

MOUNTING AND OPERATING INSTRUCTIONS



EB 3132-2 EN

Translation of original instructions



Self-operated Regulators

Type 2469/2430 Flow and Temperature Regulator

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.

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



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**.

⚠ 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

▶ www.samsongroup.com/en/about-samson/material-compliance/reach-regulation/

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

i Note

Additional information

💡 Tip

Recommended action

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1 General safety instructions

- All safety instructions and warnings given in these mounting and operating instructions, particularly those concerning installation, start-up, and maintenance, must be strictly observed.
- 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 parties are not exposed to any danger.
- 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 EC declaration of conformity, which includes information about the applied conformity assessment procedure. This 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.

! NOTICE

Non-electric valve versions whose bodies are not lined with an insulating material coating do not have their own potential ignition source according to the risk assessment stipulated in Clause 5.2 of ISO 80079-36, 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 Clause 6.4 of EN 60079-14 (VDE 0165-1).

2 Process medium and scope of application

Regulators for district heating systems, heat generators, heat exchangers and other HVAC or industrial applications. For safety monitoring and safety limitation of the energy supplied to heat generators or heat exchangers.

Temperature set points from **0 to 150 °C** · Limit signals up to **120 °C** · Valves **DN 15 to 50** · Pressure rating **PN 25** · Suitable for liquids up to **150 °C**

The valve **closes** when the flow rate or temperature rises.

3 Transportation and storage

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

4 Design and principle of operation

See Fig. 1 on page 7.

The flow regulator consists of the Type 2469 Valve with restriction, seat and plug, the closing actuator with operating diaphragm and the control thermostat with set point adjuster, capillary tube and temperature sensor.

The regulator is used to maintain the flow rate and temperature constant at their adjusted set points. The valve closes as the controlled variable rises.

Versions for safety equipment are additionally equipped with a Type 2403 Safety Thermostat (as safety temperature monitor FR/TR/STM) or with a Type 2439 Safety Thermostat (as safety temperature limiter FR/TR/STL).

Details can be found in the associated mounting and operating instructions:

For Type 2403: ► EB 2183 and
Type 2439: ► EB 2185.

Design and principle of operation

The medium flows through the valve in the direction indicated by the arrow on the valve body. The flow rate is determined by the area released by the valve plug (3) and the adjustable restriction (1.2).

The pressure upstream of the restriction is transmitted to the high-pressure side [+] of the actuator through the attached control line (11).

The low pressure created downstream of the restriction acts on the low-pressure side [-] of the operating diaphragm (6.1) through a hole in the valve plug.

The differential pressure generated across the restriction is converted into a positioning force by the operating diaphragm. This force is used to move the valve plug according to the force of the set point spring (5).

The temperature of the medium creates a pressure in the temperature sensor. This pressure is transferred to an operating bellows (23) through a capillary tube (24) where it is converted into a positioning force. This force moves the valve plug (3) over the coupling rod (8), dependent on the force of the spring (21) loaded by the set point adjuster (22).

The largest signal is always used to control the regulator.

Legend for Fig. 1

1	Valve body
1.1	Connection nut with seal and welding end
1.2	Restriction
2	Seat
3	Guide nipple with plug section
4	Plug stem
5	Valve spring
6	Actuator
6.1	Operating diaphragm
6.2	Diaphragm plate
7	Housing screws
8	Coupling rod
10	Coupling nut
11	Control line
12	Set point screw (flow rate)
13	Lock nut
14	Cap
20	Control thermostat
21	Spring
22	Set point adjuster (temperature)
23	Bellows with actuator stem
24	Capillary tube
25	Temperature sensor

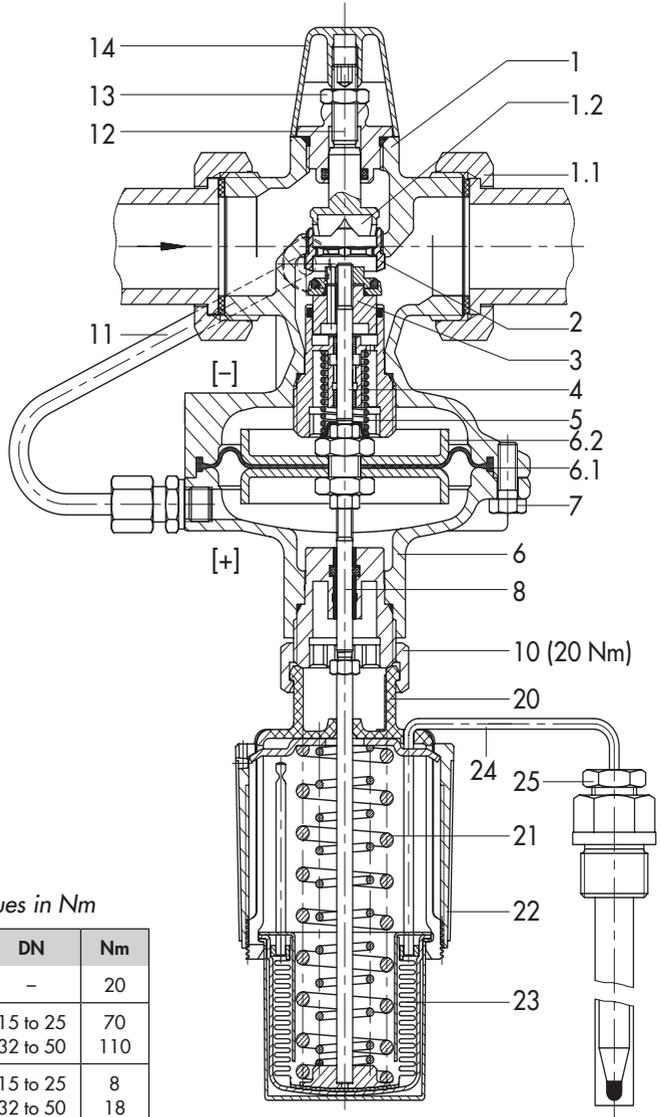


Table 1: Tightening torques in Nm

Position	DN	Nm
Coupling nut (10)	-	20
Plug section (3)	15 to 25	70
	32 to 50	110
Body screws (7)	15 to 25	8
	32 to 50	18

Fig. 1: Functional diagram of Type 2469/2430, DN 32 to 50

5 Installation

5.1 Mounting orientation

See Fig. 1 on page 7.

Standard installation · Install the regulators in horizontal pipelines with the actuator with control thermostat facing down.



! NOTICE

Incorrectly installed regulator

The regulator can be damaged.

- Make sure the regulator is installed free of stress. Observe permissible mounting position.

The regulator in valve sizes DN 15 to 25 can also be installed in vertical pipes. Actuator with control thermostat face sideways.

The following generally applies:

- Choose a place of installation that allows you to freely access the regulator even after the entire plant has been completed.
- Install a strainer (e.g. SAMSON Type 1 N/NI) upstream of the regulator.
- The direction of flow must match the direction indicated by the arrow on the body.
- Use the included connection nuts with welding ends to connect the regulator.

! NOTICE

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

Do not install the device 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.

5.2 Strainer

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 1 N/NI Strainer is suitable (► T 1010).

- Do not use the strainer to permanently filter the process medium.
- 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 downward.
- Remember to leave enough space to remove the filter element.

5.3 Shut-off valve

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

5.4 Pressure gauges

Install a pressure gauge at a suitable point to monitor the pressures prevailing in the plant.

5.5 Thermometer

To check the adjusted temperature set point, install a thermometer immersed in the medium to be controlled near the sensor.

5.6 Installing the temperature sensor

i Note

Details on the Type 2430 Control Thermostat can be found in the *Mounting and Operating Instructions* ► EB 2430.

The temperature sensor can be installed in any position as required. Its entire length must be immersed in the medium. Select a place of installation where overheating and noticeable idle times will not occur.

- ➔ Weld a welding socket with G ½ female thread (for a sensor with 9.5 mm diameter) or G ¾ female thread (for a sensor with 16 mm diameter) at the place of installation.

- ➔ Seal the screw gland or thermowell in the welded-in socket.
- ➔ Insert the sensor and tighten it with the clamping screw.

! NOTICE

Risk of contact corrosion due to the use of different materials.

On installing the sensor or thermowell, only use similar materials (e.g. stainless steel with stainless steel or copper together with other copper materials).

This prevents material damage due to contact corrosion.

5.7 Capillary tube

The capillary tube must be run in such a way that it cannot be damaged. The smallest permissible bending radius is 50 mm. Roll up excess capillary tube to form a ring. Do not bend or shorten the tube. The temperature at the tube must not exceed the permissible ambient temperature range. The ambient temperature must remain constant.

5.8 Assembling the valve and control thermostat

Place the control thermostat on the connection on the actuator. Tighten the coupling nut (10) with 20 Nm tightening torque.

6 Operation

See Fig. 1 on page 7.

6.1 Start-up

- Do not start up the regulator until all parts have been mounted.
- Open the shut-off valves slowly over a time period of several minutes starting from the upstream pressure side. Afterwards, open all the valves on the consumer side (downstream of the regulator).

i Note

On filling the plant, make sure the restriction (1.2) is open by turning the set point screw (12) counterclockwise (↺) as far as it will go.

Pressure testing of the plant · All plant components must be designed for the test pressure. Remove the regulator from the pipeline, if necessary.

! NOTICE

Impermissible excessive pressure.
*The diaphragm actuator can be damaged. The pressure at the actuator must not exceed the **nominal pressure by 1.5 times** on testing the pressure of the plant when the regulator is already installed.*

Rinsing the plant · After filling the plant, first completely open the consumers. Set the maximum flow cross-section by turning the set point screw (12) counterclockwise (↺) as far as it will go. 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.

6.2 Adjusting the set point

6.2.1 Flow rate

Make sure all control and shut-off valves or a bypass valve in the plant are fully open.

- Unscrew cap (14) and undo lock nut (13). Turn set point screw (12) clockwise ↻ using a 4 mm Allen key (SW 4) as far as it will go to open the restriction (1.2).

i Note

The required number of turns of the set point screw is based on a closed restriction.

- Refer to the diagram (Fig. 2) to find out how many turns are required to set the flow rate.
- Turn set point screw (12) counterclockwise ↺ by the required number of turns.

The adjustable set point range is written on the regulator's nameplate. Various set point ranges are available for DN 15 (see Table 2).

For exact adjustment, verify adjusted value with a heat or flow meter.

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

Retighten the lock nut (13) and screw the cap

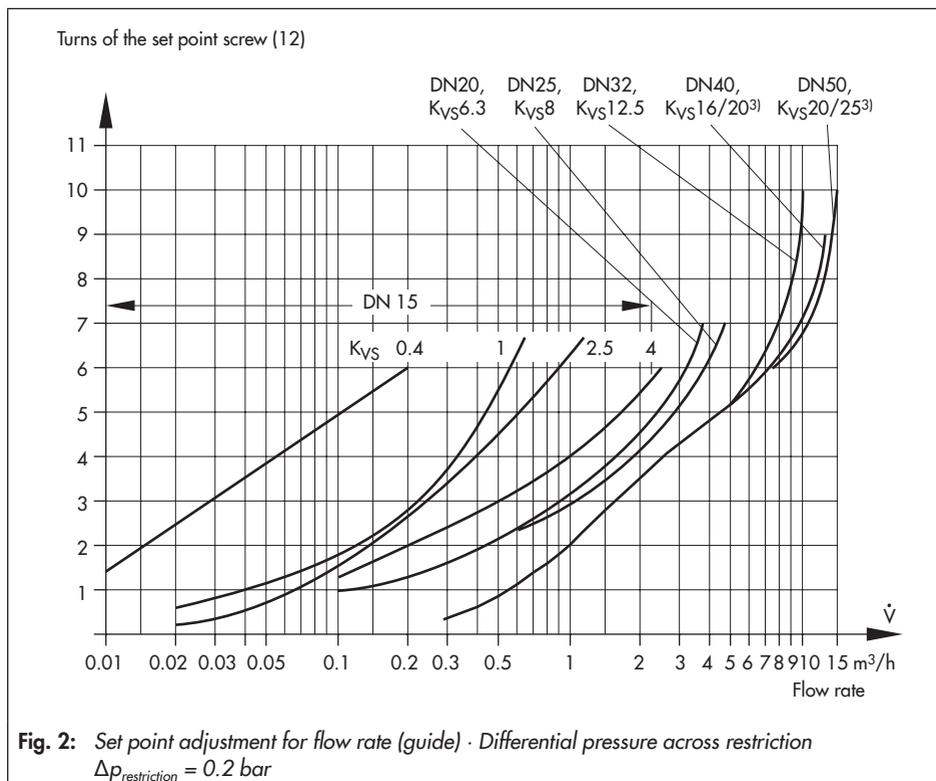
(14) back on after the required flow rate is reached. For the special version with a scaled cap, the set point can be adjusted directly using the scaled cap. One scale division corresponds to one turn of the set point screw.

- ➔ Turn clockwise ☺:
Lower temperature.
- ➔ Turn counterclockwise ☹:
Higher temperature.

The adjusted set point can be lead-sealed at the hole in the set point adjuster.

6.2.2 Temperature

Adjust the set point by turning the black plastic ring (set point adjuster, 22) while watching the reference thermometer.



Maintenance and replacing parts

Table 2: Flow rate set point ranges for water in m³/h

Valve size	DN 15				DN 20	DN 25	DN 32	DN 40 ¹⁾	DN 50 ¹⁾
K _{V5} coefficient	0.4 ²⁾	1 ²⁾	2.5	4 ²⁾	6.3	8	12.5	16/20 ³⁾	20/25 ³⁾
Flow rate set point range in m ³ /h	0.01 to 0.2	0.02 to 0.64	0.2 to 1.2	0.1 to 2.5	0.1 to 3.6	0.1 to 4.2	0.3 to 10	0.4 to 12.5	0.4 to 15

¹⁾ Also as version with flanged valve body

²⁾ Special version

³⁾ K_{V5} coefficient with flanged valve body

6.3 Decommissioning

Preferably close first the shut-off valve on the upstream side of the valve and then on the downstream side of the valve.

6.4 Disposal



We are registered with the German national register for waste electric equipment (stiftung ear) as a producer of electrical and electronic equipment, WEEE reg. no.: DE 62194439

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

i Note

We can provide you with a recycling passport according to PAS 1049 on request. Simply e-mail us at aftersaleservice@samsongroup.com giving details of your company address.

Tip

On request, we can appoint a service provider to dismantle and recycle the product.

7 Maintenance and replacing parts

See Fig. 1 on page 7.

The regulator does not require any 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.

Details on faults and how to remedy them can be found in Table 3. If faults cannot be

remedied following the recommended action, contact SAMSON.

If the valve does not close tightly, this may be caused by a dirty seat and plug or due to wear.

If the flow rate deviates considerably from the adjusted set point, e.g. rapidly increasing flow rate, check the operating diaphragm for ruptures and replace it, if necessary.

To replace the plug and operating diaphragm, proceed as described in section 7.1 and 7.2.

WARNING

Before performing any work on the regulator, make sure the relevant plant section has been depressurized and, depending on the process medium, drained. 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.

7.1 Cleaning or replacing the plug

1. Remove the device from the pipeline
2. Unscrew the control line (11).
3. Unscrew the screws (7). Remove the bottom diaphragm case together with the operating diaphragm (6.1) and diaphragm plate.
4. For valve sizes DN 15 to 25, unscrew and pull out the guide nipple with plug section (3) using a socket wrench (item no. 1280-3001).
5. For valve sizes DN 32 to 50, unscrew the stopper first and pull out the plug section.
6. Clean the seat and plug thoroughly. Check the control line for any blockages. If the plug is damaged, replace the entire plug section with a new one.

To reassemble, proceed in reverse order. Observe tightening torques specified in Table 1.

7.2 Replacing the diaphragm

See Fig. 1 on page 7.

1. Remove the device from the pipeline
2. Unscrew the control line (11).
3. Unscrew the screws (7). Remove the bottom diaphragm case together with the operating diaphragm (6.1) and diaphragm plate.
4. Replace the diaphragm together with the diaphragm plates with new ones.

To reassemble, proceed in reverse order. Observe tightening torques specified in Table 1.

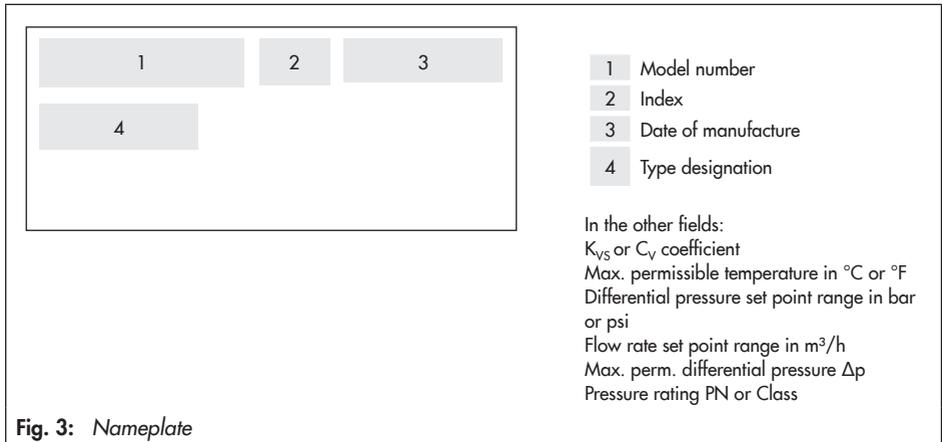
Maintenance and replacing parts

Table 3: Troubleshooting

Malfunction	Possible reasons	Recommended action
Flow rate		
Flow rate exceeds adjusted set point	Leak between seat and plug.	Remove valve from the pipeline and clean seat and plug. Renew plug, if necessary (see section 7.1). If this is not possible, return regulator to SAMSON for repair.
	Defective operating diaphragm	Replace diaphragm (see section 7.2) or return regulator to SAMSON for repair.
	Control line blocked	Remove control line and clean it.
	Valve too large for control task	Recalculate K_{VS} and contact SAMSON for further action.
Flow set point not reached.	Leak between seat and plug.	Remove valve from the pipeline and clean seat and plug. Renew plug, if necessary (see section 7.1). If this is not possible, return regulator to SAMSON for repair.
	Incorrect set point range selected.	Check set point range and contact SAMSON for further action.
	Plant differential pressure too low	Compare differential pressure in the plant with the plant's drag.
	Strainer blocked	Drain and clean filter of the strainer.
	Incorrectly installed valve (direction of flow).	Install the regulator in such a way that the flow of direction corresponds with the direction indicated by the arrow.
Control loop hunts.	Valve too large for control task	Recalculate K_{VS} and contact SAMSON for further action.
Temperature		
Temperature at the sensor does not reach the temperature set point or exceeds it.	Leak between seat and plug.	Remove valve from the pipeline and clean seat and plug. Renew plug, if necessary (see section 7.1). If this is not possible, return regulator to SAMSON for repair.
	Sensor installed in the wrong location.	Check whether the sensor is immersed in the medium with its entire immersion depth or whether it has been installed in a location where dead times may occur or heat accumulates.
	A safety device (STL or STM) has been triggered.	Check plant. Unlock safety device.
Temperature exceeds the set point.	Insufficient heating or cooling energy available	Draw up an energy balance.
	Control thermostat defective	Repair by SAMSON.

Control loop hunts.	Valve too large for control task	Recalculate K_{VS} coefficient. Notify SAMSON.
	Time constant too large for the control loop.	Fill the thermowell with thermal paste, remove thermowell or use sensor with smaller time constant.

8 Nameplate



9 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 aftersaleservice@samsongroup.com.

Addresses of SAMSON AG and its subsidiaries

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on our website (▶ www.samsongroup.com) 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 (so far as possible). See section 8:

- Device type and valve size
- Model number or material number
- Upstream and downstream pressure
- Temperature and process medium
- Min. and max. flow rate
- 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.)

10 Technical data

Valve size		DN 15				DN 20	DN 25	DN 32 ²⁾	DN 40 ²⁾	DN 50 ²⁾
K _{VS} coefficient	Body with screwed ends	0.4 ¹⁾	1 ¹⁾	2.5	4 ¹⁾	6.3	8	12.5	16/20	20/25
	Flanged body	-				-	-	12.5	20	25
x _{FZ} value	Body with screwed ends	0.6				0.55		0.5		0.45
	Flanged body	-							0.45	0.40
Pressure rating		PN 25								
Max. permissible differential pressure Δp across valve		20 bar						16 bar		
Max. permissible temperature		Liquids 150 °C								
Conformity		CE · EAC								
Flow rate set point ranges in m³/h										
Type 2469/... with differential pressure across restriction of 0.2 bar	0.01 to 0.2	0.02 to 0.64	0.2 to 1.2	0.1 to 1.3 ³⁾	0.1 to 2.3 ³⁾	0.1 to 3.5 ³⁾	0.3 to 5.8 ³⁾	0.4 to 9.1 ³⁾	0.4 to 14.1 ³⁾	
				0.1 to 2.5	0.1 to 3.6	0.1 to 4.2	0.3 to 10	0.4 to 12.5	0.4 to 15	

1) Special versions

2) Additional version: valve with flanged body made of spheroidal graphite iron (EN-GJS-400-18-LT)

3) An increase in noise level can be expected when the specified flow rate is exceeded, even if cavitation does not occur (see AGFW (German District Heating Association) document FW 514).

The minimum required differential pressure Δp_{min} across the valve is calculated as follows:

$$\Delta p_{\min} = \Delta p_{\text{restriction}} + \left(\frac{\dot{V}}{K_{VS}} \right)^2$$

Δp_{min} Minimum differential pressure across the valve in bar

Δp_{restriction} Differential pressure created at the restriction for measuring the flow rate

\dot{V} Adjusted flow rate in m³/h

K_{VS} Valve flow coefficient in m³/h

Table 4: Control thermostats

Type 2430 Control Thermostat		
Set point range	Continuously adjustable: 0 to 35, 25 to 70, 40 to 100, 50 to 120 or 70 to 150 °C	
Permissible ambient temperature range	-20 to 80 °C	
Max. perm. temperature at the sensor	50 K above the adjusted set point	
Max. perm. pressure at sensor	40 bar	
Capillary tube	2 m (5 m as special version)	
Type Safety Thermostat	2403 (STM)	2439 (STL)
Adjustment range of limit value	60 to 75 °C · 75 to 100 °C · 100 to 120 °C	10 to 95 °C · 20 to 120 °C
Max. permissible ambient temperature	50 °C	80 °C (with electric signal transmitter 60 °C)
Max. perm. temperature at the sensor	25 K above the adjusted set point	20 K above the adjusted set point
Max. permissible pressure at sensor with thermowell	40 bar	40 bar
Capillary tube	5 m	2 m (5 m as special version)

⚠ WARNING

Medium temperatures below 0 °C may cause ice to form on the regulator, depending on the air humidity. This may affect, in particular, the functioning of the coupling rod guide or set point adjuster. This must be prevented on site by taking appropriate precautions (e.g. enclosure, trace heater etc.).

In principle, the materials are also resistant to high concentrations of glycol. Nevertheless, glycol reacts when it comes into contact with metals and causes acids to form. We cannot prevent this reaction. Therefore, plant operators must prevent it by using suitable inhibitors.

11 Dimensions and weights

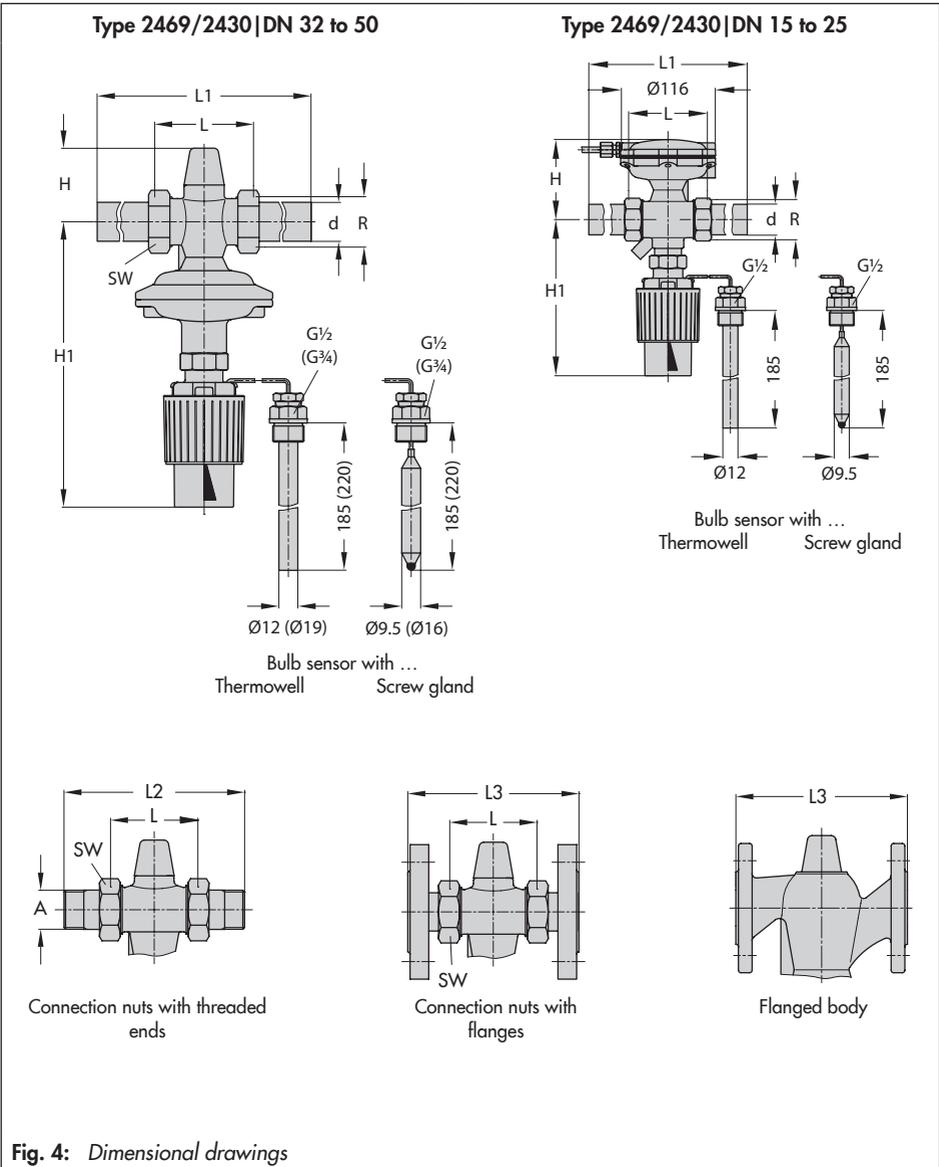


Table 5: Regulators *without* connecting parts · Dimensions in mm

Valve size	DN 15	DN 20	DN 25	DN 32 ¹⁾	DN 40 ¹⁾	DN 50 ¹⁾
Pipe Ø d	21.3	26.8	32.7	42	48	60
Connection R	G ¾	G 1	G 1¼	G 1¾	G 2	G 2½
Width across flats SW	30	36	46	59	65	82
Length L	65	70	75	100	110	130
H	85					
H1	280			265	295	

¹⁾ Additional version: Valve with flanged body made of spheroidal graphite iron

Table 6: Regulator *with* connecting parts · Dimensions in mm and weights

Valve size	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
With welding ends						
L1	210	234	244	268	294	330
Weight, approx. kg	2.5	2.6	2.7	3.8	6.5	7.0
With threaded ends						
L2	129	144	159	192	206	228
Male thread A	G ½	G ¾	G 1	G 1¼	G 1½	G 2
Weight, approx. kg	2.5	2.6	2.7	3.8	6.5	7.0
With flanges ^{1) 2)} or with flanged body (DN 32 to 50)						
L3	130	150	160	180	200	230
Weight, approx. kg	3.9	4.6	5.2	7.0	10.5	12

¹⁾ PN 16/25

²⁾ Flanges are already mounted on valves in DN 40 and 50

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