

# Self-operated Temperature Regulators

## Temperature Regulator Type 1

with unbalanced single-seated globe valve with female threads<sup>1)</sup>



### Application

Temperature regulator for heating installations with control thermostats for **set points from -10 to +250 °C** and valves in sizes **G<sup>1</sup>/<sub>2</sub> to G1** · **Nominal pressure PN 25** · **For gases up to 80 °C** · **Liquids and steam up to 220 °C**  
The valve closes when the temperature rises.

### Conversion of valve sizing coefficients:

$$C_v \text{ (in US gallons/min)} = 1.17 \cdot K_{vs} \text{ (in m}^3\text{/h)}$$

$$K_{vs} \text{ (in m}^3\text{/h)} = 0.86 \cdot C_v \text{ (in US gallons/min)}$$

The regulators consist of an unbalanced valve and a control thermostat comprising a temperature sensor, a set point adjustment head with an excess temperature safety device, a capillary tube and an operating element.

### Special features

- Low-maintenance P regulators requiring no auxiliary energy
- Wide set point range and easy adjustment of the set point indicated on a dial
- Unbalanced, single-seated globe valves, applicable for liquids, gases and steam, especially for heat transfer fluids such as water and steam
- Versions with double adapter available to attach a temperature limiter or a second control thermostat to the regulator. For details, see Data Sheet T 2036 EN.

### Versions

**Temperature Regulator Type 1** · With Type 2111 Valve · Female threads G<sup>1</sup>/<sub>2</sub> to G1 and a Type 2231, 2232, 2233, 2234 or 2235 Control Thermostat. For details on the application of the thermostats, see Information Sheet T 2010 EN.

**Type 2111/2231** (Fig. 1) · With Type 2111 Valve and Type 2231 Control Thermostat for liquids · Set points from -10 to +150 °C · Set point adjustment at the sensor

**Type 2111/2232** (Fig. 2) · With Type 2111 Valve and Type 2232 Control Thermostat for liquids and steam · Set points from -10 to +250 °C · Separate set point adjustment

**Type 2111/2233** · With Type 2111 Valve and Type 2233 Control Thermostat for liquids, air and other gases · Set points from -10 to +150 °C · Set point adjustment at the sensor

**Type 2111/2234** · With Type 2111 Valve and Type 2234 Control Thermostat for liquids, air and other gases · Set points from -10 to +250 °C · Separate set point adjustment

**Type 2111/2235** · With Type 2111 Valve and Type 2235 Control Thermostat for air-heated storerooms as well as drying, climatic and heating cabinets · Set points from -10 to +250 °C · Separate set point adjustment and a sensor tube which can be installed by the operator

<sup>1)</sup> For valve versions with flanges in sizes DN 15 to DN 50, see Data Sheet T 2111 EN

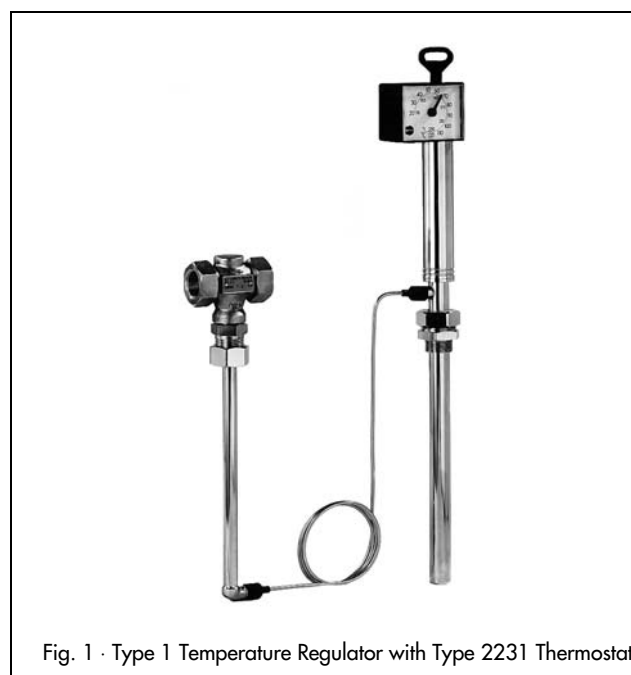


Fig. 1 · Type 1 Temperature Regulator with Type 2231 Thermostat

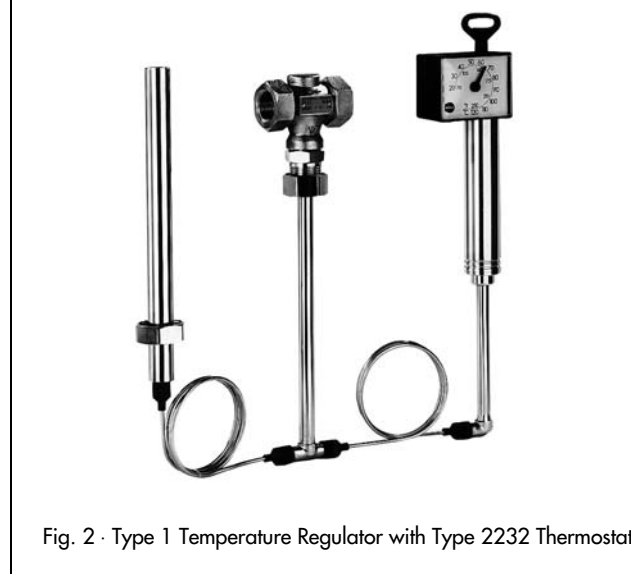


Fig. 2 · Type 1 Temperature Regulator with Type 2232 Thermostat

### Special version

- Capillary tube of either 5 m, 10 m or 15 m
- Sensor made of CrNiMo steel
- Capillary tube made of CrNiMo steel or Cu, plastic-coated
- Set point ranges of 100 to 200 °C/150 to 250 °C – only for Types 2232, 2234 and 2235 –
- ANSI version

### Principle of operation (Fig. 3)

The regulators operate according to the liquid expansion principle. The temperature sensor (13), capillary tube (10) and operating element (7) are filled with an expansion liquid. The temperature-dependent change in volume of this liquid causes the operating element (7) to move and, as a result, also moves the plug stem (5) of the control valve with the attached plug (3). The position of the plug determines the flow rate of the heat transfer medium across the area released between the seat (2) and plug. The set point is adjustable with a key (11) to a value which can be read off from the dial (12).

### Valve

- 1 Valve body
- 2 Seat
- 3 Plug
- 5 Plug stem
- 5.1 Spring
- 6 Threaded nipple

### Control thermostat

- 7 Operating element
- 10 Capillary tube
- 11 Key for set point adjustment
- 12 Set point dial
- 13 Temperature sensor (bulb sensor)

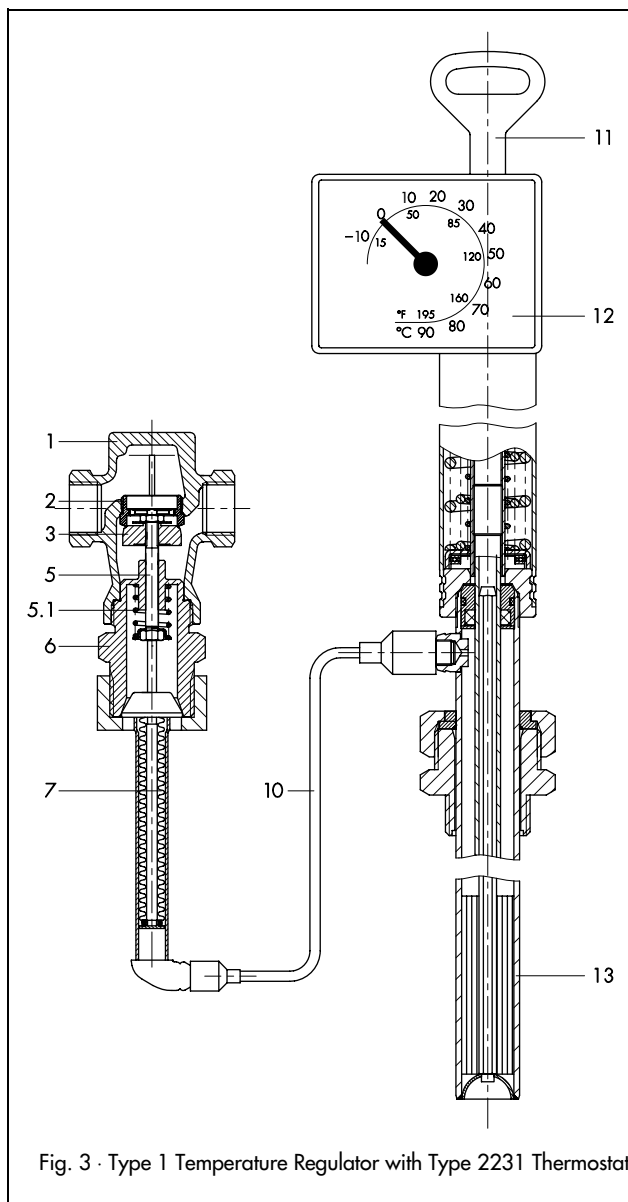


Fig. 3 · Type 1 Temperature Regulator with Type 2231 Thermostat

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

Type 2111 Valve		Female thread		
Nominal pressure	PN	25		
Connection	G	1/2	3/4	1
Kvs	Standard version	3.6	5.7	7.2
	Special version	0.4; 1.6	1.6	–
Leakage rate	≤ 0.05% of Kvs			
Permissible differential pressure $\Delta p_{max1}$ )	14 bar			
Permissible valve temperature	Steam: 220 °C, liquids: 220 °C, gases: 80 °C			
Type 2231 to Type 2235 Thermostats		Size 150		
Set point ranges (set point span, each 100 K)	Types 2231 and 2233	–10 to 90 °C, 20 to 120 °C or 50 to 150 °C		
	Types 2232, 2234, 2235	–10 to 90 °C, 20 to 120 °C, 50 to 150 °C, 100 to 200 °C or 150 to 250 °C		
Perm. temperature at the set point adjustment head	–40 to 80 °C			
Permissible temperature at the sensor	100 K above the adjusted set point			
Permissible pressure at the sensor	Types 2231 and 2232	Without thermowell: PN 40 · With thermowell: PN 40/PN 100 (version of copper PN 16)		
	Types 2233 and 2234	With thermowell and flange PN 40/ DN 32 or PN 100/ DN 40		
Length of capillary tube	PN 40			
	3 m (special version 5, 10 or 15 m)			

1) The differential pressure corresponds to the pressure head of the pump for liquids

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

Type 1 Control Valve	
Nominal pressure	PN 25
Body	Red brass, CC491K (Rg 5)
Seat	Stainless steel 1.4104
Plug	1.4305
Threaded nipple	Brass
Distance piece	Brass

Types 2231 to 2235 Control Thermostats		Standard version	Special version
Operating element		Brass, nickel-plated	
Bulb sensor	Type 2231 Type 2232	Bronze, nickel-plated	
	Type 2233 Type 2234	Copper, nickel-plated	
	Type 2235	Copper	
	Capillary tube	Copper, nickel-plated	Copper, plastic-coated
<b>Thermowell</b>			
Threaded connection			
Immersion tube	Bronze, nickel-plated	Copper	1.4571
Threaded nipple	Brass, nickel-plated		
With flange			
Immersion tube	Steel	Plastic-coated or PTFE <sup>1)</sup>	1.4571
Flange			

**Accessories**

**For Type 2231 and Type 2232 Control Thermostats:** thermowells with threaded connection or flange

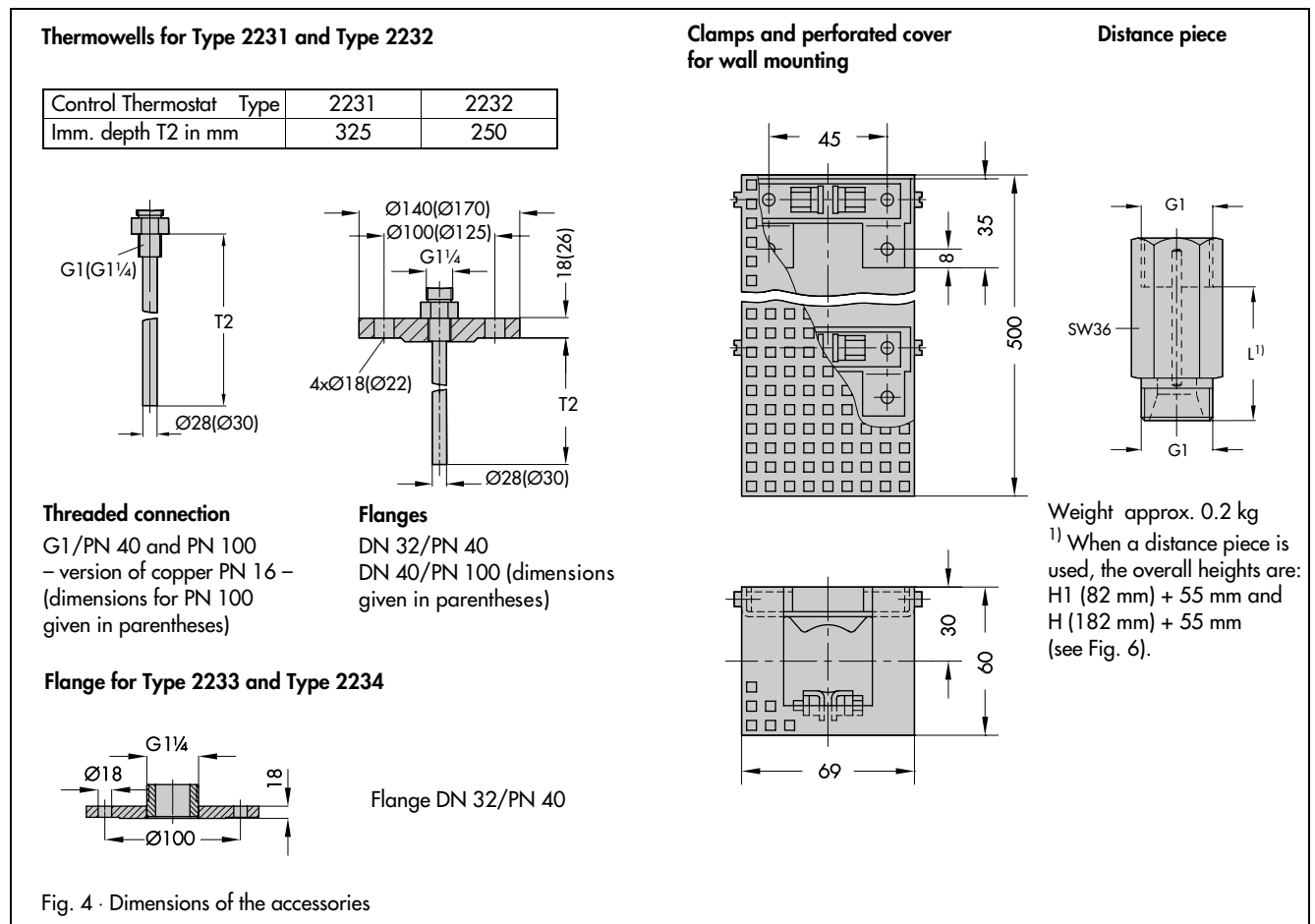
**For Type 2233 and Type 2234 Control Thermostats:** clamps and perforated cover for wall mounting

Use a **distance piece** to separate the operating element from the medium flowing through the valve. It is mounted between the valve and the operating element. In addition, it prevents the medium from leaking when the thermostat is replaced.

1) Plastic coating (up to 80 °C) · PVC or PPH coating; PTFE version · Immersion tube: PTFE · Flange: steel with PTFE bushing

2) Not for Type 2235

**Dimensions**



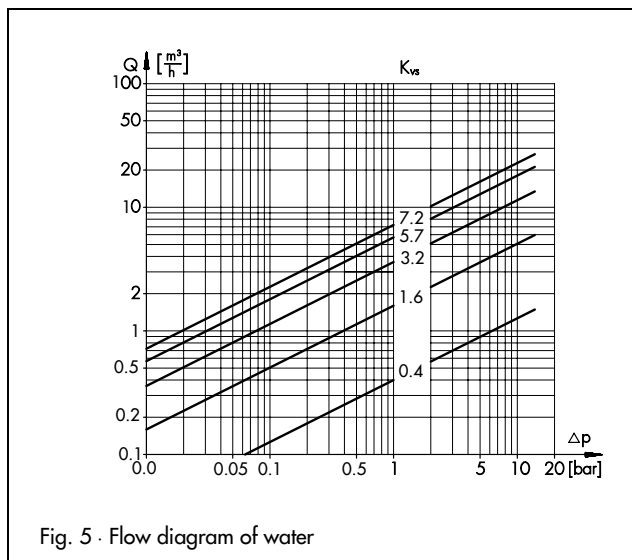
**Table 3 · Dimensions in mm and weights in kg**

Type 2111 Valve	Female thread		
Connection	G $\frac{1}{2}$	G $\frac{3}{4}$	G1
Length L	65	75	90
Weight approx. kg	0.9	1.0	1.1

Thermostat	Type	2231	2232	2233	2234	2235
Immersion depth T		290 <sup>1)</sup>	235 <sup>1)</sup>	430	460	3460
Weight approx. kg		3.2	4	3.4	3.7	3.6

<sup>1)</sup> Greater immersion depths available on request.

**Flow diagram of water**



**Installation**

**Valve**

The valves are to be installed in horizontal pipelines with the valve bonnet, including the operating element of the thermostat, vertically suspended. The process medium must flow through the valve in the direction indicated by the arrow on the body.

**Temperature sensor**

The temperature sensor can be installed in any desired position. Its whole length must be immersed in the medium to be controlled. Choose a place of installation where neither overheating nor considerable idle times occur.

**Capillary tube**

The capillary tube must be installed in such a way that it is not exposed to considerable temperature fluctuations and cannot be damaged. Make sure the permissible ambient temperature range (approx. temperature: 20 °C) is not exceeded. The smallest permissible bending radius is 50 mm.

Only use the same kind of materials together, for example thermowells made of stainless steel 1.4571 can be installed in stainless steel heat exchangers.

**Ordering text**

Temperature Regulator Type 1  
 Body material ...  
 Female thread G ...  
 With Control Thermostat Type ..., set point range ... °C,  
 Capillary tube ... m  
 Optional: special version..., accessories ...

Specifications subject to change without notice.

