

Self-operated Temperature Regulators

Temperature Regulator Type 8

Including three-way valve with unbalanced plug · Flanges



Application

Temperature regulator with mixing or diverting valve designed for plants which are heated or cooled with liquids, including control thermostats for **set points** from **-10 °C** to **+150 °C** · **Three-way valves** in **nominal sizes DN 15** to **DN 50** · **Nominal pressure PN 16** · **Temperatures** up to **150 °C**

Conversion of valve sizing coefficients:

C_v (in U.S. gallons/min) = $1.17 \cdot K_{vs}$ (in m^3/h)
 K_{vs} (in m^3/h) = $0.86 \cdot C_v$ (in U.S. gallons/min)

Note

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



The regulators consist of a three-way valve with unbalanced plug and a control thermostat, comprising a temperature sensor, a set point adjuster with an excess temperature safety device, a capillary tube and an operating element.

Special features

- Low-maintenance P regulators requiring no auxiliary energy
- Broad set point range and convenient set point adjustment
- Three-way valve with a choice of plug arrangements for either mixing or diverting service of liquids
- Flow rate across the port AB almost independent of the valve plug position
- Valve body made of cast iron
- Versions with double adapter for either installing a temperature limiter or attaching a second control thermostat. Refer to Data Sheet T 2036 EN for details.

Versions

Type 8 Temperature Regulator with three-way valve

Type 2118 Valve · Nominal sizes from DN 15 to DN 50 · Nominal pressure PN 16 · Types 2231 to 2235 Control Thermostats
Three-way valves with optional plug arrangements for either mixing or diverting service. Further details on the application of thermostats can be found in Information Sheet T 2010 EN.

Type 2118/2231 (Fig. 1) · With Type 2118 Valve and Type 2231 Control Thermostat · For liquids and steam · Set point values from -10 to +150 °C, set point adjustment at the sensor

Type 2118/2232 (Fig. 2) · With Type 2118 Valve and Type 2232 Control Thermostat · For liquids · Set point values from -10 to +150 °C, separate set point adjustment

Type 2118/2233 · With Type 2118 Valve and Type 2233 Control Thermostat · For liquids, air and other gases · Set point values from -10 to +150 °C, set point adjustment at the sensor

Type 2118/2234 · With Type 2118 Valve and Type 2234 Control Thermostat · For liquids, air and other gases · Set point values from -10 to +150 °C, separate set point adjustment

Type 2118/2235 · With Type 2118 Valve and Type 2235 Control Thermostat · For air-heated storerooms, drying, climatic and heating cabinets · Set point values from -10 to +150 °C, separate set point adjustment and a capillary tube which can be installed by the user

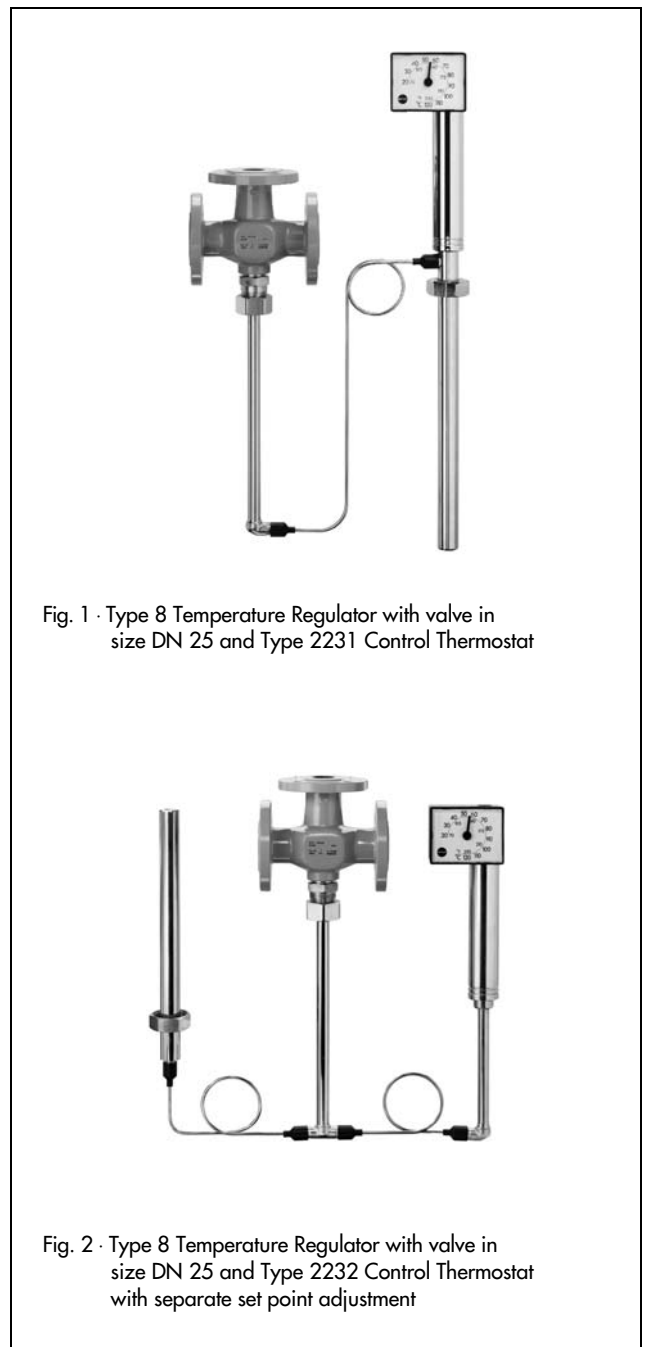


Fig. 1 · Type 8 Temperature Regulator with valve in size DN 25 and Type 2231 Control Thermostat

Fig. 2 · Type 8 Temperature Regulator with valve in size DN 25 and Type 2232 Control Thermostat with separate set point adjustment

Special version

- Capillary tube of either 5 m, 10 m or 15 m
- Sensor made of CrNiMo steel
- Capillary tube made of CrNiMo steel/Cu, plastic-coated

Principle of operation (Figs. 3 and 4)

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 (3).

The set point is adjustable with a key (9) to a value which can be read off from the dial (10).

In mixing valves (Fig. 3 with plug arrangement I), the process media to be mixed enter through the ports A and B. The combined flow leaves at port AB. The flow rate from A or B to AB is determined by the area released between the seats (2) and plugs (3), i.e. by the position of the plug stem (5). When the temperature rises, port A opens and port B closes.

In diverting valves (Fig. 4 with plug arrangement II), however, the process medium enters through port AB and the diverted flows leave the valve at ports A or B. The flow rate from AB to A or B depends on the position of the plug stem.

Three-way valve

- 1 Valve body
- 2 Seat
- 3 Plug
- 4 Lower part
- 5 Plug stem with spring
- 6 Threaded nipple with coupling nut

Control thermostat

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

Pressure-temperature diagram · acc. to DIN EN 12516-1

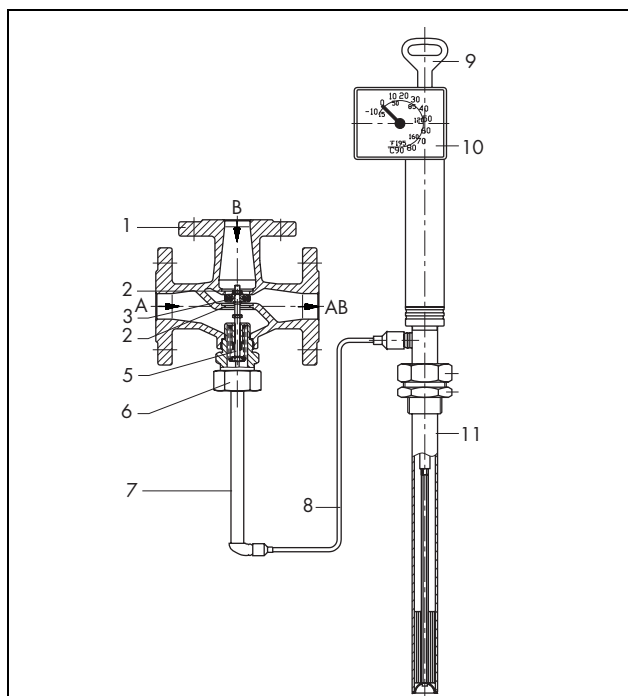
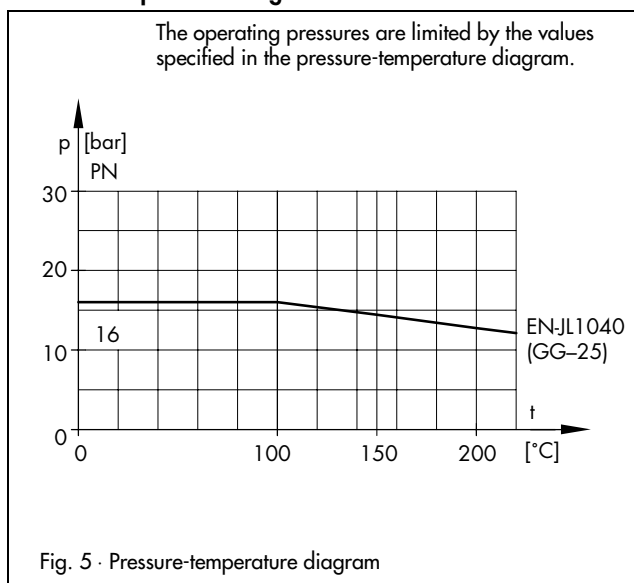


Fig. 3 · Type 8 Temperature Regulator with Type 2231 Control Thermostat and three-way valve with plug arrangement I, the arrows indicate mixing service

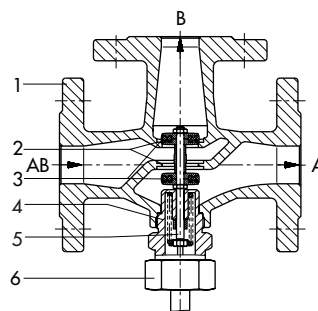


Fig. 4 · Three-way valve with plug arrangement II, the arrows indicate diverting service

Installation

Valve

The thermostat connection must be vertically suspended. Other mounting positions are possible on request. Make sure the direction of flow complies with the desired service type, i.e. mixing or diverting service.

Capillary tube

Install the capillary tube in a way that it is not exposed to large ambient temperature fluctuations and cannot be damaged. The smallest permissible bending radius is 50 mm.

Temperature sensor

The temperature sensor may 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.

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

Table 1 · Technical data · All pressures in bar (gauge). The specified permissible pressures and differential pressures are limited by the values specified in the pressure-temperature diagram and the nominal pressure ratings.

Type 2118 Three-way Valve								
Nominal pressure				PN 16				
Kvs value and max. permissible differential pressures Δp ¹⁾								
Connection		DN	15	20	25	32	40	50
Kvs value			1.6/4	6.3	10	16	20	32
Max. permissible differential pressure Δp			4 bar			1.7 bar	1.1 bar	
Permissible temperature of the valve		See Fig. 5 · Pressure-temperature diagram						
Type 2231 to Type 2235 Thermostat								
Size 150								
Set point range		-10 to +90 °C, 20 to 120 °C and 50 to 150 °C						
Permissible temperature at the set point adjuster		-40 to +80 °C						
Permissible temperature at the sensor		100 K above the adjusted set point						
Perm. pressure at the sensor		Types 2231/2232		Without thermowell: PN 40 · With thermowell: PN 40 or PN 100 (version of copper PN 16) With thermowell with flange: PN 40/DN 32 or PN 100/DN 40				
		Types 2233/2234		Without thermowell: PN 40 · With flange: PN 6 (140 external \varnothing) or PN 40/DN 32				
Length of the capillary tube		3 m (special version: 5 m, 10 m or 15 m)						

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

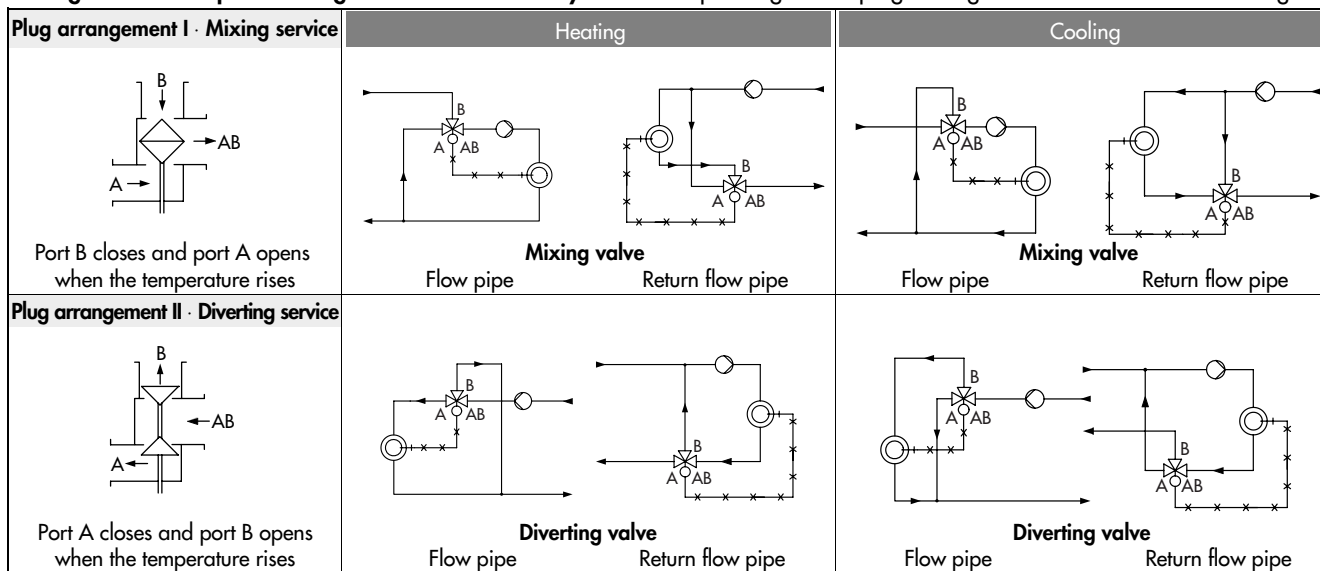
Table 2 · Materials · Material numbers according to DIN EN

Type 2118 Three-way Valve				
Connection		DN 15 to 50		
Nominal pressure		PN 16		
Body		Cast iron EN-JL1040 (GG-25)		
Seat		Cast iron EN-JL1040 (GG-25)		
Plug		1.4305 and brass with EPDM Shore 70		
Plug stem		1.4305		
Spring		1.4310		
Threaded nipple		Brass		
Sealing ring		O-ring made of EPDM		
Accessories				
Distance piece		Brass		
Types 2231, 2232, 2233, 2234 and 2235 ¹⁾ Thermostats				
		Standard version	Special version	
Operating element		Brass, nickel-plated		
Sensor	Types 2231/2232	Bronze, nickel-plated	Stainless steel 1.4571	
	Types 2233/2234	Copper, nickel-plated		
	Type 2235	Copper		
Capillary tube		Copper, nickel-plated	Copper, plastic-coated	
Thermowell with threaded connection				
Immersion tube		Bronze, nickel-plated	Copper	1.4571
Threaded nipple		Brass, nickel-plated	Copper	1.4571
Thermowell with flange				
Immersion tube		Steel	Plastic coating or PTFE ²⁾	1.4571
Flange		Steel		1.4571

¹⁾ Type 2235 is not available as stainless steel version

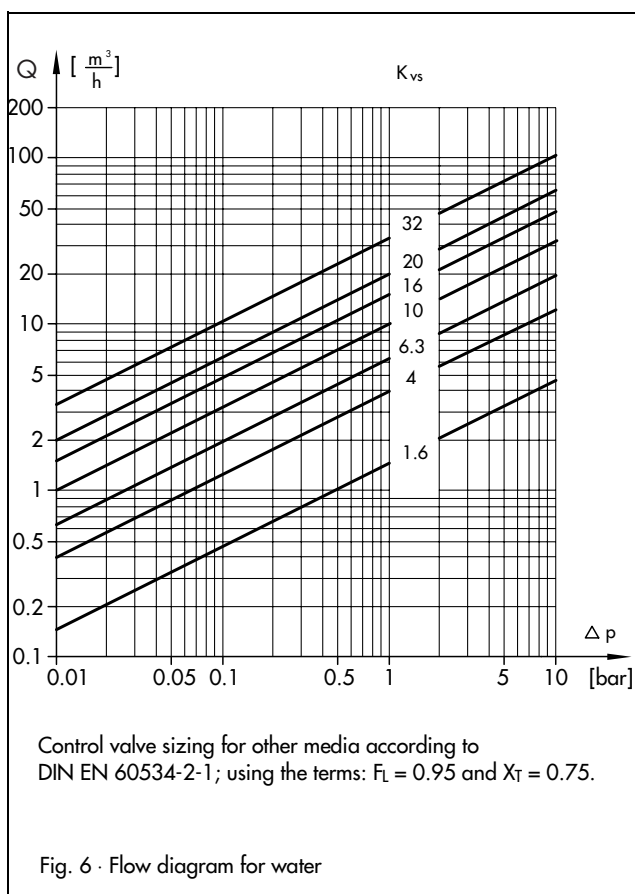
²⁾ Plastic coating - for temperatures up to 80 °C - PVC or PPH coating. PTFE version · Immersion tube: PTFE · Flange: steel with PTFE bushing

Arrangement of temperature regulators with three-way valves - depending on the plug arrangement in the valve - Block diagram



Flow diagram for water

The values apply for a fully opened valve.



Typetested safety equipment

The register no. is available on request.

The following equipment is available:

Temperature regulator (TR) with Types 2231, 2232, 2233, 2234 or 2235 Thermostat and a Type 2118 Three-way Valve in nominal sizes DN 15 to DN 50. The max. operating pressure must not exceed the max. permissible differential pressure Δp specified in the technical data section.

Sensor without thermowell: applicable up to 40 bar

Sensor with thermowell: only applicable up to 40 bar when using SAMSON version G1, bronze and 1.4571, with copper applicable up to 16 bar

Thermowell for flammable gases typetested by DVGW (German Technical and Scientific Association on Gas and Water), threaded connection G1, PN 100

Temperature limiter (TL) with thermostat and three-way valve as specified above and a double adapter Do (see Data Sheet T 2036 EN).

Further details on the selection and application of typetested equipment can be found in Information Sheet T 2040 EN.

Additionally available are: safety temperature monitors (STM) and safety temperature limiters (STL). For details refer to Data Sheets T 2043 EN and T 2046 EN.

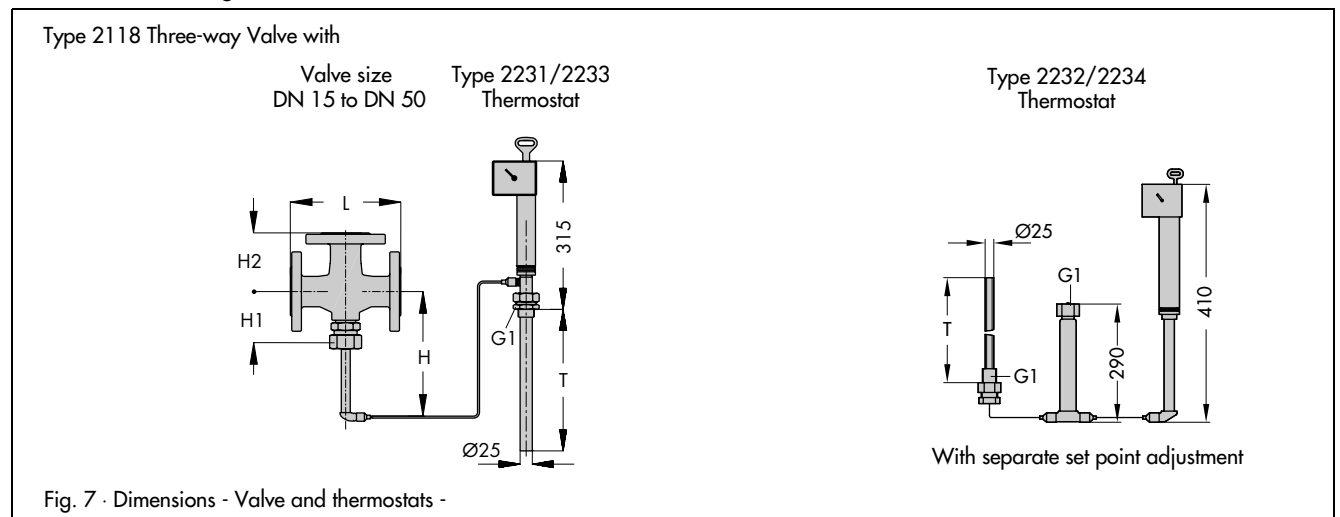
Table 3 · Dimensions in mm and weights

Type 2118 Three-way Valve	DN	15	20	25	32	40	50
Overall length L		130	150	160	180	200	230
H2		70	80	85	100	105	120
H1		78			88		
H		370			380		
Weight (body PN 16)	Approx. kg	5	6.5	8	12.5	14.5	17

Thermostat	Type	2231	2232	2233	2234	2235
Immersion depth T		290 ¹⁾	235 ¹⁾	430	460	3460
Weight	Approx. kg	3.2	4.0	3.4	3.7	3.6

¹⁾ Larger immersion depths available on request.

Dimensional drawing



Dynamic behavior of the thermostats

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

Table 4 (right) lists the response times of SAMSON thermostats operating on different principles when tested in water.

Table 4 · Dynamic response of SAMSON thermostats

Functioning 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⁾
Adsorption	2213	70	120
	2212	- ¹⁾	40

¹⁾ Not permissible

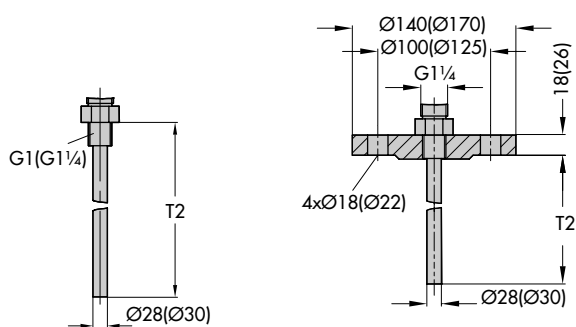
Ordering text

- Temperature Regulator Type 8/...
- Nominal size DN ..., nominal pressure PN ...
- Mixing or diverting valve with Type ... Thermostat
- Set point range ...°C, capillary tube ... m
- Optional: special version ...
- Optional: accessories ...

Accessories

Thermowells for Types 2231/2232

Thermostat	Type 2231	Type 2232
T2 in mm	325	250

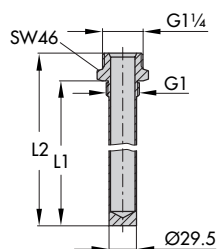


With **threaded connection**
G1 for PN 40/PN 100
(version of copper PN 16)
Dimensions for PN 100 in ()

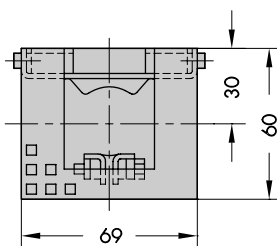
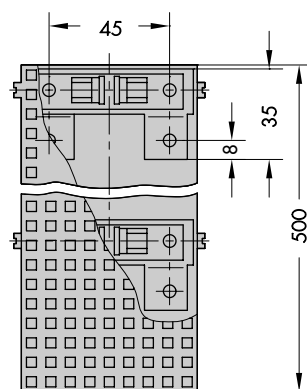
With **flange**
DN 32 for PN 40
DN 40 for PN 100
Dimensions in ()

Thermowells for flammable gases (G 1/PN 100)

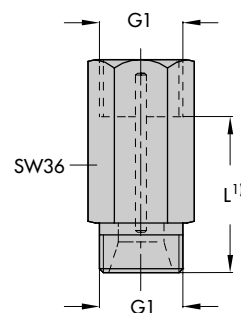
Control Thermostat	Type 2231	Type 2232
Length L1 in mm	315	255
Length L2 in mm	340	280



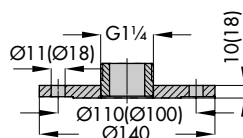
Clamps and perforated cover for wall mounting



Distance piece (weight approx. 0.2 kg)



Flange for Types 2233 and 2234



Flange PN 6; 140 external Ø

Flange PN 40/DN 32
Dimensions in parentheses ()

Fig. 8 · Dimensions - Accessories -

Thermowells with threaded or flanged connections for Types 2231 and 2232 Bulb Sensors · G 1 threaded connection, PN 40, made 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 type tested by DVGW (German gas & water association) for flammable gases, G 1 threaded connection, PN 100

Mounting parts for Type 2233 and Type 2232 · 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

Specifications subject to change without notice.



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