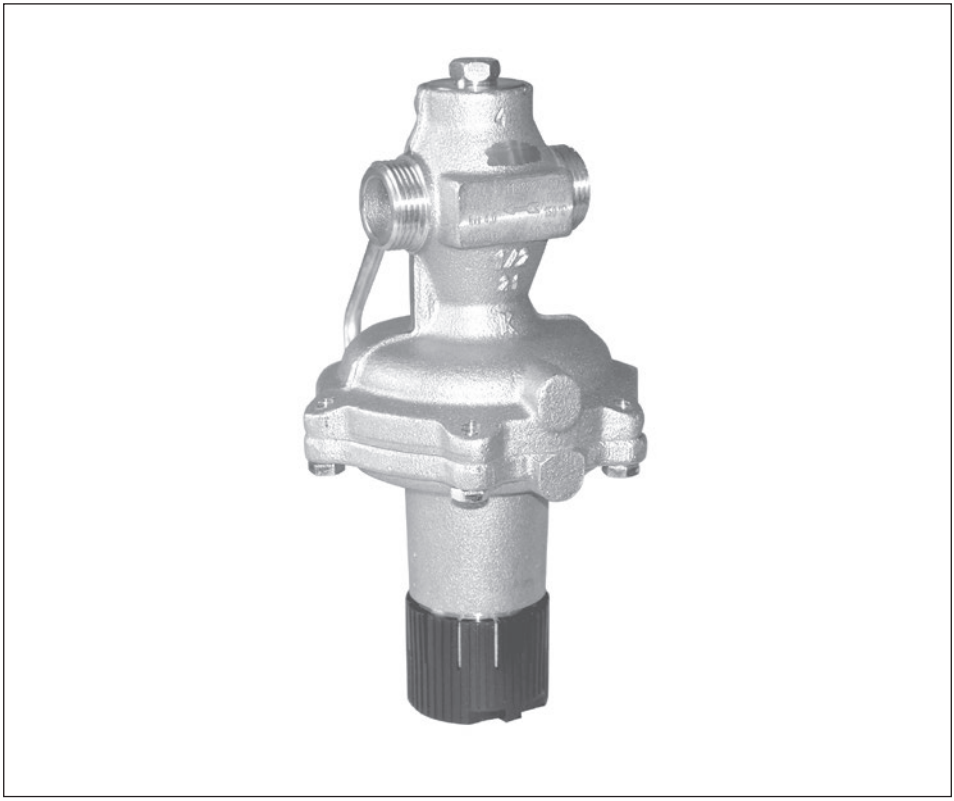
MOUNTING AND
OPERATING INSTRUCTIONS

EB 3226 EN

Translation of original instructions



Type 45-6 Differential Pressure Regulator

Self-operated Regulators

Edition April 2022

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 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

Note

Additional information

Tip

Recommended action

1 Safety instructions and measures

Intended use

The SAMSON Type 45-6 Regulator is a differential pressure regulator.

The self-operated regulator is used to control the differential pressure in plants. Liquids and gases in processing and industrial plants can be controlled by the regulator.

The regulators are 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.

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. Follow the instructions given by the plant operator.
- ➔ Hard hat
- ➔ Safety harness, e.g. when working at height
- ➔ Safety footwear, if applicable ESD (electrostatic discharge) footwear
- ➔ Check with the plant operator for details on further protective equipment.

Revisions and other modifications

Revisions, conversions or other modifications of the product are not authorized by SAMSON. They are performed at the user's own risk and may lead to safety hazards, for example. Furthermore, the product may no longer meet the requirements for its intended use.

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, warnings 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 45-6 Regulator does not have any special safety features. When relieved of pressure, the regulator is closed by the force of the set point springs.

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.

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 regulators do not have their own potential ignition source even in the rare incident of an operating fault. As a result, they do not fall within the scope of Directive 2014/34/EU.

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

Referenced documentation

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

– Mounting and operating instructions for

e.g.	**Type 1 N or 1 NI Strainer**	▶ EB 1010
e.g.	**Type 2 N or 2 NI Strainer**	▶ EB 1015

– Data sheets for

e.g.	**Type 1 N or 1 NI Strainer**	▶ T 1010
e.g.	**Type 2 N or 2 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.

1.2 Notes on possible personal injury

⚠ WARNING

Risk of personal injury due to 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.

⚠ WARNING

Risk of hearing loss or deafness due to loud noise.

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

➔ Wear hearing protection when working near the valve. Follow the instructions given by the plant operator.

Crush hazard arising from moving parts.

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

➔ Do not insert hands or fingers between the set point springs while the regulator is in operation.

➔ Before performing any work on the regulator, depressurize the plant. Disconnect or shut off the external control line.

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 regulator 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

Damage to health relating to the REACH regulation.

If a SAMSON device contains a substance listed as a substance of very high concern on the candidate list of the REACH regulation, this 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/

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.

1.3 Notes on possible property damage

NOTICE

Risk of regulator damage due to incorrectly attached slings.

➔ Do not attach load-bearing slings to the regulator.

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 equipment.

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.

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 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.

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.

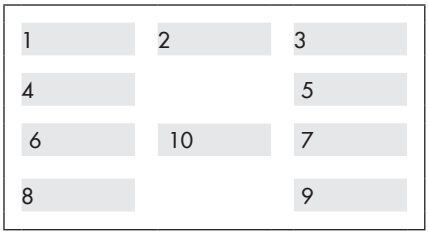
➔ Make sure that only suitable lubricants are used.

Note

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

2 Markings on the device

2.1 Regulator nameplate



1 Model number
2 Material number and device index
3 Order number or year of manufacture
4 Type designation
5 Pressure rating PN
6 K_{VS} coefficient
7 Perm. temperature in °C
8 Set point range in bar
9 Max. perm. differential pressure Δp in bar
10 Arrow indicating the direction of flow

Fig. 2-1: *Nameplate*

2.2 Location of the nameplates

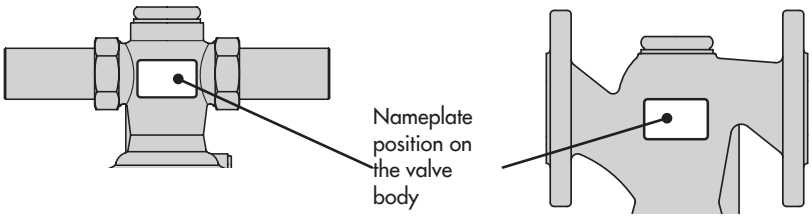


Fig. 2-2: *Nameplate on the valve body*

2.3 Material numbers

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 (2). For more details on the nameplate, see section 2.1.

3 Design and principle of operation

➔ See Fig. 3-2 and Fig. 3-1

The Type 45-6 Differential Pressure Regulators basically consists of the valve with balanced plug as well as an opening actuator with an operating diaphragm and spring assembly.

The differential pressure regulator is designed to maintain the differential pressure to an adjustable set point. The valve opens when the differential pressure rises.

The differential pressure to be controlled is transferred to the operating diaphragm (6.1) where it is transformed into a positioning force. The pressure downstream of the valve (low pressure) is transmitted to the top diaphragm chamber (low-pressure chamber) of the actuator through the body hole (11.1). The pressure upstream of the valve (high pressure) is transmitted through the attached control line (11) and acts on the high-pressure side of the diaphragm.

The differential pressure creates a force at the operating diaphragm (6.1) which moves the valve plug depending on the force of the set point spring (8).

The spring force together with the set point is changed by turning the set point adjuster (10).

The principle of operation described also applies to regulators with a manual adjuster (0.1 to 1 bar, DN 15 to 32). The set point springs are located in the covered housing. The manual adjuster (12) and scale (12.1) are used for set point adjustment.

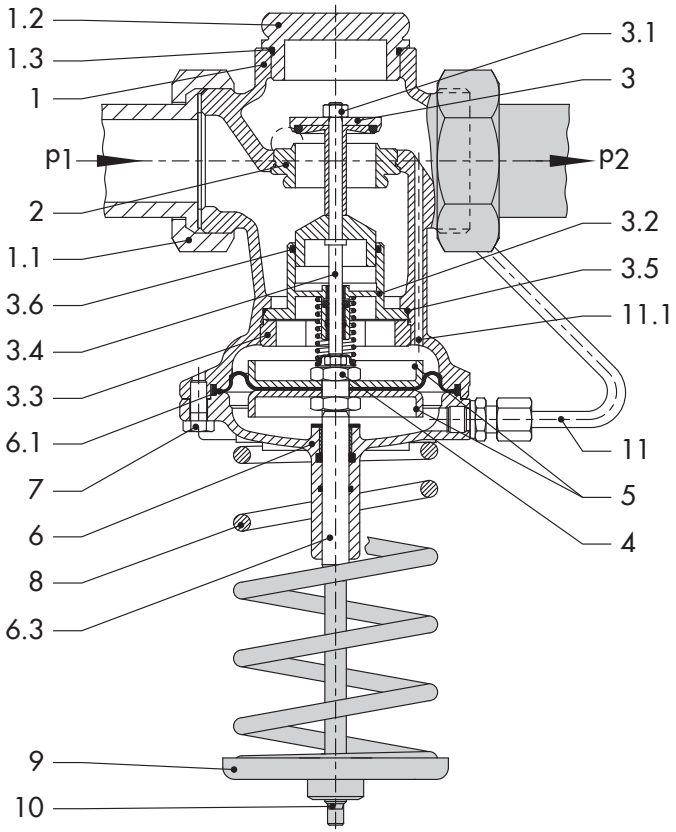


Fig. 3-1: *Functional diagram of the regulator (DN 15 to 50, with external spring)*

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

1	Valve body	3.2	Guide nipple	6	Actuator housing	11	Control line
1.1	Coupling nut	3.3	Plug nipple (DN 32 to 50)	6.1	Operating diaphragm	11.1	Borehole in the body
1.2	Body stopper (DN 32 to 50)	3.4	Plug stem	6.2	Spring housing	12	Manual adjuster
1.3	Seal	3.5	Seal	6.3	Diaphragm stem	12.1	Reading on manual adjuster
2	Seat	3.6	Balancing piston	7	Housing screws		
3	Plug (balanced)	4	Diaphragm plate nut	8	Set point spring		
3.1	Plug nut	5	Diaphragm plate	9	Spring plate		
				10	Set point adjuster		

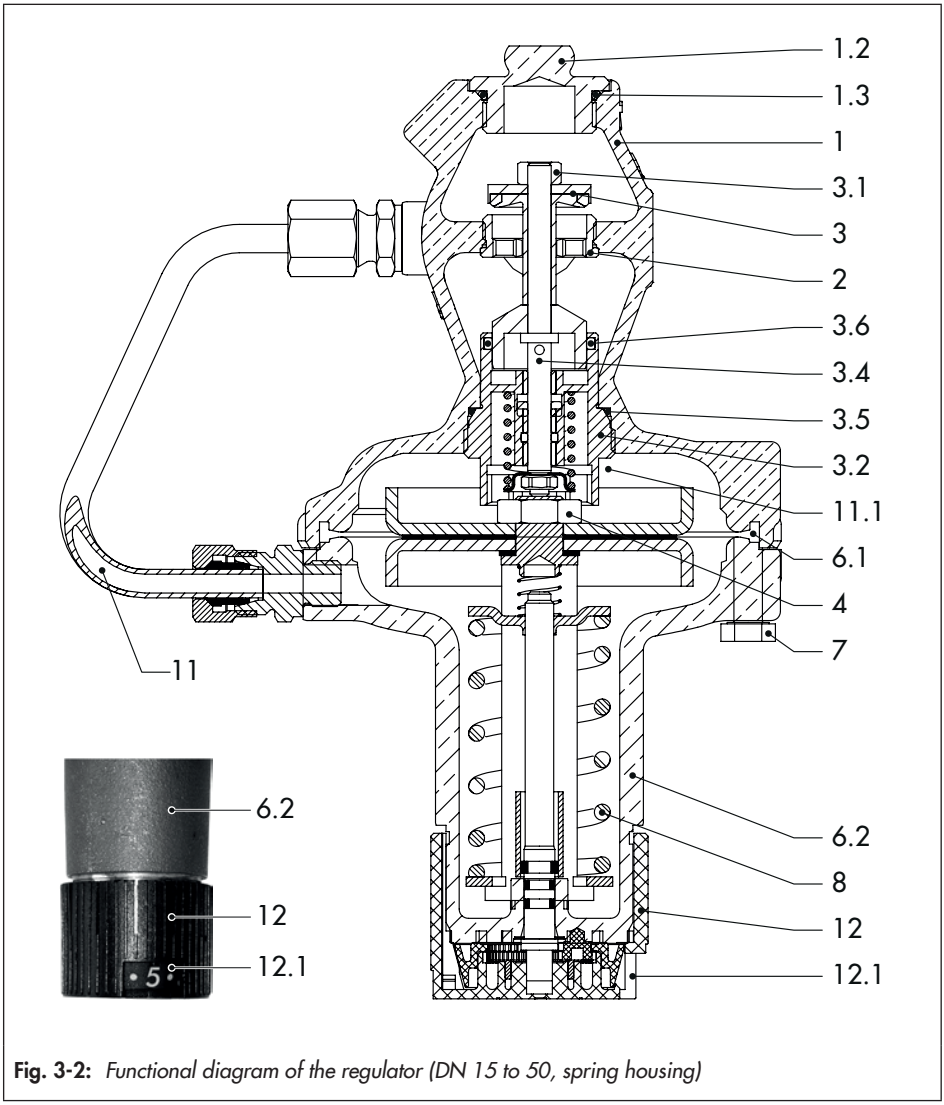


Fig. 3-2: *Functional diagram of the regulator (DN 15 to 50, spring housing)*

3.1 Additional fittings

➔ See Fig. 3-3

Pressure gauges

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

Shut-off valves

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

Insulation

Refer to the instructions in the 'Assembly and installation' section.

Strainers

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. Therefore, we recommend installing a strainer (e.g. SAMSON Type 1 NI or 2 NI) upstream of the regulator (▶ EB 1010, ▶ EB 1015).

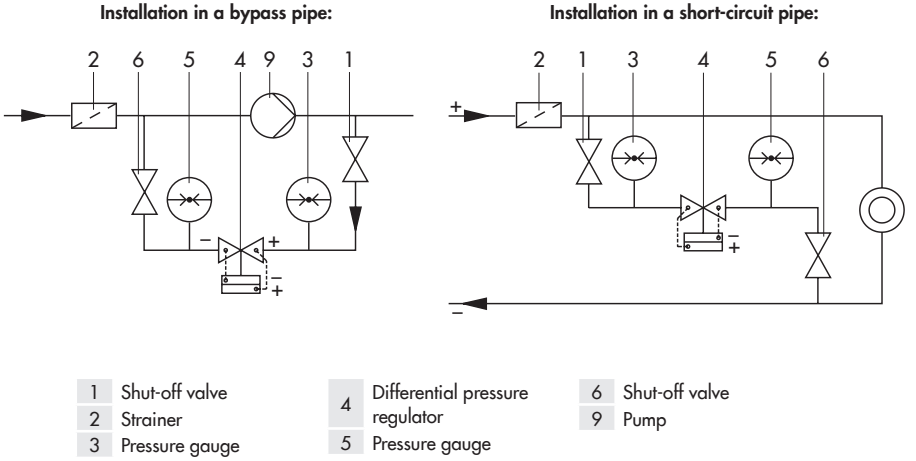


Fig. 3-3: *Sample application*

Note

The Type 45-6 Regulator is not a safety valve. If necessary, a suitable overpressure protection must be installed on site in the plant section.

3.2 Technical data

The regulator nameplate provides information on the regulator version (see the 'Markings on the device' section).

Note

More information is available in Data Sheet ▶ T 3226.

Compliance

The Type 45-6 Regulator bears both the CE and EAC marks of conformity.

CE EAC

Process medium and scope of application

The Type 45-6 Differential Pressure Regulator is designed to maintain the differential pressure in a plant to an adjustable set point.

- Suitable for **gases and liquids**
- Max. temperature **150 °C**
- Set points from **0.1 to 4 bar**
- Valve size **DN 15 to 50**
- Pressure rating **PN 25**

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

Leakage class

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

Temperature range

Depending on how the regulator is configured, it can be used up to temperatures of 150 °C (see Fig. 3-1). The minimum temperature is limited by the actuator's diaphragm material (▶ T 3226).

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

Table 3-3 and Table 3-4 provide a summary of the dimensions and weights. The lengths and heights in the dimensional drawings are shown on page 3-8.

Table 3-1: *Technical data · All pressures in bar (gauge)*

Valve size	DN	15	20	25	32 [1]	40 [1]	50 [1]
K_{VS} coefficient	Body with screwed ends	4.0 [4]	6.3	8.0	12.5	16.0	20.0
	Flanged body	–			12.5	20.0	25.0
X_{Fz} value	Body with screwed ends	0.6		0.55			0.45
	Flanged body	–			0.45		0.4
Pressure rating		PN 25					
Max. permissible differential pressure Δp across the valve		20 bar				16 bar	
Max. permissible temperature		Liquids: 150 °C · Nitrogen and air: 150 °C [2]					
Compliance		CE · EAC					
Differential pressure set point ranges							
Continuously adjustable		0.1 to 1 bar [3]				0.2 to 1 bar	
		0.5 to 2 bar · 1 to 4 bar					

1) Additional version: Valve with flanged body made of spheroidal graphite iron
2) Diaphragm and seals made of FKM
3) Version with rotary knob and scale division
4) Special K_{VS} coefficient: 1.0 · 2.5

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

Body	Red brass CC491K/CC499K (Rg 5) Spheroidal graphite iron EN-GJS-400-18-LT [1]
Seat	Stainless steel 1.4305 1.4104, 1.4006
Plug	Brass, resistant to dezincification, with EPDM soft seal [2]
Valve springs	Stainless steel 1.4310
Operating diaphragm	EPDM with fabric reinforcement [2]
Seals	EPDM [2]
Seals	EPDM/PTFE [6]

1) Version only in DN 32, 40 and 50: valve with flanged body made of spheroidal graphite iron
2) Special version, e.g. for mineral oils: FKM

Table 3-3: *Dimensions in mm*

Valve size DN	**15**	**20**	**25**	**32**	**40**	**50**
Pipe Ø d	21.3	26.8	32.7	42.0	48.0	60.0
Connection R	G ¾	G 1	G 1¼	G 1¾	G 2	G 2½
Width across flats SW	30	36	46	59	65	82
L	65	70	75	100	110	130
H	40			58		
H1	230			250	380	
H2	160			180	–	
ØD	116				160	

1) Additional version: valve with flanged body

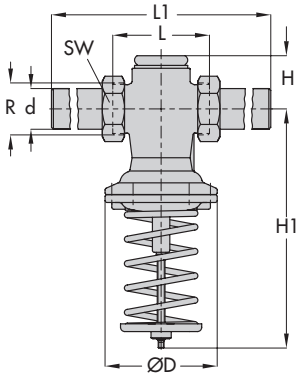
Table 3-4: *Dimensions in mm and weights · Including connecting parts*

Valve size DN	**15**	**20**	**25**	**32**	**40**	**50**
With welding ends						
Overall length L1	210	234	244	268	294	330
Weight, approx. kg	2.0	2.1	2.2	8.5	9.0	9.5
With threaded ends						
Overall length L2	129	144	159	180	196	228
Male thread A	G ½	G ¾	G 1	G 1¼	G 1¾	G 2
Weight, approx. kg	2.0	2.1	2.2	8.5	9.0	9.5
With flanges 1) 2) or with flanged body (DN 32 to 50)						
Overall length L3	130	150	160	180	200	230
Weight, approx. kg	3.4	4.1	4.7	6.7	13.0	14.5

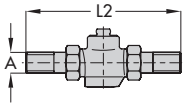
1) PN 16/25
2) Flanges are already mounted on valves in DN 40 and 50.

Dimensional drawings

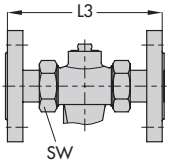
Type 45-6 with connection nuts and welding ends · DN 40/50 (body with screwed ends)



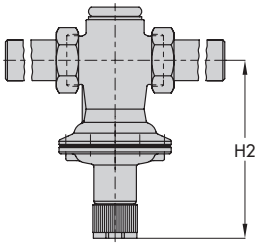
Connection nuts with threaded ends



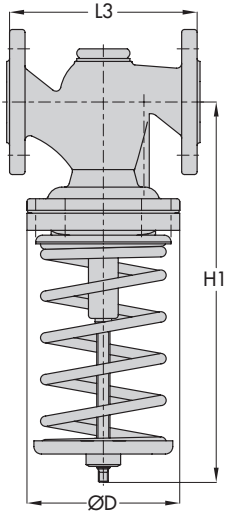
Connection nuts with flanges



Type 45-6 with connection nuts and welding ends · With rotary knob and scale division · Set point range 0.1 to 1 bar/DN 15 to 32



Type 45-6 with flanged body valve



The dimensions and weights of valves with flanged bodies (DN 32, 40 and 50) are the same as those of the valves with screwed-on flanges.

Fig. 3-4: *Dimensions*

4 Shipment and on-site transport

The work described in this section is only to be performed by personnel qualified for the assignment accordingly.

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 nameplate and on the regulator itself 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.

4.2 Removing the packaging from the regulator

The regulator is delivered as an assembled unit.

- ➔ Do not open or remove the packaging until immediately before lifting to install the regulator into the pipeline.
- ➔ Leave the regulator 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 with flanges into the pipeline. They prevent foreign particles from entering the valve.
- ➔ Dispose and recycle the packaging in accordance with the local regulations.

4.3 Transporting and lifting the regulator

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

- ➔ 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 regulator against moisture and dirt.

➔ The permissible ambient temperature of standard regulators is –20 to +80 °C.

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 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.

Note

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

Special storage instructions for elastomers

Elastomer, e.g. O-rings

➔ To keep elastomers in shape and to prevent cracking, do not bend them or hang them up.

➔ We recommend a storage temperature of 15 °C for elastomers.

➔ Store elastomers away from lubricants, chemicals, solutions and fuels.

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

Mounting position

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

- ➔ Standard mounting position: 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

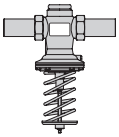
Damage due to freezing.

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.

Note

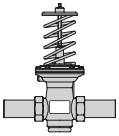
*When an **external control line** is to be connected (**special version**), observe the following:*

- ➔ *Connect the high pressure of the plant to the high-pressure connection (+) of the actuator (bottom diaphragm chamber)*
- ➔ *Connect the low pressure of the plant to the low-pressure connection (–) of the actuator (top diaphragm chamber). See Fig. 5-2.*



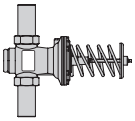
Standard mounting position, suspended

All versions with medium temperature up to 150 °C.



Alternative mounting position, actuator on top

All versions with medium temperature up to max. 80 °C.



Alternative mounting position (as required)

DN 15, 20 and 25 with max. medium temperature of 80 °C.

Fig. 5-1: *Mounting position*

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 regulator and pipeline must be supported or suspended.

! ***NOTICE***

Do not attach supports directly to the regulator.

5.2 Preparation for installation

Before mounting, 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.

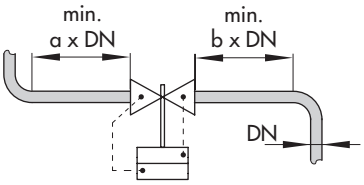
Proceed as follows:

➔ 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.

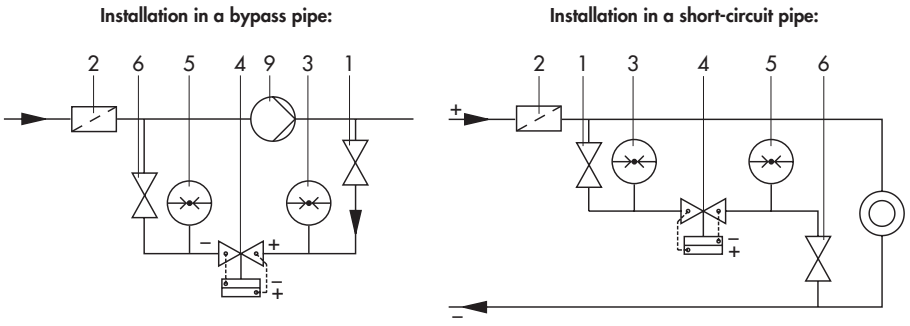
➔ Check any mounted pressure gauges to make sure they function properly.

Table 5-1: *Inlet and outlet lengths*



a Inlet length
b Outlet length

State of process medium	Valve conditions	Inlet length a	Outlet length b
Gas	Ma ≤ 0.3	2	4
Liquid	Free of cavitation/w < 3 m/s	2	4
	Cavitation producing noise/w ≤ 3 m/s	2	4



1 Shut-off valve
2 Strainer
3 Pressure gauge
4 Differential pressure regulator
5 Pressure gauge
6 Shut-off valve
9 Pump

Fig. 5-2: *Installation example*

5.2.1 Cleaning the pipeline

We recommend additionally flushing the pipeline without an installed regulator over a time period of several minutes before start-up. In this case, install a suitable length of pipe into the pipeline in place of the regulator.

➔ Before flushing the plant with the process medium, read the information under 'Starting up the plant' in the 'Start-up' section.

➔ Observe the mesh size of the upstream strainer for the maximum particle size. Use strainers to suit the process medium.

➔ Check the strainer for dirt each time the pipeline is flushed and clean it, if necessary.

5.3 Installation

Tested SAMSON regulators are delivered as assembled units. 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 Annex).*

NOTICE

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

➔ *Only use lubricants approved by SAMSON (see Annex).*

5.3.1 Installing the regulator

The regulator can be installed into a bypass pipe or a short-circuit pipe (see installation example in Fig. 5-2).

1. Close the shut-off valves upstream and downstream of the regulator while the regulator is being installed.
2. Remove the protective caps from the valve ports of regulators with flanges before installation.
3. Lift the regulator to the site of installation. Observe the flow direction through the regulator. The arrow on the valve indicates the direction of flow.
4. Make sure that the correct gaskets are used.
5. Bolt the pipe to the valve free of stress.

5.3.2 Filling the plant

Open the shut-off valves slowly over a time period of several minutes preferably starting from the upstream pressure side to fill the plant (all consumers are open).

➔ Make sure that the pressure rises simultaneously upstream and downstream of the regulator to avoid damaging the balancing bellows.

➔ Avoid pressure surges.

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 valve. Follow the instructions given by the plant operator.*

⚠ 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. Install the regulator into the pipeline. See section "Installation".
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

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 regulator damage due to a sudden pressure increase and resulting high flow velocities.
– Slowly open the shut-off valves (1, 6).

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 regulator body.

➔ The regulator must remain open. Therefore, adjust the lowest set point to ensure that the regulator does not close.

➔ Make sure that the pressure rises simultaneously upstream and downstream of the regulator to avoid damaging the balancing piston.

5.5 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.

➔ *The regulator must be insulated for medium temperatures below 0 °C.*

➔ *Only insulate the regulator up to the actuator for medium temperatures above 80 °C.*

---

6 Start-up

The work described in this section is to be performed only 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

Crush hazard arising from moving parts.

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

➔ *Do not insert hands or fingers between the set point springs while the regulator is in operation.*

➔ *Before starting any work on the regulator, depressurize plant sections as well as the regulator.*

⚠ 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. Follow the instructions given by the plant operator.*

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. All consumer valves are open.
3. Open the shut-off valves slowly over a time period of several minutes. Slowly opening these valves prevents a sudden surge in pressure and high flow velocities which can damage regulator parts.
4. Check the regulator to ensure it functions properly (see information under 'Adjusting the differential pressure set point' in the 'Operation' section).

6.2 Starting up the plant

1. The plant is filled with the process medium (see information under 'Filling the plant' in the 'Installation' section).
2. The control line (if installed on site) is open (needle valve) and correctly connected.

➔ To start up the pressure regulator, open shut-off valves **slowly**.

3. Slowly open the shut-off valves upstream of the pressure regulator.
4. Slowly open all the valves downstream of the regulator (consumer side).
5. Avoid pressure surges.
6. Put the pressure regulator into operation.

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 heat up.*

➔ *Wear protective clothing and safety gloves.*

⚠ WARNING

Risk of personal injury due to pressurized components and process medium escaping under pressure.

➔ *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.*

⚠ WARNING

Crush hazard arising from moving parts.

➔ *Do not insert hands or fingers between the set point springs while the regulator is in operation.*

➔ *Before starting any work on the regulator, depressurize plant sections as well as the regulator.*

7.1 Adjusting the set point

➔ The control and shut-off valves as well as all consumers must be open.

Manual/set point adjuster

➔ Turn the set point screw clockwise (↻) to increase the pressure set point.

➔ Turn the set point screw counterclockwise (↺) to reduce the pressure set point.

7.1.1 Manual adjuster

The set point spring of regulators with set point range 0.1 to 1 bar/DN 15 to 32 is located in the actuator housing. The set point can be directly adjusted using the manual adjuster according to the value on the scale (see Fig. 7-3).

One turn of the manual adjuster will change the differential pressure by approx. 0.033 bar.

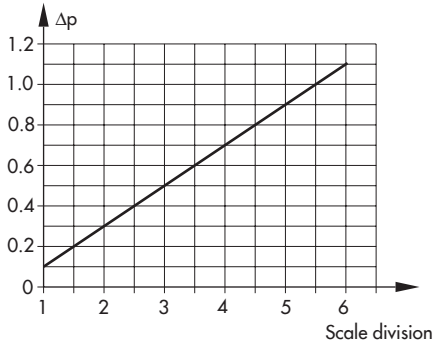


Fig. 7-3: *Set point adjusted according to the value on the scale*

i Note

Do not adjust the set point to a value on the scale lower than 1.
Under unfavorable conditions, the set point cannot be adjusted anymore as a result.
In this case, the following action is recommended:
– Depressurize the regulator.
– Turn the manual adjuster counterclockwise counterclockwise as far as it will go.
– Turn the manual adjuster back clockwise at least past the value 1 to 2 on the scale.
– The set point can be adjusted again.

7.1.2 Set point adjuster

Adjust the required set point by turning the set point adjuster (10) with an open-end wrench.

i Note

The following open-end wrench sizes are required to adjust the set point:
– 19 mm for DN 15 to 32
– 27 mm for DN 40 and 50

8 Malfunctions

8.1 Troubleshooting

Malfunction	Possible reasons	Recommended action
Differential pressure exceeds adjusted set point.	Insufficient pressure pulses on the operating diaphragm	➔ Clean the control line and screw fittings.
	Foreign particles blocking the plug	➔ Remove foreign particles. ➔ Replace damaged parts. ➔ Contact SAMSON's After-sales Service.
	Seat and plug are worn or leak.	➔ Replace the damaged seat and plug. ➔ Contact SAMSON's After-sales Service.
	Regulator or K_{VS}/C_V coefficient too large	➔ Check the sizing. ➔ Change K_{VS}/C_V coefficient, if necessary or install a different sized regulator. ➔ Contact SAMSON's After-sales Service.
	Defective operating diaphragm	➔ Replace damaged diaphragm.
Differential pressure set point not reached	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.
	Incorrect set point range selected	➔ Check set point range ➔ Contact SAMSON's After-sales Service.
	Safety device, e.g. pressure limiter, has been triggered	➔ Check plant. If necessary, unlock safety device.
	Plant differential pressure Δp too low	➔ Compare differential pressure in the plant with the plant's drag. Differential pressure across the plant: $\Delta p_{min} = \Delta p_{restriction} + (\dot{V}/K_{VS})^2$
	Foreign particles blocking the plug	➔ Remove foreign particles. ➔ Replace damaged parts. ➔ Contact SAMSON's After-sales Service.
	Control line blocked	➔ Clean the control line and screw fittings.
	Strainer blocked	➔ Clean the strainer.

Malfunction	Possible reasons	Recommended action
Control loop hunts	Regulator or K_{VS}/C_V coefficient too large	➔ Check the sizing. ➔ Change K_{VS}/C_V coefficient, if necessary or install a different sized regulator. ➔ Contact SAMSON's After-sales Service.
	The restriction in the control line for pressure tapping is too large or missing.	➔ Install a restriction. ➔ Install a smaller restriction.
Slow control response	Restriction in the screw joint of the actuator dirty or too small	➔ Clean screw joint or install larger screw joint.
	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. ➔ Replace damaged parts. ➔ Contact SAMSON's After-sales Service.
Loud noises	High flow velocity, cavitation	➔ Check the sizing. ➔ Install larger regulator, if necessary.
Leakage at the actuator	Defective operating diaphragm	➔ Replace damaged diaphragm.

i ***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 remedy 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

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 valve back into operation after a malfunction

See the 'Start-up' section.

9 Servicing

The regulator does not require much maintenance. Nevertheless, it is subject to natural wear, particularly at the seat, plug and operating diaphragm. 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 to be performed only by personnel appropriately qualified to carry out such tasks.

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

⚠ DANGER

Risk of bursting in pressure equipment.

Regulators and pipelines are pressure equipment. Improper opening can lead to bursting of the regulator.

– *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.*

⚠ WARNING

Crush hazard arising from moving parts.

➔ *Do not insert hands or fingers between the set point springs while the regulator is in operation.*
➔ *Before starting any work on the regulator, depressurize plant sections as well as the regulator.*

⚠ 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 incorrect servicing or repair.

Only allow trained staff to perform service and repair work.

NOTICE

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

➔ *Only use tools approved by SAMSON (see Annex).*

NOTICE

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

➔ *Only use lubricants approved by SAMSON (see Annex).*

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).*

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 and Fig. 9-2

1	Valve body
1.1	Coupling nut
1.2	Body stopper
1.3	Seal
2	Seat
3	Plug (balanced)
3.1	Plug nut
3.2	Guide nipple
3.3	Plug assembly (DN 32 to 50)
3.4	Plug stem
3.5	Seal
3.6	Balancing piston
4	Diaphragm plate nut
5	Diaphragm plate
6	Actuator housing
6.1	Operating diaphragm
6.2	Spring housing
6.3	Diaphragm stem
7	Housing screws
8	Set point spring
9	Spring plate
10	Set point adjuster
11	Control line
11.1	Borehole in the body
12	Manual adjuster
12.1	Reading on manual adjuster

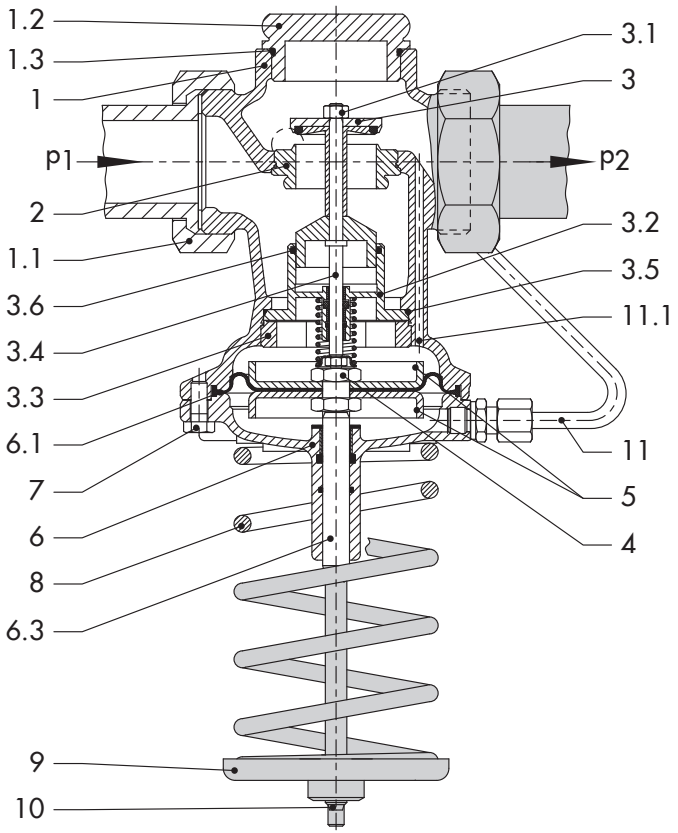


Fig. 9-1: *Functional diagram of the regulator (DN 15 to 50, with external spring)*

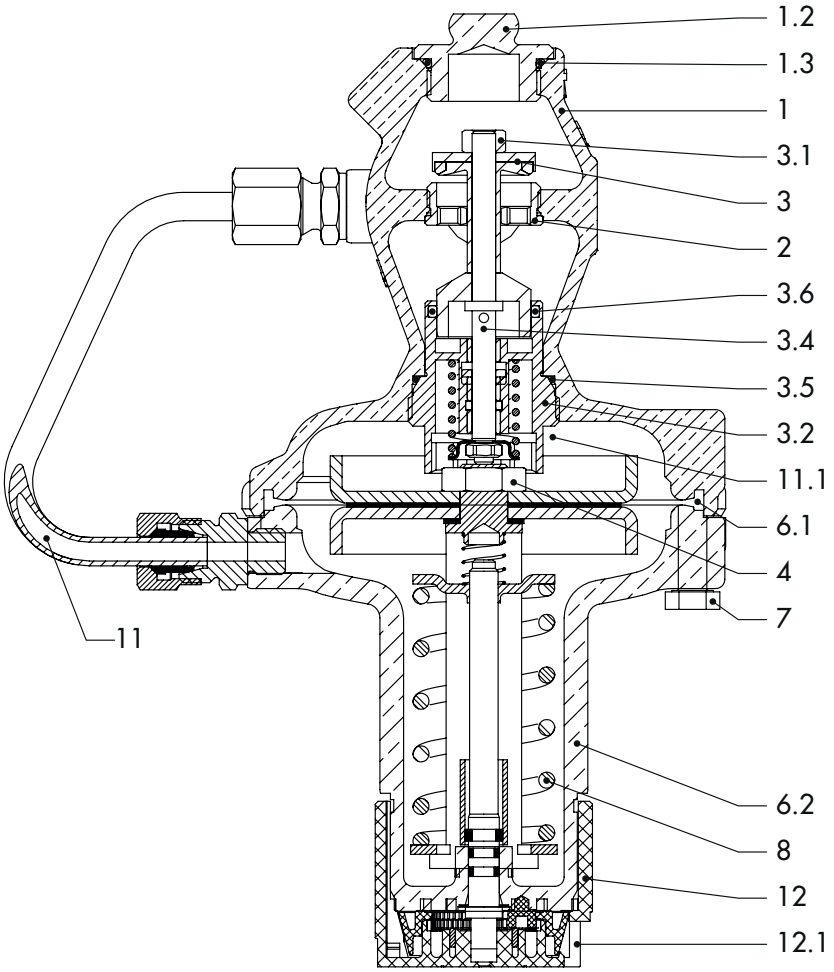


Fig. 9-2: *Functional diagram of the regulator (DN 15 to 50, spring housing with manual adjuster)*

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 seat and plug (see section 9.3.1)
– Replace the operating diaphragm (see section 9.3.2)
– Replacing the set point springs (see section 9.3.3)

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.

9.3 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).

9.3.1 Replacing the seat and plug

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.

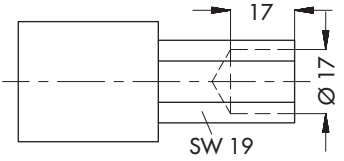
NOTICE

Risk of damage to the facing of the seat and plug due to incorrect service or repair.

Always replace both the seat and plug.

Note

The socket wrench for DN 15 to 25 can also be made, for example from a GEDORE screwdriver bit (IN 19-19) by drilling a 17-mm-deep hole (Ø17) into a 17 mm hex bit.



SAMSON order no. 1280-3001

➔ See Fig. 9-1 and Fig. 9-2

Removing the seat and plug

1. Put the regulator out of operation (see the 'Decommissioning' section).
2. Completely relieve the tension from the set point spring (8) by turning the set point adjuster (10) or manual adjuster (12) counterclockwise (↺).
3. Remove the device from the pipeline
4. Unscrew the control line (11).
5. Unscrew the body stopper (1.2).
6. Remove the seal (1.3).
7. Unscrew the body screws (7) and take off the actuator housing (6) together with the set point spring (8).
8. Unscrew the plug nut (3.1) and take the plug (3) off the plug stem.
9. **DN 15 to 25:** unscrew and pull out the guide nipple (3.2) using a socket wrench.

   DN 32 to 50: unscrew the plug nipple (3.3) and pull out the guide nipple (3.2).
10. Remove the seal (3.5).
11. Thoroughly clean the seat (2), plug (3) and balancing piston (3.6). Replace damaged parts with new ones.
12. Check the control line (11) for any blockages.
13. Unscrew the seat (2) using a seat wrench if the seat facing is damaged.

Mounting the seat and plug

1. Screw in the seat (2) using a seat wrench. Observe the specified tightening torques (see 'Tightening torques' in Annex).
2. Renew the seal (3.5) and insert it into the valve body.
3. **DN 15 to 25:** insert and screw in the guide nipple (3.2). Observe the specified tightening torques (see 'Tightening torques' in Annex).

   DN 32 to 50: insert the the guide nipple (3.2) and screw in the plug nipple (3.3). Observe the specified tightening torques (see 'Tightening torques' in Annex).
4. Place the plug (3) onto the plug stem and screw on the plug nut (3.1). Observe the specified tightening torques (see 'Tightening torques' in Annex).
5. Renew the seal (1.3) and insert it into the valve body.
6. Screw in the body stopper (1.2). Observe the specified tightening torques (see 'Tightening torques' in Annex).
7. Check the facings of the actuator housing (6) for dirt and clean them, if necessary.
8. Place the actuator housing (6) on the valve body (1) and screw tight the body screws (7). Observe the specified tightening torques (see 'Tightening torques' in Annex).
9. Screw on the control line (11). Observe the specified tightening torques (see 'Tightening torques' in Annex).
10. Put the regulator back into operation (see the 'Start-up' section).

9.3.2 Replacing the operating diaphragm

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.

Note

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

Note

The stem surface is roller-burnished. Do not reface the stem.

After replacing the diaphragm stem, the nipple (guide bushing) in the actuator case must be replaced as well.

Tip

The associated order number is written on the actual rolling diaphragm.

➔ See Fig. 9-1 and Fig. 9-2

Disassembling the Type 45-6 with external set point spring

1. Put the regulator out of operation (see the 'Decommissioning' section).
2. Completely relieve the tension from the set point spring (8) by turning the set point adjuster (10) counterclockwise (↺).
3. Remove the device from the pipeline
4. Unscrew the control line (11).
5. Use the SAMSON disassembly tool to unscrew the set point adjuster (10) from the diaphragm stem (7).
6. Lift off the spring plate (9) and the set point spring (8).
7. Unscrew the body screws (7) and take off the actuator housing (6).
8. Unscrew the diaphragm plate nut (4) from the diaphragm stem (6.3).
9. Take off the diaphragm plate (9) and operating diaphragm (6.1). Renew the operating diaphragm.
10. Examine the diaphragm stem (6.3) for score marks. Replace, if necessary.

Disassembly of Type 45-6 with spring housing

1. Put the regulator out of operation (see the 'Decommissioning' section).
2. Completely relieve the tension from the set point spring (8) by turning the manual adjuster (12) counterclockwise (↺).
3. Remove the device from the pipeline
4. Unscrew the control line (11).

5. Unscrew the body screws (7) and take off the actuator housing (6.2). Replace the spring housing with a new one.

Assembling the Type 45-6 with external set point spring

1. Place the new operating diaphragm (6.1) together with the diaphragm plate (5) onto the diaphragm stem (6.3) and tighten the nut (4). Observe the specified tightening torques (see 'Tightening torques' in Annex).
2. Apply lubricant to the diaphragm stem (6.3). Observe lubricant specifications (see 'Lubricants' in Annex).
3. Insert the diaphragm stem (6.3) together with the operating diaphragm (6.1) into the actuator housing (6).
4. Check the facings of the actuator housing (6) and the valve body (1) for dirt and clean them, if necessary.
5. Place the actuator housing (6) on the valve body (1) and tighten the body screws (7) evenly. Observe the specified tightening torques (see 'Tightening torques' in Annex).
6. Use the SAMSON disassembly tool to screw the valve body (1) together with spring plate (9) and the set point spring (8).
7. Screw the set point adjuster (10) onto the diaphragm stem (6.3).
8. Screw on the control line (11). Observe the specified tightening torques (see 'Tightening torques' in Annex).
9. Put the regulator back into operation (see the 'Start-up' section).

Assembly of Type 45-6 with spring housing

1. Check the facings of the new spring housing (6.2) and the valve body (1) for dirt and clean them, if necessary.
2. Place the spring housing (6.2) on the valve body (1) and tighten the body screws (7) evenly. Observe the specified tightening torques (see 'Tightening torques' in Annex).
3. Screw on the control line (11). Observe the specified tightening torques (see 'Tightening torques' in Annex).
4. Put the regulator back into operation (see the 'Start-up' section).

9.3.3 Replacing the set point springs

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.

Note

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

Note

The stem surface is roller-burnished. Do not reface the stem.

After replacing the diaphragm stem, the nipple (guide bushing) in the actuator case must be replaced as well.

Note

Change the nameplate and material number after changing the set point range.

➔ See Fig. 9-1 and Fig. 9-2

Disassembling the Type 45-6 with external set point spring

1. Put the regulator out of operation (see the 'Decommissioning' section).
2. Completely relieve the tension from the set point spring (8) by turning the set point adjuster (10) counterclockwise (↺).
3. Remove the device from the pipeline
4. Unscrew the control line (11).
5. Use the SAMSON disassembly tool to unscrew the set point adjuster (10) from the diaphragm stem (7).
6. Lift off the spring plate (9) and the set point spring (8). Replace. the set point spring
7. Examine the diaphragm stem (6.3) for score marks. Replace, if necessary.

Assembling the Type 45-6 with external set point spring

8. Use the SAMSON disassembly tool to screw the valve body (1) together with spring plate (9) and the new set point spring (8).
9. Screw the set point adjuster (10) onto the diaphragm stem (6.3).
10. Screw on the control line (11). Observe the specified tightening torques (see 'Tightening torques' in Annex).
11. Put the regulator back into operation (see the 'Start-up' section).

Type 45-6 with spring housing

Do not replace the set point spring in Type 45-6 with spring housing.

9.4 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.

Lubricants

See Annex for details on spare parts.

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 qualified for the assignment accordingly.

⚠ DANGER

Risk of bursting in pressure equipment.

Regulators and pipelines are pressure equipment. Improper opening can lead to bursting of the regulator.

- *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.*

⚠ WARNING

Risk of personal injury due to pressurized components and process medium escaping under pressure.

➔ *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 heat up.*

➔ *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 regulator.*

⚠ WARNING

Crush hazard arising from moving parts.

➔ *Do not insert hands or fingers between the set point springs while the regulator is in operation.*

➔ *Before starting any work on the regulator, depressurize plant sections as well as 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.*

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 heat up.

11 Removal

The work described in this section is only to be performed by personnel qualified for the assignment accordingly.

⚠ 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 heat up.*

➔ *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.*

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. Undo the pipe connections.
3. Remove the regulator from the pipeline (see the 'Shipment and on-site transport' 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 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:

4. Exceptions apply concerning some special device models ▶ www.samsongroup.com > Service & Support > After-sales Service.
5. Send an e-mail ▶ 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 > Service & Support > After-sales Service.

   After checking your registration, we will send you a return merchandise authorization (RMA).
6. Attach the RMA (together with the Declaration on Decontamination) to the outside of your shipment so that the documents are clearly visible.
7. Send the shipment to the address given on the RMA.

Note

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

13 Disposal

➔ Observe local, national and international refuse regulations.

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

14 Certificates

The 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.

SMART IN FLOW CONTROL

SAMSON

EU-KONFORMITÄTSERKLÄRUNG
EU DECLARATION OF CONFORMITY

Modul H/Module H, Nr./No. / N° CE-0062-PED-H-SAM 001-16-DEU-rev-A

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 S. A. (0062)
Conformity assessment procedure applied for fluids according to Article 4(1)(c.i), first indent	See table for module	

Nenndruck *Pressure rating*	**DN** *NPS*	**15** ½	**20** ¾	**25** 1	**32** 1¼	**40** 1½	**50** 2	**65** -	**80** 3	**100** 4	**125** -	**150** 6	**200** 8	**250** 10	**300** 12	**400** 16
PN 16		ohne/*without* (1)			A (2)(3)			-	-	-	-	-	-	-	-	-
PN 25		ohne/*without* (1)			A (2)(3)		H									
PN 40		ohne/*without* (1)								H						-
PN 100 und PN 160		ohne/*without* (1)							H				-	-	-	-
Class 150		ohne/*without* (1)			A (2)(3)						H					-
Class 300		ohne/*without* (1)								H						
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 oft 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 S.A. gilt nicht für Modul A.
The identification number 0062 of Bureau Veritas S.A. is not valid for Modul 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 S.A. Nr./No. 0062, Newtime, 52 Boulevard du Parc, Ille de la Jatte, 92200 Neuilly sur Seine, France
Hersteller:/Manufacturer: SAMSON AG, Weismüllerstraße 3, 60314 Frankfurt am Main, Germany

Frankfurt am Main, 08. Februar 2017/08 February 2017

i.V. Klaus Hörschken

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

i.V. Dr. Heß

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

SAMSON AKTIENGESELLSCHAFT
Weismüllerstraße 3 60314 Frankfurt am Main

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

Revision 03

SMART IN FLOW CONTROL

SAMSON

EU-KONFORMITÄTSERKLÄRUNG
EU DECLARATION OF CONFORMITY

Modul H/Module H, Nr./No. / N° CE-0062-PED-H-SAM 001-16-DEU-rev-A

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, 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/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.	Modul siehe Tabelle	durch certified by Bureau Veritas S. A. (0062)
Conformity assessment procedure applied for fluids according to Article 4(1)(c.ii) and (c.i), second indent	See table for module	

Nenndruck *Pressure rating*	**DN** *NPS*	**15** ½	**20** ¾	**25** 1	**32** 1¼	**40** 1½	**50** 2	**65** -	**80** 3	**100** 4	**125** -	**150** 6	**200** 8	**250** 10	**300** 12	**400** 16
PN 16		ohne/*without* (1)						A (2)(3)				H				
PN 25		ohne/*without* (1)						A (2)(3)				H				
PN 40		ohne/*without* (1)				A (2)(3)		H								-
PN 100 und PN 160		ohne/*without* (1)				H								-		
Class 150		ohne/*without* (1)				A (2)(3)						H				-
Class 300		ohne/*without* (1)				A (2)(3)		H								
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 S.A. gilt nicht für Modul A.
The identification number 0062 of Bureau Veritas S.A. is not valid for Modul 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 S.A. Nr./No. 0062, Newtime, 52 Boulevard du Parc, Ille de la Jatte, 92200 Neuilly sur Seine, France
Hersteller:/Manufacturer: SAMSON AG, Weismüllerstraße 3, 60314 Frankfurt am Main, Germany

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Revision 03

EU-Konformitaetserklaerung_Blatt-04_Modul-A_Modul-H_DE-EN_Rev03_2017-02-08.docx

15 Annex

15.1 Tightening torques

Table 15-1: *Tightening torque*

Part	Width across flats	Valve size/ actuator area	Tightening torque in Nm
Body stopper (1.2)	SW 13	DN 15 to 25	70
	SW 50	DN 32 to 50	110
Seat (2)	SW 17	DN 15 to 25	45
	SW 36	DN 32 to 50	110
Plug nut (3.1)	SW 8	DN 15 to 32	4
	SW 13	DN 40 to 50	8
Guide nipple (3.2)	SW 19	DN 15 to 25	70
Plug nipple (3.3)	SW 39	DN 32 to 50	110
Diaphragm plate nut (4)	SW 17	DN 15 to 32	40
	SW 19	DN 40 to 50	80
Body screws (7)	SW 10	DN 15 to 32	8
	SW 13	DN 40 to 50	18
Control line connection (11)	–	All	22

15.2 Lubricants

Table 15-2: *Lubricant*

Lubricant	Item no.
Gleitmo 591	8150-0111

15.3 Tools

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

15.4 Spare parts

Legend for Fig. 15-1 and Fig. 15-2	
7	Restriction
26	Body stopper
27	Plug assembly (DN 32 to 50)
30	Valve body
31…34	Seat
56	Set point adjuster
57	Diaphragm plate nut
70…78	Set point springs
83	Diaphragm stem
90	Diaphragm plate
95	Spring plate
103…105	Washer
112	Actuator housing
116	Control line
124, 125	Operating diaphragm
129…131	Housing screws
134, 135	Seal
150	Axial needle seal
155	Screw fitting
186, 187	Seal
205	Plug stem
206	Plug
207	Pre-stage of plug
208	Guide nipple
210	Plug spring
212	Spring plate
215	Seal
216	Balancing piston
221	Seal
224	Plug nipple nut
226	Plug nut

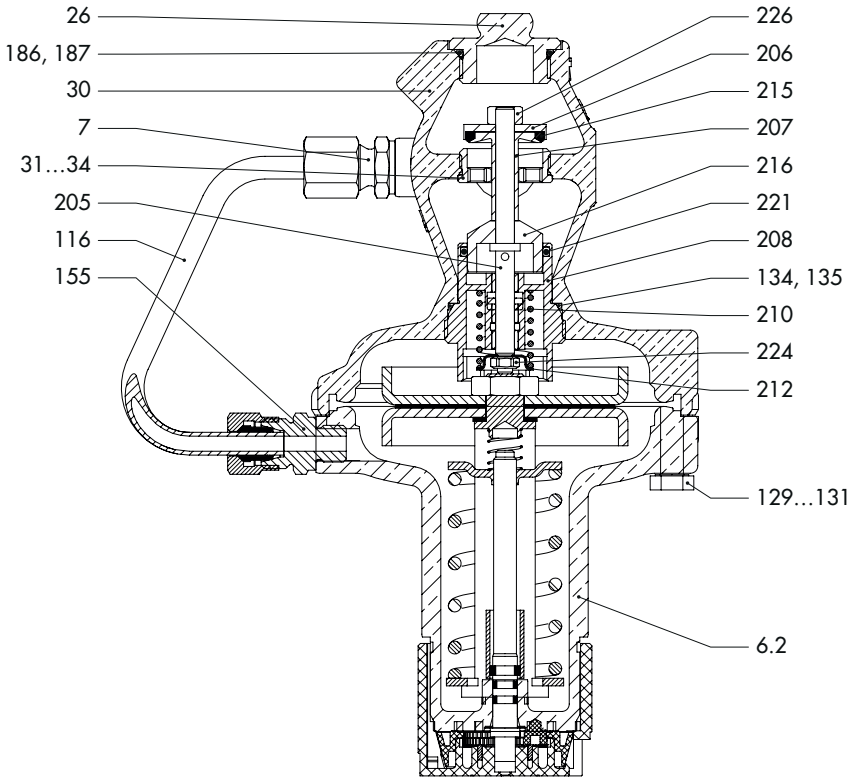

Fig. 15-1: *Regulator (DN 15 to 50, spring housing)*

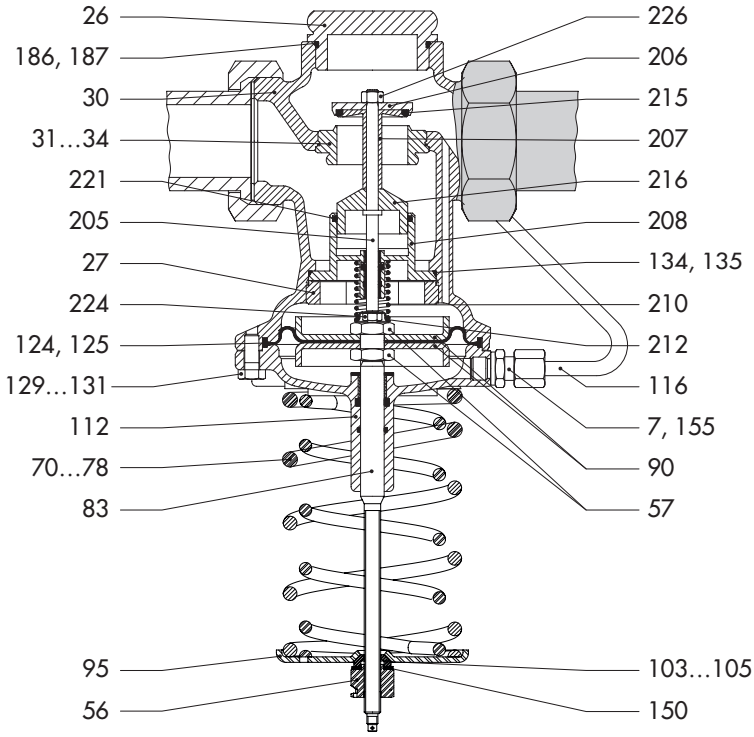

Fig. 15-2: *Regulator (DN 15 to 50, with external spring)*

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.

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) or in all SAMSON product catalogs.

Required specifications

Please submit the following details:

- Device type and nominal size
- Model number or material number
- Upstream and downstream pressure
- Temperature and process medium
- Min. and max. flow rate in m^3/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 3226 EN

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2023-06-26 · English