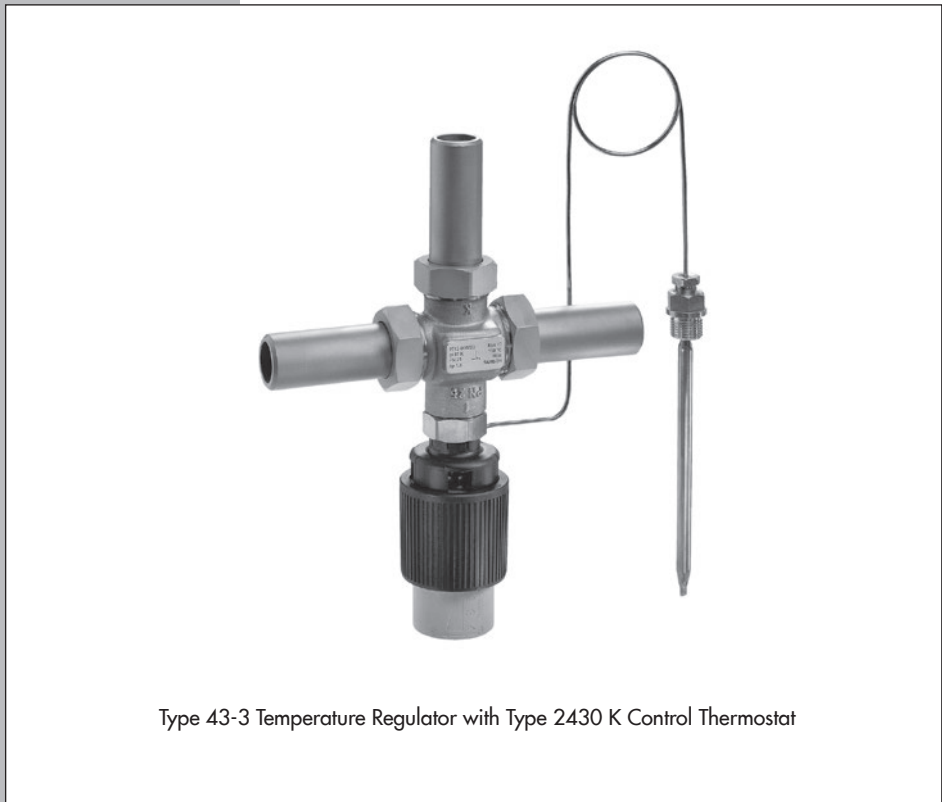


# Series 43 Temperature Regulators

## Type 43-3



Type 43-3 Temperature Regulator with Type 2430 K Control Thermostat

## Mounting and Operating Instructions

**EB 2173 EN**

Edition June 2016



**Note:**

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

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

**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 97/23/EC. The declaration of conformity issued for a regulator bearing the CE marking includes information on 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 temperature 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.

## 2 Process medium and scope of application

Temperature regulators for mixing and diverting <sup>1)</sup> service in heating or cooling installations  
Temperature set points from **0** to **150 °C** · Valves **G ½** to **G 1** female thread · **DN 15** to **50**  
with welding ends, threaded ends, or flanges · Nominal pressure **PN 25** · Suitable for liquids  
up to **150 °C**

<sup>1)</sup> Diverting service only with male thread to attach welding ends, threaded ends, or flanges

### 2.1 Transportation and storage

The devices must be carefully handled, transported, and stored. Protect the devices against adverse influences, such as dirt, moisture, or temperature outside the permissible ambient temperature range from **-20** to **+80 °C**.

## 3 Design and principle of operation

See Fig. 1.

The regulators consists of an unbalanced Type 2433 K Three-way Valve with the Type 2430 K Thermostat attached to it.

The valve consists of the valve body designed either as a mixing or diverting valve and the plug with plug stem.

The thermostat consists of the operating bellows, set point spring, capillary tube, and temperature sensor.



**Note:**

*Details on the Type 2430 K Thermostat with a temperature sensor working according to the vapor pressure principle ► EB 2430-3.*

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The regulators consist of a three-way valve made of red brass and a control thermostat with set point adjuster, capillary tube, and temperature sensor.

The Type 2430 K Thermostat is attached to the valve body using the coupling nut.

The temperature regulators work according to the adsorption principle.

The temperature of the controlled medium creates a pressure in the sensor which is proportional to the measured temperature. This pressure is transferred through the capillary tube (11) to the operating element (12) and converted into a positioning force.

This force acts on the operating bellows (9) and the pin of the operating element (10) which moves the plug stem and plug (3). By turning the set point adjuster (8), the point of response is changed over the spring (7). As a result, the valve plug moves through its travel range within a higher or lower temperature range measured by the sensor.

Depending on its plug arrangement, the three-way valve is either used for mixing or diverting service.

In mixing valves, the process media to be mixed enter at valve ports A and B. The combined flow exits the valve at port AB. When the temperature rises, port A opens and port B closes.

In diverting valves, in contrast, the process medium enters at the valve port AB and the partial flows exit at ports A and B. When the temperature rises, port A closes and port B opens.

### 3.1 Version with safety thermostat

When a Type 2403 K Safety Thermostat is attached to the valve or the regulator, this combination functions as a safety temperature monitor (STM) or a temperature regulator with safety temperature monitor (TR/STM).

Details in Data Sheet ► T 2183 and Mounting and Operating Instructions ► EB 2183.

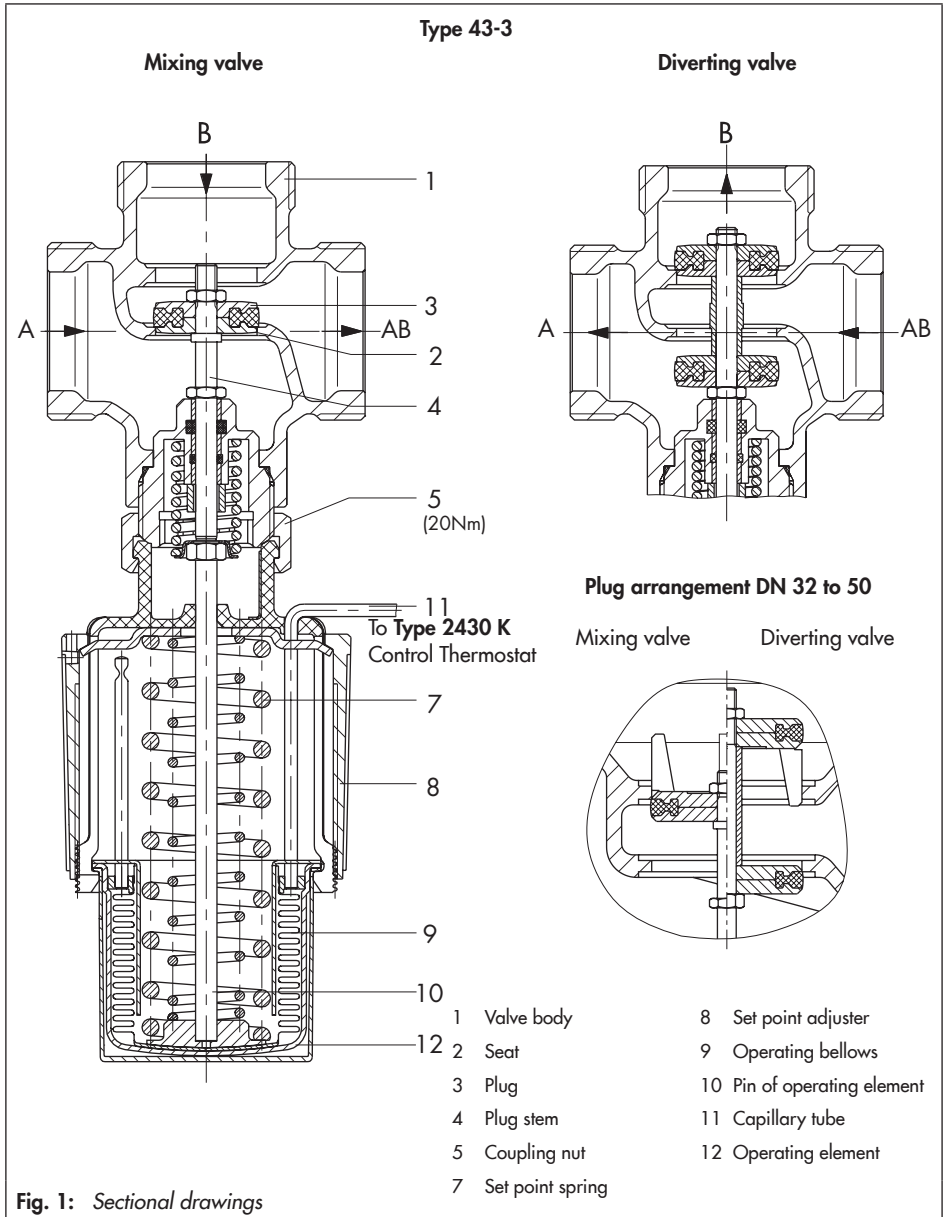
When a Type 2439 K Safety Thermostat is attached, this version functions as a safety temperature limiter (STL). Details in Data Sheet ► T 2185 and Mounting and Operating Instructions ► EB 2185.

#### Tested safety equipment (according to DIN EN)



**Note:**

A SAMSON *thermowell* must be used when a sensor in versions tested according to DIN EN is used with a *thermowell*.



## 4 Installation

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

Make sure that the permissible ambient temperature does not fall below  $-20\text{ }^{\circ}\text{C}$  or exceed  $+80\text{ }^{\circ}\text{C}$ .

### 4.1 Installing the valve

Flush the pipeline thoroughly before installing the regulator to ensure that any sealing parts, weld spatter, and other impurities carried along by the process medium do not impair the proper functioning of the valve, above all the tight shut-off.

#### ! NOTICE

*Malfunction and damage due to adverse effects of weather conditions (temperature, humidity).*

*Do not install the temperature 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.*

- Install the valve free of stress and with the least amount of vibrations as possible.
- The flow of direction must correspond with the direction indicated by the arrow on the valve body.

- The control thermostat must be suspended to hang downward. Other mounting positions are possible for temperatures up to  $110\text{ }^{\circ}\text{C}$ .
- Make sure that the inlet and outlet flows of the plant are correctly assigned to ports A, B and AB according to Fig. 2.

### 4.2 Temperature sensor

#### ! NOTICE

*Galvanic corrosion due to incorrectly selected materials of the mounting parts.*

*On installing the sensor or thermowell, only combine the same kind of materials (e.g. stainless steel with stainless steel or copper together with other copper materials).*

The temperature sensor may be installed in any position even when a thermowell is used. However, make sure its entire length is immersed in the process medium to be controlled. It must be installed in a location where overheating or considerable idling times cannot occur.



#### Note:

*If the sensor is to be used with a thermowell, only use original SAMSON thermowells.*

Weld a welding socket with G  $\frac{1}{2}$  or G  $\frac{3}{4}$  female thread (to match the screw gland) at the place of installation.

→ Seal the screw gland of the sensor.



### Installation with thermowell

When a thermowell is used, a welding socket with G 1/2 or G 3/4 female thread (to fit the thermowell) must be used.

- Seal the thermowell into the welding socket. Insert the sensor and tighten it with the clamping screw.



**Note:**

For temperature regulators with safety temperature limiter (TR/STL), install the sensor of the limiter near the sensor of the regulator.

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### 4.2.1 Capillary tube

Carefully run the capillary tube without bending or twisting it. Avoid locations with considerable ambient temperature fluctuations along the entire length of the tube.



**Note:**

Do not damage or shorten the capillary tube. Roll up any capillary tube that is not used. The smallest permissible bending radius is 50 mm.

---

### 4.3 Strainer (filter)

Install the strainer upstream of the temperature regulator.

- The flow of direction must correspond with the direction indicated by the arrow on the body.
- The filter element must be installed to

hang downward.



**Tip:**

Remember to leave enough space to remove the filter element for cleaning.

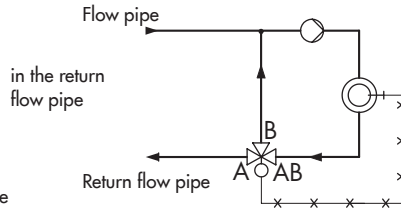
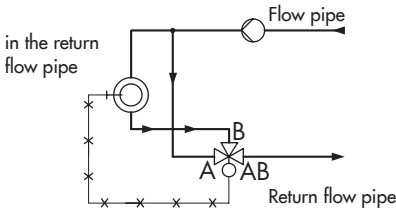
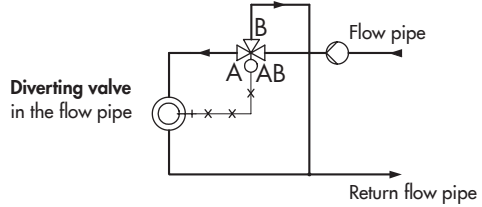
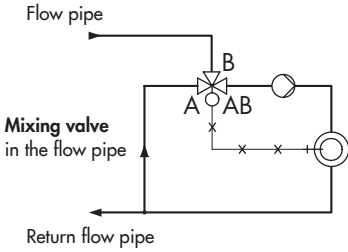
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### 4.4 Additional components

We recommend installing a hand-operated shut-off valve upstream of the strainer and downstream of the regulator in each pipe to be able to shut down the plant for cleaning and maintenance, and when the plant is not used for longer periods of time.

To check the adjusted set point, we recommend installing a thermometer immersed in the medium to be controlled near the sensor.

Heating



Cooling

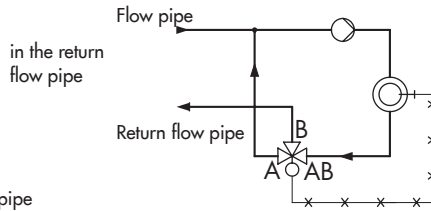
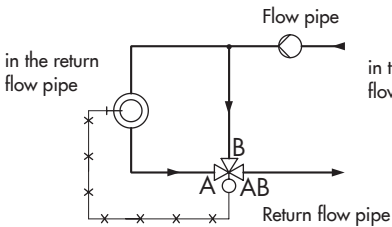
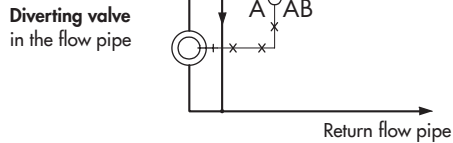
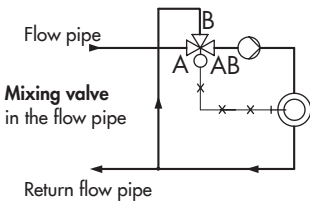


Fig. 2: Arrangement of Type 43-3 Temperature Regulator

## 5 Operation

See Fig. 1.

### 5.1 Start-up

- Put the temperature regulator into operation after mounting the valve and control thermostat.
- Fill the plant slowly with the process medium (without pressure surges).  
Slowly open the hand-operated shut-off valve downstream of the valve and then the shut-off valve upstream of the valve.
- Check the adjusted temperature set point at the thermometer installed near the temperature sensor.

### 5.2 Adjusting the set point

To adjust the set point, turn the black plastic adjuster (8) while watching the temperature at the reference thermometer.

- Turn clockwise (↻) to reduce the temperature
- Turn counterclockwise (↺) to increase the temperature

The adjustment diagrams (see Fig. 3) can be used as a guide to find the first approximate value.



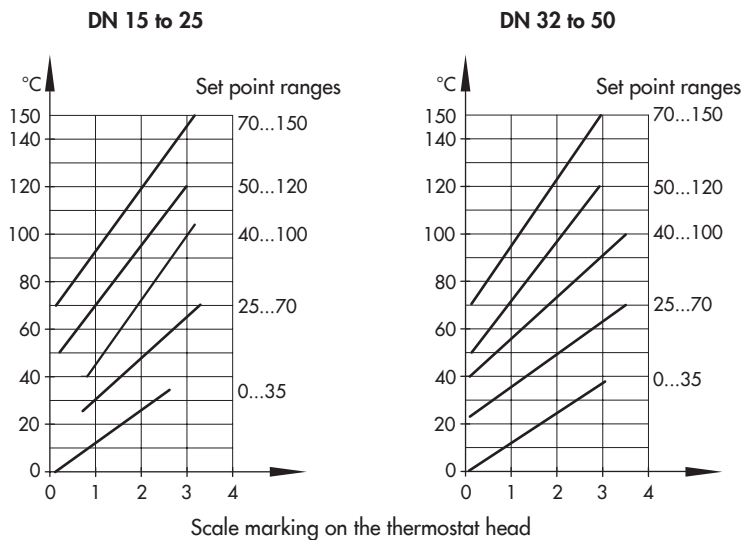
#### Tip:

Higher set point temperatures can be adjusted in increments as required. However, to lower the set point temperature, proceed in steps of 10 to 20 °C. When doing so, wait for the process medium to cool down before continuing. Watch the thermometer.

**Table 1:** Set point ranges

Set point range in °C	Set point change per turn	Sensor Ø
0 to 35 °C	2.5 °C	9.5 mm
	2 °C	16 mm
25 to 70 °C	3 °C	9.5 mm
	2 °C	16 mm
40 to 100 °C	4 °C	9.5 mm
	3 °C	16 mm
50 to 120 °C	4 °C	9.5 mm
	4.5 °C	16 mm
70 to 150 °C	4.5 °C	9.5 mm
	5 °C	16 mm

**Type 43-3**



**Fig. 3:** Adjustment diagrams

**Dynamic behavior of Type 2430 K Control Thermostat**

The dynamics of the regulator are mainly determined by the response of the sensor with its characteristic time constant.

The table shows the dynamic behavior of the Type 2430 K Thermostat measured in water.

**Table 2:** Dynamic behavior of Type 2430 K Thermostat

Type 2430 K	Sensor Ø	Time constant [s]	
		Without Thermowell	With Thermowell
Adsorption principle	9.5 mm	15 s	40 s
	16 mm	30 s	80 s
	Air sensor	8 s	- <sup>1)</sup>

<sup>1)</sup> Thermowell not possible

## 6 Maintenance

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

Depending on the operating conditions, check the regulator at regular intervals to avoid possible malfunctions.

If the temperature exceeds the value adjusted at the temperature sensor, possible causes for this are:

- The thermostat is defective due to excessive temperatures.
- Valve seat and plug are contaminated with dirt.
- Seat and plug leak due to natural wear.

Exceptional operating and installation conditions can lead to changed situations that may affect the control response and lead to malfunctions. In such cases, check the installation conditions, process medium, temperature, and pressure conditions.

## 7 Customer inquiries

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

Please send your inquiries to:  
aftersaleservice@samson.de

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

To assist diagnosis, specify the following details:

- Type and nominal size of the valve, Type ... Thermostat
- Configuration ID
- Upstream and downstream pressure
- Temperature and process medium
- Min. and max. flow rate in m<sup>3</sup>/h
- Is a strainer installed?
- Installation drawing showing the exact location of the regulator and all the additionally installed components (shut-off valves, thermometer, etc.)

## 8 Nameplate

SAMSON		2433 K
2713	1	2
3		4
5	7	6

### Explanations

- |                                |   |
|--------------------------------|---|
| 1 ID number + Index            | 5 Nominal pressure (valve)                          |
| 2 Date of manufacture          | 6 Max. permissible differential pressure $\Delta p$ |
| 3 $K_{VS}/C_V$ coefficient     | 7 Mixing/diverting valve (symbol)                   |
| 4 Max. permissible temperature |   |

Fig. 4: Nameplate




### 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](http://www.samson.de/chrome-en.html)

## 9 Technical data

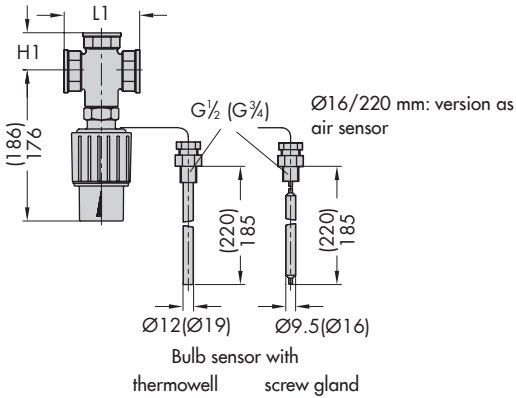
Type 2433 K Three-way Valve									
Connection	Female thread			Male thread					
Thread size	G ½	G ¾	G 1	–					
Nominal size	–			DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
Medium	Water · Oil								
K <sub>VS</sub> coefficient	4	6.3	8	4	6.3	8	10	12.5	16
Nominal pressure	PN 25								
Max. perm. differential pressure $\Delta p$ in bar									
Mixing valve									
$\Delta p$ when p in B > p in A	4.4	2.6	1.8	4.4	2.6	1.8	0.9	0.6	
$\Delta p$ when p in A > p in B	4.4	2.6	1.8	4.4	2.6	1.8	0.9	0.6	
Diverting valve									
$\Delta p$ when AB to A or B	4.4	2.6	1.8	4.4	2.6	1.8	0.9	0.6	
Max. permissible valve temperature	150 °C								
Type 2430 K Control Thermostat									
Set point range <sup>1)</sup>	Continuously adjustable: 0 to 35 °C, 25 to 70 °C, 40 to 100 °C, 50 to 120 °C or 70 to 150 °C								
Capillary tube	2 m (5 m as special version)								
Max. perm. temperature at sensor	50 K above the adjusted set point								
Perm. ambient temperature range	–20 to +80 °C <sup>2)</sup>								
Perm. pressure at sensor/thermowell	PN 25/PN 40								
Max. permissible temperature range of medium	0 to 150 °C (with separating piece: –15 to +150 °C)								
Compliance									

<sup>1)</sup> Further set point ranges on request

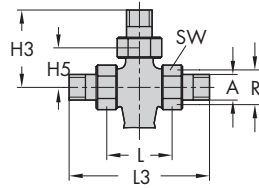
<sup>2)</sup> **NOTICE** Medium temperatures below 0 °C may cause ice to form on the valve, depending on the air humidity. This may affect, in particular, the functioning of the stem guide or set point adjuster. This must be prevented on site by taking appropriate precautions (e.g. enclosure, trace heater etc.).

## 10 Dimensions

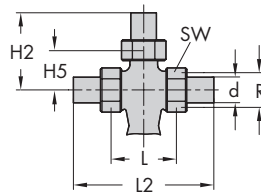
Type 43-3 · G 1/2, G 3/4, and G 1 connections



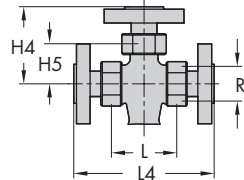
Type 43-3 · DN 15 to 50



Threaded ends



Welding ends



Flanges

The flanges are already mounted to the valve with flanges in DN 40 and 50.

Values in parentheses for DN 32 to 50

Fig. 5: Dimensions



## 10.1 Dimension tables

**Table 3:** Type 43-3 (G ½ to 1 | DN 15 to 50) · Dimensions in mm and weights in kg

Connection	G ½	G ¾	G 1	–		
Valve size	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
Pipe Ø d	21.3	26.9	33.7	42.4	48.3	60.3
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	120
L1	65	75	90	–		
H1	40			65	70	75
Weight <sup>1)</sup> , approx.	1.5 kg	1.6 kg	1.7 kg	2.7 kg	2.8 kg	3.7 kg
<b>Threaded ends, welding ends and flanges</b>						
H5	40			60	65	
<b>With threaded ends</b>						
L3	129	144	159	192	206	228
H3	72	77	82	100	108	114
Male thread A	G ½	G ¾	G 1	G 1¼	G 1½	G 2
Weight <sup>1)</sup> , approx.	2 kg	2.3 kg	2.5 kg	3.9 kg	4.2 kg	5.5 kg
<b>With flanges (PN 16/25)</b>						
L4	130	150	160	180	200	230
H4	70	80	85	100	105	120
Weight <sup>1)</sup> , approx.	4.1 kg	5.3 kg	6.3 kg	8.7 kg	10.2 kg	13 kg

<sup>1)</sup> Weights for version with bulb sensor and thermowell · Version without thermowell: minus 0.2 kg







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