DATA SHEET

T 2121 EN

Type 4 and Type 4u Temperature Regulators

Self-operated Temperature Regulators · With balanced single-seated globe valve · DIN and ANSI versions

Application

Control thermostats for set points from **–10 to +250 °C/15 to 480 °F** · Nominal sizes **DN 15 to 150/NPS ½ to 6** · Pressure rating **PN 16 to 40/Class 125 to 300** · Temperatures up to **350 °C/660 °F**

Type 4 · Temperature regulator for heating installations · The valve **closes** when the temperature **rises**.
Type 4u · Temperature regulator for cooling installations · The valve **opens** when the temperature **rises**.

The regulators consist of a balanced globe valve with flanged connections (Type 4), an additional reversing device (Type 4u) 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 valve with a plug balanced by a balancing diaphragm or stainless steel bellows
- **Type 4** · Suitable for liquids, gases and vapors, especially for heat transfer media, such as water, oil and steam
- **Type 4u** · Suitable for liquids, gases and vapors, especially for coolants, such as cooling brine or cooling water
- Valve body optionally available in cast iron, spheroidal graphite iron, cast steel or cast stainless steel
- Versions with double adapter and manual adjuster for temperature limiters or attachment of a second control thermostat (▶ T 2036 for details).

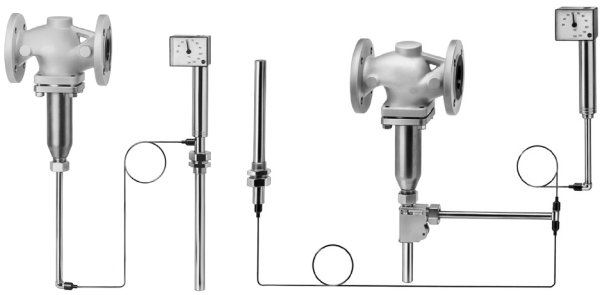


Fig. 1: *Type 4 with Type 2231 Control Thermostat (left)*

Fig. 2: *Type 4u Temperature Regulator with Type 2232 Control Thermostat, version with separate set point adjustment (right)*

Versions

Type 4 Temperature Regulator (see Fig. 1) · Type 2422 Valve with flanged connections · Balanced by a bellows (DN 15 to 150/NPS ½ to 6) · Balanced by a diaphragm (DN 65 to 100/NPS 2½ to 4) · PN 16 to 40/Class 125 to 300 · Type 2231 to 2234 Control Thermostat · Further details on the application of control thermostats can be found in Information Sheet ▶ T 2010.

Type 4u Temperature Regulator (see Fig. 2) · Type 2422 Valve with flanged connections · Reversing device · Balanced by a bellows (DN 15 to 150/NPS ½ to 6) · Balanced by a diaphragm (DN 65 to 100/NPS 2½ to 4) · PN 16 to 40/Class 125 to 300 · Type 2231 to 2234 Control Thermostat · Further details on the application of control thermostats can be found in Information Sheet ▶ T 2010.

Selection of control thermostats for Type 4 and Type 4u Temperature Regulators

- **Type 2231 Control Thermostat** suitable for liquids · Set points from –10 to +150 °C/15 to 300 °F
- **Type 2232 Control Thermostat** suitable for liquids and steam · Separate set point adjustment · Set points from –10 to +250 °C/15 to 480 °F · With clamping gland for larger immersion depths
- **Type 2234 Control Thermostat** suitable for liquids, steam, air and other gases · Separate set point adjustment · Set points from –10 to +250 °C/15 to 480 °F

Special versions

- 10 or 15 m/33 or 50 ft capillary tube lengths
- Sensor of CrNiMo steel
- Capillary tube, copper with plastic coating
- Valve entirely of stainless steel
- Reduced K_{VS}/C_V coefficient
- Valve with flow divider ST 1 for noise reduction with steam and non-flammable gases
- Reversing device version with travel adjuster (with adjustment of minimum flow rate) for Type 4u

Principle of operation (see Fig. 3)

The temperature regulators operate according to the liquid expansion principle.

The temperature sensor (12), capillary tube (9) and operating element (7) are filled with an expansion liquid. The temperature-dependent change in volume of this liquid causes the operating bellows in the operating element (7) to move.

As a result, the plug stem (5) moves the plug (3) causing the valve of the Type 4 Regulator to open or close.

Similar to the Type 4, the plug of the Type 4u Regulator is moved. However, the reversing device (13) mounted between the valve and control thermostat causes the plug to move in the reverse direction.

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 temperature set point is adjustable with a key (10) to a value which can be read off from the dial (11).

Ordering text

Type 4 Temperature Regulator or **Type 4u** Temperature Regulator

DN ..., PN ... or NPS ..., Class ...

Body material ...

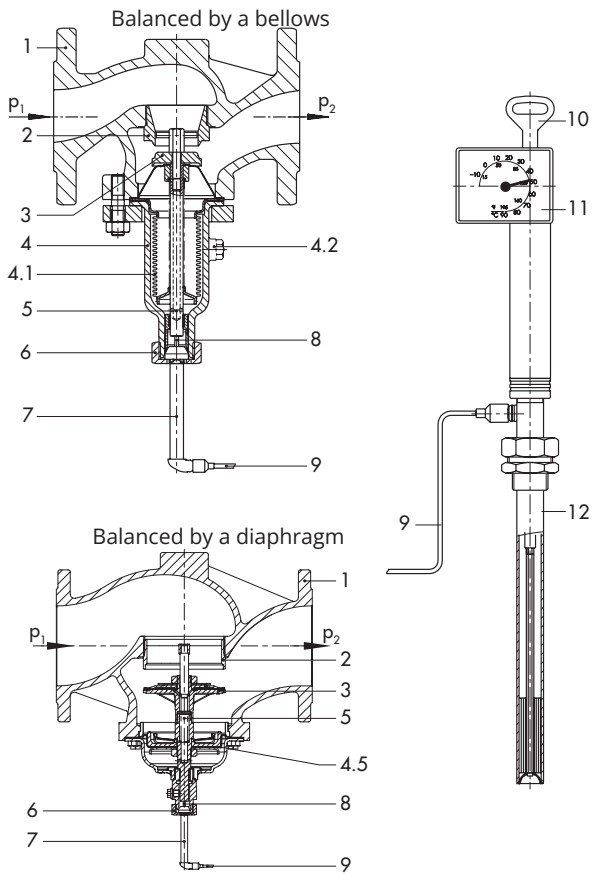
Balanced by a bellows or diaphragm

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

Capillary tube ... m/ft

Optionally, special version ...

Optionally, accessories ...



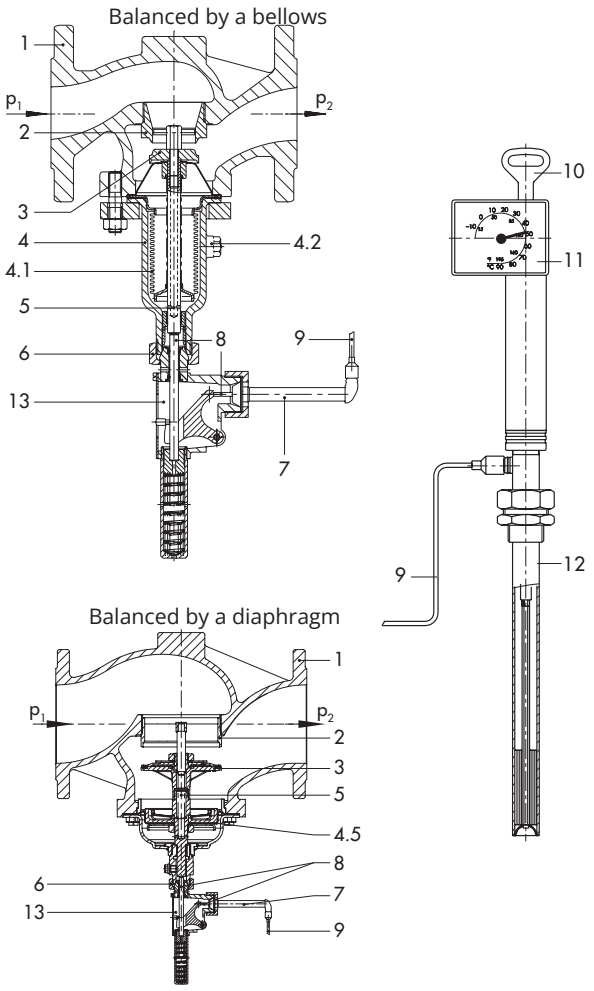
Valve

1	Valve body
2	Seat (exchangeable)
3	Plug
4	Bellows housing
4.1	Balancing bellows
4.2	Screw plug (DN 125/ NPS 6 and larger)
4.5	Balancing diaphragm
5	Plug stem with spring

Control thermostat

6	Control thermostat connection (threaded nipple with coupling nut)
7	Operating element with operating bellows
8	Pin of operating element
9	Capillary tube
10	Set point adjustment key
11	Set point dial
12	Temperature sensor (bulb sensor)

Fig. 3: *Type 4 Temperature Regulator with Type 2231 Control Thermostat, Type 2422 Valve balanced by a bellows (top left), Type 2422 Valve balanced by a diaphragm (bottom left)*



Valve

1	Valve body
2	Seat (exchangeable)
3	Plug
4	Bellows housing
4.1	Balancing bellows
4.2	Screw plug (DN 125/ NPS 6 and larger)
4.5	Balancing diaphragm
5	Plug stem with spring
13	Reversing device with coupling nut to connect it to the valve

Control thermostat

6	Control thermostat connection (threaded nipple with coupling nut)
7	Operating element with operating bellows
8	Pin of operating element
9	Capillary tube
10	Set point adjustment key
11	Set point dial
12	Temperature sensor (bulb sensor)

Fig. 4: *Type 4u Temperature Regulator with Type 2231 Control Thermostat, Type 2422 Valve balanced by a bellows (top left), Type 2422 Valve balanced by a diaphragm (bottom left)*

Accessories

- **Thermowells with threaded or flanged connections** for Types 2231 and 2232 Bulb Sensors · G 1/1 NPT threaded connection, PN 40/Class 300, made of bronze, steel or CrNiMo steel · PN 16/ Class 125, made of copper · Flanged connection, DN 32/NPS 1½, PN 40/Class 300, with thermowell made of CrNiMo steel/steel · Thermowell made of PTFE, PN 6 (flange PN 40/Class 300)
- **Thermowell for flammable gases typetested by DVGW**, G 1/1 NPT threaded connection, PN 100/ Class 600
- **Mounting parts** for Type 2234 · Clamps for wall mounting · Perforated cover for control thermostat
- **Extension piece or separating piece** · 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** (for valves **balanced by a bellows)** is needed for temperatures over 220 °C/430 °F. The standard version does not have sealing. The special version of the extension piece for DN 15 to 100/NPS ½ to 4 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/300 °F.

  Separating piece made of brass (for water and steam) or CrNi steel (for water and oil). 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 also prevents the process medium from leaking out while the control thermostat is being replaced
- **Do2 double adapter** for second control thermostat · DoS with electric signal transmitter
- **Manual adjuster Ma** with travel indicator · MaS with electric signal transmitter
- **Type 2231 and Type 2232 Sensor** · Thermowells with threaded connection
- **Type 2234 Sensor** · Clamps and perforated cover for wall mounting

Typetested safety devices

The register number is available on request.

The following versions are available:

- **Temperature regulators (TR)** with a Type 2231, Type 2232 or Type 2234 Control Thermostat and a Type 2422 Valve in DN 15 to 150/NPS ½ to 6, for which the maximum operating pressure must not exceed the maximum permissible differential pressure Δp specified in the technical data.

  Sensors without thermowell: Can be used up to 40 bar/Class 300, test pressure max. 60 psi/870 bar

  Sensors with thermowell: only use SAMSON G 1/1 NPT version made of bronze, steel or stainless steel up to PN 40/Class 300, copper up to PN 16/ Class 150
- **Thermowell for flammable gases typetested by DVGW**, G 1/1 NPT threaded connection, PN 100/ Class 600
- **Safety temperature monitors (STM) and safety temperature limiters (STL).** Details in Data Sheets ▶ T 2043 and ▶ T 2046.

Further details on the selection application of typetested equipment can be found in Information 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 1 lists the response times of SAMSON control thermostats operating according to different principles measured in water.

Table 1: *Dynamic behavior of SAMSON control thermostats*

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

[1] Not permissible

Installation

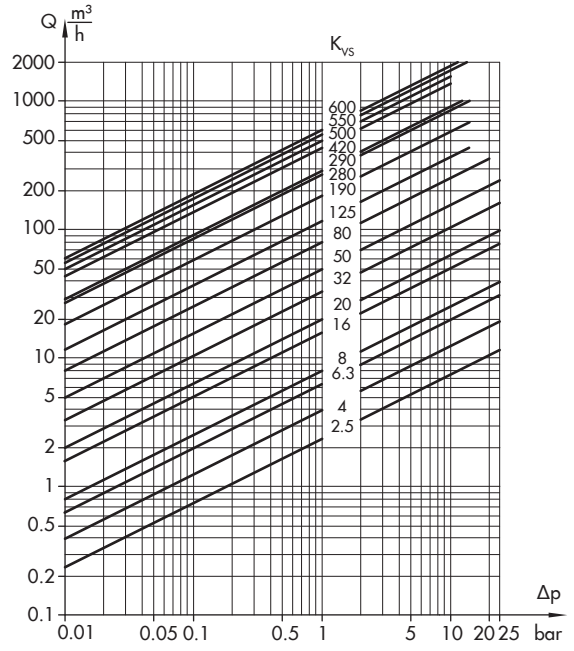
- **Valves**
  Install the valves in horizontal pipelines. The control thermostat connection (6) must face downwards. The direction of flow must match the direction indicated by the arrow on the body.
- **Capillary tube**
  The capillary tube must be run in such a way that the ambient temperature range cannot be exceeded, any deviations in temperature cannot occur and that the tube cannot be damaged. The smallest permissible bending radius is 50 mm/2".
- **Temperature sensor**
  The temperature sensor can be installed in any position as required. The entire temperature sensor must be immersed in the process medium.
  Select the site of installation 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).
- **Assembly**
  Observe a minimum spacing of 50 mm/2" for assembly and maintenance purposes.
- **Thermowell**

  Type 2231
  The sensor of the control thermostat can be used with or without a thermowell. The standard length of the thermowell is 290 mm/11.4".

  Type 2232
  The sensor of the control thermostat can be used with or without a thermowell. The standard length of the thermowell is 235 mm/9.3".
  The version with clamping gland can be used for larger immersion depths (max. 990 mm/23.6" possible with SAMSON thermowells). It is also possible to use non-SAMSON thermowells provided on site with different immersion depths. In this case, the immersion depth of the sensor can be varied as required depending on the length of the capillary tube.
  For reasons of safety and because the function to seal the sensor is missing, the use of the clamping gland is only permitted with a thermowell.

  Type 2234
  The sensor of the control thermostat can only be used without a thermowell. The maximum sensor length is 460 mm/18.1".

Flow rate diagram for water



Terms for control valve sizing for other media according to IEC 60534 Part 2-1: F_L = 0.95 and x_T = 0.75.

The specifications apply to a fully open valve

Fig. 5: *Flow rate diagram for water*

Technical data for DIN devices

Table 2: *Technical data · Valves · All pressures in bar (gauge)*

Type 2422 Valve · Balanced by a bellows · Balanced by a diaphragm				
Nominal size		**DN 15 to 50**	**DN 65 to 100**	**DN 125 to 150**
Pressure rating		PN 16, 25 and 40		
Permissible valve temperature	Balanced by a bellows	Max. 350 °C · See pressure-temperature diagram in ▶ T 2010		
	Balanced by a diaphragm	–	Max. 150 °C · See pressure-temperature diagram in ▶ T 2010	–
Leakage class according to IEC 60534-4	Balanced by a bellows	Metal seal: ≤0.05 % of K_{VS} coefficient		Soft seal: ≤0.01 % of K_{VS} coefficient
	Balanced by a diaphragm	–	Soft seal: ≤0.01 % of K_{VS} coefficient	–
Conformity		CE		

Table 3: *Technical data · Control thermostats*

Types 2231 to 2234 Control Thermostat		Size 150
Set point ranges		–10 to +90 °C, 20 to 120 °C or 50 to 150 °C For Type 2232, Type 2234 also 100 to 200 °C, 150 to 250 °C
Perm. ambient temperature at the set point adjustment		-40 to +80 °C
Perm. temperature at the sensor		100 K above the adjusted set point
Perm. pressure at sensor	Type 2231 [1] · Type 2232 [1] [2]	Without/with thermowell: PN 40 · Thermowell with flange: PN 40 or PN 100 [3]
	Type 2234	Without thermowell: PN 40 · With flange on request
Capillary tube length		5 m (10 or 15 m as special version)

1) Other pressure ratings for thermowell/flange on request
2) The version with clamping gland can be used for larger immersion depths (max. 990 mm possible with SAMSON thermowells). It is also possible to use non-SAMSON thermowells provided on site with different immersion depths. In this case, the immersion depth of the sensor can be varied inside the thermowell as required.
3) With thermowell (DVGW version)

Table 4: *Materials · Material numbers according to DIN EN*

Type 2422 Valve · Balanced by a bellows					
Nominal size		**DN 15 to 150**			
Pressure rating		PN 16	PN 16 and 25	PN 16, 25 and 40	
Valve body		Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT	Cast steel 1.0619	Cast stainless steel 1.4408
Valve seat [3]		CrMo steel · Cr steel [6]			CrNiMo steel
Plug [3] [4]	Up to DN 100 [2]	CrNiMo steel			
	DN 125 to 250	CrNiMo steel, plug with PTFE seal			CrNiMo steel
Plug stem		CrNi steel			
Spring		CrNi steel			
Balancing bellows		CrNiMoTi steel · DN 125: CrNiMo steel			
Bellows housing		Cr steel			CrNi steel
Body gasket		Graphite on metal core			
Extension piece/separating piece [7]		Brass (for version free of non-ferrous metal: CrNi steel)			CrNi steel

1) On request
2) Optionally with soft seal with standard K_{VS} coefficients
3) Special version 1.4409
4) Soft-seated plug with EPDM ring for temperatures up to 150 °C
5) PN 16 only
6) For DN 65 to 100 only
7) Select the material of the accessories to match that of the main valve

Table 4: *Materials · Material numbers according to DIN EN*

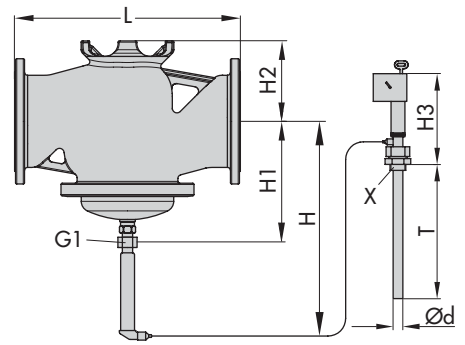
Type 2422 Valve · Balanced by a diaphragm			
Nominal size		**DN 65 to 100**	
Pressure rating		PN 16	PN 25
Valve body		Cast iron EN-GJL-250	Spheroidal graphite iron EN-GJS-400-18-LT
Valve seat		CrNiMo steel	
Plug		CW617N (brass), plug with EPDM soft seal	
Diaphragm cases		1.0619	
Pressure balancing		Diaphragm plate CrNi steel · EPDM balancing diaphragm, max. 150 °C or NBR diaphragm, max. 80 °C	
Type 2231, Type 2232 and Type 2234 Control Thermostats			
		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 [5]	CrNiMoTi steel
	Threaded nipple	Brass · Steel	
Flange connection [1]	Immersion tube	Steel	CrNiMoTi steel
	Threaded nipple	Steel	

1) On request
2) Optionally with soft seal with standard K_{VS} coefficients
3) Special version 1.4409
4) Soft-seated plug with EPDM ring for temperatures up to 150 °C
5) PN 16 only
6) For DN 65 to 100 only
7) Select the material of the accessories to match that of the main valve

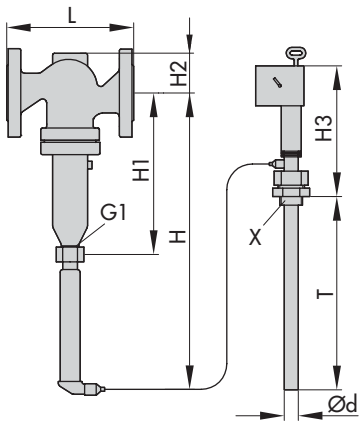
Dimensional drawings: Type 2422 Valve · Balanced by a bellows · Balanced by a diaphragm · With connection for Type 2231 to Type 2234 Control Thermostat

Control thermostat with …

Integrated set point adjustment (Type 4)

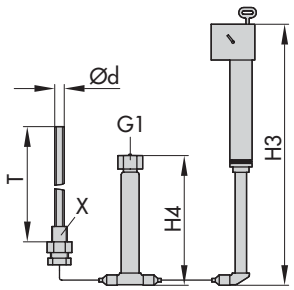


Type 2231 Control Thermostat with Type 2422 Valve balanced by a diaphragm



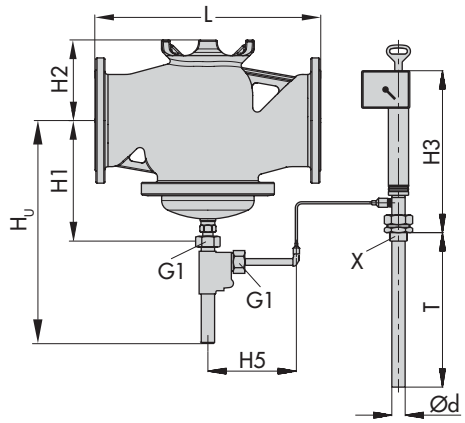
Type 2231 Control Thermostat with Type 2422 Valve balanced by a bellows

Separate set point adjustment

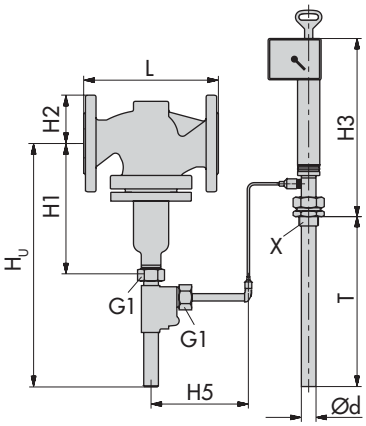


Type 2232 and Type 2234 Control Thermostat

Integrated set point adjustment (Type 4u)



Type 2231 Control Thermostat with Type 2422 Valve balanced by a diaphragm



Type 2231 Control Thermostat with Type 2422 Valve balanced by a bellows

Fig. 6: *Dimensions · Type 4 and Type 4u · DIN and ANSI*

Table 5: *K_{VS} coefficients, x_{FZ} values and max. permissible differential pressures Δp*
Terms for control valve sizing according to IEC 60534, Parts 2-1 and 2-2: $F_L = 0.95$, $X_T = 0.75$

Type 2422 Valve · Balanced by a bellows												
Nominal size	**DN**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**
Valve travel	mm	10						16			22	
Standard K_{VS}		4	6.3	8	16	20	32	50	80	125	190	280
Max. perm. diff. pressure Δp		25 bar						20 bar		16 bar		12 bar
Reduced K_{VS}		2.5 · 4 · 6.3			6.3	8	16	32		80		125
Max. perm. diff. pressure Δp		25 bar								20 bar		16 bar
x_{FZ} value		0.65	0.6	0.55		0.45	0.4		0.35			

Type 2422 Valve · Balanced by a diaphragm				
Nominal size	**DN**	**65**	**80**	**100**
Valve travel	mm	16		
K_{VS} coefficient		50	80	125
Max. perm. diff. pressure Δp		12 bar		10 bar
x_{FZ} value		0.4	0.35	

Table 6: *Dimensions in mm and weights · Type 2422 Valve*

Type 2422 Valve · Balanced by a bellows													
Nominal size		**DN**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**
Overall length L			130	150	160	180	200	230	290	310	350	400	480
H2	Body	Forged steel	53	–	70	–	92	98	–				
		Other materials	55			72			100		120	145	175
H1		Up to 220 °C (without extension piece)	225						300		355	460	590
		Up to 350 °C (with extension piece)	365						440		495	600	730
H (Type 4)		Up to 220 °C (without extension piece)	515						590		645	750	880
		Up to 350 °C (with extension piece)	655						730		785	890	1020
H_U (Type 4u)		Up to 220 °C (without extension piece)	425						500		555	660	790
		Up to 350 °C (with extension piece)	565						640		695	800	930
Weight [1) 2)], approx. kg			5	5.5	6.5	13	13.5	16	27	32	40	70	113

Type 2422 Valve, balanced by a diaphragm · Max. 150 °C				
Nominal size	**DN**	**65**	**80**	**100**
Overall length L		290	310	350
H2		98		118
H1		201	202	218
H (Type 4)		589	590	626
H_U (Type 4u)		401	402	418
Weight [1) 2)], approx. kg		30	37.5	45

1) Based on PN 16 and without extension piece: +15 % for PN 25 and 40
2) Type 4u: Reversing device approx. +0.5 kg

Table 7: *Types 2231 to 2234 Control Thermostat · All dimensions in mm*

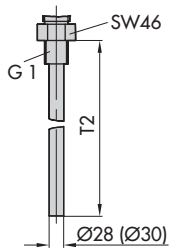
Control thermostat	Type 2231	Type 2232	Type 2234
Immersion depth T	290 [1]	235 [1]	460
Thread X	G1		
H3	310	410	
H4	290		
H5	375		
Diameter Ød	25		
Weight, approx. kg	3.2	4	3.7

[1] Larger immersion depths on request

Thermowells for Type 2231 and Type 2232

Table 8: *Thermowells for Type 2231 and Type 2232*

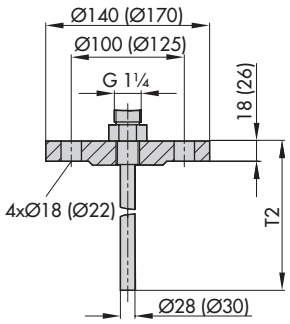
Control thermostat	Type 2231	Type 2232
Immersion depth T2	325 mm	250 mm



With threaded connection

G 1 for PN 40 and 100 (dimensions for PN 100 in parentheses)

Thermowell made of copper: PN 16



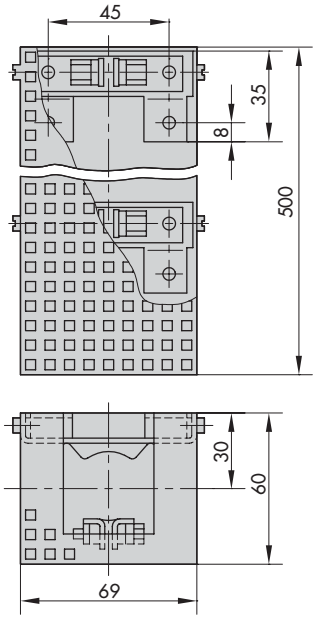
With flanges

DN 32 for PN 40

DN 40 for PN 100 (dimensions for PN 100 in parentheses)

Mounting parts for Type 2234 [1)]

Clamps and perforated cover for wall mounting

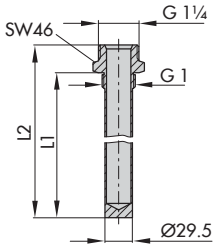


1) Mounting position of sensor: pointing down

Thermowells for Type 2231 and Type 2232

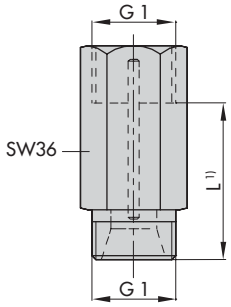
Table 9: *Thermowells for flammable gases (G 1/PN 100)*

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



Thermowell for flammable gases

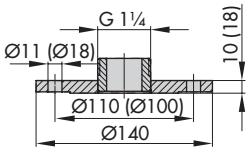
Extension piece/separating piece



Extension piece (standard)		
L (approx.)	mm	140
Weight, approx.	kg	0.5
With bellows seal (special version)		
L (approx.)	mm	180
Weight, approx.	kg	0.6
Separating piece with seals		
L (approx.)	mm	55
Weight, approx.	kg	0.2

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

Flange for Type 2234



Steel/CrNiMo steel

Flanges PN 6

140 mm outside diameter

Flange PN 40/DN 32 (dimensions in parentheses)

Technical data for ANSI devices

Table 10: *Technical data · Valves · All pressures in psi (gauge)*

Type 2422 Valve · Balanced by a bellows · Balanced by a diaphragm				
Nominal size		**NPS ½ to 2**	**NPS 2½ to 4**	**NPS 6**
Pressure rating		Class 125, 150 and 300		
Permissible valve temperature	Balanced by a bellows	Max. 660 °F · See pressure-temperature diagram in ▶ T 2010		
	Balanced by a diaphragm	–	Max. 300 °F · See pressure-temperature diagram in ▶ T 2010	–
Leakage class according to ANSI/FCI 70-2	Balanced by a bellows	Metal seal: ≤0.05 % of C_V coefficient		Soft seal: ≤0.01 % of C_V coefficient
	Balanced by a diaphragm	–	Soft seal: ≤0.01 % of C_V coefficient	–
Conformity		CE		

Table 11: *Technical data · Control thermostats*

Types 2231 to 2234 Control Thermostat		Size 150
Set point ranges		15 to 195 °F, 70 to 250 °F or 120 to 300 °F For Types 2232 and 2234 also 210 to 390 °F, 300 to 480 °F
Perm. ambient temperature at the set point adjustment		-40 to +175 °F
Perm. temperature at the sensor		100 K above the adjusted set point
Perm. pressure at sensor	Type 2231 [1] · Type 2232 [1] [2]	Without/with thermowell: Class 300 · Thermowell with flange: Class 300 or Class 600
	Type 2234	Without thermowell: Class 300 · With flange on request
Capillary tube length		16 ft (33 or 50 ft as special version)

1) Other pressure ratings for thermowell/flange on request
2) The version with clamping gland can be used for larger immersion depths (max. 23.6" possible with SAMSON thermowells). It is also possible to use non-SAMSON thermowells provided on site with different immersion depths. In this case, the immersion depth of the sensor can be varied inside the thermowell as required.
3) With thermowell (DVGW version)

Table 12: *Materials · Material numbers according to ASTM and DIN EN*

Type 2422 Valve · Balanced by a bellows				
Nominal size		**NPS 1 to 6**	**NPS ½ to 6**	
Pressure rating		Class 125	Class 150 and 300	
Valve body		Cast iron A126B	Cast steel A216 WCB/WCC	Cast stainless steel A351 CF8M
Valve seat [3]		CrMo steel · Cr steel [6]		CrNiMo steel
Plug [3] [4]	Up to NPS 4 [2]	CrNiMo steel		
	NPS 6	CrNiMo steel, plug with PTFE seal		CrNiMo steel
Plug stem		CrNi steel		
Spring		CrNi steel		
Balancing bellows		CrNiMoTi steel		
Bellows housing		Cr steel		CrNi steel
Body gasket		Graphite on metal core		
Extension piece/separating piece [7]		Brass (for version free of non-ferrous metal: CrNi steel)		CrNi steel

1) On request
2) Optionally with soft seal with standard C_V coefficients
3) Special version 1.4409
4) Soft-seated plug with EPDM ring for temperatures up to 300 °F
5) Class 125 only
6) For NPS 2½ to 4 only
7) Select the material of the accessories to match that of the main valve

Table 12: *Materials · Material numbers according to ASTM and DIN EN*

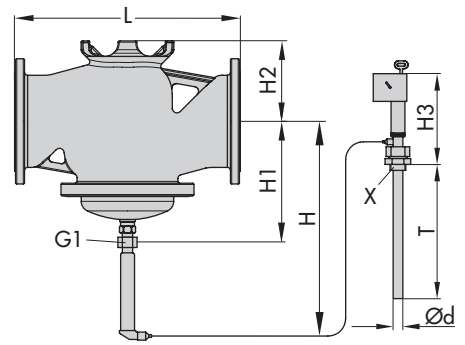
Type 2422 Valve · Balanced by a diaphragm			
Nominal size		**NPS 2½ to 4**	
Pressure rating		Class 125	Class 150
Valve body		Cast iron A126B	Cast steel A216 WCB/WCC
Valve seat		CrNiMo steel	
Plug		CW617N (brass), plug with EPDM soft seal	
Diaphragm cases		1.0619	
Pressure balancing		Diaphragm plate CrNi steel · EPDM balancing diaphragm, max. 300 °F or NBR diaphragm, max. 175 °F	
Type 2231, Type 2232 and Type 2234 Control Thermostats			
		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			
1 NPT threaded connection	Immersion tube	Bronze, steel, copper [5]	CrNiMoTi steel
	Threaded nipple	Brass · Steel	
Flange connection [1]	Immersion tube	Steel	CrNiMoTi steel
	Threaded nipple	Steel	

1) On request
2) Optionally with soft seal with standard C_V coefficients
3) Special version 1.4409
4) Soft-seated plug with EPDM ring for temperatures up to 300 °F
5) Class 125 only
6) For NPS 2½ to 4 only
7) Select the material of the accessories to match that of the main valve

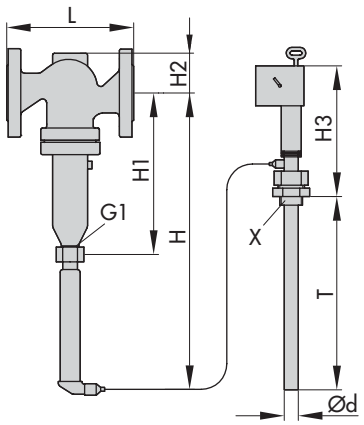
Dimensional drawings: Type 2422 Valve · Balanced by a bellows · Balanced by a diaphragm · With connection for Type 2231 to Type 2234 Control Thermostat

Control thermostat with …

Integrated set point adjustment (Type 4)

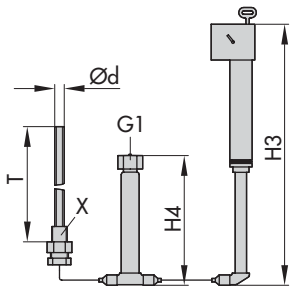


Type 2231 Control Thermostat with Type 2422 Valve balanced by a diaphragm



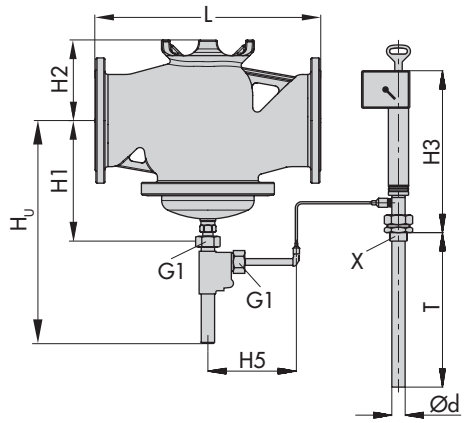
Type 2231 Control Thermostat with Type 2422 Valve balanced by a bellows

Separate set point adjustment

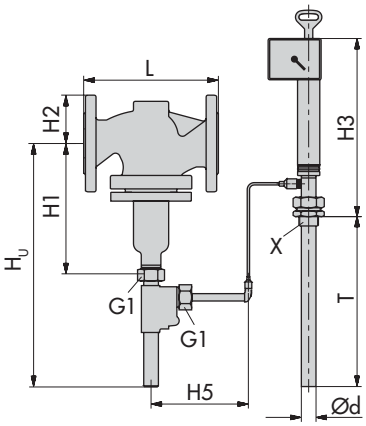


Type 2232 and Type 2234 Control Thermostat

Integrated set point adjustment (Type 4u)



Type 2231 Control Thermostat with Type 2422 Valve balanced by a diaphragm



Type 2231 Control Thermostat with Type 2422 Valve balanced by a bellows

Fig. 7: *Dimensions · Type 4 and Type 4u · DIN and ANSI*

Table 13: *C_V coefficients, x_{FZ} values and max. permissible differential pressures Δp*
Terms for control valve sizing according to IEC 60534, Parts 2-1 and 2-2: $F_L = 0.95$, $X_T = 0.75$

Type 2422 Valve · Balanced by a bellows										
Nominal size	**NPS**	**½**	**¾**	**1**	**1½**	**2**	**2½**	**3**	**4**	**6**
Valve travel	in	0.4					0.6			0.9
Standard C_V coefficient		5	7.5	9.4	23	37	60	94	145	330
Max. permissible differential pressure Δp		360 psi					290 psi		230 psi	175 psi
Reduced C_V coefficient		3 · 5 · 7.5		5	9.4	20	23	37	94	–
Max. permissible differential pressure Δp		360 psi						290 psi	230 psi	–
x_{FZ} value		0.65	0.6	0.55	0.45	0.4		0.35		

Type 2422 Valve · Balanced by a diaphragm				
Nominal size	**NPS**	**2½**	**3**	**4**
Valve travel	in	0.9		
C_V coefficient		60	94	145
Max. permissible differential pressure Δp		175 psi		145 psi
x_{FZ} value		0.4	0.35	

Table 14: *Dimensions in inches and weights · Type 2422 Valve*

Type 2422 Valve · Balanced by a bellows											
Nominal size		**NPS**	**½**	**¾**	**1**	**1½**	**2**	**2½**	**3**	**4**	**6**
Overall length L	Class 125		–		7.25	8.75	10	10.9	11.75	13.9	17.75
	Class 150		7.25								18.6
	Class 300		7.5	7.6	7.75	9.25	10.5	11.5	12.5	14.5	18.6
H2	Body: Forged steel		2	–	2.8	3.6	3.9	–			
	Body: Other materials		2.2			2.8		3.9		4.7	6.9
H1	Up to 430 °F (without extension piece)		8.9					11.8		14	23.2
	Up to 660 °F (with extension piece)		14.4					17.3		19.5	28.7
H (Type 4)	Up to 430 °F (without extension piece)		20.3					23.2		25.4	28.7
	Up to 660 °F (with extension piece)		25.8					28.7		30.9	34.6
H_U (Type 4u)	Up to 430 °F (without extension piece)		16.7					19.7		21.9	31.1
	Up to 660 °F (with extension piece)		22.2					25.2		27.4	36.6
Weight [1) 2)], approx.		lbs	12.5	13.5	15.5	31	37.5	62	73	90	254

Type 2422 Valve, balanced by a diaphragm · Max. 300 °F			
Nominal size	**2½**	**3**	**4**
Overall length L	10.9	11.75	13.9
H2	3.86		24.7
H1	7.9	8	8.6
H (Type 4)	23.2	23.3	24.7
H_U (Type 4u)	15.8	15.8	16.5
Weight [1) 2)], approx. lbs	68.5	85	101.5

1) Based on Class 125 and without extension piece: +15 % for Class 150 and 300
2) Type 4u: Reversing device approx. +1.5 lbs

Table 15: *Types 2231 to 2234 Control Thermostat · All dimensions in inches*

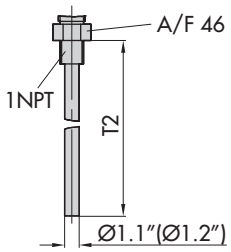
Control thermostat	Type 2231	Type 2232	Type 2234
Immersion depth T	11.4 [1)]	9.25 [1)]	18.1
Thread X	1 NPT		
H3	12.2	16.2	
H4	11.4		
H5	14.8		
Diameter Ød	1		
Weight, approx. lbs	7.5	9	8.5

1) Larger immersion depths on request

Thermowells for Type 2231 and Type 2232

Table 16: *Thermowells for Type 2231 and Type 2232*

Control thermostat	Type 2231	Type 2232
Immersion depth T2	12.8″	9.9″

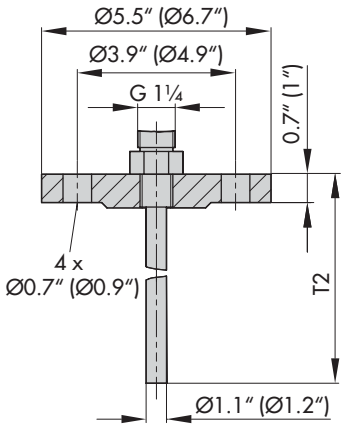


With threaded connection

1 NPT for Class 300 and 600

(dimensions for Class 600 in parentheses)

Copper thermowell: Class 125



With flanges

NPS 1¼ for Class 300

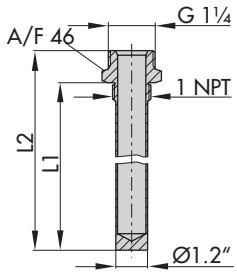
NPS 1½ for Class 600

(dimensions for Class 600 in parentheses)

Thermowells for Type 2231 and Type 2232

Table 17: *Thermowells for flammable gases*

Control thermostat	Type 2231	Type 2232
Length L1	12.4″	10″
Length L2	13.4″	11″

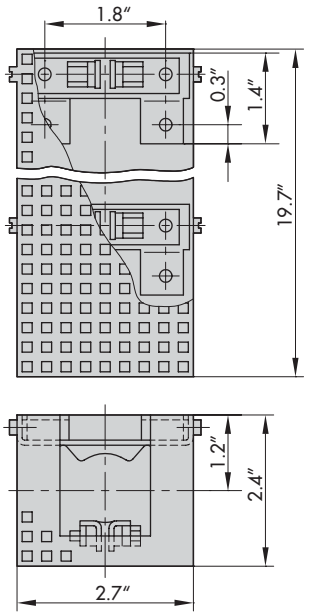


Thermowell for flammable gases

1 NPT · Class 600

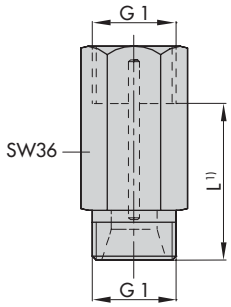
Mounting parts for Type 2234 [1)]

Clamps and perforated cover for wall mounting



1) Mounting position of sensor: pointing down

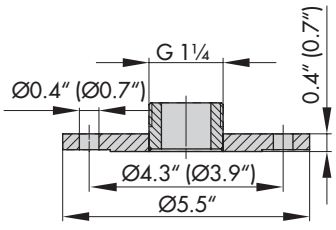
Extension piece/separating piece



Extension piece (standard)		
L (approx.)	in	5.5
Weight, approx.	lbs	1.1
With bellows seal (special version)		
L (approx.)	in	7.1
Weight, approx.	lbs	1.3
Separating piece with seals		
L (approx.)	in	2.1
Weight, approx.	lbs	0.4

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

Flange for Type 2234



Steel/CrNiMo steel

Flanges PN 6

Outside diameter: 5.5″

Flange NPS 1¼ for Class 300 (dimensions in parentheses)