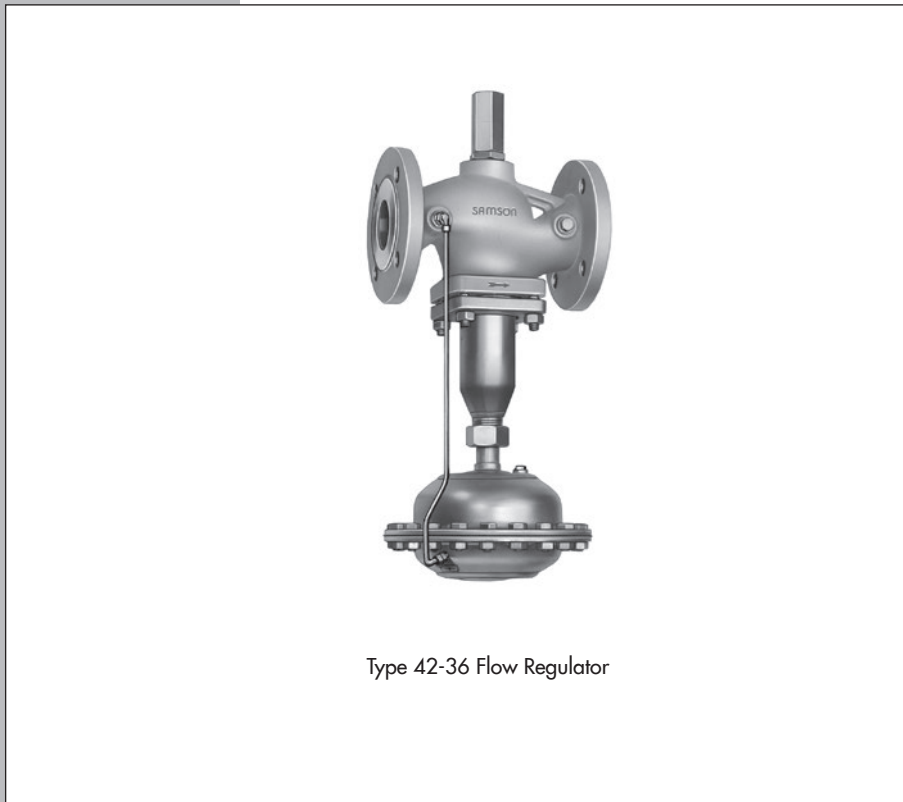


Self-operated Regulators

Type 42-36 Flow Regulator



Type 42-36 Flow Regulator

Translation of original instructions

Mounting and Operating Instructions

EB 3015 EN

Edition November 2017



Note on these mounting and operating instructions

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

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



The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website (www.samson.de) > Product documentation. You can enter the document number or type number in the [Find:] field to look for a document.



WARNING!

Damage to health relating to the REACH regulation.

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

Information on safe use of the part affected, see ► <http://www.samson.de/reach-en.html>.

Definition of signal words



DANGER!

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



NOTICE

Property damage message or malfunction



WARNING!

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



Note:

Additional information



Tip:

Recommended action

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1 General safety instructions

- The device must be mounted, started up or serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. Make sure employees or third persons are not exposed to any danger.
- All safety instructions and warnings given in these mounting and operating instructions, particularly those concerning installation, start-up and maintenance, must be strictly 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 dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
- The devices comply with the requirements of the European Pressure Equipment Directive 2014/68/EU. Devices with a CE marking have an EU declaration of conformity, which includes information about the applied conformity assessment procedure. This EU declaration of conformity can be provided on request.
- To ensure appropriate use, only use the device in applications where the operating pressure and temperatures do not exceed the specifications used for sizing the device at the ordering stage.
- The manufacturer does not assume any responsibility for damage caused by external forces or any other external factors.
- Any hazards that could be caused in the regulator by the process medium, operating pressure or by moving parts are to be prevented by taking appropriate precautions.
- Proper transport, storage, installation, operation and maintenance are assumed.

Note: Non-electric control valve versions whose bodies are not lined with an insulating material coating do not have their own potential ignition source according to the risk assessment stipulated in EN 13463-1: 2009, section 5.2, even in the rare incident of an operating fault. Therefore, such valve versions do not fall within the scope of Directive 2014/34/EU.

For connection to the equipotential bonding system, observe the requirements specified in section 6.4 of EN 60079-14: 2011 (VDE 0165 Part 1).

2 Process medium and scope of application

Regulators for flow rate control in district heating systems or large heating networks. · Valves DN 15 to 250 · Nominal pressure PN 16 to 40 · Suitable for liquids, gases and vapors from 5 to 150 °C

2.1 Transportation and storage

The device must be carefully handled, transported and stored. Protect the regulator against adverse influences, such as dirt, moisture or frost, during storage and transportation.



Note:

Before installing the regulator, tighten the blanking plug(s) at the side of the valve body using a suitable box wrench.

Torque: 50 Nm for G 1/4, 70 Nm for G 3/8

When regulators are too heavy to be lifted by hand, fasten the lifting equipment to a suitable place on the valve body.



WARNING!

Incorrectly attached lifting slings or rigging equipment.

Risk of injury and property damage due to valve falling.

Securely fasten slings or rigging equipment to the valve body and secure against slipping.

3 Design and principle of operation

See Fig. 1 and Fig. 2 · Functional drawings of the regulators

Type 42-36 · The flow regulator is used to limit the flow rate in the pipeline. The set point is adjusted at the restriction.

The regulator basically consists of a Type 2423 Valve with seat, plug, and set point adjuster as well as a Type 2426 Actuator (closing) with operating diaphragm.

Valve and actuator are delivered separately and must be fastened together on site using a coupling nut.

Type 42-36 DoT · This version can also control or limit the temperature by mounting a double adapter with thermostat. Read the mounting and operating instructions:

▶ EB 3019 for double adapter DoT and

▶ EB 2231 for Type 2231 to 2235 Control Thermostats

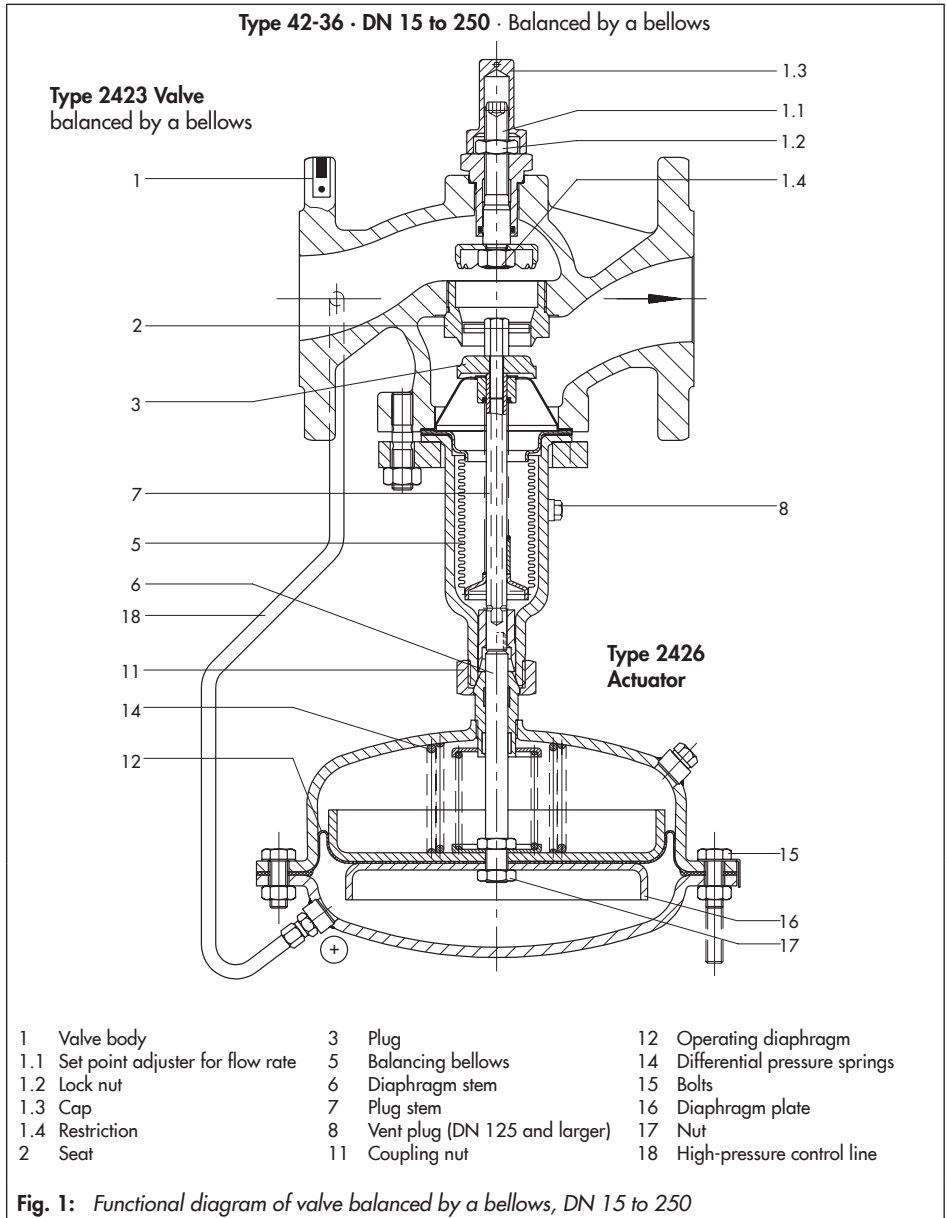
The medium flows through the valve in the direction indicated by the arrow. The areas released by the restriction (1.4) and the valve plug (3) determine the flow rate.

In fully balanced valves, the forces acting on the valve plug created by the upstream and downstream pressures are balanced by a balancing bellows (5) or balancing diaphragm (5.1) (DN 65 to 250, balanced by a diaphragm).

Regulators balanced by a bellows or a diaphragm only differ in the pressure balancing

principle applied. Valves balanced by a diaphragm have a balancing diaphragm (5.1) instead of the balancing bellows (5). The downstream pressure p_2 acts on the bottom of the diaphragm and the upstream pressure p_1 on the top of the diaphragm. In both cases, the forces created by the upstream and downstream pressures that act on the plug are balanced out.

The pressure upstream of the restriction (1.4) is transferred over the control line (18) to the bottom diaphragm chamber and the pressure downstream of the restriction (1.4) is transferred through the hollow plug stem (7) past the diaphragm stem (6) to the top diaphragm chamber of the actuator. This differential pressure creates a positioning force at the operating diaphragm (12), which moves the valve plug depending on the force of the differential pressure springs (14). For example, if the flow rate increases, the differential pressure (at the restriction) increases as well. The actuator and plug stems move in the closing direction, causing the flow rate to decrease until it reaches the set point adjusted at the restriction (1.4). When the flow rate starts to drop, the described procedure is reversed.



Type 42-36 · DN 65 to 250 · Balanced by a diaphragm

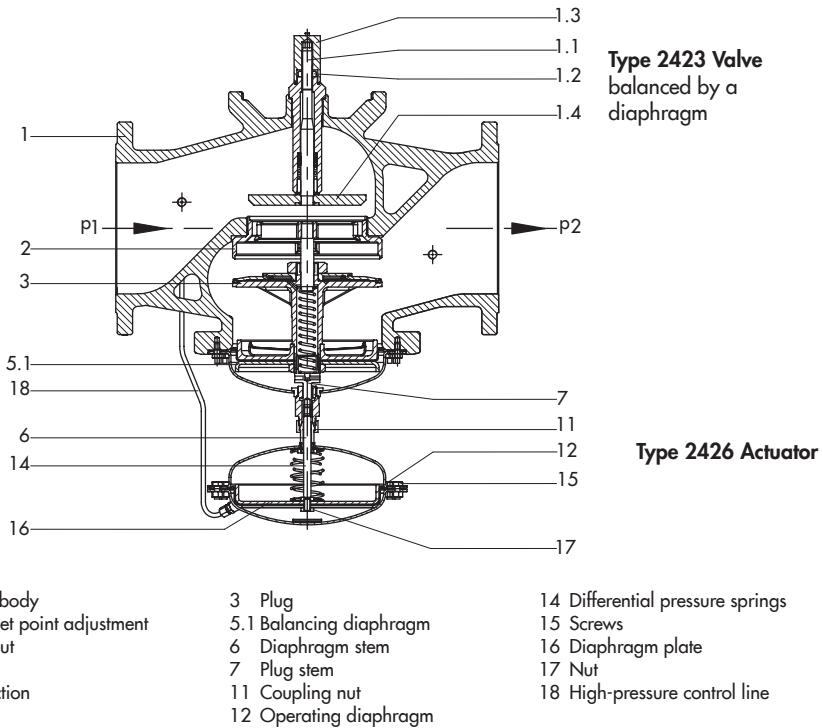


Fig. 2: Functional diagram of valve balanced by a diaphragm, DN 65 to 250

4 Installation

See Fig. 1 and Fig. 2 · Functional drawings of the regulators

The regulator can be installed into the downstream pressure pipe (return flow pipe) or the upstream pressure pipe (flow pipe) of the plant. See installation examples in Fig. 4.

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

- Install the regulator free of stress. If necessary, support the pipeline near to the connecting flanges. Do not attach supports directly to the valve or actuator.
- Install a strainer (e.g. SAMSON Type 2 N/2 NI) upstream of the regulator to prevent any sealing parts, weld

spatter and other impurities carried along by the process medium impairing the proper functioning of the valve, above all the tight shut-off.

4.1 Mounting position

See Fig. 3 for permissible mounting positions.

Standard mounting position · Install valve without actuator in a horizontal pipeline with the connection for the actuator facing downward. Make sure the medium flows through the valve in the direction indicated by the arrow. Connect the actuator to the valve connection using the coupling nut (11).

! NOTICE

Possible malfunction and damage due to adverse effects of weather conditions (temperature, humidity). Do not install the regulator outdoors or in rooms prone to frost. If such a location cannot be avoided, protect the regulator against freezing up if the process medium flowing through the valve can freeze up. Either heat the regulator or remove it from the plant and completely drain the residual medium.

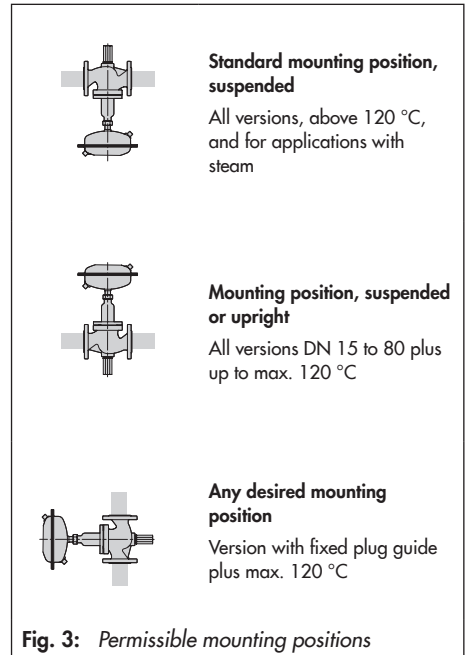


Fig. 3: Permissible mounting positions

4.1.1 Insulation

Insulation at temperatures below dew point · To insulate cold systems, we recommend first filling the plant and carefully rinsing it (see section 2.1). The regulator must not be insulated until the set point is adjusted.

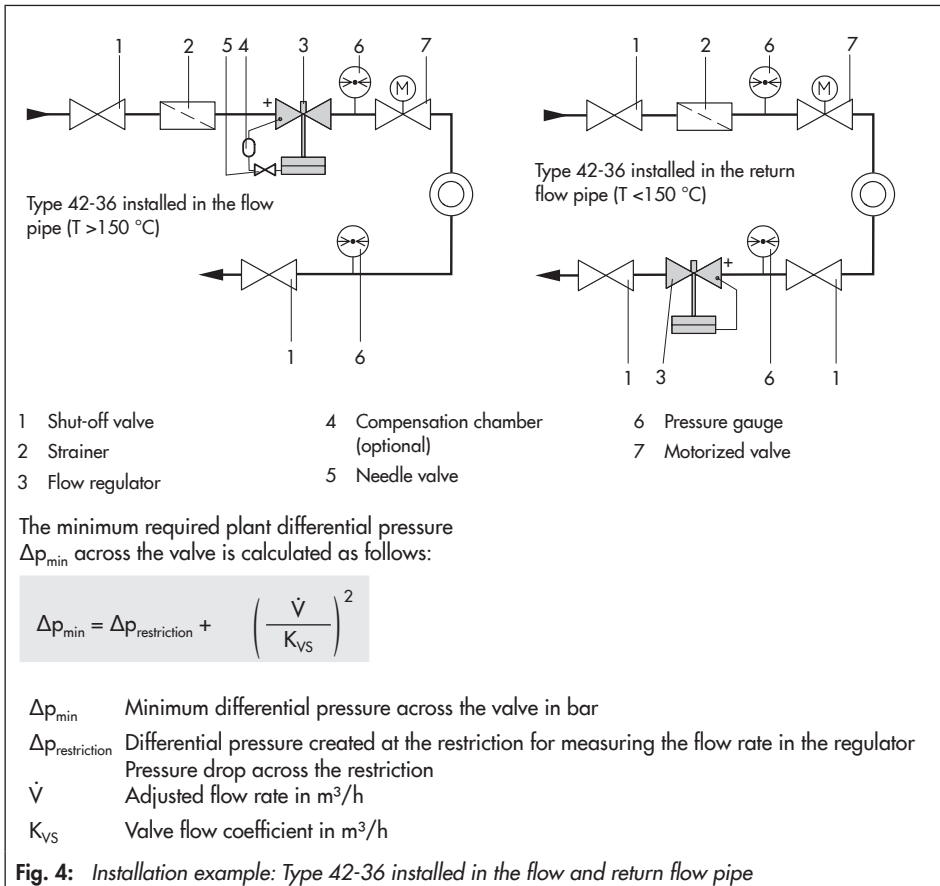
- ➔ Start up the plant and adjust the set point. Shut down the plant again and let it heat up until the condensation water has dried off.
- ➔ Afterwards, insulate the regulator and pipes conveying the process medium using insulation material with a water vapor barrier.

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.

4.2 Control line, compensation chamber and needle valve

Control lines · After the actuator has been mounted, attach the supplied high-pressure control line to the regulator as shown in Fig. 1 and Fig. 2.



**Tip:**

Needle valves, compensation chambers and compression-type screw fittings can be supplied as required.

These accessories are listed in ► T 3095.

Control line kit · A control line kit for tapping pressure directly at the valve body is available as an accessory part from SAMSON (► T 3095).

Compensation chamber · Required for liquids above 150 °C as well as for steam; install a compensation chamber for the control line directly downstream of the tapping point at the valve. 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 process medium cannot cool down and the safe functioning of the regulator cannot be guaranteed.

Needle valve · If the regulator tends to hunt, we recommend installing a SAMSON needle valve at the control line installed on site (connection of the actuator).

4.3 Strainer (filter)

A strainer installed upstream in the flow pipe holds back any dirt or other foreign particles carried along by the medium. For example, the SAMSON Type 2 N/2 NI Strainer is suitable (► T 1010).

Install the strainer upstream of the regulator. The direction of flow must correspond to the arrow on the body. The filter element must be installed to hang downwards or sideways for applications with steam. Remember to leave enough space to remove the filter element.

4.4 Shut-off valve

Install a hand-operated shut-off valve both upstream of the strainer and at the outlet of the return flow pipe (see Fig. 4). This allows the plant to be shut down for cleaning and maintenance, and when the plant is not used for longer periods of time.

4.5 Pressure gauge

Install a pressure gauge at a suitable point to monitor the pressures prevailing in the plant (see Fig. 4).

5 Operation

See Fig. 1 and Fig. 2 · Functional drawings of the regulators

5.1 Start-up



Note:

Do not start up the regulator until all parts have been mounted (e.g. valve, actuator and control lines).

Open control lines with needle valve and before start-up check to ensure they are connected correctly.

For medium temperatures above 150 °C, fill the compensation chamber with the operating medium (water) before start-up.



Note:

On filling the plant, make sure the restriction (1.4) is open by turning the adjustment screw counterclockwise (↺) as far as it will go.

- ➔ Open all the valves on the consumer side.
 - ➔ Open the shut-off valves preferably starting from the return flow pipe. Slowly open the valves in small steps waiting a few minutes in between.
- Vent the bellows housing of valves balanced by a bellows (DN 125 and larger) at the vent plug (8) located at the side.

Rinsing the plant · After filling the plant, first completely open the consumers. If this is not possible, open the bypass line. Completely open the restriction for flow rate adjustment. Rinse out the pipeline at full flow rate for several minutes. Check the installed strainer (e.g. by measuring the pressure drop). Clean the strainer, if necessary.



NOTICE

The pressure at the actuator must not exceed the permissible pressure on testing the pressure of the plant. If necessary, detach the control line and seal the openings with end plugs. Alternatively, install a shut-off valve in the control line. Make sure that the pressure rises simultaneously upstream and downstream of the regulator to avoid damaging the balancing bellows.

5.2 Adjusting the set point

5.2.1 Flow rate set point

- ➔ The control and shut-off valves as well as all consumers or a bypass valve (if installed) must be open to ensure that the maximum flow rate is reached.
- ➔ Set the required flow rate by adjusting the restriction (1.4), while watching, for example, the reading of a flow rate measuring unit at the heat meter (see Table 1).

**Note:**

Adjustment is always based on the closed restriction.

- Turning it clockwise (↻) closes the restriction; the flow rate drops.
- Turning it counterclockwise (↺) opens the restriction; the flow rate rises.

To adjust the flow rate, use the adjustment diagrams for water (Fig. 5, Fig. 6 and Fig. 7).

**Note:**

Observe the differential pressure across the restriction $\Delta p_{\text{restriction}}$ of 0.2 bar or 0.5 bar (see section 1). It is determined by the differential pressure springs (14) installed in the actuator.

- Unscrew cap (1.3) and undo lock nut (1.2). Turn restriction screw clockwise as far as it will go.
- Find the flow rate set point in the diagram and determine the associated number of turns.
- Based on a closed restriction, turn the restriction screw counterclockwise (↺) to adjust this value. Wait until the plant has settled. If necessary, readjust.
- Check the flow rate at the heat meter and correct it, if necessary.
- Lock the restriction screw in place with the nut (1.2) and screw the cap (1.3) back on after the required flow rate is reached.

- Close a possibly open bypass valve again.
- Lead-seal the adjusted value, if necessary.

Table 1: Flow rate set point ranges for water

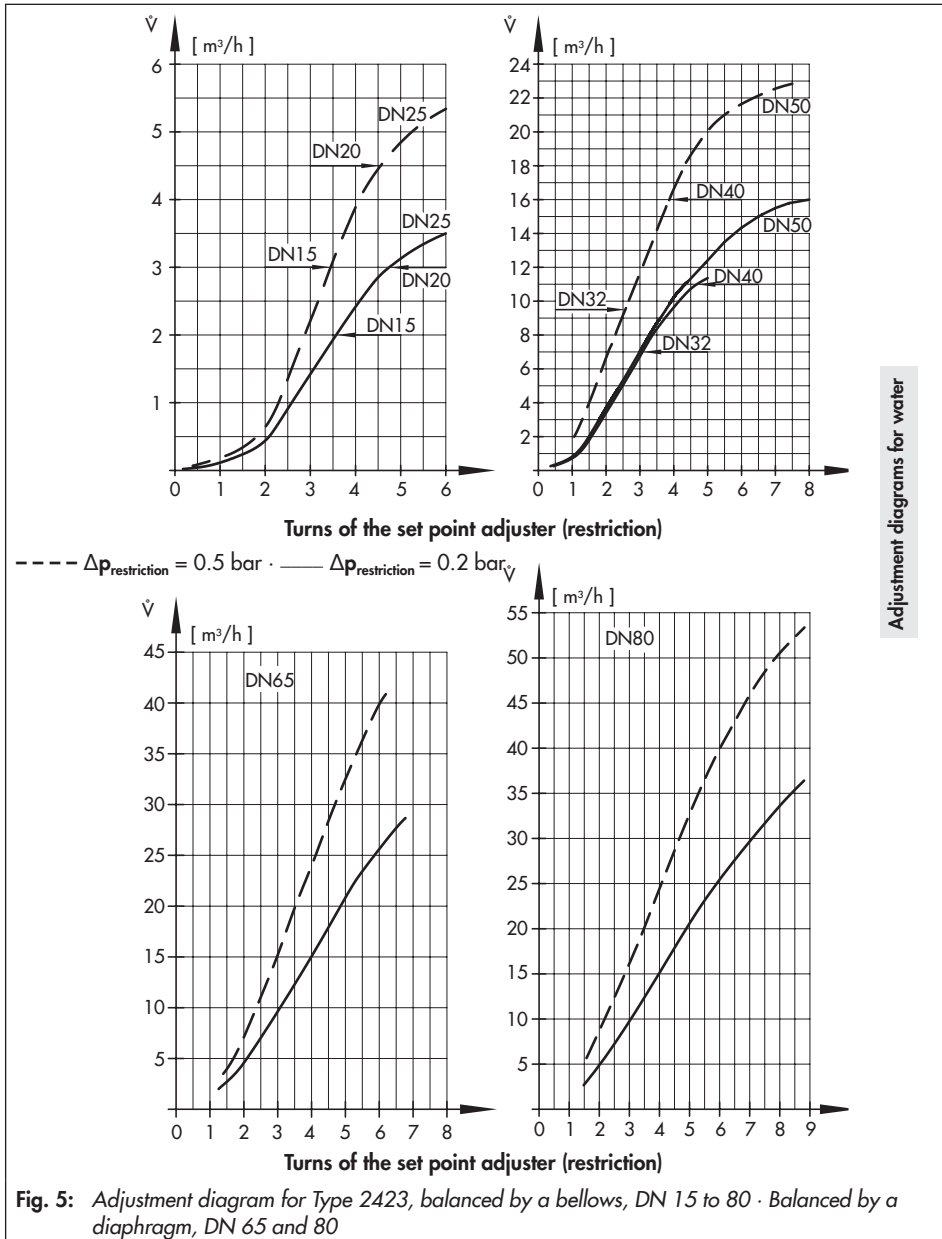
Type 2423 · Balanced by a bellows

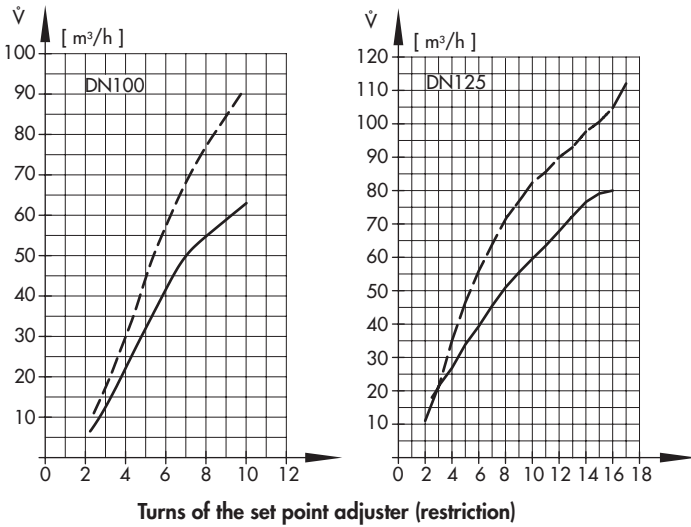
Nominal size DN	15	20	25	32	40	50	65	80	100	125	150	200	250	
Flow rate set point ranges for water in m³/h														
Diff. pressure across restriction $\Delta p_{\text{restriction}}$	0.2 bar	0.05 to 2	0.15 to 3	0.25 to 3.5	0.4 to 7	0.6 to 11	0.9 to 16	2 to 28	3.5 to 35 ¹⁾	6.5 to 63	11 to 80	18 to 120	20 to 180	26 to 220
	0.5 bar	0.15 to 3	0.25 to 4.5	0.4 to 5.3	0.6 to 9.5	0.9 to 16	2 to 24	3.5 to 40	6.5 to 55	11 to 90	18 to 120	20 to 180	26 to 260	30 to 300
Max. permissible diff. pressure Δp	25 bar						20 bar		16 bar		12 bar		10 bar	

Type 2423 · Balanced by a diaphragm

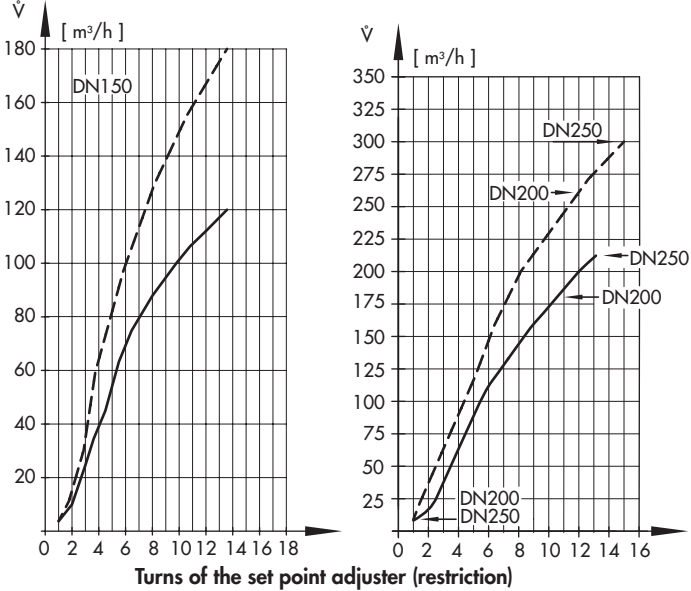
Nominal size DN	65	80	100	125	150	200	250	
Flow rate set point ranges for water in m³/h								
Diff. pressure across restriction $\Delta p_{\text{restriction}}$	0.2 bar	2 to 28	3.5 to 35 ¹⁾	6.5 to 63	11 to 120	18 to 180	20 to 320	26 to 350
	0.5 bar	3.5 to 40	6.5 to 55	11 to 90	18 to 180	20 to 260	26 to 450	30 to 520
Max. permissible diff. pressure Δp	10 bar			12 bar		10 bar		

¹⁾ 7 to 35 m³/h with 160 cm² actuator, 7 to 40 m³/h with 320 cm² actuator





--- $\Delta p_{\text{restriction}} = 0.5 \text{ bar}$ · — $\Delta p_{\text{restriction}} = 0.2 \text{ bar}$



Adjustment diagrams for water

Fig. 6: Adjustment diagram for Type 2423, balanced by a bellows, DN 100 to 250 · Balanced by a diaphragm, DN 100

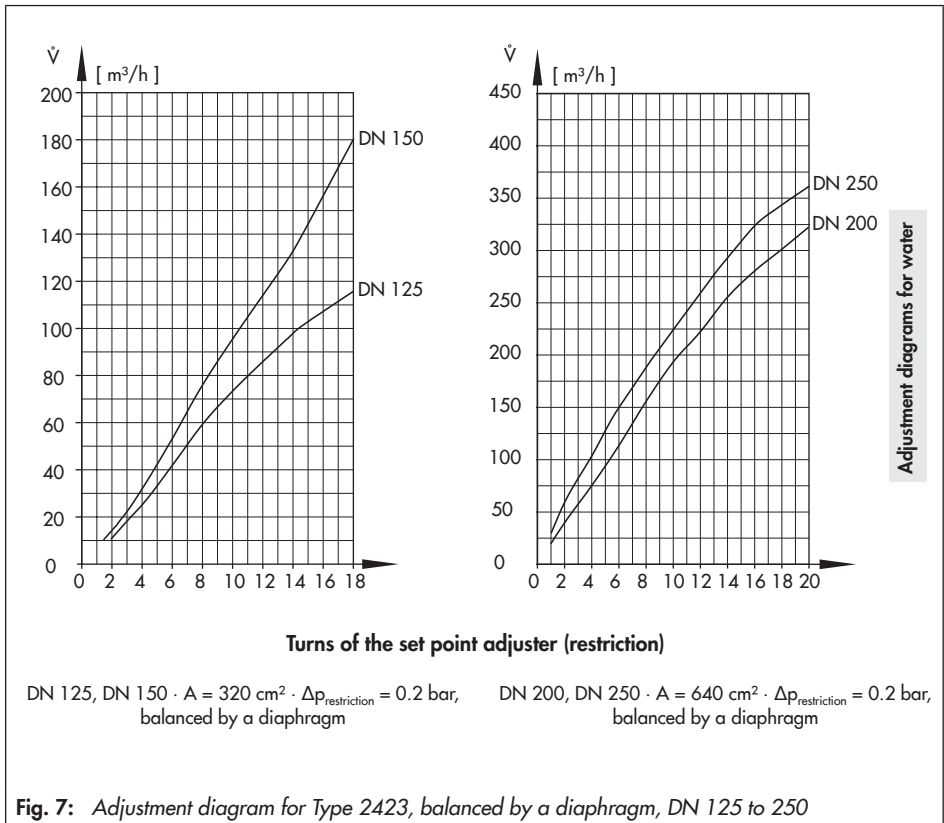


Fig. 7: Adjustment diagram for Type 2423, balanced by a diaphragm, DN 125 to 250

5.3 Decommissioning

Close the shut-off valves starting from the flow pipe (high-pressure line).

6 Maintenance · Troubleshooting

The regulators do not require any maintenance. Nevertheless, they are subject to natural wear, particularly at the seat, plug and operating diaphragm. Depending on the operating conditions, check the regulators at regular intervals to avoid possible malfunctions.



WARNING!

Before performing any work on the regulator, make sure the relevant plant section has been depressurized and, depending on the process medium, drained as well. We recommend removing the valve from the pipeline. When used at high temperatures, allow the plant section to cool down to ambient temperature. Disconnect or shut off the control line to prevent the risk posed by moving regulator parts. As valves are not free of cavities, remember that residual process medium might still be contained in the valve.

the valve from the pipeline. Depressurize and drain the relevant section of the pipeline. Unscrew the control line and separate the actuator from the valve.

1. Loosen the bolts (15) at the actuator and remove the top casing together with the actuator stem and spring assembly.
2. Unscrew the nut (17) while holding the bottom diaphragm stem stationary using a suitable tool.
3. Lift off the diaphragm plate (16) and pull out the diaphragm.
4. Insert a new diaphragm (12).
5. Proceed in the reverse order to continue assembly of the regulator.

Perform start-up as described in section 5.1.

6.1 Replacing the operating diaphragm

See Fig. 1 and Fig. 2 · Functional drawings of the regulators

If just the operating diaphragm is defective, it can be replaced without having to remove

Table 2: Troubleshooting

Malfunction	Possible reasons	Recommended action
Flow rate exceeds adjusted set point	Leak between seat and plug	Remove valve from the pipeline and clean seat and plug. Replace the plug, if possible. If this is not possible, return regulator to SAMSON for repair.
	Defective operating diaphragm	Replace diaphragm or return regulator to SAMSON for repair.
	Control line blocked	Remove control line and clean it.
	Valve too large for control task (flow rate) or too small (differential pressure)	Recalculate K_{VS} and contact SAMSON for further action.
Flow set point not reached.	Incorrect set point range selected.	Check set point range and contact SAMSON for further action.
	Safety device, e.g. pressure limiter, has been triggered.	Check plant. Unlock safety device.
	Plant differential pressure Δp too low.	Compare differential pressure in the plant with the plant's drag. Plant differential pressure $\Delta p_{\min} = \Delta p_{\text{restriction}} + (V/K_{VS})^2$
	Strainer blocked	Drain and clean filter of the strainer.
Control loop hunts.	Incorrectly installed valve (direction of flow).	Install the valve in such a way that the flow of direction corresponds with the direction indicated by the arrow on the valve body.
	Valve too large for control task	Recalculate K_{VS} and contact SAMSON.
	The restriction in the control line for pressure tapping is missing.	Install a screw joint with restriction.

If faults cannot be remedied following the recommended action in the table, contact SAMSON (see section 10).

7 Nameplates

Nameplates are attached to the valve and the actuator.

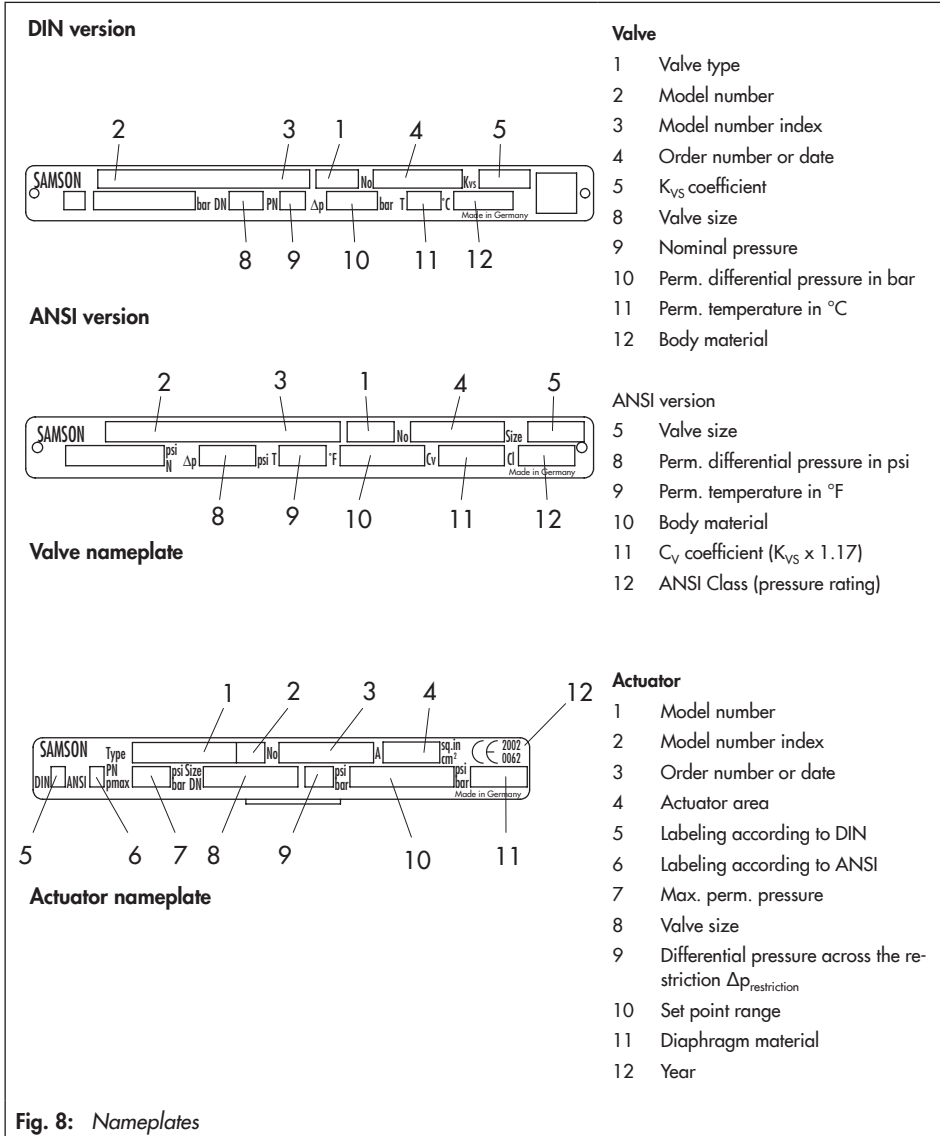




Fig. 8: Nameplates

8 Technical data

Table 3: *Technical data · Type 42-36*

Type 2423 Valve, balanced by a bellows		
Valve size	DN 15 to 250	
Nominal pressure	PN 16, 25 or 40	
Max. permissible temperature	Valve body	See pressure-temperature diagram in ▶ T 3000
	Actuator	With compensation chamber: steam and liquids up to 220 °C Without compensation chamber: liquids up to 150 °C, air and nitrogen up to 150 °C ¹⁾
Set point (differential pressure at restriction)	0.2 bar · 0.5 bar	
Leakage class according to IEC 60534-4 DN 15 to 100 DN 125 to 250	≤ 0.05 % of K_{VS} coefficient ≤ 0.01 % of K_{VS} coefficient	
Compliance		
Type 2423 Valve, balanced by a diaphragm		
Valve size	DN 65 to 250	
Nominal pressure	PN 16, 25 or 40	
Max. permissible temperature	Valve body	150 °C
	Actuator	Water 150 °C · Air and gases 80 °C
Set point (differential pressure at restriction)	0.2 bar · 0.5 bar	
Leakage class according to IEC 60534-4	≤ 0.05 % of K_{VS} coefficient	
Compliance		

¹⁾ Special version: valve with FKM orifice stem sealing. FKM diaphragm in the actuator.



Note:

Conversion from chromate coating to iridescent passivation

We at SAMSON are converting the surface treatment of passivated steel parts in our production. As a result, you may receive a device assembled from parts that have been subjected to different surface treatment methods. This means that the surfaces of some parts show different reflections. Parts can have an iridescent yellow or silver color. This has no effect on corrosion protection.

For further information go to ▶ www.samson.de/chrome-en.html

9 Dimensions

Dimensional drawing · Type 2423 Valve balanced by a bellows

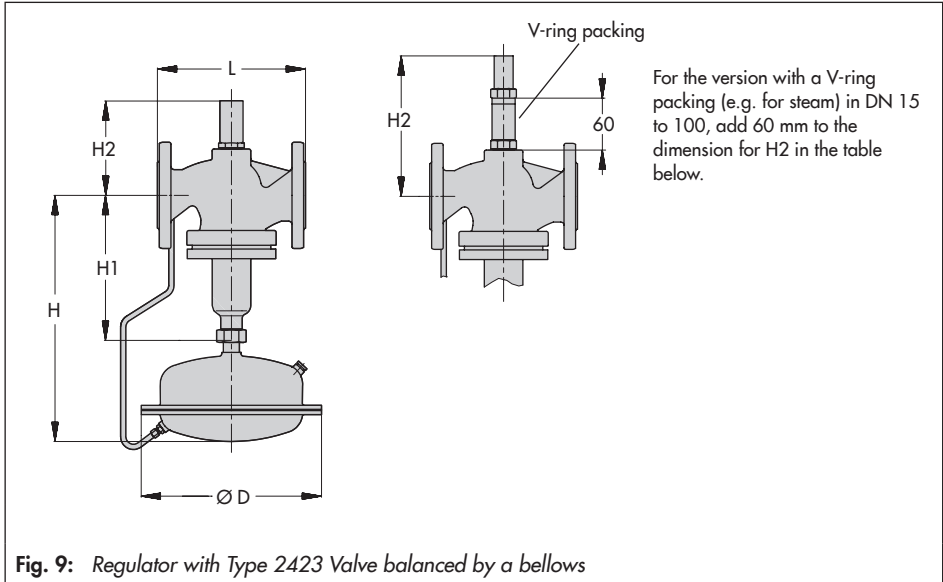


Table 4: Dimensions in mm and weights · Type 2423 Valve balanced by a bellows

Nominal size DN	15	20	25	32	40	50	65	80	100	125	150	200	250
Length L	130	150	160	180	200	230	290	310	350	400	480	600	730
Height H1	225						300		355	460	590	730	
Over- all height H2 ¹⁾	Other materials		115		150		175	180	200	250	280	400	
	1.4571	113	-	130	-	170	176	-					
Height H	390						465		520	625	765	895	
Actuator	ØD = 225 mm, A = 160 cm ² ²⁾									ØD = 285 mm, A = 320 cm ² ³⁾			
Weight ⁴⁾ , approx. kg	12	12.5	13.5	20	20.5	23	39	44	59	121	171	425	485

¹⁾ Version with V-ring packing in DN 15 to 100: +60 mm.

²⁾ Optionally with 320 cm² actuator (DN 65 to 100). For regulators with double adapter Do2 (► T 3019) for DN 65 to 100, actuator 320 cm² recommended.

³⁾ Optionally with 640 cm² actuator

⁴⁾ Valve in PN 25/40: +10 %

Dimensional drawing · Type 2423 Valve balanced by a diaphragm

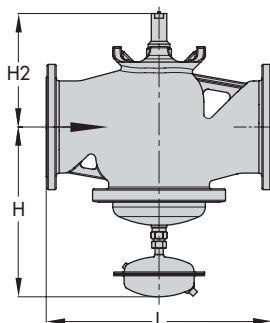


Fig. 10: Regulator with Type 2423 Valve, balanced by a diaphragm

Table 5: Dimensions in mm and weights · Type 2423 Valve balanced by a diaphragm

Valve size	DN 65	DN 80	DN 100	DN 125	DN 150	DN 200	DN 250
Length L	290	310	350	400	480	600	730
Height H	355		380	450	475	585	
Height H2	195		220	295	325	345	375
Weight for PN 16 ¹⁾							
Type 2423 Valve	34 kg	39 kg	56 kg	65 kg	85 kg	250 kg	270 kg
Type 2426 Actuator	7 kg			20 kg		30 kg	

¹⁾ PN 25/40: +10 %

10 After-sales service

If malfunctions or defects occur, contact the SAMSON After-sales Service department for support.

The addresses of SAMSON subsidiaries, representatives and service facilities worldwide can be found on the SAMSON website (► www.samson.de), in all SAMSON product catalogs or on the back of these Mounting and Operating Instructions.

To assist diagnosis and in case of an unclear mounting situation, specify the following details:

- Device type and nominal size
- Valve balanced by a bellows or diaphragm
- Order and model number
- Upstream and downstream pressure
- Min. and max. flow rate in m³/h
- Is a strainer installed?
- Installation drawing showing the exact location of the regulator and all the additionally installed components (shut-off valves, pressure gauge, etc.)



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