

T 2111 EN

Type 1 Temperature Regulator

Self-operated Temperature Regulators · Flanges



Application

Temperature regulators for heating installations · Control thermostats for set points from **-10 to +250 °C** · Valve sizes **DN 15 to 50** · Pressure rating **PN 16 to 40** · Suitable for temperatures up to **350 °C** · The valve **closes** when the temperature rises.

Note

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

The regulators consist of an unbalanced valve and a control thermostat with temperature sensor, set point adjuster with excess temperature protection, capillary tube and operating element.

Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Wide set point range and convenient set point adjustment with a dial
- Single-seated globe valve without pressure balancing, suitable for liquids, gases and vapors, especially for heat transfer media, such as water, oil ¹⁾ and steam
- Valve body optionally available in cast iron, spheroidal graphite iron, cast steel or cast stainless steel
- Versions with double adapter for temperature limiters or attachment of a second control thermostat. Refer to Data Sheet ▶ T 2036.

Versions

Type 1 Temperature Regulator with Globe Valve

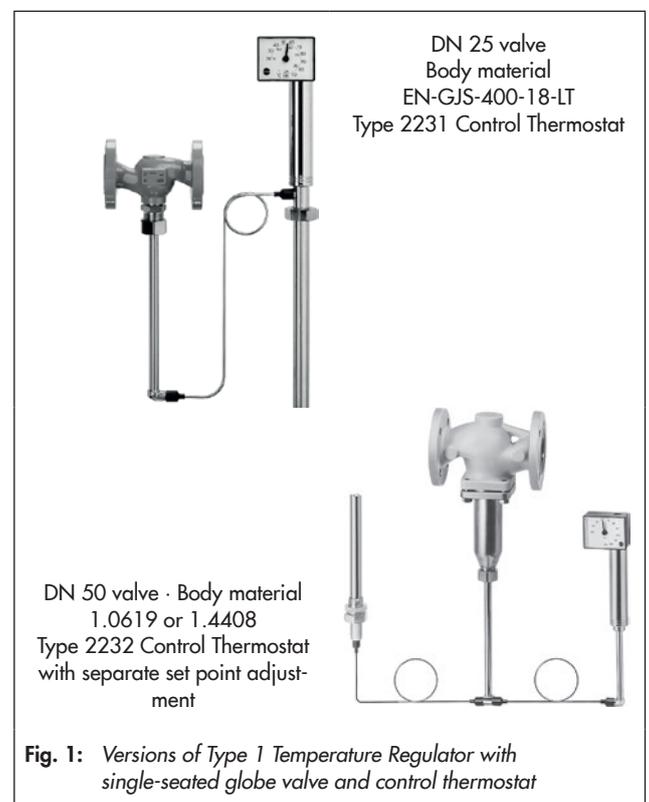
Valve size DN 15 to 25 (PN 25 to 40) · DN 32 to 50 (PN 16 to 40) · Types 2231 to 2234 Control Thermostat (see Fig. 1)

Further details on the application of thermostats can be found in Information Sheet ▶ T 2010.

Type 2111/2231 · With Type 2111 Valve and Type 2231 Control Thermostat · Set points from **-10 to +150 °C** · Set point adjustment at the sensor

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

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



Special version

- 10 and 15 m capillary tube lengths
- Sensor of CrNiMoTi steel
- Capillary tube, copper with plastic coating
- Valve free of non-ferrous metal
- Stainless steel valve version
- Dimensions and materials according to ANSI (▶ T 2115)

¹⁾ Field of applications are the control of Group II fluids according to Pressure Equipment Directive 2014/68/EU.

Principle of operation (Fig. 2)

The regulators operate according to the liquid expansion principle. The temperature sensor (11), capillary tube (8) 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) 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 (9) to a value which can be read off from the dial (10).

Installation

Valve

Install the valves in horizontal pipelines. The thermostat connection must face downwards and the direction of flow must correspond with the arrow on the valve body.

Capillary tube

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

Temperature sensor

The bulb sensor can be installed in any position. However, its entire length must be immersed in the medium. 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.

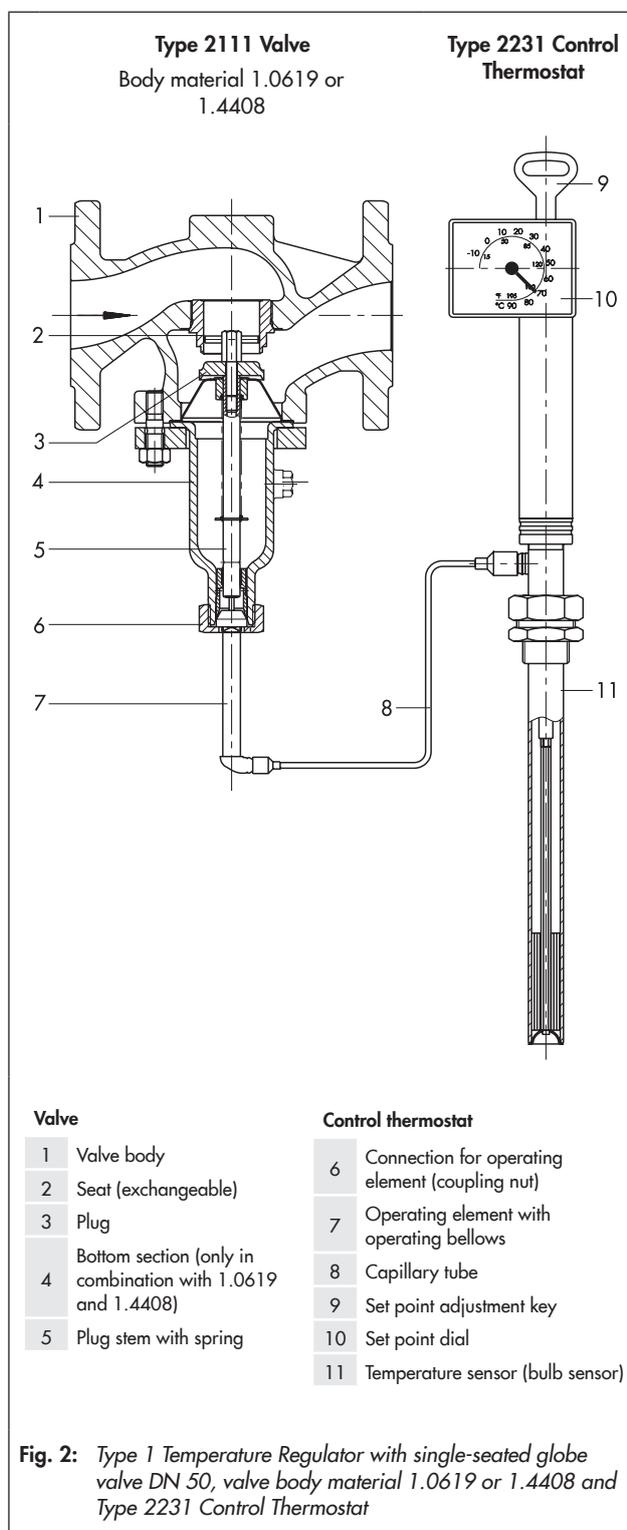


Fig. 2: Type 1 Temperature Regulator with single-seated globe valve DN 50, valve body material 1.0619 or 1.4408 and Type 2231 Control Thermostat

Table 1: Technical data · All pressure stated as gauge pressure in bar

The listed permissible pressures and differential pressures are restricted by the specifications in the pressure-temperature diagram and the pressure rating (according to DIN EN 12516-1).

Type 2111 Valve							
Standard version	DN	15	20	25	32	40	50
Pressure rating		PN 25 to 40					
Standard version	K_{VS} coefficient	4	6.3	8	16	20	32
	Differential pressure Δp_{max} bar	25 ¹⁾	16 ¹⁾	14	6	6 ²⁾	4
Special version	K_{VS} coefficient	2.5 · 1.0 · 0.4 · 0.1		4.0 ¹⁾ · 1.0 · 0.4 · 0.1		6.3 ³⁾	8
	Differential pressure Δp_{max} bar	25			16	14	6
Leakage class according to IEC 60534-4		≤ 0.05 % of K_{VS} coefficient					
Permissible valve temperature		Max. 350 °C · See pressure-temperature diagram in ► T 2010					
Type 2231 to 2234 Thermostat							
		Size 150					
Set point range (set point span 100 K)		-10 to +90 °C, 20 to 120 °C or 50 to 150 °C For Types 2232 and 2234 also 100 to 200 °C, 150 to 250 °C					
Permissible ambient temperature at the set point adjustment		-40 to +80 °C					
Permissible temperature at sensor		100 K above the adjusted set point					
Permissible pressure at the sensor	Type 2231/2232	Without thermowell PN 40 · With thermowell PN 40 or 100 With thermowell with flange: PN 40 · PN 100					
	Type 2234	Without thermowell: PN 40 · With flange: PN 6 · PN 40					
Capillary tube length		5 m (10 or 15 m as special version)					

1) With EN-GJS-400-18-LT: $\Delta p_{max} = 14$ bar

2) In combination with Type 2212 STL: 4 bar

3) Only with cast steel 1.0619 or cast stainless steel 1.4408

Table 2: Materials · Material numbers according to DIN EN

Type 2111 Valve				
Valve size	DN	40 and 50	15 to 50	
Pressure rating		PN 16	PN 25	PN 40
Body		Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619 Cast stainless steel 1.4408
Seat and plug		1.4305		1.4104 · 1.4112 1.4404
Plug stem · Spring		CrNiMoTi steel		
Bottom section		1.8935 ¹⁾ · 1.0460 ¹⁾		1.4571
Seal		Graphite on metal core		
Extension piece · Separating piece		Brass (for version free of non-ferrous metal: CrNi steel)		1.4301
Types 2231, 2232 and 2234 Thermostats				
Version		Standard version		Special version
Operating element		Nickel-plated brass		
Sensor	Type 2231	Bronze		–
	Type 2232	Bronze		CrNiMoTi steel
	Type 2234	Copper		
Capillary tube		Copper		Plastic-coated copper
Thermowell				
G 1 threaded connection	Immersion tube	Bronze, steel, copper ²⁾		CrNiMoTi steel
	Threaded nipple	Brass · Steel		
Flange connection	Immersion tube	Steel		CrNiMoTi steel
	Threaded nipple	Steel		

1) EN-GJS-400-18-LT with brass bushing

2) PN 16 only

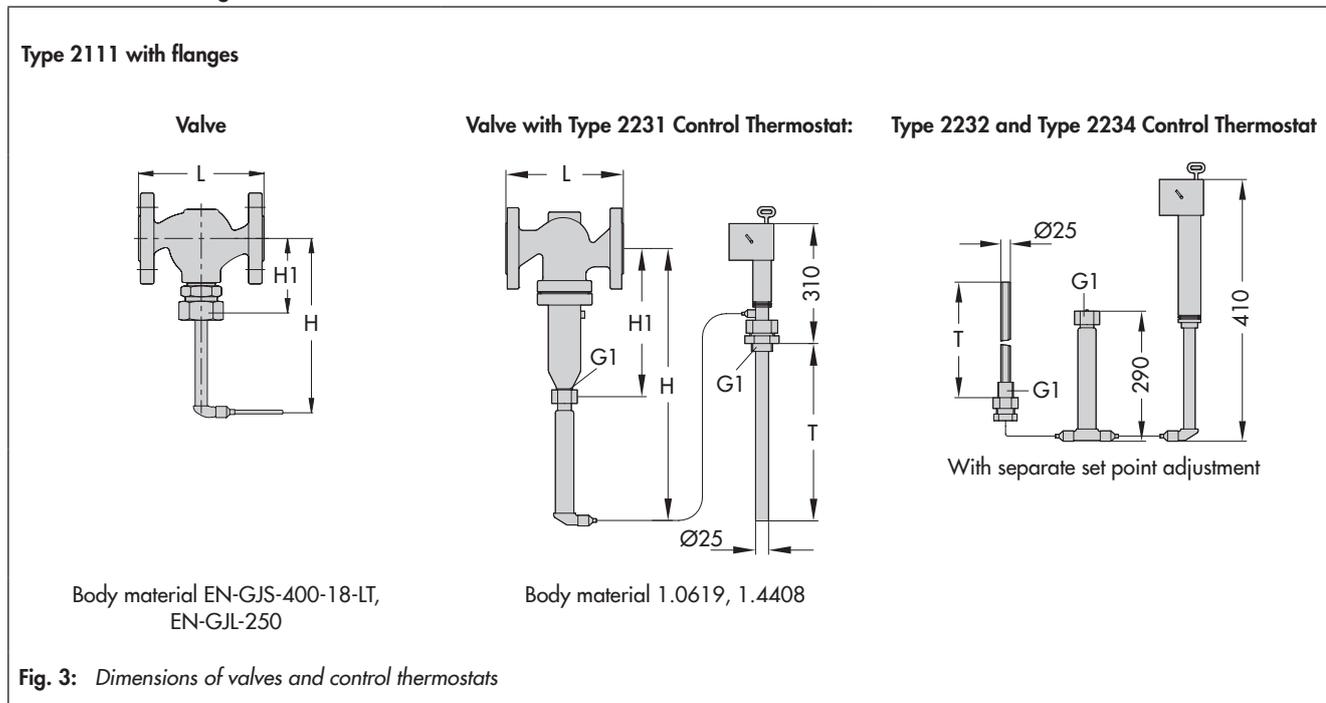
Table 3: Dimensions and weights

Type 2111 Valve	DN	15	20	25	32	40	50		
Length L		130	150	160	180	200	230		
Body material EN-GJS-400-18-LT, EN-GJL-250									
H1		82			152				
H		372			442				
Weight, kg (approx.)		4.6			11.5	10.0 ²⁾			
Body material 1.0619, 1.4408									
H1	Without Extension piece	225							
	With Extension piece	365							
H	Without Extension piece	515							
	With Extension piece	655							
Weight, kg (approx.)		4.6	5.2	6.3	11.5	12.1	15.5		
Control thermostat		Type		2231		2232		2234	
Immersion depth T	mm	290 ¹⁾		235 ¹⁾		460			
Weight, kg (approx.)		3.2		4.0		3.7			

¹⁾ Larger immersion depths on request

²⁾ PN 16 body; +15 % for PN 25/40

Dimensional drawings of valves and control thermostats



Accessories (see Fig. 5)

Thermowells with threaded or flanged connections for Types 2231 and 2232 Bulb Sensors · G 1 threaded connection, PN 40, made of bronze, steel or CrNiMo steel · Flanged connection, DN 32, PN 40, with thermowell made of CrNiMo steel/steel · Thermowell made of PTFE, PN 6 (flange PN 40) Thermowell for flammable gases **typetested by DVGW**, G 1 threaded connection, PN 100

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

To protect the operating element from inadmissible operating conditions, an extension piece or separating piece must be installed between the valve and the operating element.

An **extension piece** is needed for temperatures over 220 °C. The standard version does not have sealing. The special version of the extension piece is made of stainless steel and has a bellows seal. It additionally acts as a separating piece.

In combinations with valves made of cast iron or spheroidal graphite iron together with Type 2212 Safety Temperature Limiter or Type 2213 Safety Temperature Monitor, an extension piece is required for temperatures over 150 °C.

A **separating piece** must be used when a seal between control thermostat and valve is required. Separating pieces made of CrNi steel must be used when all wetted parts are to be free of non-ferrous metals. The separating piece is made of brass (for water and steam) or CrNi steel (for water and oil ¹⁾)

In addition, it prevents the medium from leaking while the control thermostat is being replaced.

Additionally, the following are available:

Safety temperature monitors (STM) and **safety temperature limiters (STL)**. Details can be found in data sheets ► T 2043 and ► T 2046.

Typetested safety devices are available.

The registration number is available on request. Temperature regulators (TR) with a Type 2231, 2232 or 2234 Control Thermostat and a Type 2111 Valve, DN 15 to 50.

Sensor without thermowell: can be used up to 40 bar, test pressure max. 60 bar.

Sensor with thermowell: only use SAMSON G 1 version made of bronze or stainless steel 1.4571 up to 40 bar.

Thermowell for flammable gases **typetested by DVGW**, G 1 threaded connection, PN 100.

More details on typetested devices in Data Sheet ► T 2040.

Dynamic behavior of control thermostats

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

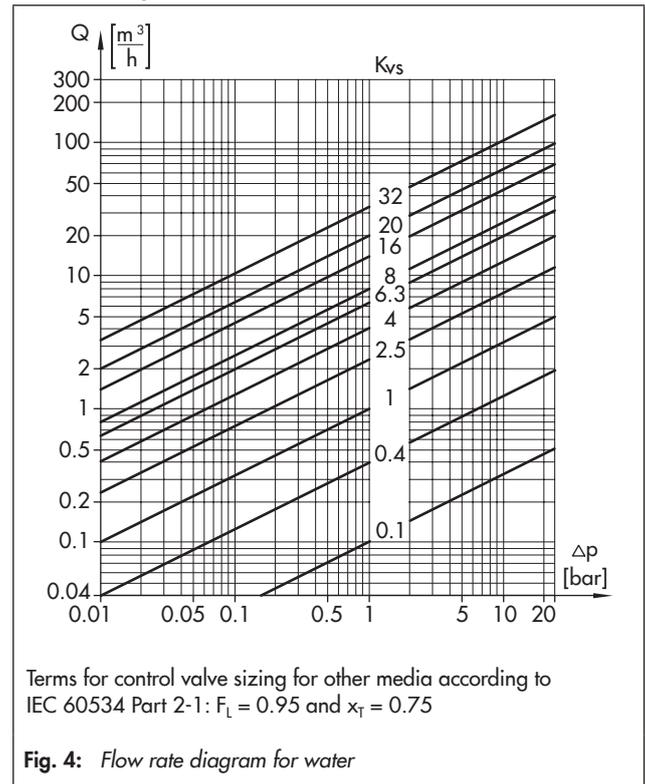
Table 4 lists the response times of SAMSON control thermostats operating according to different principles measured in water.

Table 4: Dynamic behavior of SAMSON control thermostats

Principle of operation	Control thermostat Type	Time constant [s]	
		Without Thermowell	With Thermowell
Liquid expansion	2231	70	120
	2232	65	110
	2234	15	- ¹⁾
	2213	70	120
Adsorption	2212	- ¹⁾	40

¹⁾ Not permissible

Flow rate diagram for water



Ordering text

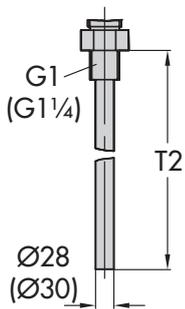
Type 2111/... Temperature Regulator
 DN ...
 PN ...
 Body material ...
 With Type 223... Control Thermostat
 Set point range ... °C
 Capillary tube ... m,
 Optionally, special version ...
 Accessories ...

¹⁾ Field of applications are the control of Group II fluids according to Pressure Equipment Directive 2014/68/EU.

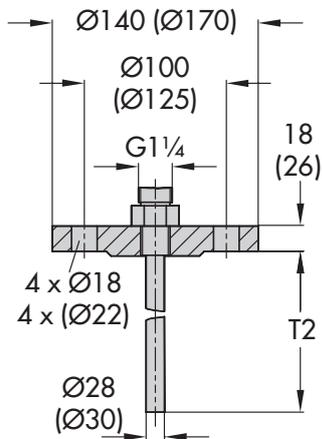
Dimensional drawings of accessories

Thermowells for Type 2231/2232

Control thermostat	Type	2231	2232
Immersion depth T2	mm	325	250

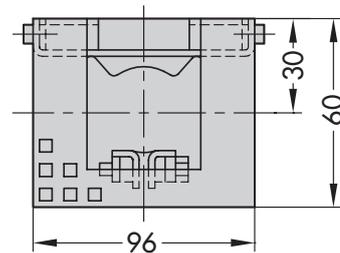
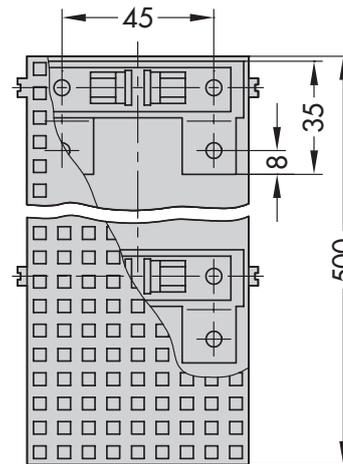


Thermowell with threaded connection
G 1/PN 40 or PN 100¹⁾



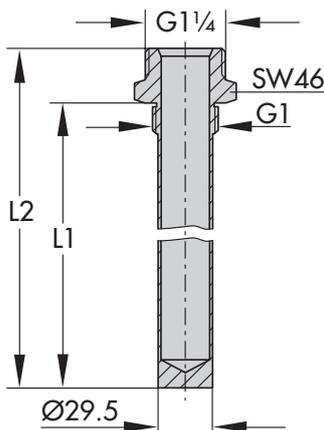
Thermowell with flanges
DN 32 for
PN 40 · DN 40 for
PN 100¹⁾

Clamps and perforated cover for wall mounting (Type 2234)²⁾



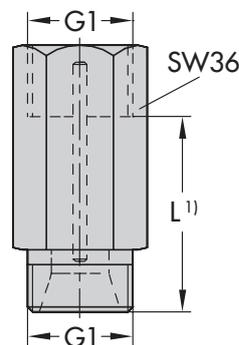
Thermowells for flammable gases (PN 100)

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



Thermowell for flammable gases
(G 1/PN 100)

Extension piece/separating piece



Extension piece

L = approx. 140 mm, approx. 0.5 kg

With bellows seal (special version)

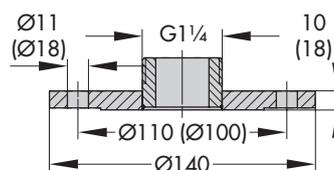
L = approx. 180 mm, approx. 0.6 kg

Separating piece with seals,

L = approx. 55 mm, approx. 0.2 kg

¹⁾ Add the dimension L to H and H1 when these accessories are used.

Flange for Type 2234



Flange PN 6; 140 mm outer diameter

Flange PN 40/DN 32 (dimensions in parentheses)

Fig. 5: Dimensions and weights of accessories

¹⁾ Dimensions in brackets

²⁾ Mounting position of sensor: pointing down