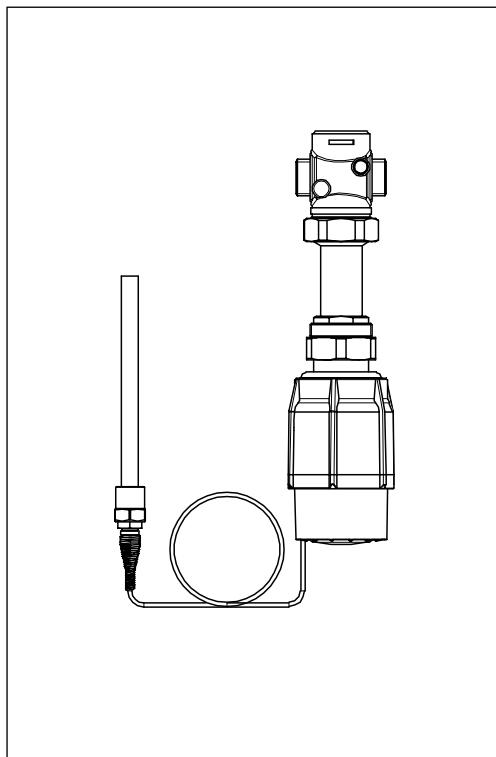


Data sheet

Temperature controller for steam (PN 25) AVT / VGS - external thread

Description



The AVT / VGS controller is a self-acting proportional temperature controller developed primarily for steam or hot water applications for temperatures up to 200 °C. Controller closes on rising temperature.

The temperature controller is type-tested according to EN 14597 and can be used in combinations with safety temperature monitors STM and safety temperature limiters STL.

Flow and return mounting.

Main data:

- DN 15 - 25
- k_{vs} 1.0 - 6.3 m³/h
- PN 25
- Setting ranges:
-10 ... 40 °C / 20 ... 70 °C / 40 ... 90 °C / 60 ... 110 °C
and
10 ... 45 °C / 35 ... 70 °C / 60 ... 100 °C / 85 ... 125 °C
- Temperature:
- Circ. water / glycolic water up to 30%:
2 ... 150 °C
- Steam: 2 ... 200 °C
- Connections:
- Ext. thread (weld-on, thread and flange tailpieces)

Ordering

Example:
Temperature controller for steam,
DN 15, k_{vs} 1.6, PN 25, setting range
40 ... 90 °C, t_{max} 200 °C, ext. thread

- 1x VGS DN 15 valve
Code No: **065B0787**
- 1x AVT thermostat, 40 ... 90 °C
Code No: **065-0602**

Option:

- 1x Weld-on tailpieces
Code No: **003H6908**

The valve will be delivered (assembled) together with an adapter M34 × M45.

VGS Valve ¹⁾

Picture	DN (mm)	k_{vs} (m ³ /h)	$t_{max.}$ (°C)	PN	Connection	Code No.
	15	1.0	200	Cylindrical external thread acc. to ISO 228/1	G 3/4 A	065B0786
		1.6				065B0787
		3.2				065B0788
	20	4.5			G 1 A	065B0789
	25	6.3			G 1 1/4 A	065B0790

¹⁾ Adapter M34 × M45 for connection to AVT thermostat is delivered (assembled) together with the valve.

AVT Thermostat (actuator)

Picture	For valves	Setting range (°C)	Temperature sensor with brass immersion pocket, length, connection	Code No.
	DN 15 - 25	-10 ... +40	210 mm, R 3/4" ¹⁾	065-0600
		20 ... 70		065-0601
		40 ... 90		065-0602
		60 ... 110		065-0603
		10 ... 45	255 mm, R 3/4" ¹⁾ ²⁾	065-0604
		35 ... 70		065-0605
		60 ... 100		065-0606
		85 ... 125		065-0607

¹⁾ conic male thread EN 10226-1

²⁾ without immersion pocket

Ordering (continuous)
Accessories for valves

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		003H6908
		20			003H6909
		25			003H6910
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R 1/2"	003H6902
		20		R 3/4"	003H6903
		25		R 1"	003H6904
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		
		20		003H6915	
		25		003H6916	

Accessories for thermostats

Picture	Type designation	Material	Code No.
	Immersion pocket	Brass	065-4416*
		Stainless steel, mat. No. 1.4435	065-4417*
	Adapter**	M34 x 1.5 mm / M45 x 1.5 mm	003H6927
	Combination piece K2		003H6855
	Combination piece K3		003H6856

* Not for AVT thermostat code numbers: **065-0604, 065-0605, 065-0606, 065-0607**

** Adapter for VGS combinations with temperature actuators AVT, temperature monitors STM and temperature limiters STL

Service kits

Picture	Type designation	for valves DN / k _{vs}	Code No.
	Stuffing box	15/3.2, 20/4.5, 25/6.3	003H6877
	Sensor stuffing box set	for sensors	
		AVT R 3/4"	065-4421

Technical data

Valves

Nominal diameter	DN	15	20	25
k_{vs} value	m^3/h	1.0	1.6	3.2
Cavitation factor z^*			≥ 0.6	
Leakage acc. to standard IEC 534			0.05	
Nominal pressure	PN		25	
Max. differential pressure	bar		10	
Medium		Steam / Circulation water / glycolic water up to 30%		
Medium pH			Min. 7, max. 10	
Medium temperature			2 ... 200 °C	
Connections	valve		Thread	
	tailpieces		Weld-on, external thread and flange	
Materials				
Valve body		Red bronze CuSn5ZnPb (Rg5)		
Valve seat		Stainless steel, mat. No. 1.4571		
Valve cone		Stainless steel, mat. No. 1.4122		

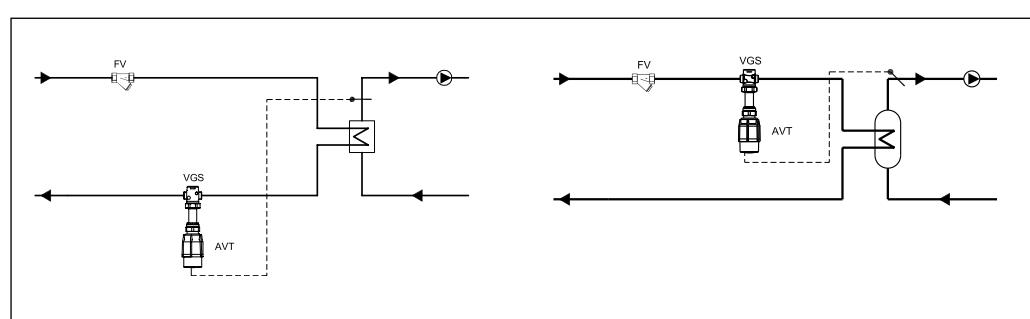
* $k_v/k_{vs} \leq 0.5$ at DN 25 and higher

Thermostat (actuator)

Setting range X_s	°C	-10 ... 40 °C / 20 ... 70 °C / 40 ... 90 °C / 60 ... 110 °C 10 ... 45 °C / 35 ... 70 °C / 60 ... 100 °C / 85 ... 125 °C
Time constant T acc. to EN 14597	s	max. 50 (210 mm), max. 30 (255 mm)
Gain K_s	mm/°K	0.3 (210 mm), 0.7 (255 mm)
Max. adm. temperature at sensor		50 °C above maximum setpoint
Perm. amb. temperature at sensor		0 ... 70 °C
Nominal pressure sensor	PN	25
Capillary tube length		5 m (210 mm), 4 m (255 mm)
Materials		
Temperature sensor		Cooper / Brass
Immersion pocket *	Ms design	Brass, nickel-plated
	Stainless steel design	Mat. No. 1.4435 (210 mm)
Handle for temp. setting		Polyamide, glass fiber-reinforced
Scale carrier		Polyamide

* for sensor 210 mm

Application principles



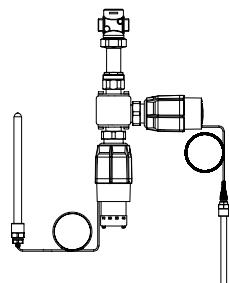
Combinations
Example:

Temperature controller with safety temperature monitor for steam, DN 15, k_{vs} 1.6, PN 25, setting range 40 ... 90 °C, t_{max} 200 °C, ext. thread

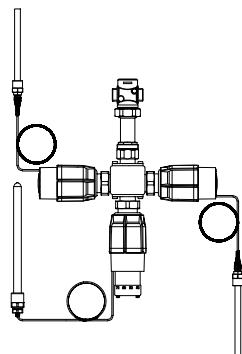
- 1x VGS DN 15 valve
Code No: **065B0787**
- 1x AVT thermostat, 40 ... 90 °C
Code No: **065-0602**
- 1x STM thermostat, 30 ... 110 °C
Code No: **065-0608**
- 1x K2 combination piece
Code No: **003H6855**

Note:

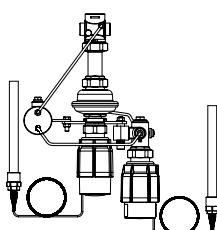
For safety temperature monitor STM / VGS and safety temperature limiter STLS see relevant data sheet



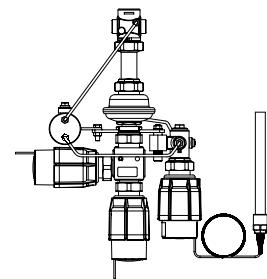
STM / AVT / VGS
- temperature controller with safety temperature monitor for steam



STM / AVT / AVT / VGS
- two temperature controllers with safety temperature monitor for steam



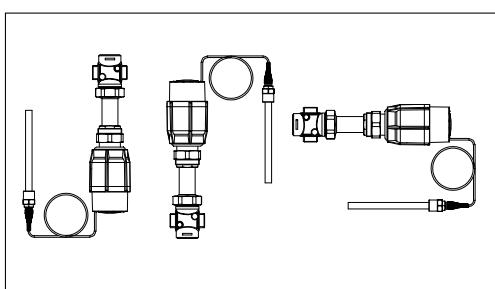
STLS / AVT
- temperature controller with safety temperature limiter for steam



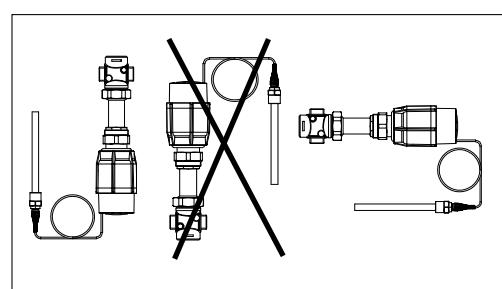
STLS / AVT / AVT
- two temperature controllers with safety temperature limiter for steam

Installation positions
Temperature controller

Up to medium temperature of 160 °C the controllers AVT / VGS can be installed in any position.



For higher temperatures the controllers AVT / VGS have to be installed horizontal and in horizontal pipelines with the actuator oriented downwards.

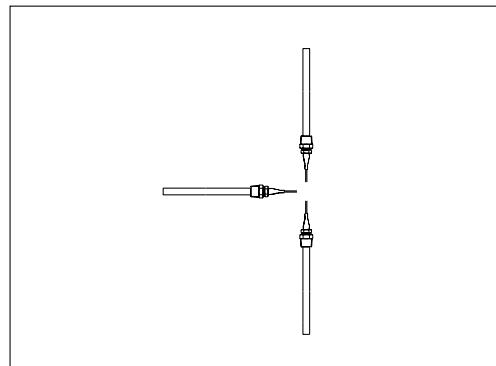


Installation positions
(continuous)
Temperature sensor

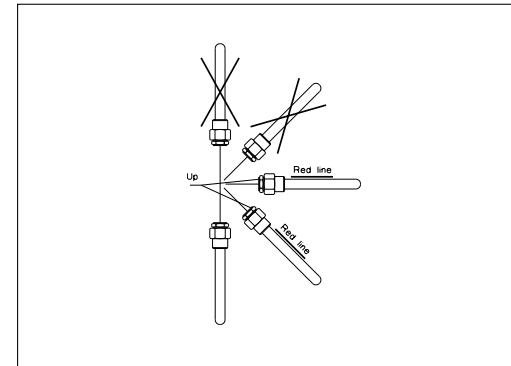
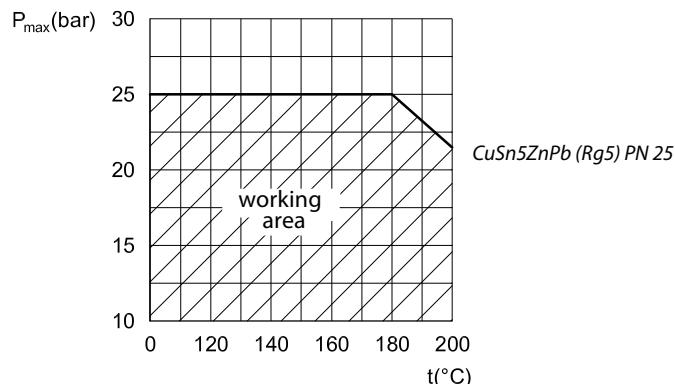
The place of installation must be chosen in a way that the temperature of the medium is directly taken without any delay. Avoid overheating of temperature sensor. The temperature sensor must be immersed into the medium in its full length.

Temperature sensor 210 mm R $\frac{3}{4}$ " :

- The temperature sensor may be installed in any position.

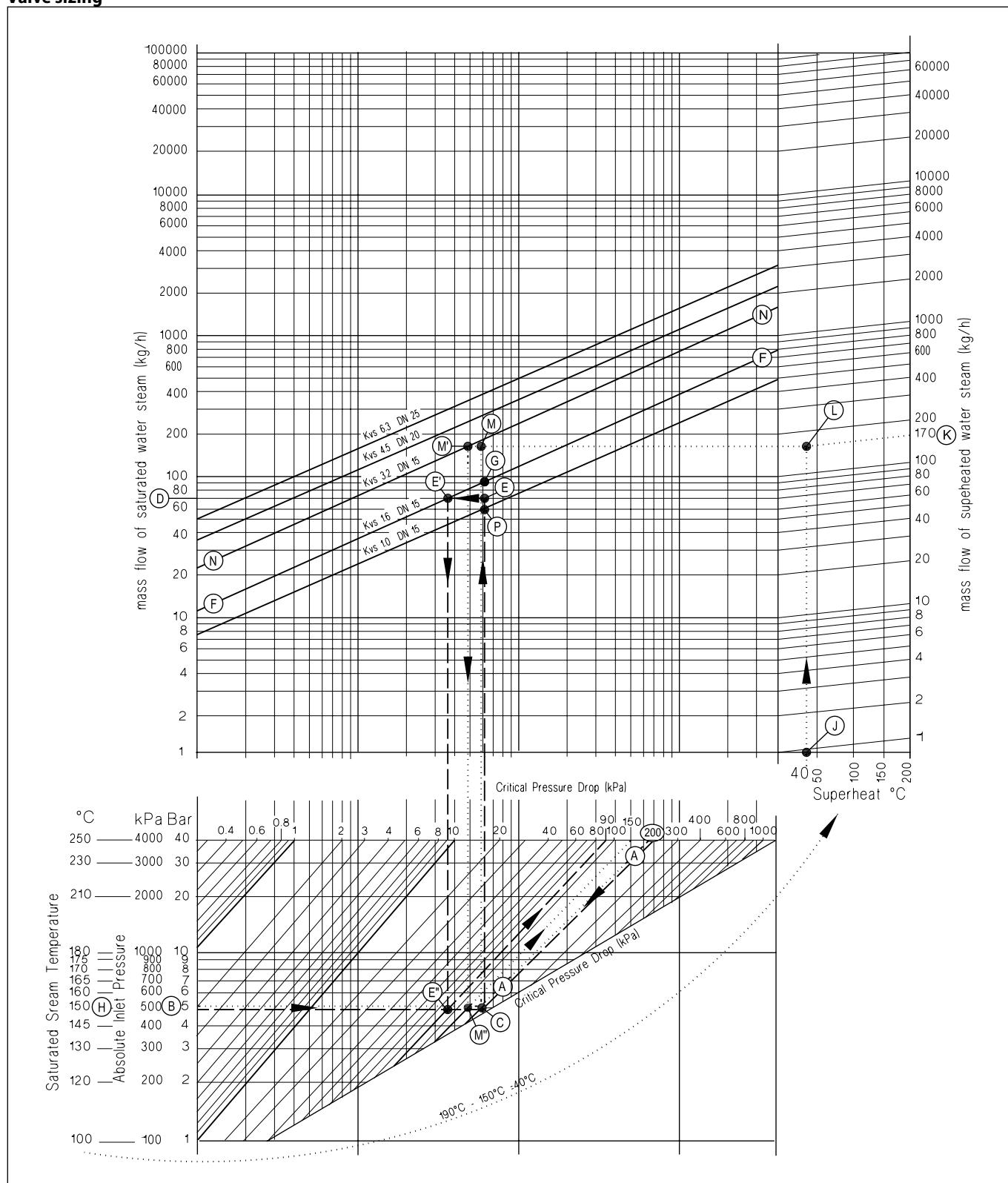
Temperature sensor 255 mm R $\frac{3}{4}$ " :

- The temperature sensor must be installed as shown on the picture.

**Pressure temperature diagram**

Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-3).

Valve sizing



Steam valve sizing is based on 40 % drop of the steam pressure across the valve when fully open. At this condition the steam is travelling at or close to its critical velocity (approx. 300 m/s) and throttling would occur over the full valve stroke.

If the steam is travelling slower than this, then the first part of the valve stroke would merely increase the velocity of the steam without reducing the volumetric flow.

Valve sizing (continuous)

1. For saturated steam

Given data:

Flow rate: 70 kg/h

Absolute inlet pressure: 5 bar (500 kPa)

*Remark:**For this example follow dashed line*

The absolute inlet pressure is 500 kPa. Critical pressure drop (40% of 500 kPa) is 200 kPa. Locate the diagonal line corresponding to the pressure drop of 200 kPa (line A - A).

Read the absolute inlet pressure on the lower left hand scale (point B), and draw a horizontal line across until it meets the pressure drop diagonal A - A at point C.

From this point C extend a vertical line upwards until it meets the horizontal line representing the steam flow of 70 kg/h from point D. The intersection of this is point E.

The nearest diagonal k_{vs} line above this is line F - F with a k_{vs} of 1.6. If the ideal valve size is not available the next largest size should be selected to ensure design flow.

The pressure drop through valve at the flow rate is found by the intersection of the 70 kg/h line with F - F (point E') and dropping a vertical line downwards; this actually hits the horizontal line for 500 kPa absolute inlet pressure (point E'') at a pressure drop diagonal of 90 kPa. This is only 18 % of the pressure drop across the valve and the control quality will not be good until the valve has partially closed. As with all steam valves this compromise is necessary since the next smaller valve would not pass the required flow (maximum flow would be about 60 kg/h; point P).

The maximum flow for the same inlet pressure is found by extending the vertical line (C - E) through point E until it crosses the k_{vs} 1.6 line F - F (point G) and reading off the flow (90 kg/h).

2. For superheated steam

Given data:

Flow rate: 170 kg/h

Absolute inlet pressure: 5 bar (500 kPa)

Steam temperature: 190 °C

*Remark:**For this example follow dotted line*

The procedure for superheated steam is much the same as for saturated steam, but uses a different flow scale which slightly elevates the readings according to the degree of superheat.

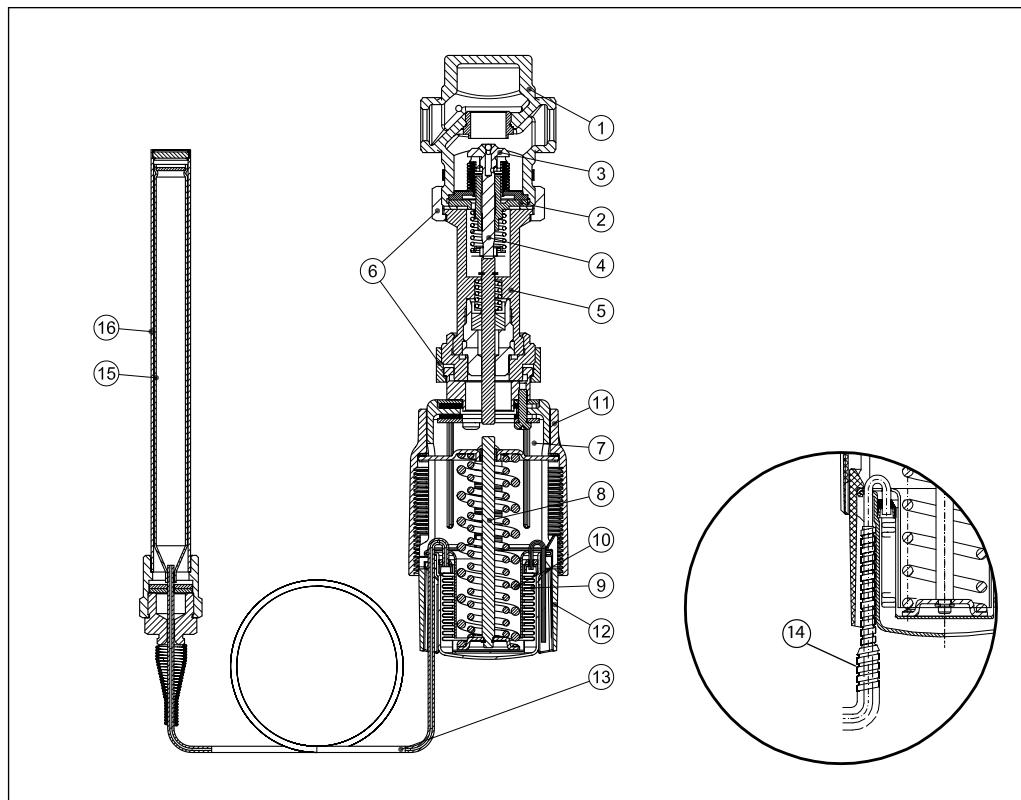
As before, the diagonal critical pressure drop line A - A is located at 40 % of 500 kPa (200 kPa). The horizontal inlet pressure line through point B is now extended to the left to read off the corresponding saturated steam temperature at point H (150 °C). The difference between the saturated steam temperature and the superheated steam temperature is $190 °C - 150 °C = 40 °C$ (see point J).

The superheated steam flow 170 kg/h is found on the upper right hand scale (point K). From here the diagonal line is followed down until it meets a vertical line from the steam temperature elevation (40 °C, point J) at point L.

As before, the horizontal line through point B is drawn to cut line A - A at point C. The point where the vertical line from point C meets the horizontal line from point L is the operating point (point M). This horizontal line, L - M, is the corrected flow line. The nearest diagonal line above this is line N - N with a k_{vs} 3.2. A vertical line dropped from the intersection of L - M line with line N - N (point M') intersects the 500 kPa absolute inlet pressure line (point M'') at a pressure drop diagonal of about 150 kPa. This is about 30% of the pressure drop across the valve which will give reasonable control quality (compared to recommended ratio of 40 %).

Design

1. Valve VGS
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Valve body extension for steam valves
6. Union nut
7. Thermostat AVT
8. Thermostat stem
9. Bellows
10. Setting spring for temperature control
11. Handle for temperature setting, prepared for sealing
12. Scale carrier
13. Capillary tube
14. Flexible protected pipe (only at AVT 255 mm)
15. Temperature sensor
16. Immersion pocket



Function

Medium temperature changes cause pressure changes in temperature sensor. Resulting pressure is being transferred through the capillary tube to the bellows. Bellows moves thermostat stem and opens or closes valve cone.

By increasing of medium temperature valve cone moves towards the seat (valve closes), by decreasing of medium temperature valve cone moves away from the seat (valve opens).

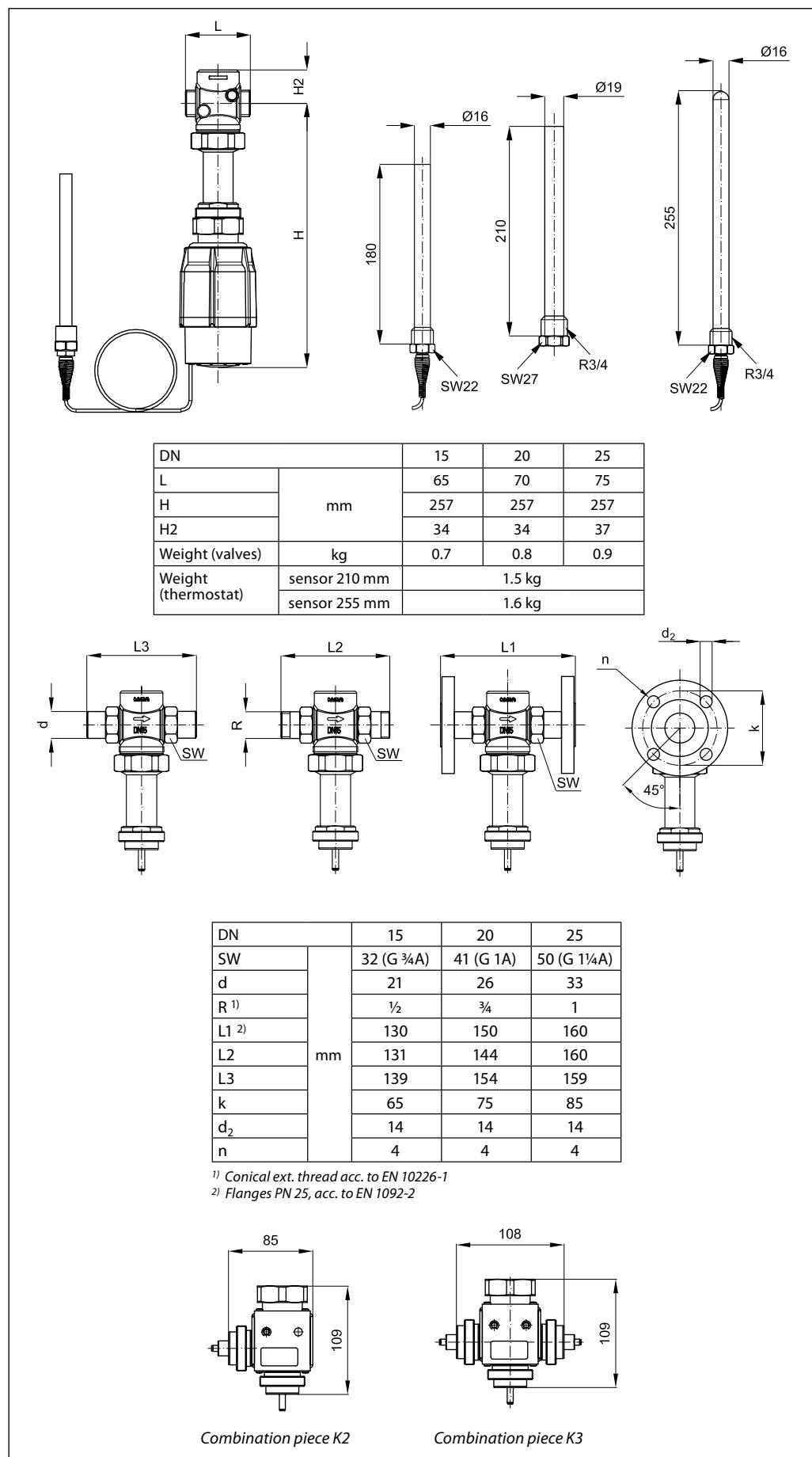
Handle for temperature setting can be sealed.

Settings

Temperature setting

Temperature setting is being done by the adjustment of the setting spring for temperature control.

Dimensions



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