the regulator.  
The plant operator is responsible for cleaning the pipelines in the plant.
- ➔ Check any mounted pressure gauges to make sure they function properly.

---

### **i** Note

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

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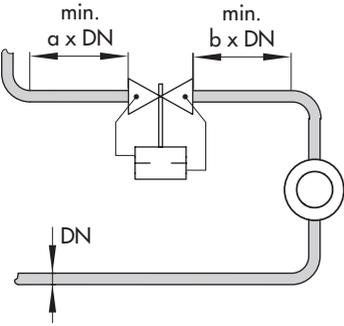
### **i** Note

*Any impurities carried along by the process medium may impair the proper functioning of the regulator. Therefore, we recommend installing a strainer (e.g. SAMSON Type 2 NI) upstream of the regulator.*

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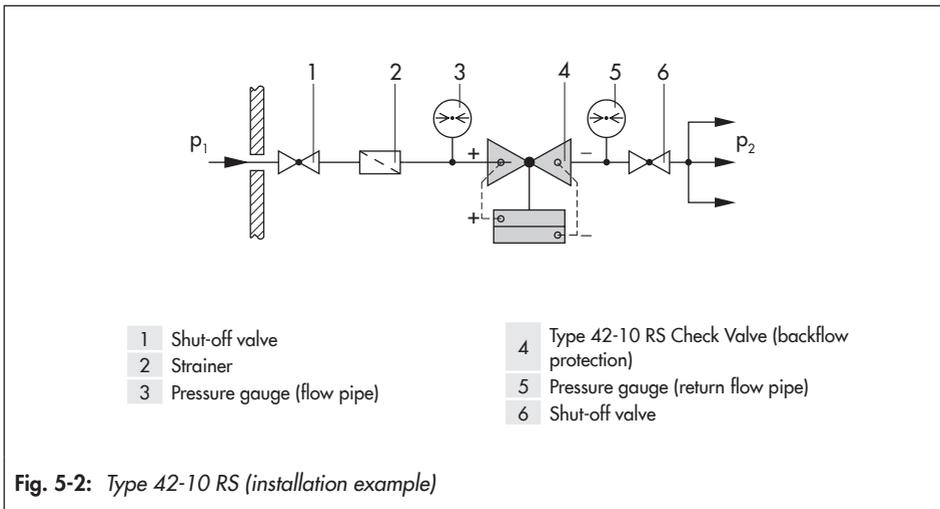
## Installation

**Table 5-1: Inlet and outlet lengths**



State of process medium	Valve conditions	Inlet length a	Outlet length b
Gas	$Ma \leq 0.3$	2	4
Vapors <sup>1)</sup>	$Ma \leq 0.3$	2	4
Liquid	Free of cavitation/ $w < 3 \text{ m/s}$	2	4
	Cavitation producing noise/ $w \leq 3 \text{ m/s}$	2	4

<sup>2)</sup> No wet steam



**Fig. 5-2: Type 42-10 RS (installation example)**

## 5.3 Installation

The regulator is delivered ready for connection.

The activities listed below are necessary for installation and before start-up of the regulator.

---

### ⚠ NOTICE

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

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

→ Observe the specified tightening torques (see 'Tightening torques' in Annex).

---

### ⚠ NOTICE

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

→ Only use tools approved by SAMSON (see 'Tools' in Annex).

---

### ⚠ NOTICE

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

→ Only use lubricants approved by SAMSON (see 'Lubricants' in Annex).

---

### 5.3.1 Installing the regulator

1. Close the shut-off valves (1, 6) upstream and downstream of the regulator while the regulator is being installed.
2. Remove the protective caps from the valve ports before installing the valve.
3. Lift the regulator using suitable lifting equipment to the site of installation. Observe the flow direction through the valve. The arrow on the valve indicates the direction of flow.
4. Make sure that the correct flange gaskets are used.
5. Bolt the pipe to the valve free of stress.
6. Slowly open the shut-off valves in the pipeline after the regulator has been installed.

### 5.3.2 Cleaning the pipeline

We recommend additionally flushing the pipeline without the installed regulator before start-up.

## 5.4 Testing the regulator

---

### **⚠ DANGER**

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

Regulators 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 regulator:

- Depressurize all plant sections concerned and the regulator.
- Drain the process medium from all the plant sections concerned as well as the valve.

---

### **⚠ DANGER**

**Risk of personal injury due to process medium escaping.**

- Do not start up the regulator until all parts have been mounted.
- 

---

### **⚠ 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.

- Wear hearing protection when working near the regulator.
- 

---

### **⚠ WARNING**

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

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

- Wear protective clothing and safety gloves.
- 

SAMSON regulators are delivered ready for use. To test the regulator functioning before start-up or putting back the regulator into operation, perform the following tests:

### 5.4.1 Leakage

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

*SAMSON's After-sales Service can support you to plan and perform a leak test for your plant.*

1. Slowly open the shut-off valve (1) installed upstream of the regulator.
2. Apply the required test pressure.
3. Check the regulator for leakage to the atmosphere.
4. Depressurize the pipeline section and valve.
5. Rework any parts that leak and repeat the leak test.

### 5.4.2 Pressure test

#### **i** Note

*The plant operator is responsible for performing the pressure test. SAMSON's After-sales Service can support you to plan and perform a pressure test for your plant.*

#### **!** NOTICE

**Risk of valve damage due to a sudden pressure increase and resulting high flow velocities.**

– Slowly open the shut-off valves.

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

- ➔ Do not allow the pressure to exceed the 1.5 times the pressure rating of the valve body.
- ➔ Do not apply a pressure higher than the specified pressure rating or the maximum constant operating pressure (25 bar/360 psi) to the actuator. The lowest pressure always applies and restricts the maximum test pressure.
- ➔ Make sure that the pressure rises simultaneously upstream and downstream of the regulator. To achieve this, fill the system and apply pressure only on the upstream pressure side (not the return flow side).

## 5.5 Proof testing

Detailed test instructions ► SH 3009

They describe testing in the workshop and in the installed state. The maintenance intervals depend on the intervals between regular testing and the scope of the testing. A five-year interval has proven suitable under normal operating and ambient conditions. We recommend replacing parts subject to wear on performing this maintenance work.

### 5.6 Insulation

To insulate cold systems, we recommend first filling the plant and carefully rinsing it. The regulator must not yet be insulated at this stage.

1. Start up the plant and adjust the set point (see the 'Start-up' section).
2. Shut down the plant again and let it heat up until the condensation water has dried off.
3. Insulate the regulator and pipes conveying the process medium using insulation material with a water vapor barrier. If a control line is to be routed through the insulation, special care must be taken with the sealing since slight changes in shape may occur. The insulation thickness depends on the medium temperature and the ambient conditions. 50 mm is a typical thickness.

---

#### NOTICE

***Risk of regulator damage due to incorrect insulation.***

→ *Only insulate the regulator up to the actuator for medium temperatures below 0 °C or above 220 °C.*

---

## 6 Start-up

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

### **⚠ DANGER**

**Risk of personal injury due to process medium escaping.**

→ Do not start up the regulator until all parts have been mounted.

### **⚠ WARNING**

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

→ Do not loosen the control line while the valve is pressurized.

### **⚠ WARNING**

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

Regulator 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 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.

→ Wear hearing protection when working near the valve.

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

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

### 6.1 Start-up and putting the device back into operation

1. Depending on the field of application, allow the regulator to cool down or warm up to reach ambient temperature before start up.
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 regulator to ensure it functions properly.

### 6.2 Starting up the plant

→ For steam applications, make sure that the pipelines are dry. Moisture will damage the inside of the valve.

1. Open the shut-off valves slowly preferably starting from the upstream pressure side. Afterwards, open all the valves on the consumer side (downstream of the regulator).
2. Fill the plant **slowly** with the process medium. Avoid pressure surges.
3. Make sure that the pressure rises simultaneously upstream and downstream of the regulator to avoid damaging it.

→ Raise the plant pressure in steps of 5 bar/70 psi.

→ Wait several seconds after each rise in pressure before continuing.

### 6.2.1 Regulation of steam

→ For steam applications, make sure that the pipelines are dry. Moisture will damage the inside of the valve.

Unscrew filler plug (20) on the compensation chamber (19). Use the included plastic funnel or a jug to pour in water until it starts to overflow (see 'Tightening torque' in the Annex). Screw the filler plug (20) back in and tighten it. The regulator is now ready for operation. Open the hand-operated shut-off valves slowly to prevent water hammer.

### 6.2.2 Regulation of liquids

→ To start up the regulator, open shut-off valves slowly.

## 7 Operation

Immediately after completing start-up or placing the regulator back into service (see the 'Start-up' section), the regulator is ready for use.

---

### **⚠ WARNING**

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

*Regulator 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 control line 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.*

- *Wear hearing protection when working near the valve.*
- 

## 7.1 Adjusting the set point

The regulator is delivered with a ready adjusted set point of 0.2 bar/3 psi and has been tested.

The regulator is open, provided the upstream pressure is greater than the downstream pressure by at least the ready adjusted set point. It closes automatically when the downstream pressure rises to or above the value of the upstream pressure.

The user cannot adjust the set point.

## Operation

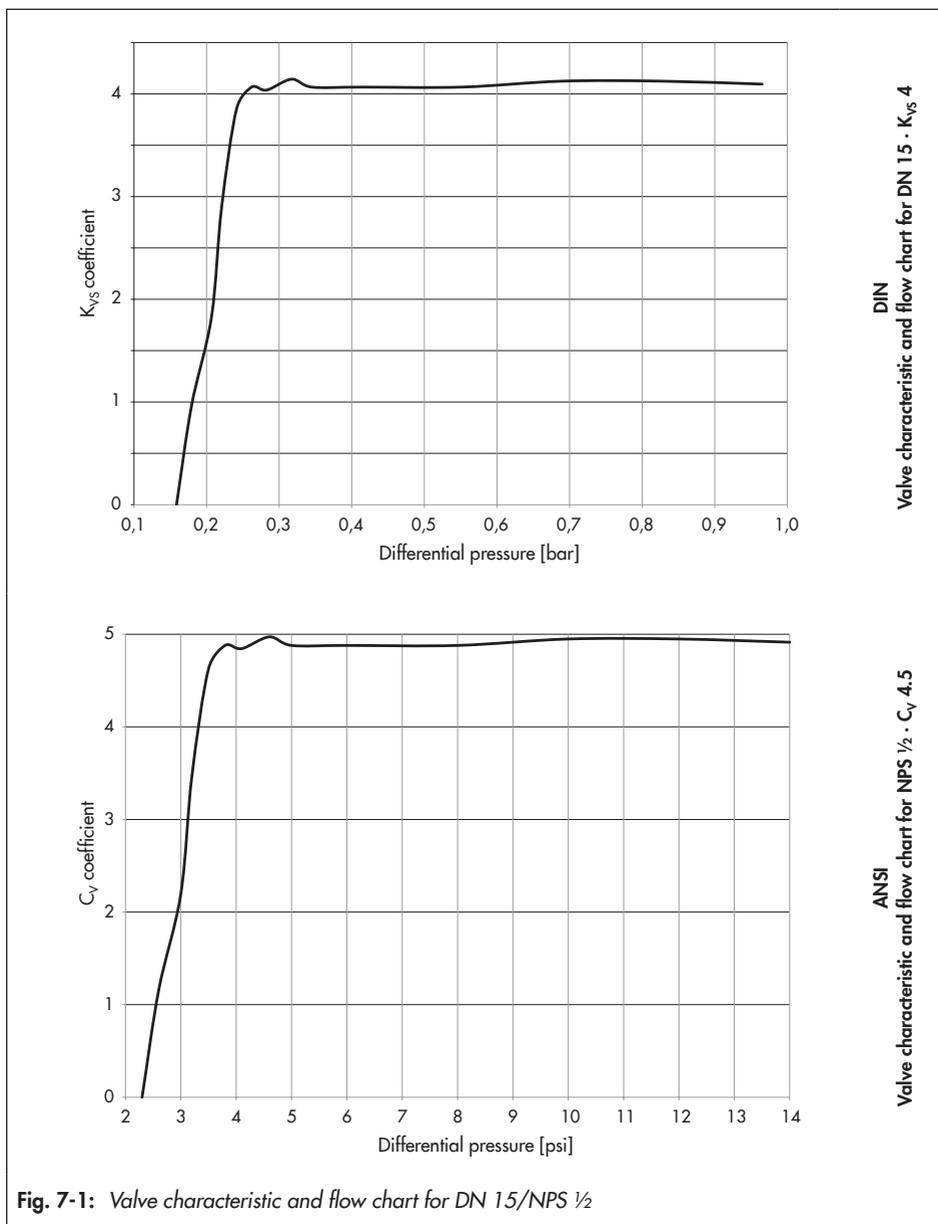
**Table 7-1: Flow rates for Type 2421 RS Valve**

0.25 bar pressure drop across the valve for nitrogen

DN	15	20	25	32	40	50	65	80	100	125	150	
$K_{VS}$	4	6.3	8	16	20	32	50	80	125	190	280	
<b>Maximum flow rate of nitrogen in Nm<sup>3</sup>/h at 20 °C · 0.25 bar pressure drop across the valve</b>												
Inlet pressure $p_1$ (gauge) in bar	2	82.19	129.4	164.5	328.8	411.3	658	1028	1645	2160	3907	5758
	3	95.9	151	191.8	383.6	497.7	767.5	1199	1918	2519	4557	6716
	4	107.8	169.9	215.8	431.5	539.5	863.3	1349	2158	2833	5126	7554
	5	118.6	186.9	237.4	474.6	593.5	949.5	1483	2374	3116	5638	8309
	6	128.5	202.4	257.1	514.2	642.9	1028	1607	2571	3376	6108	9001
	8	146.3	230.5	292.8	585.5	732	1171	1830	2928	3844	6954	10240
	10	162.2	255.6	324.6	649.1	811.5	1298	2029	3246	4261	7709	11360
	12	176.7	278.4	353.6	707.1	884	1414	2210	3536	4641	8398	12370
	15	196.5	309.6	393.1	786.2	982.9	1572	2457	3931	5161	9338	13760
	20	225.7	355.6	451.6	903.1	1129	1806	2822	4516	5928	10720	15800
	25	251.7	396.4	503.4	1006	1258	2013	3146	5034	6608	11950	17620

0.25 bar pressure drop across the valve for air

DN	15	20	25	32	40	50	65	80	100	125	150	
$K_{VS}$	4	6.3	8	16	20	32	50	80	125	190	280	
<b>Maximum flow rate of air in Nm<sup>3</sup>/h at 20 °C · 0.25 bar pressure drop across the valve</b>												
Inlet pressure $p_1$ (gauge) in bar	2	80.95	127.5	161.8	323.4	404.5	647.2	1011	1618	2125	3843	5663
	3	94.32	148.5	188.7	377.3	471.8	754.8	1179	1887	2478	4482	6605
	4	106.1	167.1	212.2	424.4	530.7	849.1	1326	2122	2787	5042	7430
	5	116.7	183.8	233.4	466.8	583.7	933.9	1459	2335	3065	5545	8172
	6	126.4	199.1	252.9	505.8	632.4	1011	1581	2529	3320	6008	8853
	8	143.9	226.7	288	575.9	720	1152	1800	2880	3780	6840	10080
	10	159.6	251.4	319.2	638.5	798.2	1277	1995	3193	4191	7583	11170
	12	173.8	273.5	347.8	695.5	869.5	1391	2174	3478	4565	8261	12170
	15	193.3	304.5	386.7	774	966.9	1547	2417	3867	5076	9185	13530
	20	222.1	349.8	444.2	888.5	1110	1777	2776	4442	5831	10550	15550
	25	247.8	390	495.3	990.6	1238	1981	3095	4953	6501	11760	17330



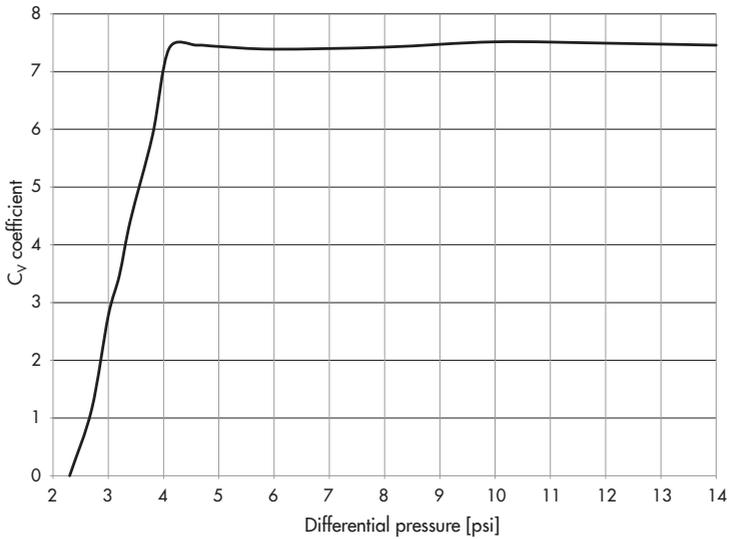
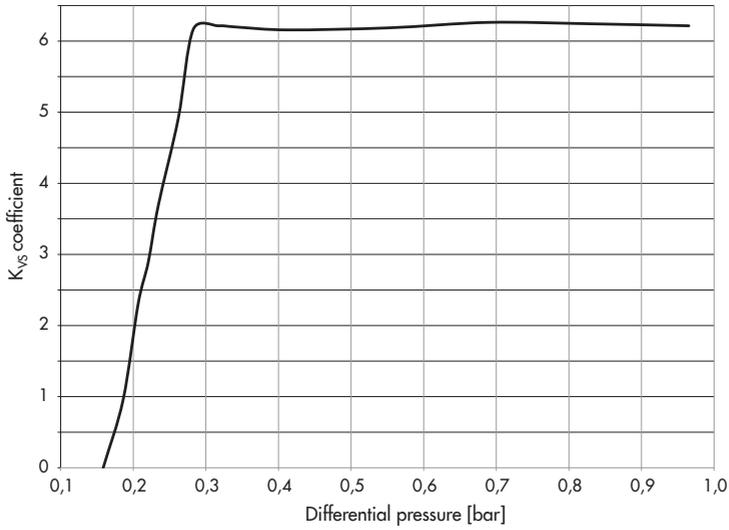


Fig. 7-2: Valve characteristic and flow chart for DN 20/NPS ¾

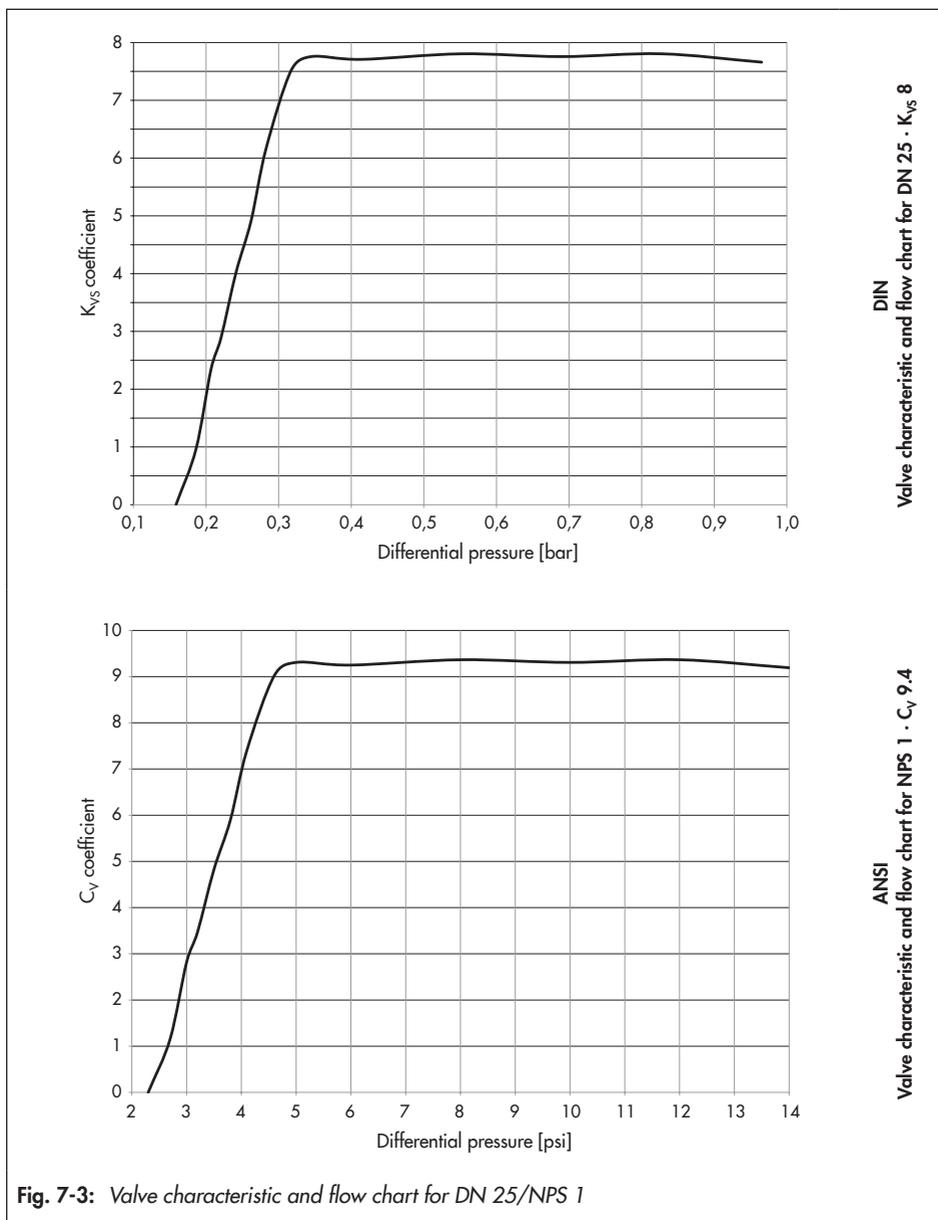
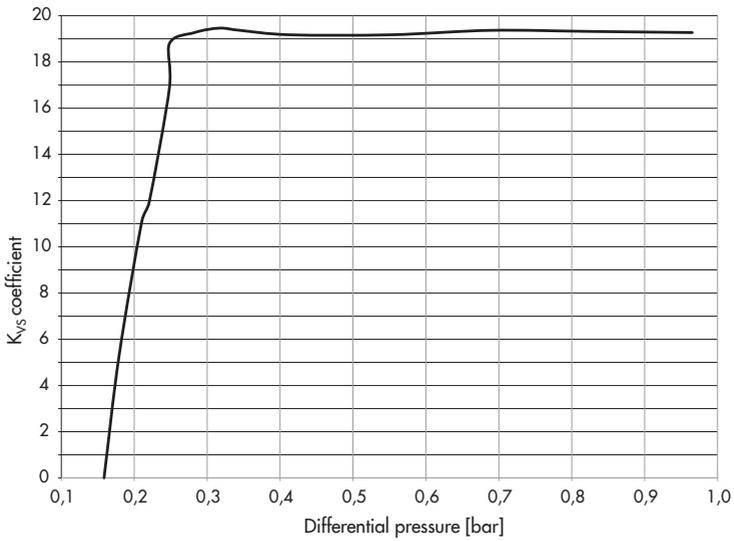
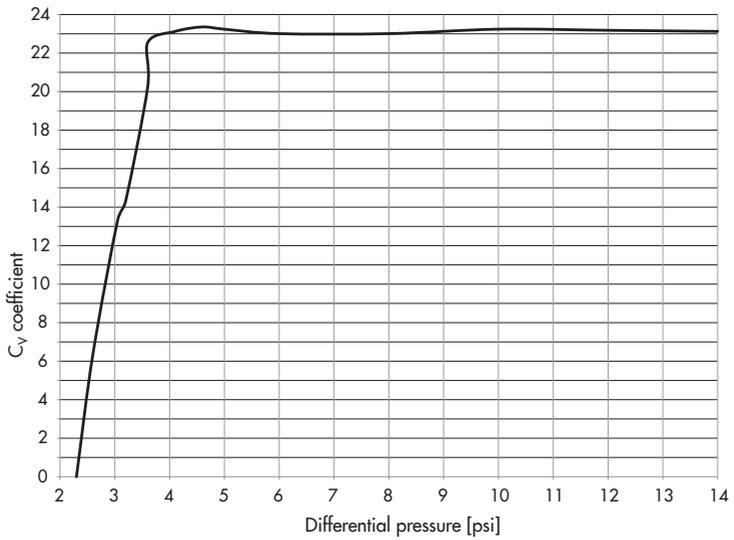


Fig. 7-3: Valve characteristic and flow chart for DN 25/NPS 1



DIN  
Valve characteristic and flow chart for DN 40 · KvS 20



ANSI  
Valve characteristic and flow chart for NPS 1 1/2 · Cv 23

Fig. 7-4: Valve characteristic and flow chart for DN 40/NPS 1 1/2

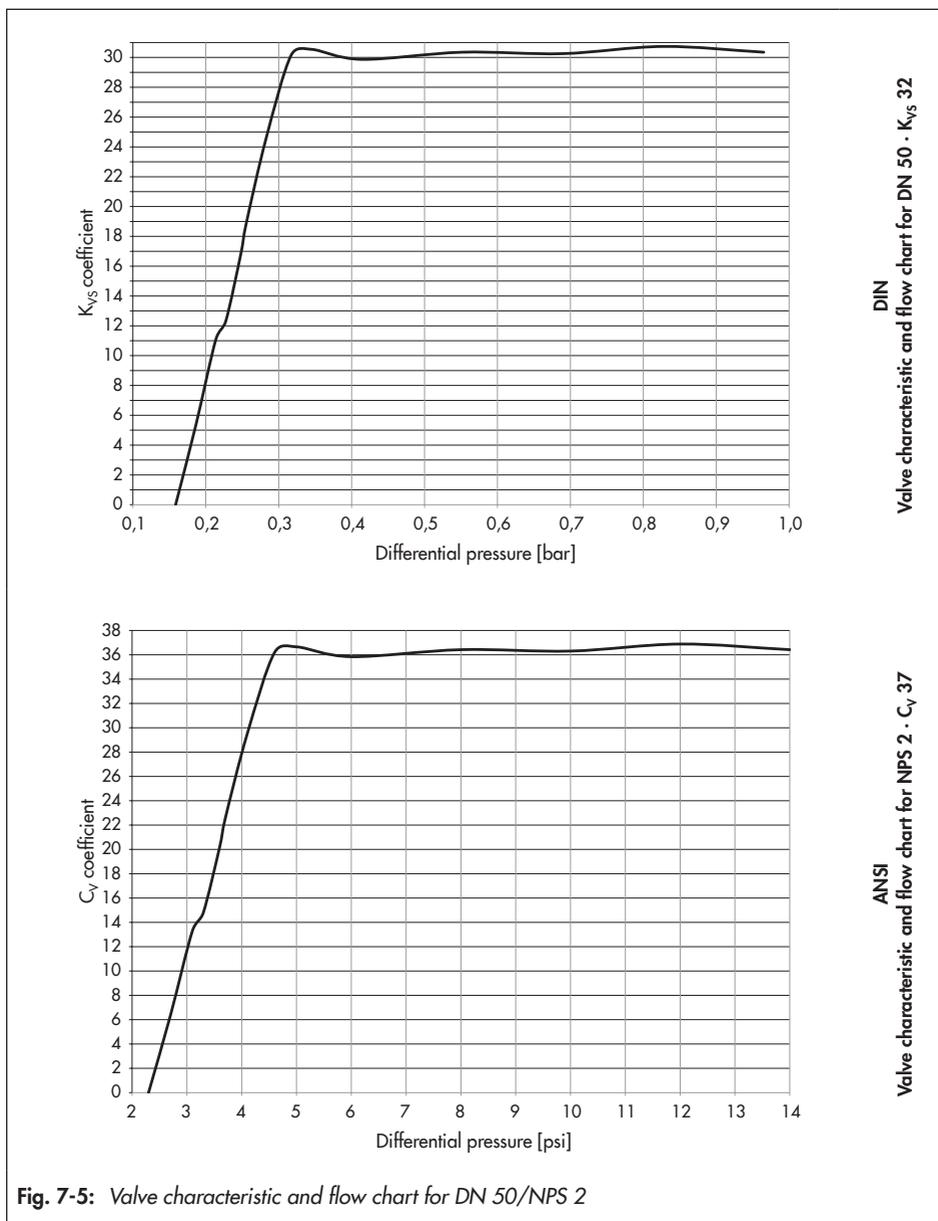


Fig. 7-5: Valve characteristic and flow chart for DN 50/NPS 2

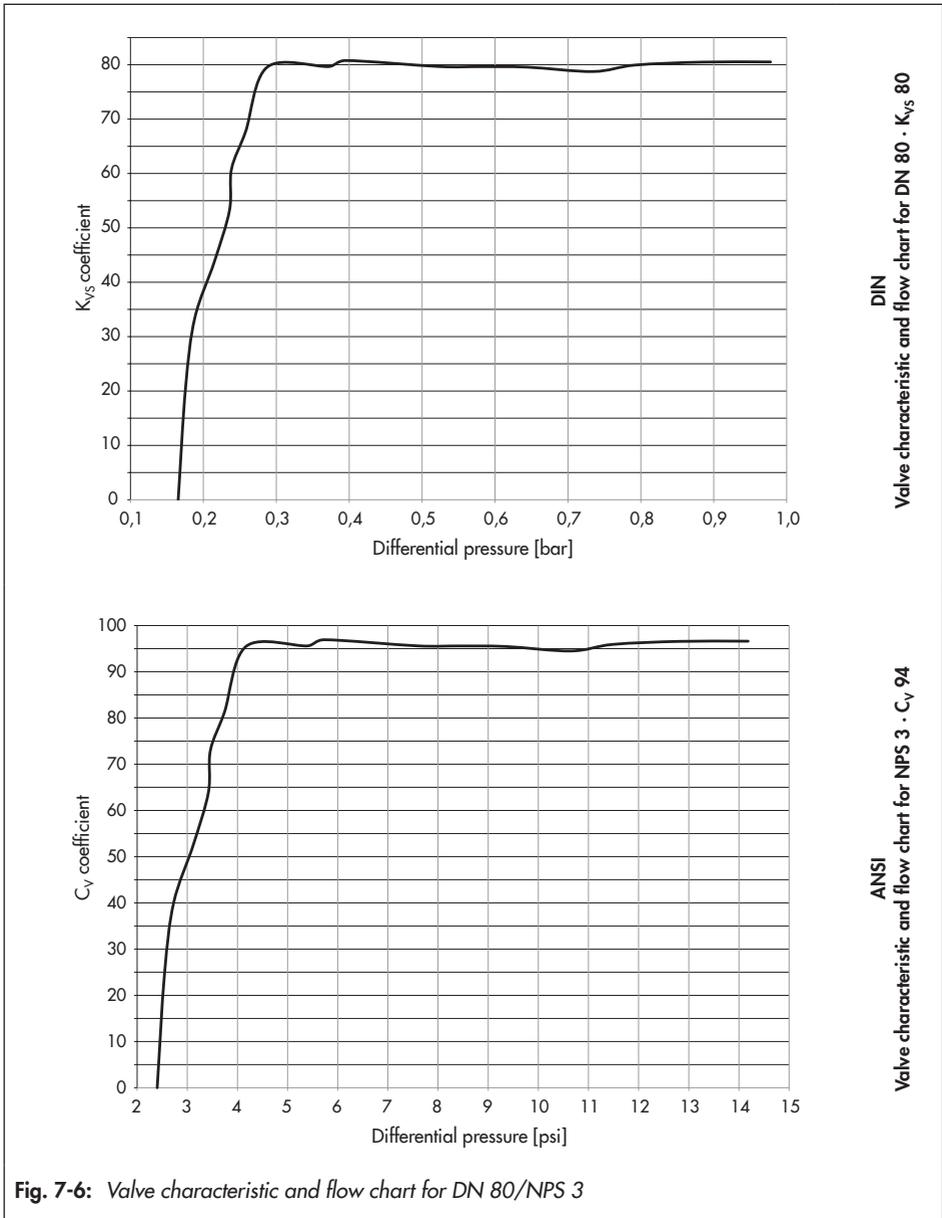
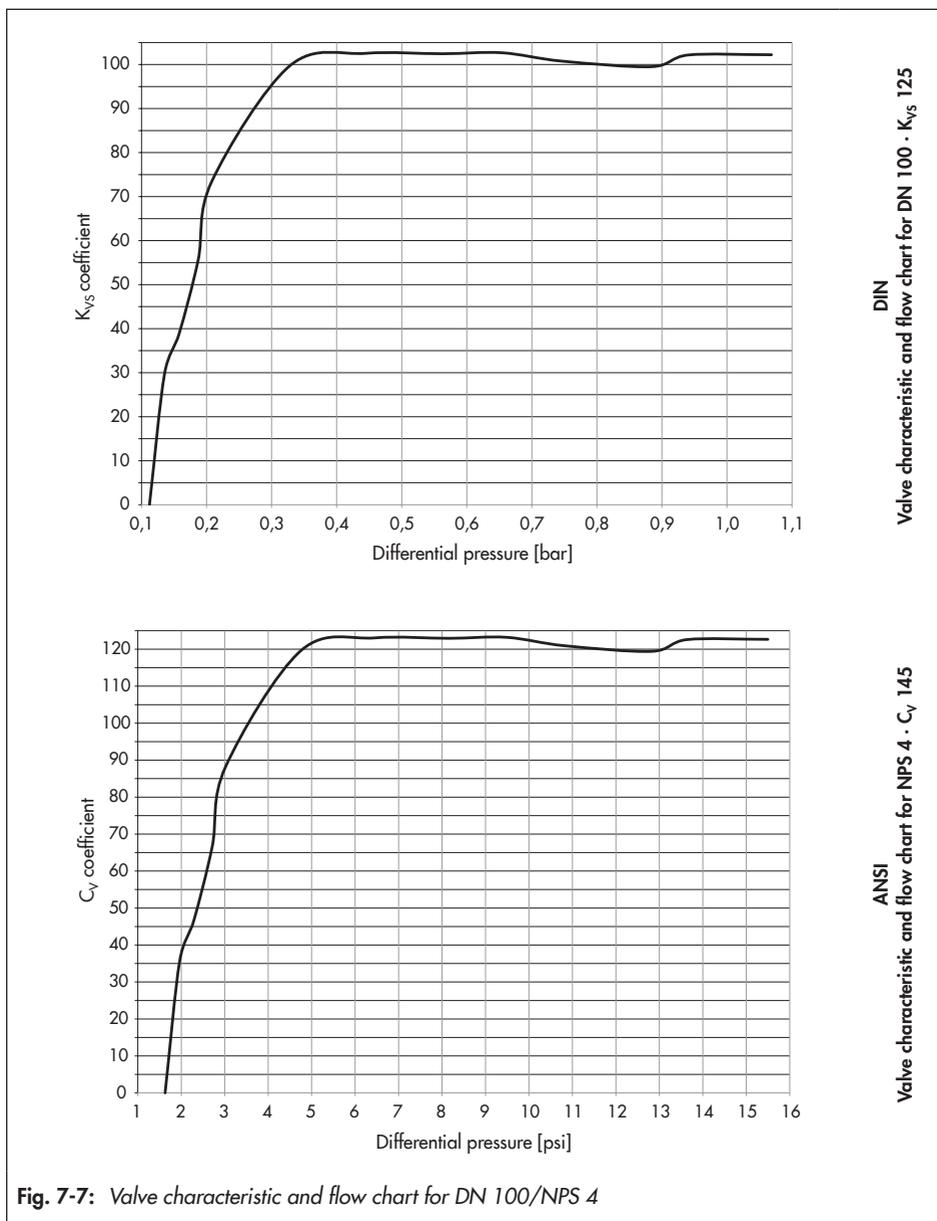


Fig. 7-6: Valve characteristic and flow chart for DN 80/NPS 3



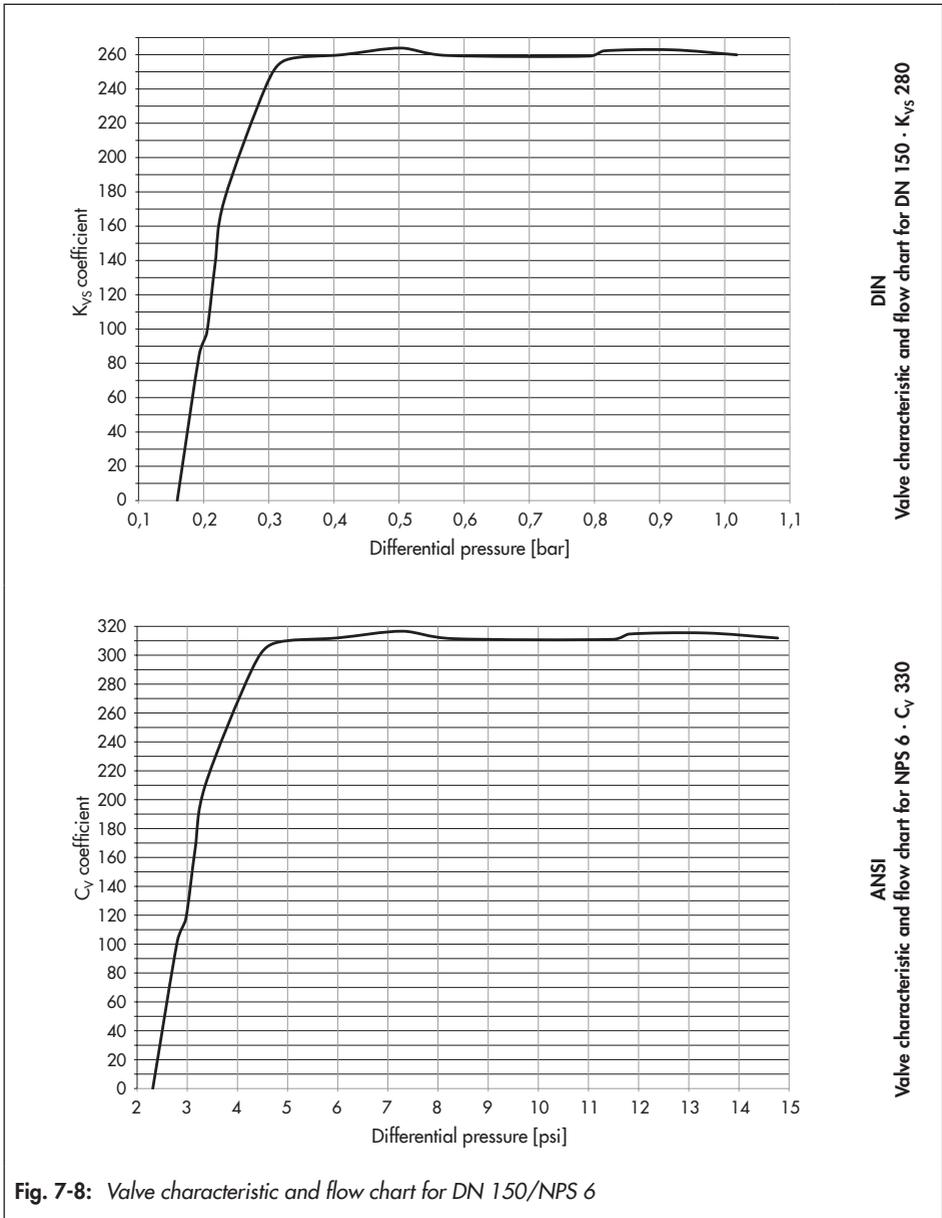


Fig. 7-8: Valve characteristic and flow chart for DN 150/NPS 6

## 8 Malfunctions

### 8.1 Troubleshooting

Malfunction	Possible reasons	Recommended action
The valve does not close. The differential pressure drops below the set point.	Insufficient pressure pulses on the operating diaphragm (downstream pressure)	→ Clean the control line and screw fittings.
	Foreign particles blocking the plug	→ Remove foreign particles. → Contact SAMSON's After-sales Service when parts are damaged.
	Seat and plug are worn or leak.	→ Contact SAMSON's After-sales Service when parts are damaged.
	Two diaphragms defective (check the diaphragm rupture indicator).	→ Contact SAMSON's After-sales Service when parts are damaged.
The valve does not fully open. The differential pressure exceeds the set point.	Two diaphragms defective (check the diaphragm rupture indicator).	→ Contact SAMSON's After-sales Service when parts are damaged.
	Insufficient pressure pulses on the operating diaphragm (upstream pressure)	→ Clean the control line and screw fittings.
	Regulator installed against the flow	→ Install the regulator so that the direction of flow matches the direction indicated by the arrow on the body.
	Regulator or $K_{VS}/C_V$ coefficient too small	→ Check the sizing. → Change $K_{VS}/C_V$ coefficient, if necessary or install a different sized regulator. → Contact SAMSON's After-sales Service.
	Foreign particles blocking the plug	→ Remove foreign particles. → Contact SAMSON's After-sales Service when parts are damaged.
	Strainer blocked	→ Clean the strainer.
Slow control response	Restriction in the screw joint of the actuator dirty	→ Clean the restriction.
	Dirt in the control line	→ Clean the control line.
Jerky control response	Increased friction, e.g. due to foreign particles between seat and plug	→ Remove foreign particles. → Contact SAMSON's After-sales Service when parts are damaged.

## Malfunctions

Malfunction	Possible reasons	Recommended action
Control loop hunts	Regulator or $K_{VS}/C_V$ coefficient too large	<ul style="list-style-type: none"><li>→ Check the sizing.</li><li>→ Change <math>K_{VS}/C_V</math> coefficient, if necessary or install a different sized regulator.</li><li>→ Contact SAMSON's After-sales Service.</li></ul>
Loud noises	High flow velocity, cavitation	<ul style="list-style-type: none"><li>→ Check the sizing.</li><li>→ Install larger regulator, if necessary.</li></ul>
Red mark appears on the diaphragm rupture indicator	Defective operating diaphragm	<ul style="list-style-type: none"><li>→ Contact SAMSON's After-sales Service to replace the damaged diaphragm.</li></ul>

### Note

Contact SAMSON's After-sales Service for malfunctions not listed in the table.

The malfunctions listed in section 8.1 are caused by mechanical faults and incorrect regulator sizing. In the simplest case, the functioning can be restored following the recommended action. Special tools may be required to rectify the fault.

Exceptional operating and installation conditions may lead to changed situations that may affect the control response and lead to malfunctions. For troubleshooting, the conditions, such as installation, process medium, temperature and pressure conditions, must be taken into account.

### Tip

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

## 8.2 Emergency action

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

We recommend removing the regulator from the pipeline before repairing it.

In the event of a regulator malfunction:

1. Close the shut-off valves upstream and downstream of the regulator to stop the process medium from flowing through the regulator.
2. Perform troubleshooting (see section 8.1).
3. Rectify those malfunctions that can be remedied based on the instructions provided here. Contact SAMSON's After-sales Service in all other cases.

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

See the 'Start-up' section.

## 9 Servicing

The regulator does not require any maintenance. Nevertheless, it is subject to natural aging, particularly at the seat, plug and operating diaphragms. Depending on the operating conditions, check the regulator at regular intervals to avoid possible malfunctions. Plant operators are responsible for drawing up an inspection and test plan. Details on faults and how to remedy them can be found in the 'Malfunctions' section.

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

We recommend removing the regulator from the pipeline before performing any maintenance or service work.

### **⚠ WARNING**

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

*Regulator 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 residual process medium in the regulator.**

*While working on the regulator, 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.

### **⚠ NOTICE**

#### **Risk of regulator damage due to excessively high or low tightening torques.**

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

- Observe the specified tightening torques (see 'Tightening torques' in Annex).

### **⚠ NOTICE**

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

- Only use tools approved by SAMSON (see 'Tools' in Annex).

### **⚠ NOTICE**

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

- Only use lubricants approved by SAMSON (see 'Lubricants' in Annex).

### Note

**The regulator was checked by SAMSON before it left the factory.**

- Certain test results certified by SAMSON lose their validity when the regulator 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.

### Tip

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

### Legend for Fig. 9-1

1	Valve body
2	Seat
3	Plug
4	Plug stem
5	Threaded connection for diaphragm actuator
6	Actuator stem
7	Diaphragm stem
10	Actuator housing
10.1	Distance ring
11	Two diaphragms
11.1	Operating diaphragm for upstream pressure
11.2	Operating diaphragm for downstream pressure
12	Diaphragm rupture indicator
13	Set point springs
13.1	Force limiter
14	Control line 8x1 mm
15	Spacer bushing including seal
16	Housing bolts (two long bolts opposite each other, DN 15 to 25/NPS ½ to 1 only)
16.1	Top housing bolts
16.2	Bottom housing bolts
17	Diaphragm plate nut
18	Pressure switch (optional, not shown)
19	Compensation chamber (optional)
20	Filler plug
21	Screw fitting (control line)



### 9.1 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 regulator out of operation (see the 'Decommissioning' section).



#### **Tip**

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

---

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

- Replace the actuator (see section 9.1.1)
- Replace the seat and plug (see section 9.1.2)
- Replace the actuator's operating diaphragm (see section 9.1.3)

### 9.2 Installing the regulator after service work

- Put the regulator back into operation (see the 'Start-up' section). Make sure the requirements and conditions for start-up or putting the valve back into operation are met.

### 9.1 Service work

- Before performing any service work, preparations must be made to the regulator (see section 9.1).
- After all service work is completed, check the regulator before putting it back into operation (see the 'Testing the regulator' section).

### **9.1.1 Replacing the actuator**

To replace the actuator, contact SAMSON's After-sales Service.

### **9.1.2 Replacing the seat and plug**

To replace seat and plug, contact SAMSON's After-sales Service.

### **9.1.3 Replacing the actuator's operating diaphragm**

To replace the operating diaphragm, contact SAMSON's After-sales Service.

## **9.2 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.

### **Spare parts**

See Annex for details on spare parts.

### **Lubricant**

Contact SAMSON's After-sales Service for more information on lubricants.

### **Tools**

Contact SAMSON's After-sales Service for more information on 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.**

Regulators 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 regulator:

- Depressurize all plant sections concerned and the regulator.
- Drain the process medium from all the plant sections concerned as well as the valve.

### **⚠ WARNING**

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

Regulator 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 control line 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.

- Wear hearing protection when working near the regulator.

### **⚠ WARNING**

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

While working on the regulator, 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.

## Decommissioning

To decommission the regulator for service work or disassembly, proceed as follows:

1. Close the shut-off valve (1) on the upstream side of the regulator.
2. Close the shut-off valve (6) on the downstream side of the regulator.
3. Completely drain the pipelines and valve.
4. Depressurize the plant.
5. If necessary, allow the pipeline and regulator 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 personal injury due to residual process medium in the regulator.***

*While working on the regulator, 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.***

*Regulator 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.*

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

- The regulator is put out of operation (see the 'Decommissioning' section).

### 11.1 Removing the regulator from the pipeline

1. Support the regulator to hold it in place when separated from the pipeline (see the 'Shipment and on-site transport' section).
2. Unbolt the flanged joint.
3. Remove the regulator from the pipeline (see the 'Shipment and on-site transport' section).

### 11.2 Removing the actuator from the valve

See 'Replacing the actuator' in the 'Servicing' section.



## 12 Repairs

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

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

### 12.1 Returning devices to SAMSON

Defective devices can be returned to SAMSON for repair.

Proceed as follows to return devices:

1. Exceptions apply concerning some special device models
  - ▶ [www.samsongroup.com](http://www.samsongroup.com) > Service & Support > After-sales Service.
2. Send an e-mail
  - ▶ [retouren@samsongroup.com](mailto:retouren@samsongroup.com) to register the return shipment including the following information:

- Type
- Material number
- Item numbers of accessories
- Original order
- Completed Declaration on Contamination, which can be downloaded from our website at
  - ▶ [www.samsongroup.com](http://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.

### i Note

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

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



## 13 Disposal



SAMSON is a producer registered at the following European institution ► <https://www.ewrn.org/national-registers/national-registers>.  
WEEE reg. no.:  
DE 62194439/FR 025665

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

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### Note

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

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### Tip

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

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## 14 Certificates

The EU declarations of conformity are included on the next pages:

- EU declaration of conformity in compliance with Pressure Equipment Directive 2014/68/EU on page 14-2.
- EU declaration of conformity in compliance with Machinery Directive for the Type 42-10 RS Regulator on page 14-4.
- Declaration of incorporation in compliance with Machinery Directive 2006/42/EC for the Type 2421 RS Valve and Type 2420 RS Actuator on page 14-5.

SMART IN FLOW CONTROL



**EU-KONFORMITÄTSERKLÄRUNG  
EU DECLARATION OF CONFORMITY**

**Modul H/Module H, Nr./No. / N° CE-0062-PED-H-SAM 001-20-DEU**

SAMSON erklärt in alleiniger Verantwortung für folgende Produkte:/For the following products, SAMSON hereby declares under its sole responsibility:

**Ventile für Druck-, Differenzdruck-, Temperatur- und Volumenstromregler/Valves for pressure, temperature, flowregulators and differential pressure regulators**

Typ 2336, 2373, 2375, 44-1B, 44-2, 44-3, 44-4, 44-6B, 44-9, 45-1, 45-2, 45-3, 45-4, 45-6, (Erz.-Nr. 2720), 45-9, 47-4, 2488, 2489, (2730), 2405, 2406, 2421 (2811), 2412 (2812), 2417 (2817), 2422 (2814), 2423 (2823), 2423E (2823)

die Konformität mit nachfolgender Anforderung/the conformity with the following requirement

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

Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States relating of the making available on the market of pressure equipment (see also Articles 41 and 48). 2014/68/EU of 15 May 2014

Angewandtes Konformitätsbewertungsverfahren für Fluide nach Art. 4(1)(c.i) erster Gedankenstrich.

Modul siehe Tabelle durch certified by Bureau Veritas Services SAS. (0062)  
See table for module Veritas Services SAS.

Nenndruck Pressure rating	DN NPS	15 ½	20 ¾	25 1	32 1¼	40 1½	50 2	65 2½	80 3	100 4	125 5	150 6	200 8	250 10	300 12	400 16	
PN 16		ohne/without <sup>(1)</sup>				A <sup>(2)(3)</sup>		-	-	-	-	-	-	-	-	-	-
PN 25		ohne/without <sup>(1)</sup>				A <sup>(2)(3)</sup>		-	-	H		-	-	-	-	-	-
PN 40		ohne/without <sup>(1)</sup>						H				-	-	-	-	-	-
PN 100 und PN 160		ohne/without <sup>(1)</sup>						H				-	-	-	-	-	-
Class 150		ohne/without <sup>(1)</sup>				A <sup>(2)(3)</sup>				H		-	-	-	-	-	-
Class 300		ohne/without <sup>(1)</sup>								H		-	-	-	-	-	-
Class 600 und Class 900		ohne/without <sup>(1)</sup>						H				-	-	-	-	-	-

(1) Das auf dem Stellgerät aufgebrauchte CE-Zeichen hat keine Gültigkeit im Sinne der Druckgeräterichtlinie.  
The CE marking affixed to the control valve is not valid in the sense of the Pressure Equipment Directive.

(2) Das auf dem Stellgerät aufgebrauchte CE-Zeichen gilt ohne Bezeichnung der benannten Stelle (Kenn-Nr. 0062).  
The CE marking affixed to the control valve is valid without specifying the notified body (ID number 0062).

(3) Die Identifikationsnummer 0062 von Bureau Veritas Services SAS gilt nicht für Modul A.  
The identification number 0062 of Bureau Veritas Services SAS is not valid for module A.

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 methods of:

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 Services SAS, 8 Cours du Triangle, 92800 PUTEAUX – LA DEFENSE, France  
Hersteller/Manufacturer: SAMSON AG, Weismüllerstraße 3, 60314 Frankfurt am Main, Germany**

Frankfurt am Main, 11. Mai 2020/11. May 2020

Thorsten Muth  
Signif. Director  
Sales and After-sales

Peter Scheemesser  
Director Central Department  
Product maintenance, contract development and ETO for valves and actuators.

SAMSON AKTIENGESELLSCHAFT  
Weismüllerstraße 3 60314 Frankfurt am Main

Telefon: 069 4009-0 · Telefax: 069 4009-1507  
E-Mail: samson@samson.de

Revision 04

EU-Konformitätserklärung, Blatt 08, Modul A, Modul H, DE, EN, Rev.03, 2017.02.08.sasoc

SMART IN FLOW CONTROL



**EU-KONFORMITÄTSERKLÄRUNG  
EU DECLARATION OF CONFORMITY**

**Modul H/Module H, Nr./No. / N° CE-0062-PED-H-SAM 001-20-DEU**

SAMSON erklärt in alleiniger Verantwortung für folgende Produkte:/For the following products, SAMSON hereby declares under its sole responsibility:

**Ventile für Druck- Differenzdruck-, Volumenstrom- und Temperaturregler/Valves for pressure, differential pressure, volume flow and temperature regulators**

2333 (Erz.-Nr./Model No. 2333), 2334 (2334), 2335 (2335), 2336, 2373, 2375, 44-0B, 44-1B, 44-2, 44-3, 44-6B, 44-7, 44-8, 45-1, 45-2, 45-3, 45-4, 45-5, 45-6, 2458, 2478 (2720), 45-9, 45-5, 45-6, 45-7, 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/the conformity with the following requirement.

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

Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States relating of the making available on the market of pressure equipment. 2014/68/EU of 15 May 2014

Angewandtes Konformitätsbewertungsverfahren für Fluide nach Art. 4(1)(c.ii) und (c.i) zweiter Gedankenstrich. Modult siehe Tabelle durch certified by Bureau Veritas Services SAS (0062)

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

Druckstufe Pressure rating	DN NPS	15 ½	20 ¾	25 1	32 1¼	40 1½	50	65	80	100	125	150	200	250	300	400	
PN 15		ohne/without (1)					A (2)(3)										
PN 25		ohne/without (1)					A (2)(3)										
PN 40		ohne/without (1)					A (2)(3)										
PN 100 und PN 160		ohne/without (1)					H										
Class 150		ohne/without (1)					A (2)(3)										
Class 300		ohne/without (1)					A (2)(3)										
Class 600 und Class 900		ohne/without (1)					H										

- (1) Das auf dem Stellgerät aufgebrachte CE-Zeichen hat keine Gültigkeit im Sinne der Druckgeräterichtlinie. The CE marking affixed to the control valve is not valid in the sense of the Pressure Equipment Directive.
- (2) Das auf dem Stellgerät aufgebrachte CE-Zeichen gilt ohne Bezeichnung der benannten Stelle (Kenn-Nr. 0062). The CE marking affixed to the control valve is valid without specifying the notified body (ID number 0062).
- (3) Die Identifikationsnummer 0062 von Bureau Veritas Services SAS gilt nicht für Modul A. The identification number 0062 of Bureau Veritas Services SAS is not valid for module A.

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 Services SAS, 8 Cours du Triangle, 92800 PUTEAUX – LA DEFENSE, France  
Hersteller:/Manufacturer: SAMSON AG, Weismüllerstraße 3, 60314 Frankfurt am Main, Germany**

Frankfurt am Main, 11. Mai 2020/11. May 2020

Thorsten Muth  
Senior Director  
Sales and After-sales

Peter Scheermesser  
Director Central Department  
Product maintenance, contract development and ETO for valves and actuators

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Revision 04

EU-Konformitätserklärung\_Breit\_04\_Modul\_A\_Modul\_H\_DE\_EN\_Rev02\_2017-02-28.docx

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:

**Type 42-10 RS Check Valve consisting of Type 2421 RS Valve and Type 2420 RS Actuator**

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

For product descriptions refer to:

- Type 42-10 RS Check Valve: Mounting and Operating Instructions EB 3009

Referenced technical standards and/or specifications:

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

Comment:

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

Persons authorized to compile the technical file:

SAMSON AG, Weismüllerstraße 3, 60314 Frankfurt am Main, Germany  
Frankfurt am Main, 7 January 2022

  
Stephan Giesen  
Director  
Product Management

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

Revision no. 00

## DECLARATION OF INCORPORATION TRANSLATION



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

For the following product:  
**Type 2421 RS Valve**

We certify that the Type 2421 RS Valve is 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 mounting and operating instructions; the documents are available in electronic form on the Internet at [www.samsongroup.com](http://www.samsongroup.com).

For product descriptions refer to:

- Type 42-10 RS Check Valve: Mounting and Operating Instructions EB 3009

Referenced technical standards and/or specifications:

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

Comments:

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

Persons authorized to compile the technical file:

SAMSON AG, Weismüllerstraße 3, 60314 Frankfurt am Main, Germany  
Frankfurt am Main, 7 January 2022

  
\_\_\_\_\_  
Stephan Giesen  
Director  
Product Management

  
\_\_\_\_\_  
i. v. P.   
Peter Scheermesser  
Director  
Product Life Cycle Management and ETO  
Development for Valves and Actuators

Revision no. 00

DECLARATION OF INCORPORATION  
TRANSLATION



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

For the following product:  
**Type 2420 RS Actuator**

We certify that the Type 2420 RS Actuator is partly completed machine as defined in the Machinery Directive 2006/42/EC and that the safety requirements stipulated in Annex I, 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4 and 1.3.7 are observed. The relevant technical documentation described in Annex VII, part B has been compiled.

Products we supply must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive 2006/42/EC.

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

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

For product descriptions refer to:

- Type 42-10 RS Check Valve: Mounting and Operating Instructions EB 3009

Referenced technical standards and/or specifications:

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

Comments:

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

Persons authorized to compile the technical file:

SAMSON AG, Weismüllerstraße 3, 60314 Frankfurt am Main, Germany  
Frankfurt am Main, 7 January 2022

Stephan Giesen  
Director  
Product Management

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

Revision no. 00

## 15 Annex

### 15.1 Tightening torques

**Table 15-1:** *Tightening torque*

Component	Width across flats	Valve size/actuator area	Tightening torque in Nm
Coupling nuts (11)	SW 36	All	120
Filler plug (20)	SW 13	All	25
Control line connection (21)	–	All	22

### 15.2 Lubricant

SAMSON's After-sales Service can support you concerning lubricants and sealants approved by SAMSON.

### 15.3 Tools

SAMSON's After-sales Service can support you concerning tools approved by SAMSON.

### 15.4 Spare parts

There are no spare parts available for the Type 42-10 RS Check Valve.

### 15.5 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](mailto:aftersalesservice@samsongroup.com).

#### Addresses of SAMSON AG and its subsidiaries

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

#### Required specifications

Please submit the following details:

- Device type and valve size
- Model number or material number
- Upstream and downstream pressure
- Temperature and process medium
- Min. and max. flow rate in m<sup>3</sup>/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.)







**EB 3009 EN**



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