

Self-operated Temperature Regulators

Series 43

Temperature Regulator with Three-way Valve Type 43-3



ANSI version

Application

Temperature regulators for mixing and flow-diverting ¹⁾ service in heating or cooling installations · Set points from **70 to 300 °F** (0 to 150 °C) · Valves $\frac{1}{2}$ to **1 NPT** · **NPS $\frac{1}{2}$ to 2** (DN 15 to 50) for connection of welding ends, threaded ends or flanges · **Class 250** · Suitable for liquids up to **300 °F** (150 °C)

Note!

Typetested temperature regulators (TR), safety temperature monitors (STM) and safety temperature limiters (SL) 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, designed for operating pressures up to 580 psig (40 bar)
- Easy set point adjustment on a scale
- Three-way valve for mixing and flow-diverting service, flow across section AB independent from the valve plug position
- Version with double adapter Do3K for the attachment of additional control thermostats or manual adjuster (see Data Sheet T 2176 EN)
- Suitable for heat transfer media - water and oil (ASTM I, II, III).

Versions

The regulators consist of a three-way valve with a control thermostat containing a set point adjustment ring, a capillary tube and a temperature sensor which functions according to the adsorption principle.

Type 43-3 Temperature Regulator (Fig. 1) with an unbalanced Type 2433 K Three-way Valve · Female thread connection $\frac{1}{2}$ to 1 NPT, optionally NPS $\frac{1}{2}$ to 2 (DN 15 to 50) for connection nuts with welding ends, threaded ends or flanges · Oil and water resistant · Type 2430 K Control Thermostat.

Typetested safety devices

Register numbers are available on request.

Type 43-3 Temperature Regulator (TR) whose maximum operating pressure must not exceed the maximum differential pressure Δp specified in the Technical data. For sensors with thermowells, only SAMSON thermowells can be used.

Details about the selection and application of typetested devices can be found in the Information Sheet T 2181 EN.

Safety Temperature Monitors (STM) and **Safety Temperature Limiters (STL)** are also available. Further details can be found in Data Sheets T 2183 EN and T 2185 EN.



Fig. 1 · Type 43-3 Temperature Regulator
NPS 1 with welding ends

Accessories

- Thermowell made of: Copper, Class 300
CrNiMo steel, Class 300
- Combinations available on request

Special versions

- 16.4 ft (5 m) capillary tube

¹⁾ Used as a flow-diverting valve, only with male thread connection for welding ends, threaded ends or flanges

Principle of operation (see Fig. 2)

The temperature of the medium produces a pressure in the sensor, which is proportional to the actual temperature measured. This pressure is transmitted through the capillary tube (6) to the positioning bellows (9), where it is converted into a positioning force. It acts on the valve plug (3) according to the set point adjusted.

The three-way valve is used only for mixing services with the female thread connection or for mixing or diverting services in the version with male thread connection in sizes NPS 1/2 to 2 (DN 15 to 50).

When used as a **mixing valve**, the media to be mixed enter A and B ports. The combined stream flows off through AB. The flow from A or B to AB is determined by the free area between the seat (2) and the plug (3) and, as a result, depends on the position of the plug stem (4). When the temperature rises, port A opens and port B closes.

When used as a **flow-diverting valve**, the medium enters at AB and the diverted streams flow off at port A or port B. The flow from AB to A or B is determined by the position of the plug stem and the plugs. When the temperature rises, port A closes and port B opens.

Installation

Only the same kind of materials should be combined, for example, a thermowell made of stainless steel 1.4571 installed in a stainless steel heat exchanger.

• Valves

The valves must be installed in horizontal pipelines. The thermostat should preferably hang downwards - other installation positions are possible for temperatures up to 230 °F (110 °C). The medium must flow through the valve in the direction indicated by the arrow on the valve body. The flow direction at ports A, B and AB must correspond with the regulator arrangement specific to the installation (see Fig. 3).

• Capillary tube

The capillary tube must be laid in such a way that the ambient temperature does not exceed the permissible temperature limit, the temperature is kept as even as possible at ambient temperatures of approx. +70 °F (+20 °C) and the tube cannot be damaged. The smallest permissible bending radius is 2" (50 mm).

• Temperature sensor

The temperature sensor can be installed in any desired position. Its whole length must be immersed in the medium to be controlled. The sensor should be installed in a location where overheating or considerable idle times cannot occur.

Ordering text

Temperature Regulator with three-way valve **Type 43-3**

Female thread ... NPT

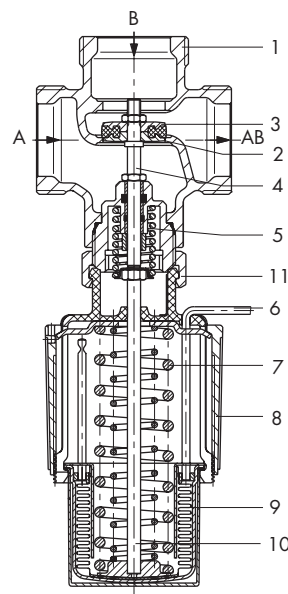
Male thread for NPS (DN) ... with connection nuts and welding ends, threaded ends or flanges

Used as mixing valve/flow-diverting valve

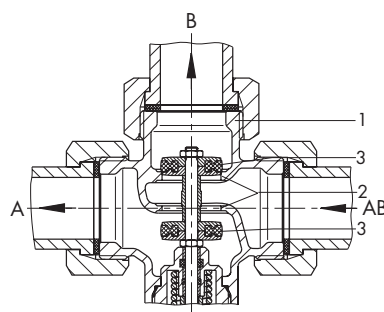
Set point range ... °F (°C)

Optionally, special version

Optionally, accessories



Type 43-3 as mixing valve



Type 43-3 as flow-diverting valve

Fig. 2 · Type 43-3 Temperature Regulator
- NPS 1/2 to 2 (DN 15 to 50) -

- | | |
|------------------|-----------------------------|
| 1 Valve body | 7 Positioning spring(s) |
| 2 Seat | 8 Set point adjustment ring |
| 3 Plug | 9 Positioning bellows |
| 4 Plug stem | 10 Pin of operating element |
| 5 Valve spring | 11 Coupling nut |
| 6 Capillary tube | |

Specifications subject to change without notice.

Examples of arrangements for Type 43-3 Temperature Regulators

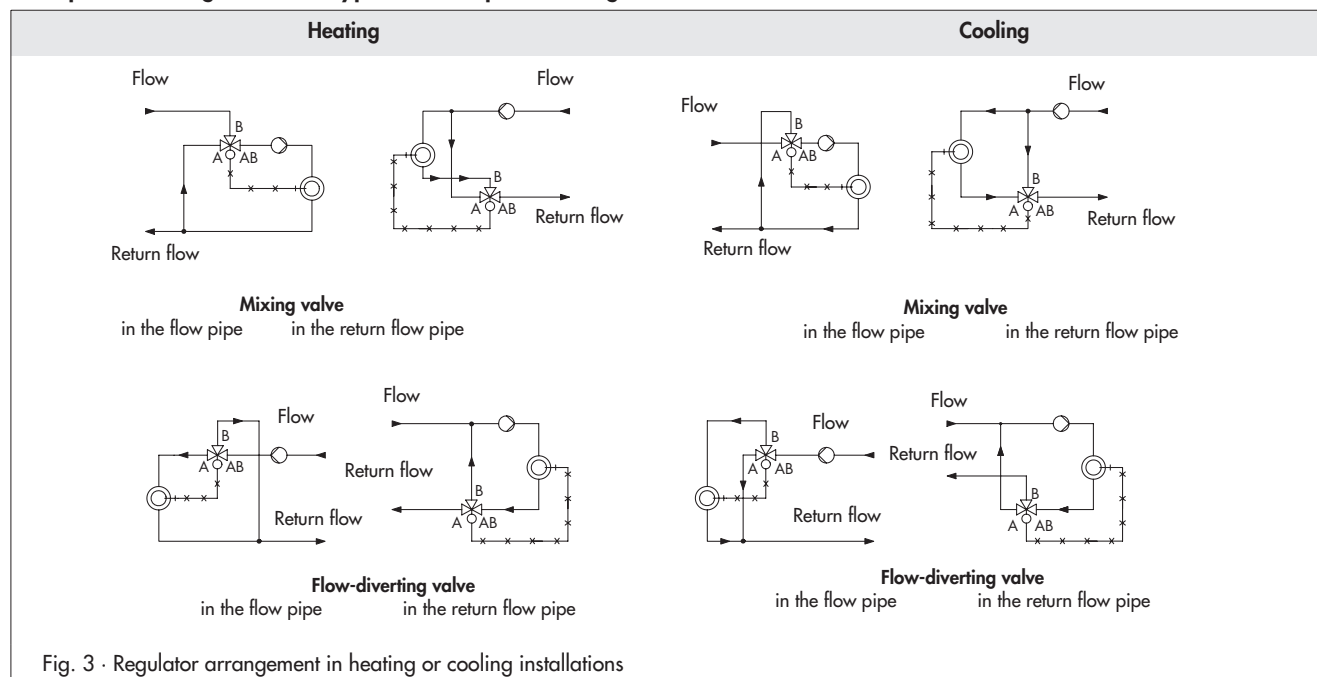


Fig. 3 · Regulator arrangement in heating or cooling installations

Table 1 · Technical data · All pressures as gauge pressures

| Type 2433 K Three-way Valve | | | | | | | | | |
|---|-----------------|---------------|-----|---|-------------------------------------|----------------|--------------|------------------|------------------|
| Connection | | Female thread | | | Male thread | | | | |
| Nominal size | NPT | 1/2 | 3/4 | 1 | - | | | | |
| | NPS | - | | | 1/2 (DN 15) | 3/4 (DN 20) | 1 (DN 25) | 1 1/4 (DN 32) | 1 1/2 (DN 40) |
| Medium | Water · Oil | | | | | | | | |
| Operated as | Mixing valve | | | | Mixing valve · Flow-diverting valve | | | | |
| Cv coefficient | 5 | 7.5 | 9.4 | 5 | 7.5 | 9.4 | 12 | 15 | 20 |
| Kvs coefficient | 4 | 6.3 | 8 | 4 | 6.3 | 8 | 10 | 12.5 | 16 |
| Nominal pressure | Class 250 | | | | | | | | |
| Max. perm. diff. pressure for mixing service | psi | 64 | 38 | 26 | 64 | 38 | 26 | 13 | 9 |
| | bar | 4.4 | 2.6 | 1.8 | 4.4 | 2.6 | 1.8 | 0.9 | 0.6 |
| Max. perm. temperature at the valve | 300 °F (150 °C) | | | | | | | | |
| Type 2430 K Control Thermostat | | | | | | | | | |
| Set point range, continuously adjustable | | | | 30 to 95 °F, 75 to 160 °F, 105 to 210 °F, 125 to 250 °F or 160 to 300 °F 0 to 35 °C, 25 to 70 °C, 40 to 100 °C, 50 to 120 °C or 70 to 150 °C | | | | | |
| Capillary tube | | | | 6.5 ft (2 m), special version: 16.4 ft (5 m) | | | | | |
| Max. permissible excess temperature at sensor | | | | 120 °F (50 °C) above adjusted set point | | | | | |
| Max. permissible ambient temperature | | | | 175 °F (80 °C) | | | | | |
| Permissible pressure at sensor/thermowell | | | | Class 250/Class 300 | | | | | |

Table 2 · Materials · Material numbers according to ASTM and DIN EN

| | | |
|---------------------------|--|--|
| Body | C 83600 (CB491K) | |
| Plug | Dezincification-resistant brass C37700 (CW617N) with EPDM soft sealing | |
| Valve spring | Stainless steel 1.4310 | |
| Temperature sensor | Capillary tube | Copper |
| | Thermowell | Nickel-plated copper or stainless steel 1.4571 |
| Set point adjustment ring | Glass fiber reinforced PETP | |

Table 3 · Dimensions and weights

| Nominal size | NPT | ½ | ¾ | 1 | - | | |
|--|-----|-----------|-----------|-----------|------------|------------|-----------|
| | NPS | ½ (DN 15) | ¾ (DN 20) | 1 (DN 25) | 1¼ (DN 32) | 1½ (DN 40) | 2 (DN 40) |
| Male thread version Pipe Ø d | in | 0.8 | 1.1 | 1.3 | 1.7 | 1.9 | 2.4 |
| | mm | 21.3 | 26.8 | 32.7 | 42 | 48 | 60 |
| Connection size R | G | ¾ | 1 | 1¼ | 1¾ | 2 | 2½ |
| Width across flats SW | in | 1.2 | 1.4 | 1.8 | 2.3 | 2.6 | 3.3 |
| | mm | 30 | 36 | 46 | 59 | 65 | 82 |
| Length L | in | 2.6 | 2.8 | 2.6 | 3.9 | 4.3 | 5.1 |
| | mm | 65 | 70 | 75 | 100 | 110 | 130 |
| Female thread vers. Height H1 | in | | 1.6 | | | 2.6 | |
| | mm | | 40 | | | 65 | |
| Length L1 | in | 2.6 | 3 | 3.5 | | - | |
| | mm | 65 | 75 | 90 | | - | |
| Weight ¹⁾ , approx. | lb | 4 | 4.3 | 4.6 | 7.2 | 7.5 | 9.9 |
| | kg | 1.5 | 1.6 | 1.7 | 2.7 | 2.8 | 3.7 |
| Connection nuts with welding ends, threaded ends or flanges | | | | | | | |
| Height H5 | in | | 1.6 | | 2.4 | | 2.6 |
| | mm | | 40 | | 60 | | 65 |
| Connection nuts with welding ends | | | | | | | |
| Length L2 | in | 8.3 | 9.2 | 9.6 | 10.6 | 11.6 | 13 |
| | mm | 210 | 234 | 244 | 268 | 294 | 330 |
| Height H2 | in | 4.4 | 4.8 | 4.9 | 5.7 | 6.2 | 6.5 |
| | mm | 112 | 122 | 124 | 144 | 157 | 165 |
| Weight ¹⁾ , approx. | lb | 4.4 | 5.1 | 5.5 | 8.6 | 9.2 | 12.1 |
| | kg | 2 | 2.3 | 2.5 | 3.9 | 4.2 | 5.5 |
| Connection nuts with threaded ends (male thread) | | | | | | | |
| Male thread A | NPT | ½ | ¾ | 1 | 1¼ | 1½ | 2 |
| Length L3 | in | 5.1 | 5.7 | 6.3 | 7.1 | 7.7 | 9 |
| | mm | 129 | 144 | 159 | 180 | 196 | 228 |
| Height H3 | in | 2.8 | 3.0 | 3.2 | 3.9 | 4.25 | 4.5 |
| | mm | 72 | 77 | 82 | 100 | 108 | 114 |
| Weight ¹⁾ , approx. | lb | 4.4 | 5.1 | 5.5 | 8.6 | 9.2 | 12.1 |
| | kg | 2 | 2.3 | 2.5 | 3.9 | 4.2 | 5.5 |
| Connection nuts with flanges | | | | | | | |
| Length L4 | in | 5.1 | 5.9 | 6.3 | 7.1 | 7.9 | 9.1 |
| | mm | 129 | 150 | 159 | 180 | 200 | 230 |
| Height H4 | in | 2.75 | 3.1 | 3.3 | 3.9 | 4.1 | 4.7 |
| | mm | 70 | 80 | 85 | 100 | 105 | 120 |
| Weight ¹⁾ , approx. | lb | 11 | 14.2 | 13.9 | 23.3 | 27.3 | 34.8 |
| | kg | 4.1 | 5.3 | 6.3 | 8.7 | 10.2 | 13 |

¹⁾ Version for version with bulb sensor and thermowell · Version without thermowell: minus 0.44 lb (0.2 kg)

