

## T 2171 EN

### Type 43-1 and Type 43-2 Temperature Regulators

#### Series 43 Self-operated Temperature Regulators



#### Application

Regulators for district heating systems, heat generators, heat exchangers and other HVAC and industrial applications. Temperature set points from **0 to 150 °C** · Valves **G ½ to 1** · **DN 15 to 50** · Pressure rating **PN 25** · Suitable for liquids up to **150 °C** and non-flammable gases up to **80 °C** · The valves close as the temperature rises

#### Note

Typetested temperature regulators (TR), safety temperature monitors (STM) and safety temperature limiters (STL) are available.

#### Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Temperature sensor suitable for installation in any desired position and for operation at high excess temperatures (50 K above the set point), designed for operating pressures up to 40 bar (► EB 2430)
- Globe valves with plug balanced by a piston
- Particularly suitable for district heating supply networks
- Suitable for gases and liquids
- Special version: fast-responding thermostats for instantaneous water heater (► EB 2430-3)

#### Versions (Fig. 1 to Fig. 3)

The regulators consist of a valve and control thermostat with set point adjuster, a capillary tube and temperature sensor operating according to the adsorption principle. Valve body made of red brass, spheroidal graphite iron or stainless steel.

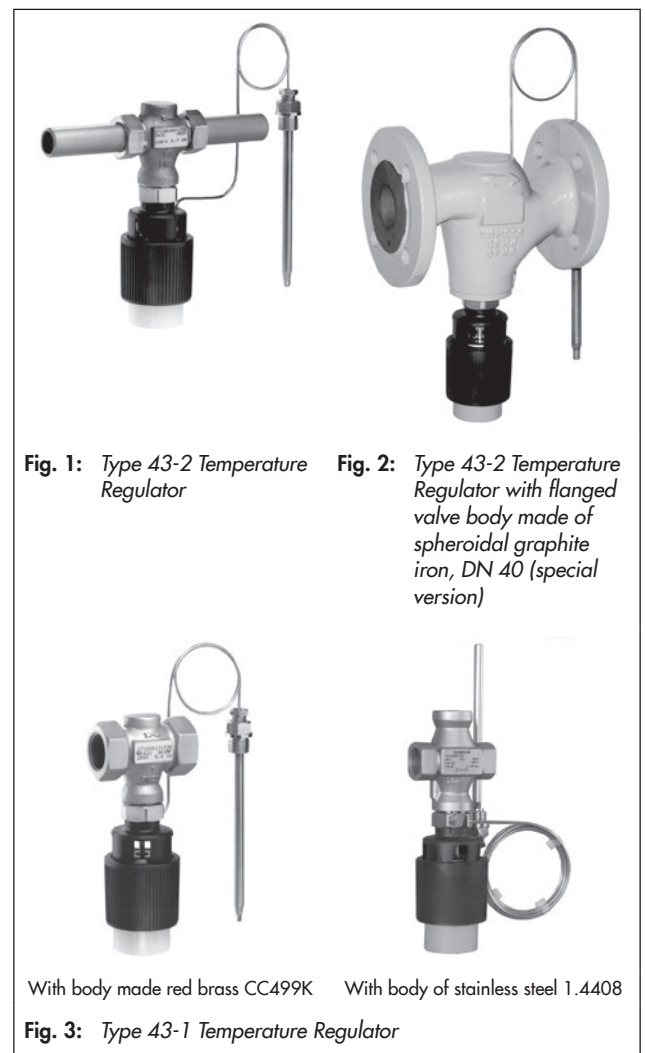
See Data Sheet ► T 2176 for versions with double adapter or manual adjuster for the attachment of additional control thermostats

- **Type 43-1** · Temperature regulator with Type 2431 Valve · G ½ to G 1 female thread · Type 2430 Control Thermostat · Sensor optionally with or without thermowell
- **Type 43-2** · Temperature regulator with Type 2432 Valve · DN 15 to 50 · With welding ends (special version with threaded ends, flanges or with flanged body) · Type 2430 Control Thermostat · Sensor optionally with or without thermowell

#### Typetested safety devices

The register number is available on request. The following versions are available:

Type 43-1 and Type 43-2 Temperature Regulators (TR) for which the maximum operating pressure must not exceed the



maximum permissible differential pressure  $\Delta p$  specified in the technical data. Only SAMSON thermowells can be used for sensors with thermowells.

Further details on the selection application of type tested equipment can be found in Information Sheet ▶ T 2181.

Additionally, the safety temperature monitors (STM) and safety temperature limiters (STL) are available. For more details refer to Data Sheets ▶ T 2183 and ▶ T 2185.

#### Accessories

- Thermowell made of:  
Copper, PN 40  
CrNiMo steel, PN 40
- Double adapter Do3 or manual adjuster Ba43
- Intermediate insulating piece for insulated pipes or medium temperatures down to  $-15\text{ }^{\circ}\text{C}$

#### Special versions

- 5 m capillary tube
- Small  $K_{VS}$  in DN 15 or G  $\frac{1}{2}$
- Oil-resistant internal parts
- Fast-response thermostats (▶ EB 2430-3) on request
- ANSI version (▶ T 2175)
- Stainless steel body for Type 43-1/G  $\frac{1}{2}$ , G  $\frac{3}{4}$  and G 1, DN 15 and 25
- Flanged valve body of EN-GJS-400-18-LT for Type 43-2 (DIN only)

#### Principle of operation (Fig. 4)

The temperature regulators work according to the adsorption principle.

The temperature of the medium creates a pressure in the sensor which is proportional to the measured temperature. This pressure is transferred through a capillary tube (11) to the operating element (9) and converted into a positioning force. Depending on the set point adjustment, the positioning force acts on the valve plug (3) over the pin of the operating element (10).

By turning the set point adjuster (8), the point of response is changed in such a way that allows the valve plug to pass through its travel in a temperature range measured by the sensor.

The regulators are suitable for plants to be heated. The valves close when the temperature rises and the temperature exceeds the adjusted set point.

#### Installation

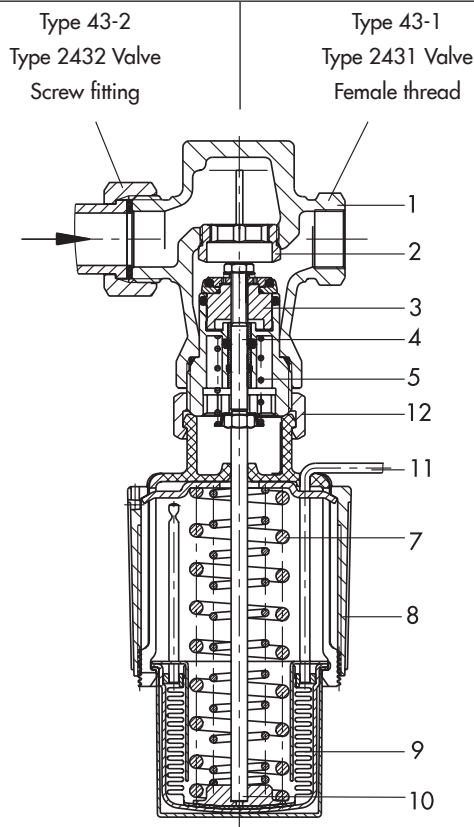
##### Valves

Install the regulators in horizontal pipelines. The control thermostat must be suspended to hang downward. Other mounting positions are possible for temperatures up to  $110\text{ }^{\circ}\text{C}$ .

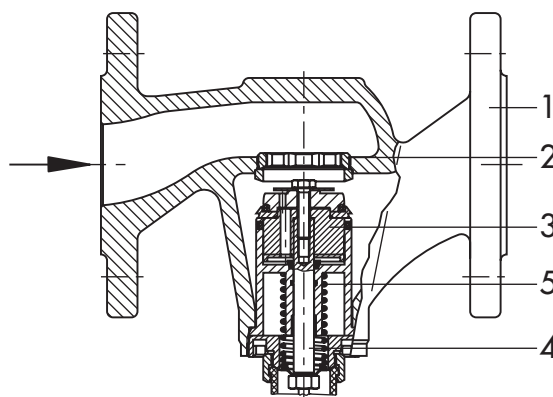
The regulator in valve sizes DN 15 to 25 can also be installed in vertical pipes. The ambient temperature at the site of installation must be at least 15 K below the adjusted set point at the set point adjuster of thermostat.

Installation conditions:

- The direction of flow must match the direction indicated by the arrow on the body
- If possible, install a strainer (e.g. SAMSON Type 1 NI) upstream of the valve.
- Further details can be found in ▶ EB 2171.



Type 43-1 and Type 43-2 Temperature Regulators  
The principle of operation of Type 2432 Valve (left) and Type 2431 Valve (right) is identical.



Type 43-2 · Flanged body made of spheroidal graphite iron (special version)

1	Valve body	8	Set point adjuster
2	Seat (exchangeable)	9	Operating element
3	Valve plug	10	Pin of operating element
4	Plug stem	11	Capillary tube to sensor
5	Valve spring	12	Coupling nut (connection valve/control thermostat)
7	Set point spring(s)		

Fig. 4: Functional diagram of Type 43-1 and Type 43-2

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

Type 2431 Valve (Type 43-1) · Type 2432 Valve (Type 43-2)						
<b>Type 43-1</b>	<b>G 1/2</b>	<b>G 3/4</b>	<b>G 1</b>	—		
K <sub>V5</sub> coefficient	3.6 <sup>1)</sup>	5.7	7.2	—		
<b>Type 43-2</b>	<b>DN 15<sup>4) 5)</sup></b>	<b>DN 20<sup>5)</sup></b>	<b>DN 25<sup>4) 5)</sup></b>	<b>DN 32<sup>5)</sup></b>	<b>DN 40<sup>5)</sup></b>	<b>DN 50<sup>5)</sup></b>
K <sub>V5</sub> coefficient	4.0 <sup>1)</sup>	6.3	8.0	12.5	16.0	20.0
Type 43-1 · Type 43-2						
Pressure rating	PN 25					
Max. perm. differential pressure Δp	20 bar			12 bar		
Max. permissible valve temperature	150 °C					
Type 2430 Control Thermostat						
Set point range <sup>2)</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 the sensor	50 K above the adjusted set point					
Permissible ambient temperature range	-20 to 80 °C <sup>3)</sup>					
Permissible pressure at sensor/thermowell	PN 25/PN 40					

<sup>1)</sup> Special version with K<sub>V5</sub> 0.4, 1.0 or 2.5

<sup>2)</sup> Further set point ranges on request

<sup>3)</sup> **Caution!** At temperatures below freezing: **ice formation** may **damage** the plant and especially the valve.

<sup>4)</sup> Flanged body of stainless steel (special version)

<sup>5)</sup> Flanged body of spheroidal graphite iron (special version)

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

Body	CC491K/CC499K (Rg 5) · EN-GJS-400-18-LT <sup>1)</sup>	Stainless steel 1.4408 <sup>2)</sup>
Valve seat	Stainless steel 1.4305	1.4404
Valve plug	1.4305 and brass, resistant to dezincification, with EPDM soft seal <sup>3)</sup>	1.4404
Valve spring	Stainless steel 1.4310	
Set point adjuster	PTFE, glass fiber reinforced	
Temperature sensor	Capillary tube	Copper
	Thermowell	Copper or stainless steel

<sup>1)</sup> Special version as flanged valve (Type 43-2) · DIN only

<sup>2)</sup> Special version for Type 43-1 as well as flanged valve (Type 43-2)

<sup>3)</sup> Special version for oils (ASTM I, II, III): FKM soft seal

### Capillary tube

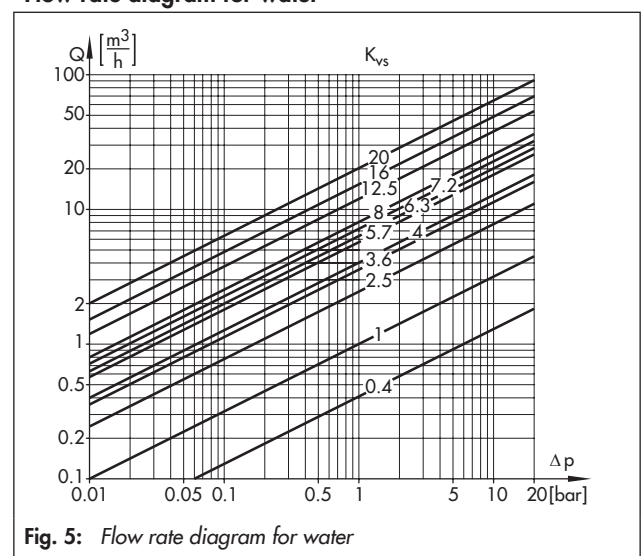
The capillary tube must be run in such a way that the ambient temperature range cannot be exceeded, any deviations in temperature cannot occur and that the tube cannot be damaged. The smallest permissible bending radius is 50 mm.

### Temperature sensor

The temperature sensor can be installed in any position as required. 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.

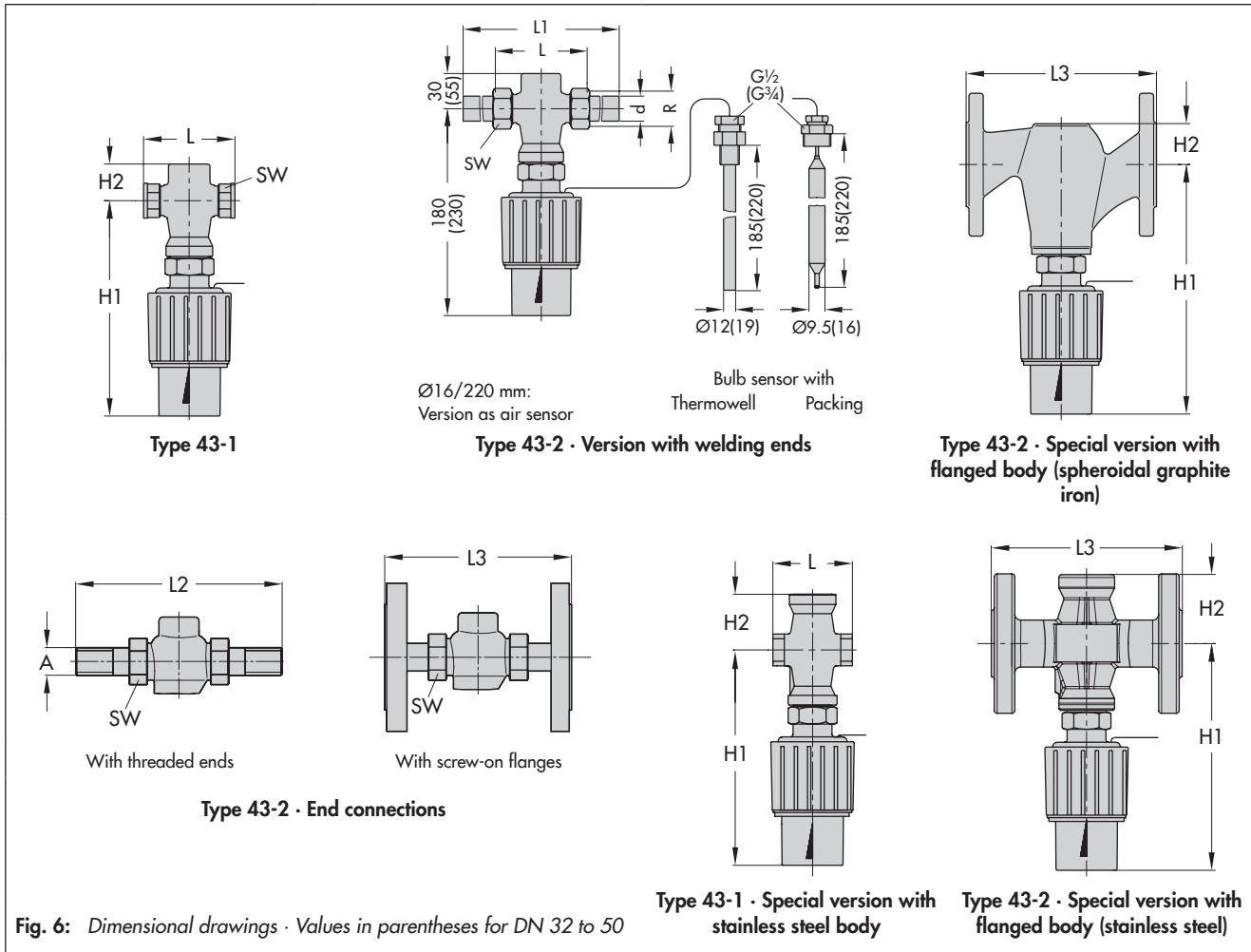
Only the combination of the same kind of materials is permitted, e.g. a stainless steel heat exchanger with thermowells made of stainless steel 1.4571.

**Flow rate diagram for water**



**Fig. 5:** Flow rate diagram for water

## Dimensions



**Table 3: Dimensions in mm and weights in kg**

Type 43-1 Temperature Regulator						
Connection	G ½	G ¾	G 1			
Length L	65	75	90			
Height H1	180					
Height H2	30 · 46 <sup>4)</sup>					
Weight <sup>1)</sup> , approx. kg	1.4	1.5	1.6			
Width across flats SW	34	34	46			
Type 43-2 Temperature Regulator						
Valve size	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
Pipe Ø d	21.3	26.8	32.7	42.0	48.0	60.0
Thread size 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
Height H1	DN 15 to 25		180			
	DN 32 to 50		230			
Height H2	DN 15 to 25		30 · 46 <sup>4)</sup>			
	DN 32 to 50		55 · 46 <sup>4)</sup>			
L1 with welding ends	210	234	244	268	294	330
Weight <sup>1)</sup> , approx. kg	1.7	2.0	2.3	4.4	5.1	5.9
Connection nuts with threaded ends						
Length L2	129	144	159	180	196	228
Male thread A	G ½	G ¾	G 1	G 1¼	G 1½	G 2
Weight <sup>1)</sup> , approx. kg	1.7	2.0	2.3	4.4	5.1	5.9
With connection nuts and flanges <sup>2)</sup> (PN 16/25)						
Length L3	130	150	160	180	200	230
Weight <sup>1)</sup> , approx. kg	3.1	4.0	4.8	7.6	9.1/9.8 <sup>3)</sup>	11.0/14.1 <sup>3)</sup>

<sup>1)</sup> Version without thermowell: minus 0.2 kg

<sup>3)</sup> Flanged body

<sup>2)</sup> Valve also with flanged body

<sup>4)</sup> Flanged valve body of stainless steel 1.4408

## Special version: vapor pressure thermostats

Fast-responding temperature regulators

### Application

The temperature sensors operating according to the vapor pressure principle are particularly suitable for use in plate heat exchangers <sup>1)</sup> due to the fast response time of approx. 3 s.

Temperature set points from 45 to 65 °C (55 to 75 °C) <sup>2)</sup> · Type 2430 Control Thermostat in combination with Type 2431 Valve (Type 43-1) or Type 2432 Valve (Type 43-2) · G ½ to G 1 · DN 15 to DN 50 · Pressure rating PN 25 · Copper or CrNiMo steel sensor · Observe mounting position of the sensor.

<sup>1)</sup> Versions for plate heat exchangers on request

<sup>2)</sup> Special version

### Principle of operation

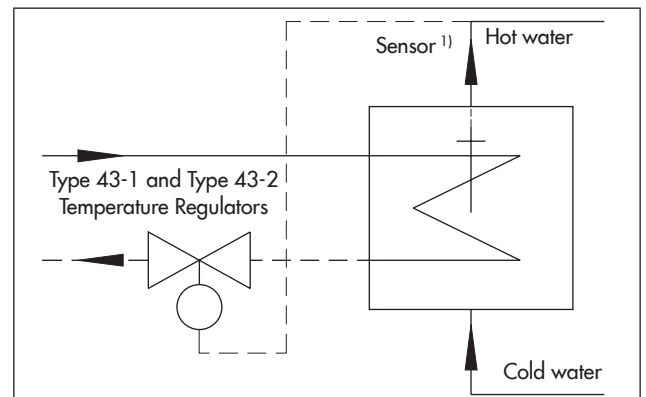
Types 43-1 and 43-2 Temperature Regulators with a sensor operating according to the vapor pressure principle.

The temperature sensor is partly filled with a liquid which evaporates depending on the temperature. As a result, a pressure in proportion to the temperature is created in the sensor. This pressure is transmitted to the operating bellows through the capillary tube and converted into a positioning force. This force moves the valve plug depending on the set point adjustment.

### Installation

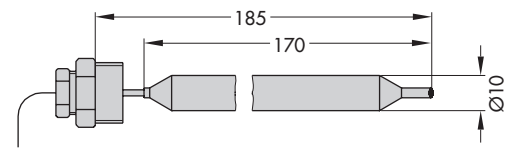
To fully use the fast response behavior of the sensor (vapor pressure), the sensor must also be installed at the best possible location. In instantaneous water heater, this location is directly upstream of the outlet where the heated water flows out of the heat exchanger and upstream of the inlet where the hot water flows into the heat exchanger (see Fig. 7).

- The ambient temperature must be at least 1.5 K below the adjusted set point at the set point adjuster of thermostat.

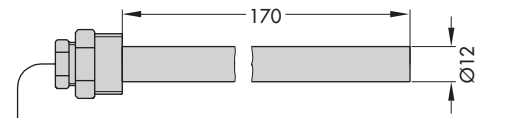


**Fig. 7:** Thermostat (vapor pressure) installed in a coaxial heat exchanger (installation example)

<sup>1)</sup> See Fig. 8



Type 2430 Thermostat (vapor pressure) · 45 to 65 °C · Copper  
Configuration ID: 1045853, 1067861, 1045883, 1072710



Type 2430 Thermostat (vapor pressure) · 45 to 65 °C · CrNiMo steel  
Configuration ID: 1058730, 1109125

**Fig. 8:** Dimensions

- The mounting position of the sensor depends on the version (see Table 4).
- Only combine the same kind of materials, e.g. stainless steel heat exchanger with stainless steel thermowell.
- Installation only **without** thermowell.

**Table 4:** Mounting position and materials

Type 2430 Thermostats (vapor pressure) · 45 to 65 °C						
Plate heat exchanger <sup>1)</sup>	Configuration ID	1058730		1109125		
	Sensor mounting position	Horizontal	•			
		Tip pointing down	–			
		Tip pointing up	–			
	Sensor material	CrNiMo steel	•			
	Sensor connection, screw gland	G ½		Without		
Capillary tube length	2 m					
Shell-and-tube or coaxial heat exchangers	Configuration ID	1045853	1067861	1045883	1072710	
	Sensor mounting position	Horizontal	•	•	•	•
		Tip pointing down	–	–	•	•
		Tip pointing up	•	•	–	–
	Sensor material	Copper	•	–	•	–
		CrNiMo steel	–	•	–	•
	Sensor connection, screw gland	G ½				
Capillary tube length	2 m					

<sup>1)</sup> Type 43-8, with instantaneous plate heat exchangers

**Ordering text****Type 43-1** Temperature Regulator

G ...

Set point range ...°C

Stainless steel or red brass body

Optionally, special version

Optionally, accessories ...

**Type 43-2** Temperature Regulator

DN ...

with welding ends, threaded ends or with flanged body

Set point range ...°C

Optionally, special version

Optionally, accessories ...