

# Series 43 Self-operated Temperature Regulators

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



ANSI version

### Application

Set points from **30 to 300 °F** (0 to 150 °C) with valves  $\frac{1}{2}$  NPT to **1 NPT** as well as **NPS  $\frac{1}{2}$  and 1** · Pressure rating **Class 150/300** · Suitable for gases up to **175 °F** (80 °C), liquids up to **300 °F** (150 °C)

The valves **close** when the temperature rises.



Regulators for district heating systems, heat generators, heat exchangers and other HVAC and industrial applications.

### 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 of 120 °F (50 °C) above the set point, designed for operating pressures up to 580 psi (40 bar)
- Spring-loaded, single-seated valve without pressure balancing or plug balanced by a bellows
- Particularly suitable for district heating supply networks
- Suitable for gases and liquids
- Compact design with particularly low overall height
- Valve body made of stainless steel

### Version (Fig. 1)

The regulator consists of a valve and a control thermostat with set point adjuster, capillary tube and temperature sensor operating according to the adsorption principle.

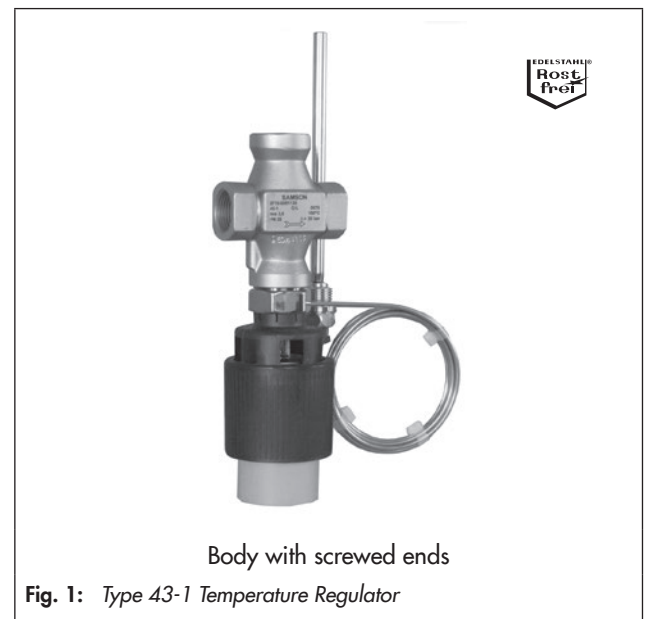
See Data Sheet ▶ T 2176 for versions with double adapter or manual adjuster for the attachment of additional control thermostats

### Type 43-1

- Temperature regulator with Type 2431 Valve
- Type 2430 Control Thermostat
- Body made of stainless steel (A351 CF8M) with screwed ends ( $\frac{1}{2}$  NPT,  $\frac{3}{4}$  NPT and 1 NPT female thread), Class 300
- Sensor optionally with or without thermowell

### Type 43-2

- Temperature regulator with Type 2432 Valve
- Type 2430 Control Thermostat
- Flanged valve body made of stainless steel (A351 CF8M) · NPS  $\frac{1}{2}$  and 1, Class 150
- Sensor optionally with or without thermowell



Body with screwed ends

Fig. 1: Type 43-1 Temperature Regulator

### Additionally, the following are available:

- Safety temperature monitors (STM) and safety temperature limiters (STL). For more details refer to Data Sheets ▶ T 2183 and ▶ T 2185.
- Further details on the selection application of type-tested equipment can be found in Information Sheet ▶ T 2181.

### Accessories and combinations

- Thermowell: copper, Class 300  
CrNiMo steel, Class 300
- Double adapter Do3 or manual adjuster  
Data Sheet ▶ T 2176

### Special versions

- 16.4 ft (5 m) or 32.8 ft (10 m) capillary tube length
- Oil-resistant internal valve parts
- $C_v$  ( $K_{VS}$ ) coefficients
- Fast-responding thermostats for instantaneous water heater (operating according to the vapor pressure principle)

**Principle of operation** (see Fig. 2)

The temperature regulators work according to the adsorption principle. The temperature of the measured medium creates a pressure in the sensor which is proportional to the measured temperature. This pressure is transferred through the capillary tube (12) to the operating element (10) and converted into a positioning force. This force causes the pin of the operating element (11) to move the plug stem (4) with the valve plug (3). By turning the set point adjuster (9), the point of response is changed over the valve spring (5).

The valves are balanced by a piston (6). The balancing piston counterbalances any changes in pressure upstream of the valve since the upstream pressure also acts on the inside of the bellows through a hole in the valve plug (3).

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**

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).

• Valve

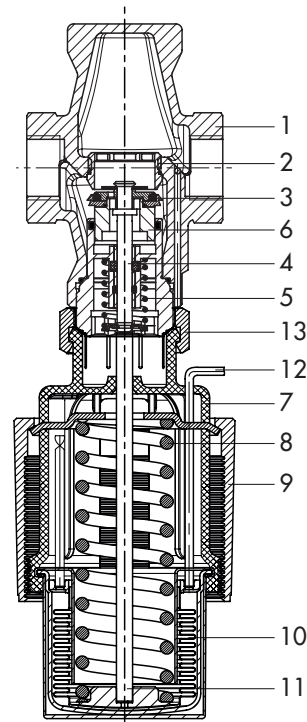
Install the valves in horizontal pipelines. The direction of flow must match the direction indicated by the arrow on the body. The control thermostat must be suspended to hang downward for temperatures higher than 230 °F (110 °C). Other mounting positions are possible for temperatures lower than 230 °F (110 °C).

• Temperature sensor

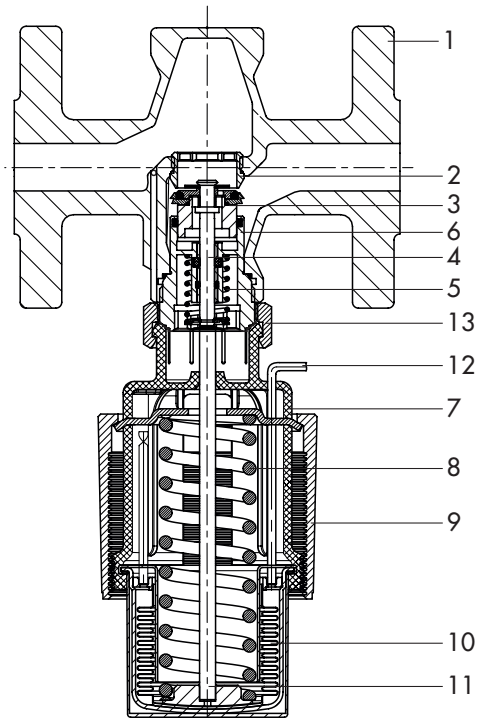
The temperature sensor can be installed in any position as required. However, make sure its entire length is immersed in the process medium to be controlled. It must be installed in a location where overheating or considerable idling times cannot occur.

• 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 2" (50 mm).



Type 43-1 made of stainless steel, body with screwed ends




Type 43-2 made of stainless steel, flanged valve body

- |                       |   |
|-----------------------|---|
| 1 Body                | 8 Set point spring(s)                                 |
| 2 Seat (exchangeable) | 9 Set point adjuster                                  |
| 3 Valve plug          | 10 Operating element                                  |
| 4 Plug stem           | 11 Pin of operating element                           |
| 5 Valve spring        | 12 Capillary tube to sensor                           |
| 6 Balancing piston    | 13 Coupling nut (connection valve/control thermostat) |
| 7 Thermostat          |   |

**Fig. 2:** Functional diagram

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

Valve	Type 43-1 Temperature Regulator	Type 43-2 Temperature Regulator
Connection	Female thread	½ NPT, ¾ NPT, 1 NPT
	Flanges	–
Pressure rating	Class 300 <sup>1)</sup>	Class 150
Max. permissible temperature	300 °F (150 °C)	
Max. perm. differential pressure $\Delta p$	290 psi (20 bar)	
Leakage class according to IEC 60534-4	≤ 0.05 % of $K_{VS}$ coefficient	
Compliance	 · ENEC	
<b>Type 2430 Control Thermostat</b> Set point range <sup>2)</sup> (continuously adjustable)	30 to 95 °F · 75 to 160 °F · 105 to 210 °F · 125 to 250 °F · 160 to 300 °F (0 to 35 °C · 25 to 70 °C · 40 to 100 °C · 50 to 120 °C · 70 to 150 °C)	
Capillary tube length <sup>3)</sup>	6.5 ft (2 m)	
Perm. temperature at the sensor	120° F (50 °C) above the adjusted set point	
Max. permissible ambient temperature	–5 to + 175 °F (–20 to +80 °C) <sup>4)</sup>	
Permissible pressure at sensor/thermowell	Class 300	

<sup>1)</sup> Max. input pressure 275 psi (19 bar)

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

<sup>3)</sup> Others capillary tube lengths on request

<sup>4)</sup> **NOTICE** At temperatures below freezing: **ice formation** may damage the plant and especially the valve.

**Table 2:**  $C_V$  and  $K_{VS}$  coefficients

Body with screwed ends and flanged body

Connection <sup>1)</sup>	½ NPT	¾ NPT	1 NPT	NPS ½	NPS 1
$C_V$ coefficients	4.3	6.8	8.6	4.6	7.3
$K_{VS}$ coefficients	3.6	5.7	7.2	4.0	6.3

<sup>1)</sup> Special version with  $C_V$  0.5, 1.2 or 3 ( $K_{VS}$  0.4, 1.0 or 2.5)

**Table 3:** Materials · Material numbers according to ASTM and DIN EN

Body	Stainless steel A351 CF8M (1.4408)
Seat	A479 316L (1.4404)
Plug	A479 316L (1.4404) with EPDM soft seal <sup>1)</sup>
Balancing piston	1.4305
Valve spring	A479 302 (1.4310)
Sensor	Capillary tube
	Thermowell
Set point adjuster	Copper or stainless steel 1.4571
	PTFE, glass fiber reinforced

<sup>1)</sup> Special version for oils (ASTM I, II, III): FKM soft seal

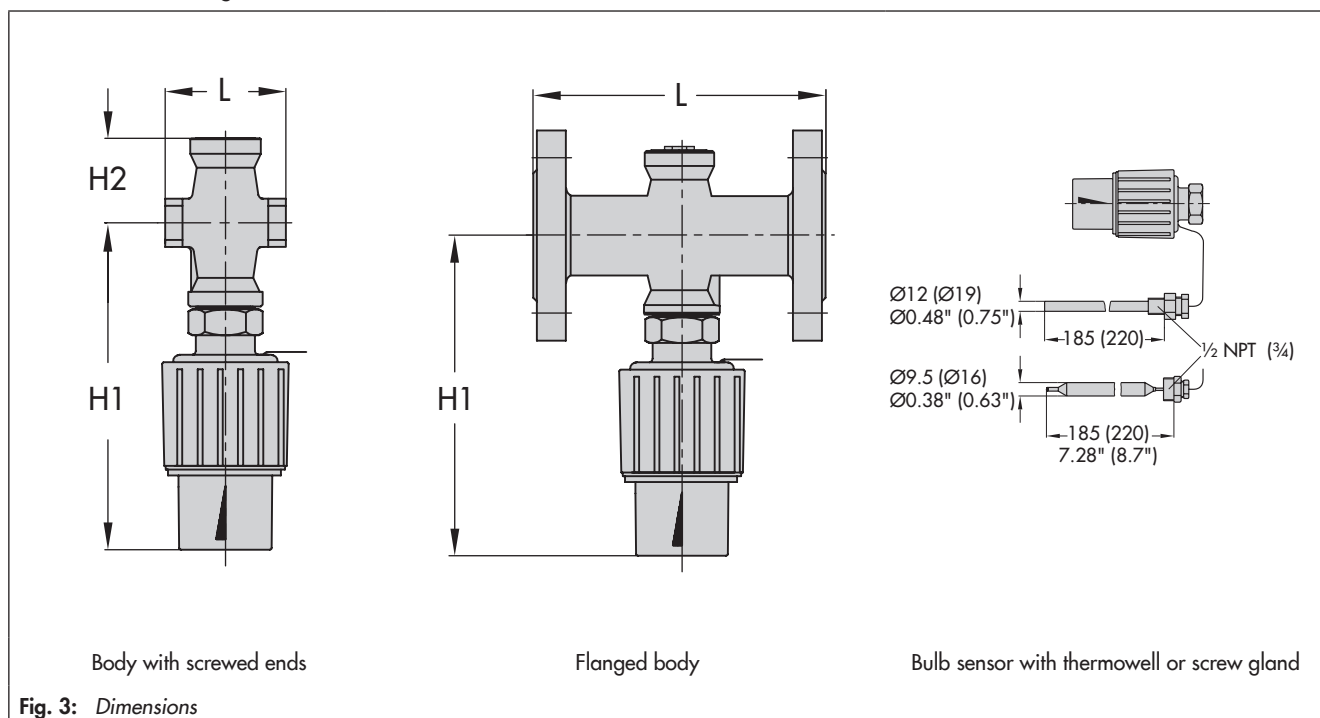
**Table 4: Dimensions and weights**

**Regulators with body with screwed ends or flanged body - A351 CF8M (1.4408)**

Connection size		1/2 NPT · G 1/2	3/4 NPT · G 3/4	1 NPT · G 1	NPS 1/2 · DN 15	NPS 1 · DN 25
Female thread	in	1/2	3/4	1		–
	G	1/2	3/4	1		–
Length L	in	2.6	3.0	3.5		7.2
	mm	65	75	90		184
Width across flats SW	in	1.3	1.3	1.8		–
	mm	34	34	46		–
Height H1	in	7.5				
	mm	190				
Height H2	in	1.8				–
	mm	46				–
D	in	2.7				–
	mm	68				–
Weight with bulb sensor and thermowell (approx.) <sup>1)</sup>	lb	4.0	4.2	4.4	7.5	10.4
	kg	1.8	1.9	2.0	3.4	4.7

<sup>1)</sup> Version without thermowell: minus 0.44 lb (0.2 kg)

**Dimensions of the regulators**



**Fig. 3: Dimensions**

## Special version: vapor pressure thermostats

Fast-responding temperature sensors

### Application

The temperature sensors operating according to the vapor pressure principle are particularly suitable for use in instantaneous water heaters (versions for plate heat exchangers on request) due to the fast response time of approx. 3 s.

- Temperature set points from 110 to 150 °F (45 to 65 °C)
- With Type 2430 Control Thermostat combined with a valve
- Valve sizes ½ NPT to 1 NPT or NPS ½ and 1
- Pressure rating: Class 150 or Class 300
- Sensor made of copper or CrNiMo steel
- Observe mounting position of the sensor.

### Principle of operation

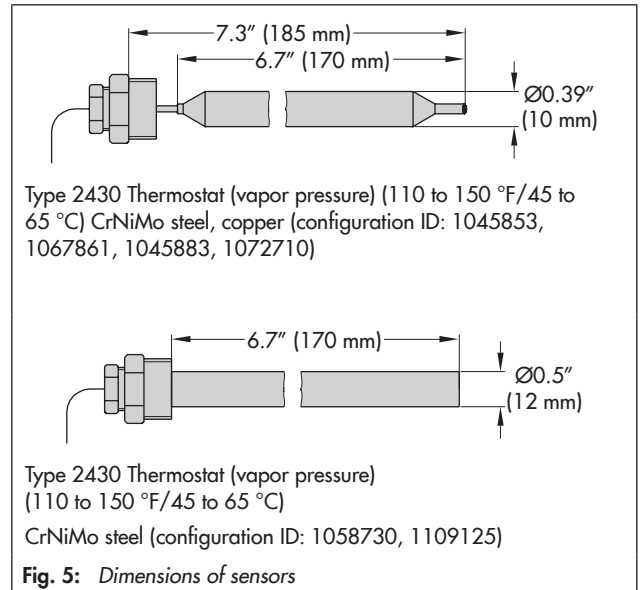
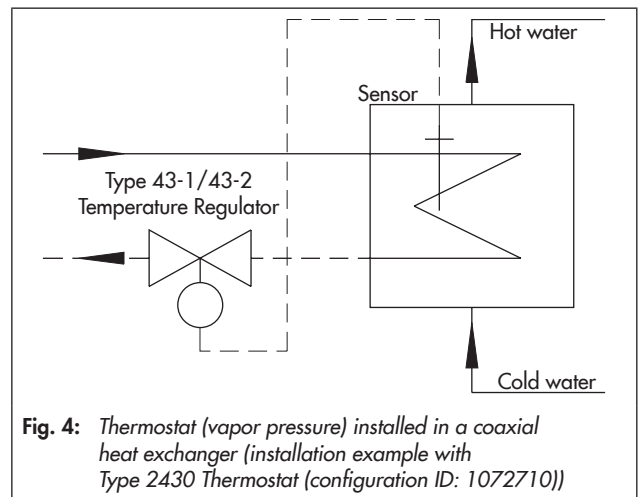
Types 43-1 and 43-2 Temperature Regulators with a sensor operating according to the vapor pressure principle.

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 most suitable 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. 4).

- The ambient temperature must be at least 1.5 K below the adjusted set point at the set point adjuster of thermostat.
- The mounting position of the sensor depends on the version.
- Only combine similar materials (e.g. stainless steel heat exchanger with stainless steel sensors).



**Table 5: Mounting position and materials**

Type 2430 Thermostats (according to vapor pressure principle) · 110 to 150 °F/45 to 65 °C						
Plate heat exchanger <sup>1)</sup>	Configuration ID	1058730		1109125		
	Sensor position	Horizontal	•			
		Tip pointing down	–			
		Tip pointing up	–			
	Sensor material	CrNiMo steel	•			
	Sensor connection, screw gland	G ½		Without		
Capillary tube length	78.7" (2 m)					
Shell-and-tube or coaxial heat exchangers	Configuration ID	1045853	1067861	1045883	1072710	
	Sensor position	Horizontal	•	•	•	•
		Tip pointing down	–	–	•	•
		Tip pointing up	•	•	–	–
	Sensor material	Copper	•	–	•	–
		CrNiMo steel	–	•	–	•
	Sensor connection, screw gland	G ½				
Capillary tube length	78.7" (2 m)					

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

**Ordering text**

Type 43-1 Temperature Regulator

... NPT

Set point range ... °F (°C)

Body made of stainless steel (A351 CF8M)

Optionally, special version ..., accessories ...

Type 43-2 Temperature Regulator

NPS ...

Set point range ... °F (°C)

Body made of stainless steel (A351 CF8M)

Optionally, special version ..., accessories ...



Specifications subject to change without notice



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