

Self-operated Temperature Regulators

Temperature Regulator Type 1u



Application

Temperature regulators for cooling installations · Control thermostats for set points from -10 to 250 °C · G $\frac{1}{2}$ to G 1 or DN 15 to DN 50 · Nominal pressure PN 25 · Suitable for liquids up to 150 °C and non-flammable gases up to 80 °C
The valve opens 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 a globe valve with female thread (G $\frac{1}{2}$ to G 1) or flanged body (DN 15 to DN 50) and a control thermostat, comprising a temperature sensor, a set point adjustment head with 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 convenient set point adjustment indicated on a dial
- Globe valves with plug balanced by a bellows (DN 32 to DN 50)
- Suitable for liquids, particularly for cooling media, e.g. cooling water and brine

Versions

Type 1u Temperature Regulators · Type 2121 Valve with G $\frac{1}{2}$ to G 1 female thread, PN 25, unbalanced version or Type 2121 Valve with flange DN 15 to DN 50, PN 25, balanced version DN 32 to DN 50 · Type 2231, 2232, 2233 or 2234 Control Thermostat

For details on the application of the control thermostats, refer to Information Sheet T 2010 EN.

Type 2121/2231 (Fig. 1) · With Type 2121 Valve and Type 2231 Control Thermostat for liquids · Set point adjustment at the sensor · Set points from -10 to $+150$ °C

Type 2121/2232 (Fig. 2) · With Type 2121 Valve and Type 2232 Control Thermostat for liquids and steam · Separate set point adjustment · Set points from -10 to $+250$ °C

Type 2121/2233 · With Type 2121 Valve and Type 2233 Control Thermostat for liquids, air, and other gases · Set point adjustment at the sensor · Set points from -10 to $+150$ °C

Type 2121/2234 · With Type 2121 Valve and Type 2234 Control Thermostat for liquids, steam, air, and other gases · Separate set point adjustment · Set points from -10 to $+250$ °C

Special version

- Capillary tube 5 m, 10 m, 15 m
- Sensor made of CrNiMo steel
- Capillary tube made of CrNiMo steel or Cu with plastic coating

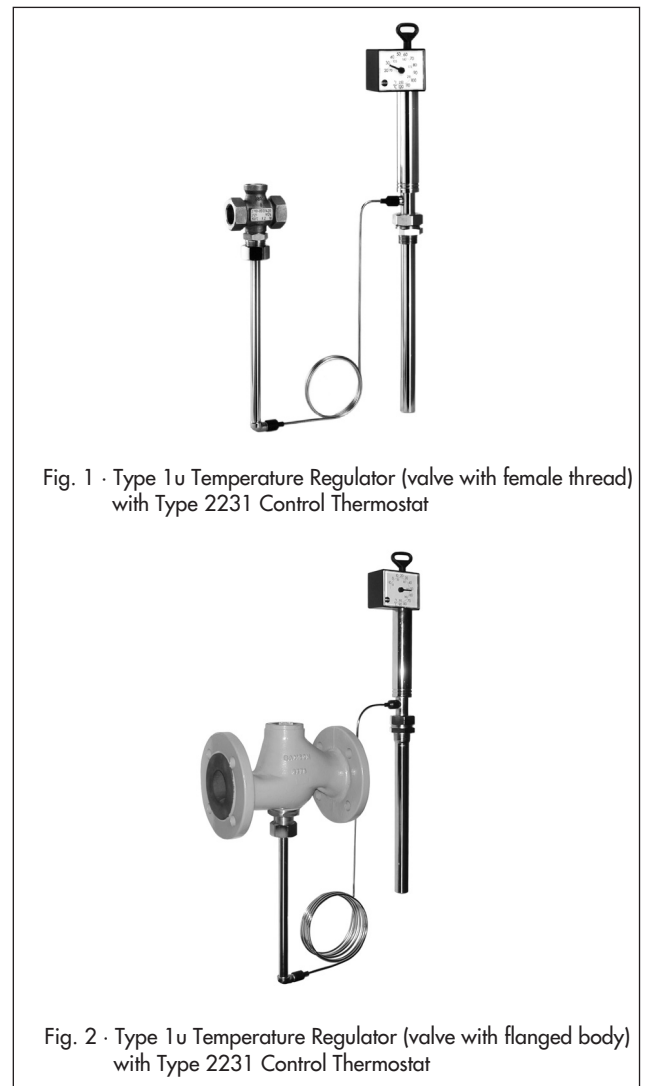


Fig. 1 · Type 1u Temperature Regulator (valve with female thread) with Type 2231 Control Thermostat

Fig. 2 · Type 1u Temperature Regulator (valve with flanged body) with Type 2231 Control Thermostat

- Version with minimum flow rate
- Plug with PTFE sealing ring
- Valve free of non-ferrous metal
- Version for oil at max. permissible temperature of 220 °C
- Dimensions and materials in accordance with ANSI (see Data Sheet T 2114 EN)

Principle of operation (see 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 liquid changes its volume depending on the temperature, causing the operating element (7) and thus the plug stem (5) with the plug (3) of the valve to move.

The position of the plug determines the flow rate of the heat transfer medium across the area released between the plug (3) and seat (2).

The temperature set point can be adjusted with a key (11) to a value that can be read off the dial (12).

Valve

- 1 Valve body
- 2 Valve seat (replaceable)
- 3 Valve plug
- 5 Plug stem
- 5.1 Spring
- 5.2 Balancing bellows
- 6 Threaded nipple with coupling nut

Control thermostat

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

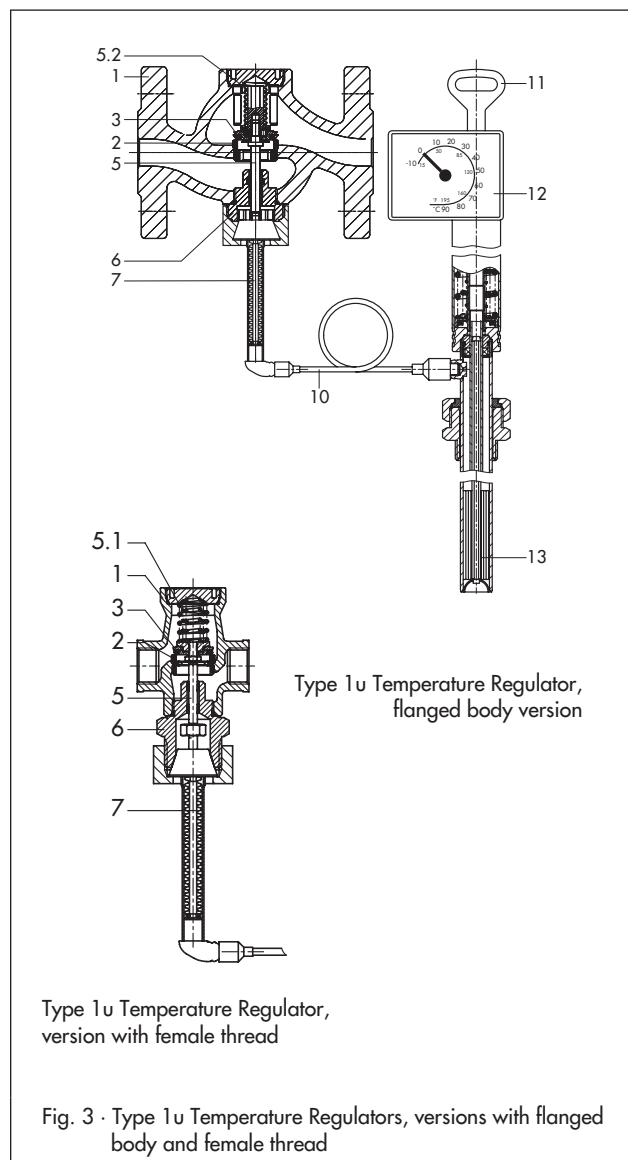


Table 1 · Technical data · All pressures in bar (gauge)

Type 2121 Valve	Female thread			Flanged body											
	PN 25														
Nominal pressure	PN 25														
Connection	G/DN	G ½	G ¾	G 1	15		20	25	32		40		50		
K _{VS} coefficient ¹⁾		3.6	5.7	7.2	1.0	2.5	4.0	6.3	8.0	8.0	16	8.0	20	8.0	32
Perm. differential pressure Δp _{max.} bar		10		20	10	12	12		8						
Leakage rate	≤ 0.05 % of K _{VS}														
Permissible valve temperature	Liquids 150 °C · Non-flammable gases 80 °C														
Types 2231 to 2234 Thermostats		Size 150													
Set point ranges (set point span 100 K each)	Type 2231/2233	-10 to 90 °C, 20 to 120 °C or 50 to 150 °C													
	Type 2232/2234	-10 to 90 °C, 20 to 120 °C, 50 to 150 °C, 100 to 200 °C or 150 to 250 °C													
Permissible temperature at set point adjustment head	-40 to 80 °C														
Permissible temperature at sensor	100 K above adjusted set point														
Permissible pressure at sensor	PN 40														
Length of capillary tube	3 m (special version 5, 10 or 15 m)														

¹⁾ Special version with minimum flow rate available on request

Table 2 · Materials · Material numbers according to DIN EN

Type 2121 Valve	Threaded connection	Flanged body version
Connection	G ½ to G 1	DN 15 to DN 50
Body	CC491K (red brass, Rg 5)	EN-JS1049 (GGG-40.3)
Seat	Stainless steel 1.4104	Stainless steel 1.4301
Plug	1.4305 and brass with EPDM soft sealing	CW602N (CuZn36Pb2As) with EPDM soft sealing ¹⁾
Spring	Stainless steel 1.4310K	
Sealing ring	–	Graphite on metal core
Distance piece	Brass (special version of stainless steel 1.4305)	
Threaded and guide nipples, plugs, and sleeves	CW602N (CuZn36Pb2As)	

¹⁾ Special version: steel 1.4305 with EPDM or FPM soft sealing, or with metal sealing

Types 2231, 2232, 2233, 2234 Control Thermostats		Standard version	Special version	
Operating element		Brass, nickel plated		
Sensor	Type 2231 Type 2232	Bronze, nickel plated	Stainless steel 1.4571	
	Type 2233 Type 2234	Copper, nickel plated		
Capillary tube		Copper, nickel plated	Copper, plastic coated or stainless steel 1.4571	
Thermowell				
Threaded connection G1				
Immersion tube		Bronze, nickel plated · Steel	Stainless steel 1.4571	
Threaded nipple		Brass, nickel plated		
Flange connection				
Immersion tube		Steel	Steel, plastic coated ^{1) 2)}	Stainless steel 1.4571
Flange		Steel, plastic-coated sealing surface		

¹⁾ Plastic coating (up to 80 °C) of PVC or PPH · ²⁾ PTFE version: immersion tube of PTFE; flange: steel with PTFE sleeve

Installation

Valve

Install the valves in horizontal pipelines. The direction of flow must correspond with the arrow on the body. The connecting element must be vertically suspended.



Temperature sensor

The temperature sensor can be installed in any desired position. Nevertheless, its entire length must be immersed in the process medium. Choose a place of installation where neither overheating nor considerable idle times occur.

Capillary tube

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

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

Flow rate diagram for water

Valve sizing for other media according to DIN EN 60534, with the terms: $F_L = 0.95$ and $x_T = 0.75$.
The values apply to a fully opened valve.

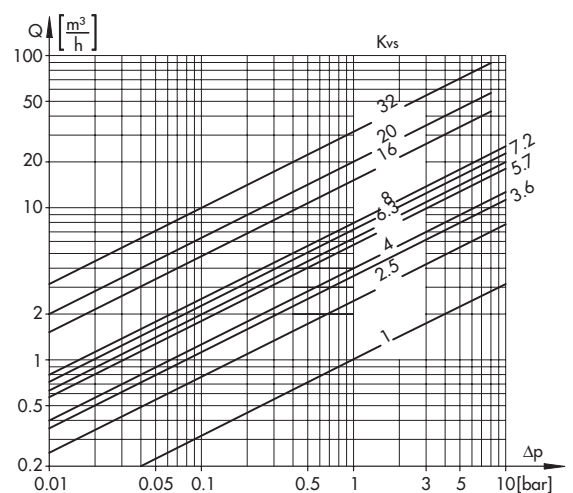
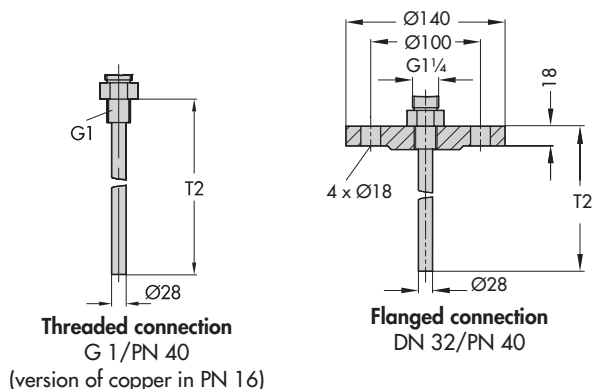


Fig. 4 · Flow rate diagram for water

Thermowells for Types 2231/2232

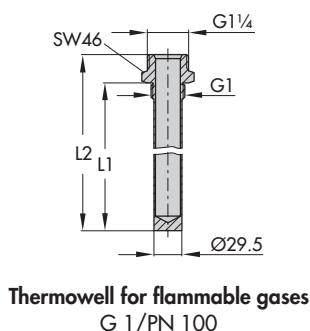
Thermowells with threaded and flanged connections

Control thermostat	Type 2231	Type 2232
Immers. depth T2 in mm	325	250



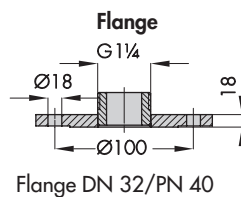
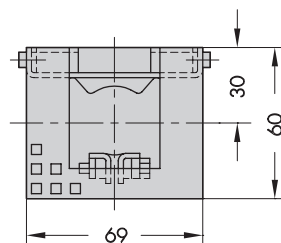
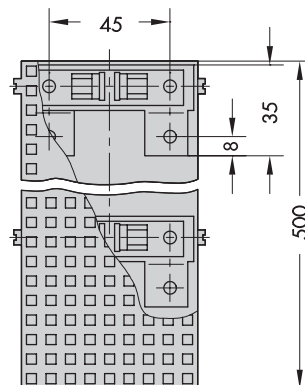
Thermowells for flammable gases (PN 100/PN 63)

Control thermostat	Type 2231	Type 2232
Length L1	mm 315	255
Length L2	mm 340	280



Mounting parts for Types 2233/2234

Clamps and perforated cover for wall mounting



Distance piece

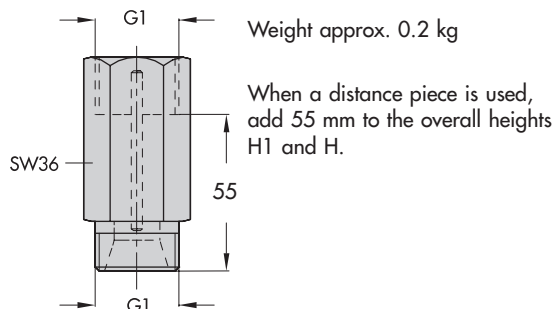


Fig. 5 · Accessories, dimensions

Accessories

Thermowells with threaded or flanged connections for Types 2231 and 2232 Bulb Sensors · G 1 threaded connection, PN 40, of bronze/steel/CrNiMo steel · Flanged connection DN 32, PN 40, with CrNiMo steel/steel immersion tube · Steel immersion tube with PVC/PPH coating, DN 32, PN 40 · PTFE immersion tube, PN 6 (flange PN 40)

Thermowells typetested by **DVGW** (German gas & water assoc.) for flammable gases, G 1 threaded connection, PN 100

Mounting parts for Type 2233 and Type 2234 · Clamps for wall mounting · Perforated cover for thermostat

Distance piece made of brass (for water, steam) or CrNiMo steel (for water, oil, steam)

A distance piece is used in the stainless steel version to separate the non-ferrous metals of the operating element from the process medium flowing through the valve. In addition, it prevents the medium from leaking when the thermostat is replaced. The distance piece is installed between the valve and thermostat.

Double adapter Type Do1 for connection of a second thermostat · Type DoS with electric signal transmitter

Manual adjuster Ma with travel indicator · MaS with electric signal transmitter

Dimensions

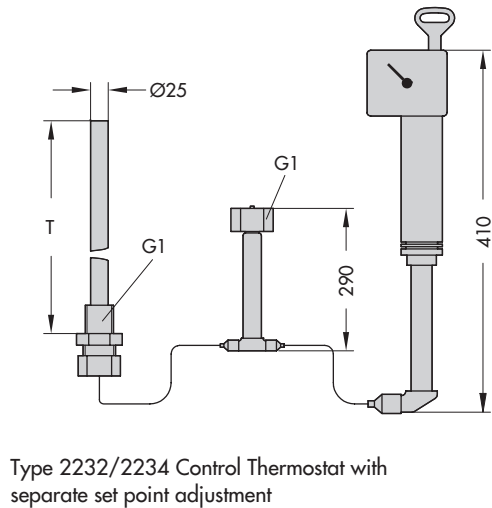
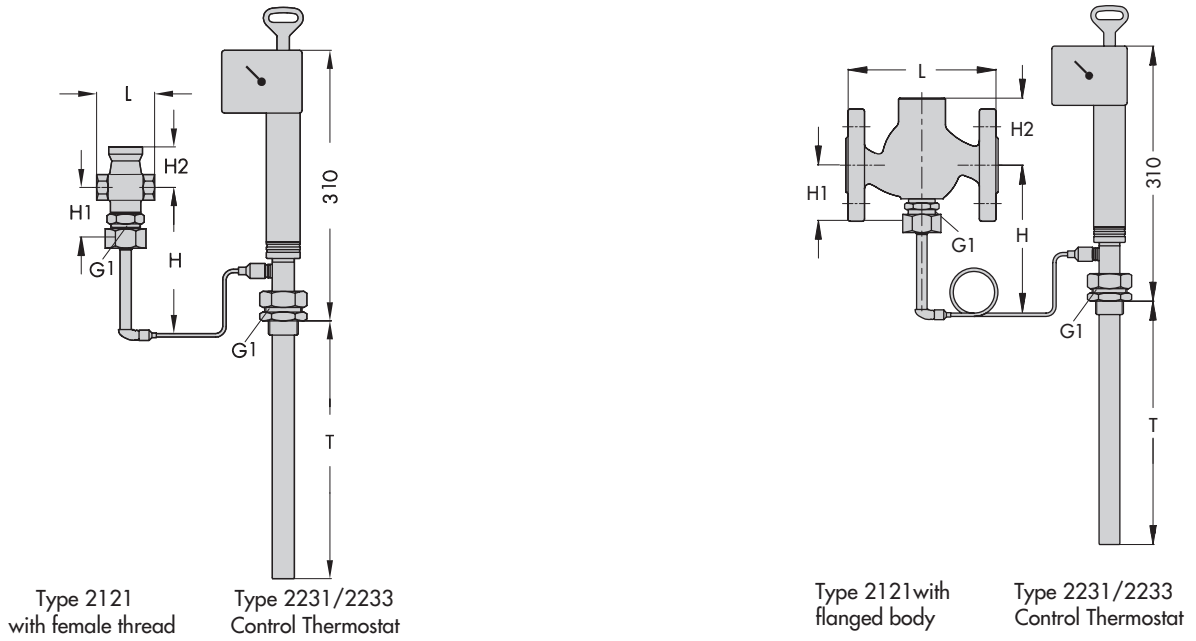


Table 3 · Dimensions in mm and weights in kg

Type 2121 Valve		Female thread			Flanged body					
Connection	G/DN	G ½	G ¾	G 1	15	20	25	32	40	50
Length L	mm	65	75	90	130	150	160	180	200	230
Height H	mm	350			249			329		
Height H1	mm	60			59			80		
Height H2	mm	46			46			92		
Weight, approx.	kg	1	1.3	1.5	4.5	5	6	11	11.5	14
Control thermostat Type...		2231		2232		2233		2234		
Immersion depth T	mm	290 ¹⁾		235 ¹⁾		430		460		
Weight, approx.	kg	3.2		4		3.4		3.7		

¹⁾ Greater immersion depths available on request

Fig. 6 · Dimensions

Dynamic behavior of the thermostats

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

Table 3 (right) lists the response times of SAMSON sensors operating on different principles when tested in water.

Ordering text

Temperature Regulator Type 1u

DN ... / G ..., PN 25

With flanged body/female thread

Body material

With Control Thermostat Type ..., set point range ...°C

Capillary tube ... m,

Special version if required, accessories

Table 3 · Dynamic response of SAMSON thermostats

Functional principle	Type ... Control Thermostat	Time constant in seconds	
		Without thermowell	With thermowell
Liquid expansion	2231	70	120
	2232	65	110
	2233	25	-1)
	2234	15	-1)
	2235	10	-1)
	2213	70	120
Adsorption	2212	-1)	40

1) Not permissible

Specifications subject to change without notice.

