ENGINEERING
TOMORROW

Data sheet

Temperature controller AVT with safety temperature monitor STM/VG(F) (PN25)

Description

DIN Geprüft TR(TW)700

DIN Geprüft STW871

STM / VGF

STM/VG(F) and STM/AVT/VG(F) are self-acting proportional temperature controllers used for temperature control and temperature monitoring of drinking water, water and water glycol mixtures for heating and district heating systems.

VG - valve with external thread
VGF - valve with flange

Controller closes on rising temperature.

The controllers are:
- Type-tested acc. to EN 14597 and protect against exceeding temperatures:
  Applications:
  - District heating systems acc. to DIN 4747
  - Heating systems acc. to EN 12828 (DIN 4751) and EN 12953-6 (DIN 4752)
  - Water heating systems for drinking and industrial waters acc. to DIN 4753

Main data:
- DN 15-50
- k_{VS} 0.4 -25 m³/h
- PN 25
- Setting ranges:
  - STM monitor:
    20 … 75 °C / 40 … 95 °C / 30 … 110 °C
  - AVT thermostatic actuator:
    –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
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)
  - Flange
- Flow and return mounting

Ordering

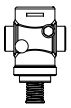
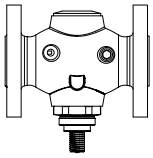
Example 1 - ***STM / VG(F)*** *controller:*
Safety temperature monitor;
DN 15; k_{VS} 1.6 , PN 25;
limit range 30 …110 °C;
T_{max} 150 °C; ext. thread

- *1×* *VG DN 15 valve*
  Code No: ***065B0772***
- *1×* *STM monitor, 30 … 110 °C*
  Code No: ***065-0608***

Option:
- *1×* *Weld-on tailpieces*
  Code No: ***003H6908***

All products will be delivered separately.

VG, VGF valve

Picture	DN (mm)	k_{VS} (m³/h)	Connection		Code No.
	15	0.4	Cylindrical external thread acc. to ISO 228/1	G ¾ A	**065B0770**
		1.0			**065B0771**
		1.6			**065B0772**
		2.5			**065B0773**
		4.0			**065B0774**
	20	6.3		G 1 A	**065B0775**
	25	8.0		G 1 ¼ A	**065B0776**
	32	12.5		G 1 ¾ A	**065B0777**
	40	16		G 2 A	**065B0778**
	50	20		G 2 ½ A	**065B0779**
	15	4.0	Flanges PN 25, acc. to EN 1092-2		**065B0780**
	20	6.3			**065B0781**
	25	8.0			**065B0782**
	32	12.5			**065B0783**
	40	20			**065B0784**
	50	25			**065B0785**

Ordering *(continuous)*

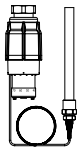
Example 2- **STM/AVT/ VG(F)** *controller:*
Temperature controller with safety temperature monitor; DN 15, k_{VS} 1.6 ; PN 25; limit range 30 … 110 °C; setting range 40 … 90 °C; T_{max} 150 °C; ext. thread

- *1× VG DN 15 valve*
  Code No: ***065B0772***
- *1× STM monitor, 30 … 110 °C*
  Code No: **065-0608**
- *1x AVT thermostatic actuator, 40 … 90 °C*
  Code No: ***065-0598***
- *1× K2 Combination piece*
  Code No: **003H6855**

Option:
- *1× Weld-on tailpieces*
  Code No: **003H6908**

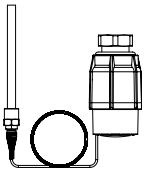
All products will be delivered separately.

STM Safety temperature monitor (actuator)

Picture	For valves	Limit range (°C)	Temperature sensor with brass immersion pocket, length, connection	Code No.
	DN 15-50	30 … 110	210 mm, R ¾ [1]	065-0608
		20 … 75		065-0609
		40 … 95		065-0610

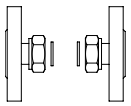
[1] *conic male thread EN 10226-1*

AVT Thermostatic actuator

Picture	For valves	Setting range (°C)	Temperature sensor with brass immersion pocket, length, connection	Code No.
	DN 15-25	–10 … +40	170 mm, R ½ [1]	065-0596
		20 … 70		065-0597
		40 … 90		065-0598
		60 … 110		065-0599
	DN 32-50	–10 … +40	210 mm, R ¾ [1]	065-0600
		20 … 70		065-0601
		40 … 90		065-0602
		60 … 110		065-0603
	DN 15-50	10 … 45	255 mm, R ¾ [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*

Accessories for valves

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		003H6908
		20			003H6909
		25			003H6910
		32			003H6911
		40			065B2006
		50			065B2007
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	003H6902
		20		R ¾	003H6903
		25		R 1	003H6904
		32		R 1¼	003H6905
		40		R 1½	065B2004
		50		R 2	065B2005
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		003H6915
		20			003H6916
		25			003H6917

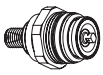
Accessories for thermostats

Picture	Type designation	PN	For controllers	Material	Code No.
	Immersion pocket	25	AVT/VG(F) DN 15-25	Brass	065-4414 [1]
				Stainless steel, mat. No. 1.4571	065-4415 [1]
			AVT/VG(F) DN 32-50 STM/VG(F) DN 15-50	Brass	065-4416 [1]
				Stainless steel, mat. No. 1.4435	065-4417 [1]
	Combination piece K2				003H6855
	Combination piece K3				003H6856

[1] *Not for AVT thermostatic actuator code numbers:* ***065-0604, 065-0605, 065-0606, 065-0607***

Ordering *(continuous)*

Service kits

Picture	Type designation	DN (mm)	k_{VS} (m^3/h)	Code No.
	Valve insert	15	0.4	**003H6869**
			1.0	**003H6870**
			1.6	**003H6871**
			2.5	**003H6872**
			4.0	**003H6873**
		20	6.3	**003H6874**
		25	8.0	**003H6875**
		32 / 40 / 50	12.5 / 16 / 20 / 25	**003H6876**
	Housing of sensor stuffing box	**for sensors**		
		AVT 170 R ½		**065-4420**
		AVT 210, 255 R ¾		**065-4421**

Technical data

VG, VGF valves

Nominal diameter		DN	15					20	25	32	40	50
k_{VS} value		m^3/h	0.4	1.0	1.6	2.5	4.0	6.3	8	12.5	16/20 [1]	20/25 [1]
Stroke			3		5					10		
Control ratio			> 1:50									
Control characteristic			linear									
Cavitation factor z			≥ 0.6						≥ 0.55		≥ 0.5	
Leakage acc. to standard IEC 534		% of k_{VS}	≤ 0.02							≤ 0.05		
Nominal pressure		PN	25									
Max. differential pressure		bar	20							16		
Medium			Circulation water / glycolic water up to 30 %									
Medium pH			Min. 7, max. 10									
Medium temperature		°C	2 … 150									
Connections	valve		External thread									
			-					Flange				
	tailpieces		Weld-on and external thread									
			Flange							-		
Materials												
Valve body	thread		Red bronze CuSn5ZnPb (Rg5)							Ductile iron EN-GJS-400-18-LT (GGG 40.3)		
	flange		-					Ductile iron EN-GJS-400-18-LT (GGG 40.3)				
Valve seat			Stainless steel, mat. No. 1.4571									
Valve cone			Dezincing free brass CuZn36Pb2As									
Sealing			EPDM									
Pressure relieve system			Piston									

[1] *Flange valve body*

STM Safety temperature monitor (actuator)

Limit range X_s		°C	20 … 75 / 40 … 95 / 30 … 110
Time constant T acc. to EN 14597		s	max. 100
Gain K_s		mm/°K	0.3
Max. adm. temperature at sensor			80 °C above maximum setpoint
Max. amb. temperature at thermostat		°C	0 … 70
Nominal pressure sensor		PN	25
Nominal pressure immersion pocket			
Capillary tube length		m	5
Materials			
Temperature sensor			Cooper
Immersion pocket	Ms design		Brass, nickel-plated
	Stainless steel design		mat. No. 1.4435
Handle for temp. setting			Polyamide, glass fiber-reinforced
Scale carrier			Polyamide

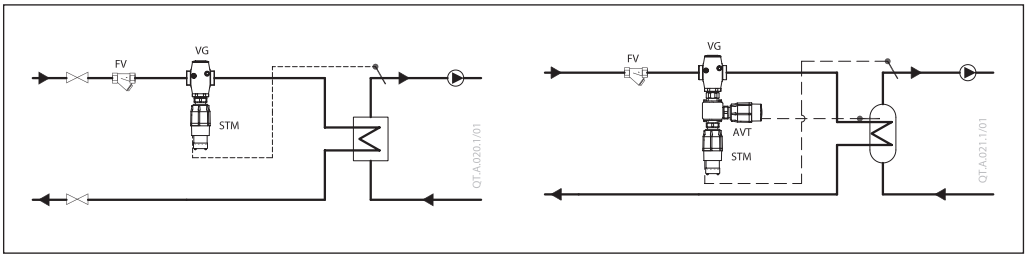
Technical data *(continuous)*

AVT Thermostatic actuator

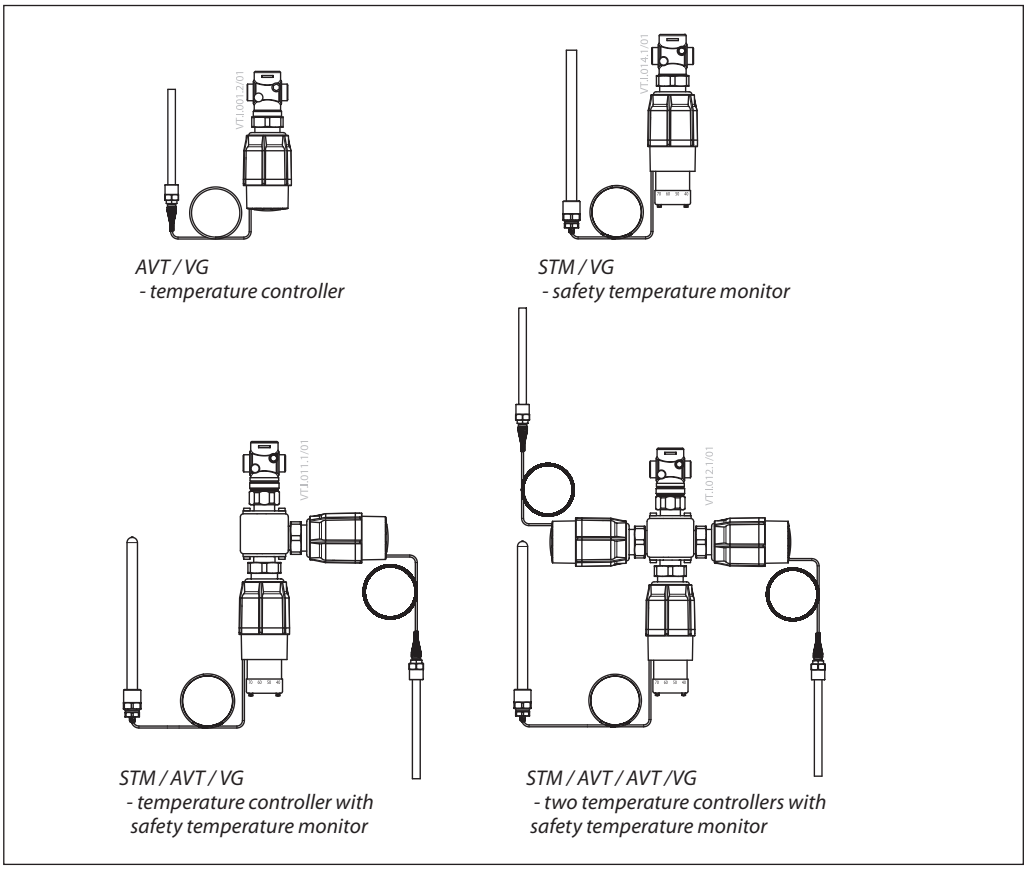
Setting range X_s		°C	–10 … 40 / 20 … 70 / 40 … 90 / 60 … 110 10 … 45 / 35 … 70 / 60 … 100 / 85 … 125
Time constant T acc. to EN 14597		s	max. 50 (170 mm, 210 mm), max. 30 (255 mm)
Gain K_s		mm/°K	0.2 (170 mm); 0.3 (210 mm); 0.7 (255 mm)
Max. adm. temperature at sensor			50 °C above maximum setpoint
Max. amb. temperature at thermostat		°C	0 … 70
Nominal pressure sensor		PN	25
Nominal pressure immersion pocket			
Capillary tube length		m	5 (170 mm, 210 mm), 4 m (255 mm)
Materials			
Temperature sensor			Cooper
Immersion pocket [1]	Ms design		Brass, nickel-plated
	Stainless steel design		Mat. No. 1.4571 (170 mm), mat. No. 1.4435 (210 mm)
Handle for temp. setting			Polyamide, glass fiber-reinforced
Scale carrier			Polyamide

[1] *for sensor 170 and 210 mm*

Application principles

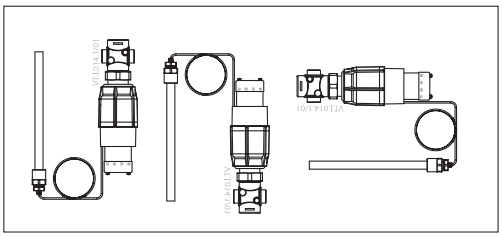


Combinations



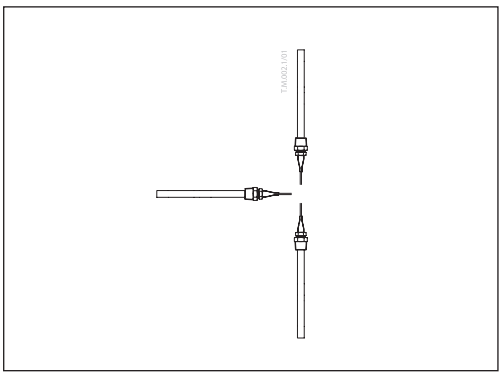
Installation positions

Temperature controller and safety temperature monitor
Temperature controller AVT / VG(F) and safety temperature monitor STM / VG(F) can be installed in any position.

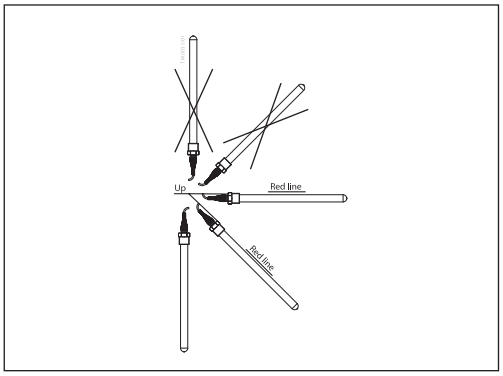


Temperature sensor
The place of installation must be chosen in a way that the temperature of the medium is directly taken without any delay. Avoid overheating of temperature sensor. The temperature sensor must be immersed into the medium in its full length.

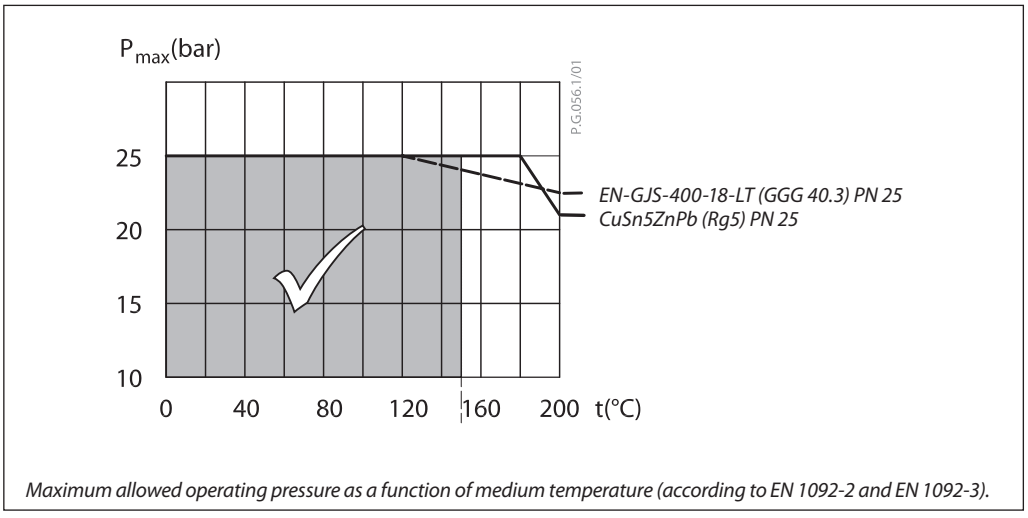
Temperature sensors 170 mm R½ and 210 mm R¾
- The temperature sensor may be installed in any position.



Temperature sensor 255 mm R¾
- The temperature sensor must be installed as shown on the picture.

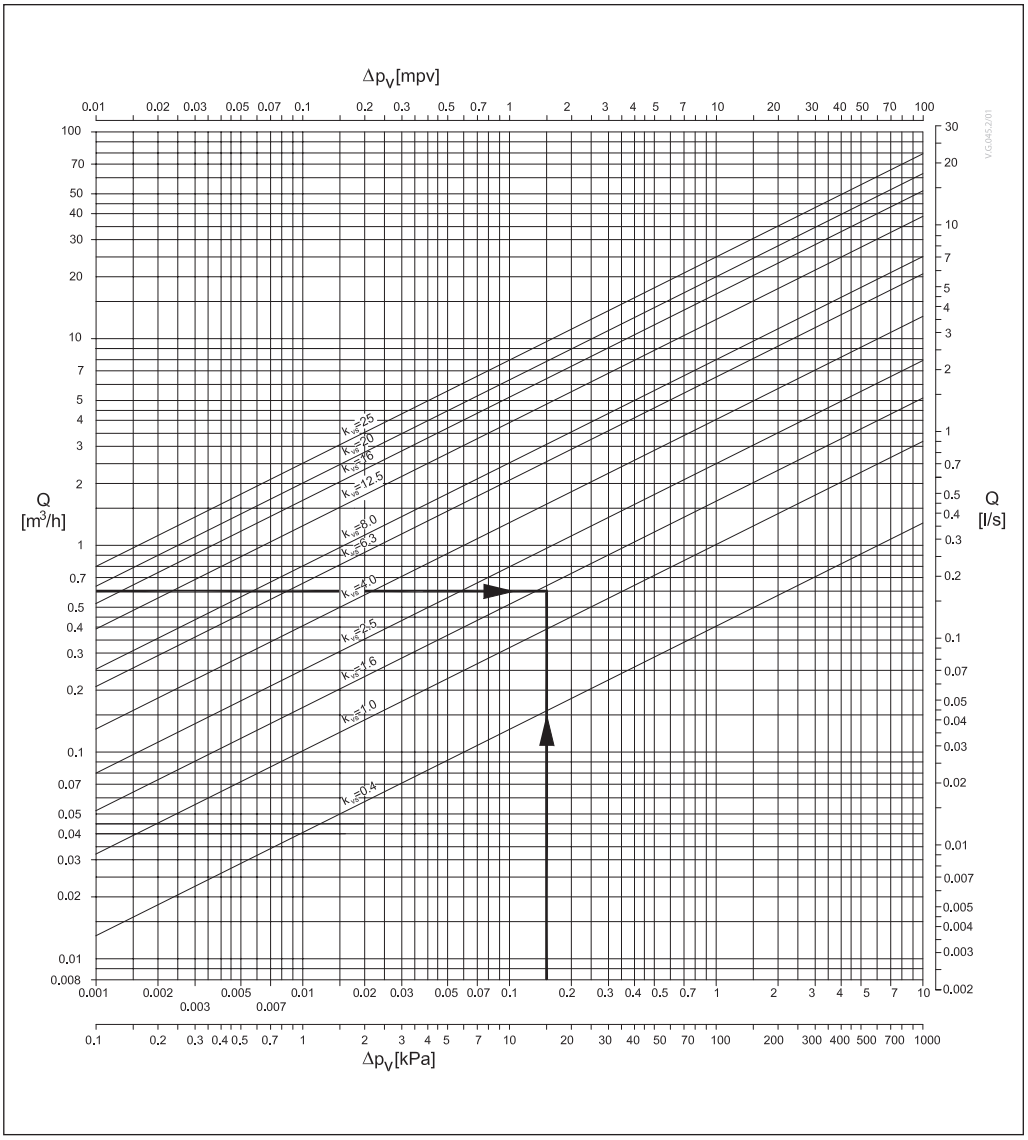


Pressure temperature diagram



Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-2 and EN 1092-3).

Valve sizing



Given data:
P_{max} = 14 kW
Δt = 20 K
Δp_v = 0.15 bar

P_{max} - heating power (kW)
Δt -temperature difference (K)
Δp_v - differential pressure across the valve

Maximum flow Q_{max} (m^3/h) through the valve is calculated according to formula:

$$Q_{max} = \frac{P_{max} \times 0.86}{\Delta t} = \frac{14 \times 0.86}{20}$$

Q_{max} = 0.6 m^3/h

k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_V}} = \frac{0.6}{\sqrt{0.15}}$$

k_v = 1.5 m^3/h

Chosen k_{VS} = 1.6 m^3/h

or read from the sizing diagram by taking a line through Q scale (0.6 m^3/h) and Δp_v scale (0.15 bar) to intersect k_v-scale at 1.5 m^3/h

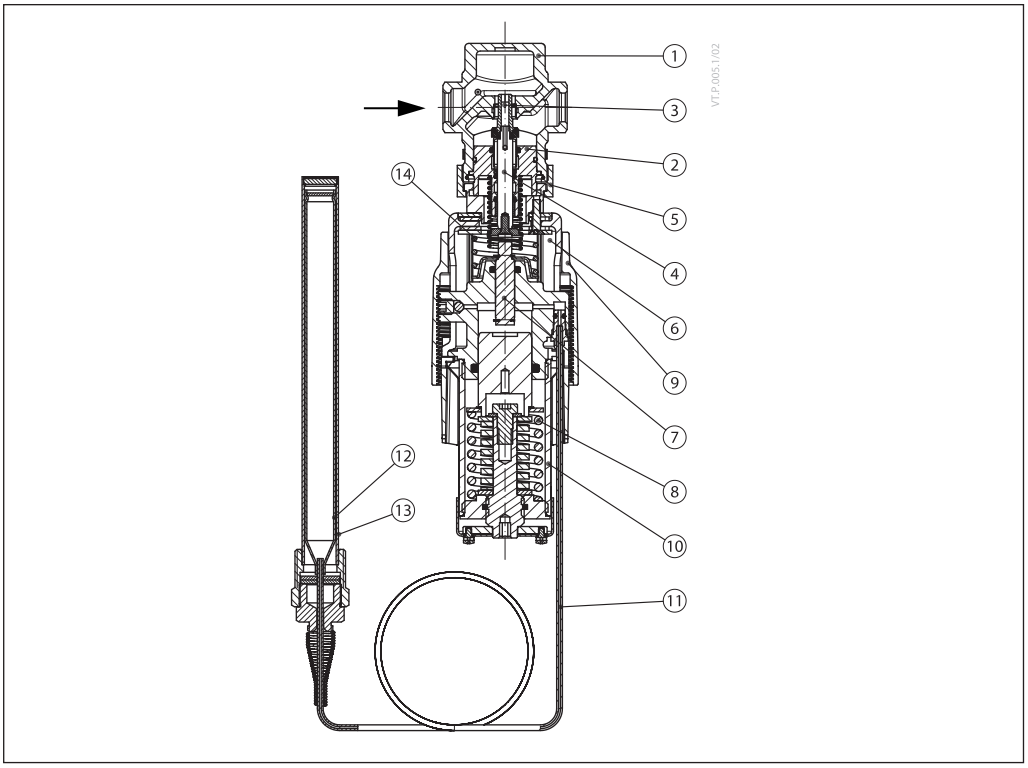
Chosen k_{vs} = 1.6 m^3/h

Solution:
The example selects:
1) ext. thread valve VG DN 15, k_{VS} value 1.6 or
2) flange valve VGF DN 15, k_{VS} value 1.6

Design

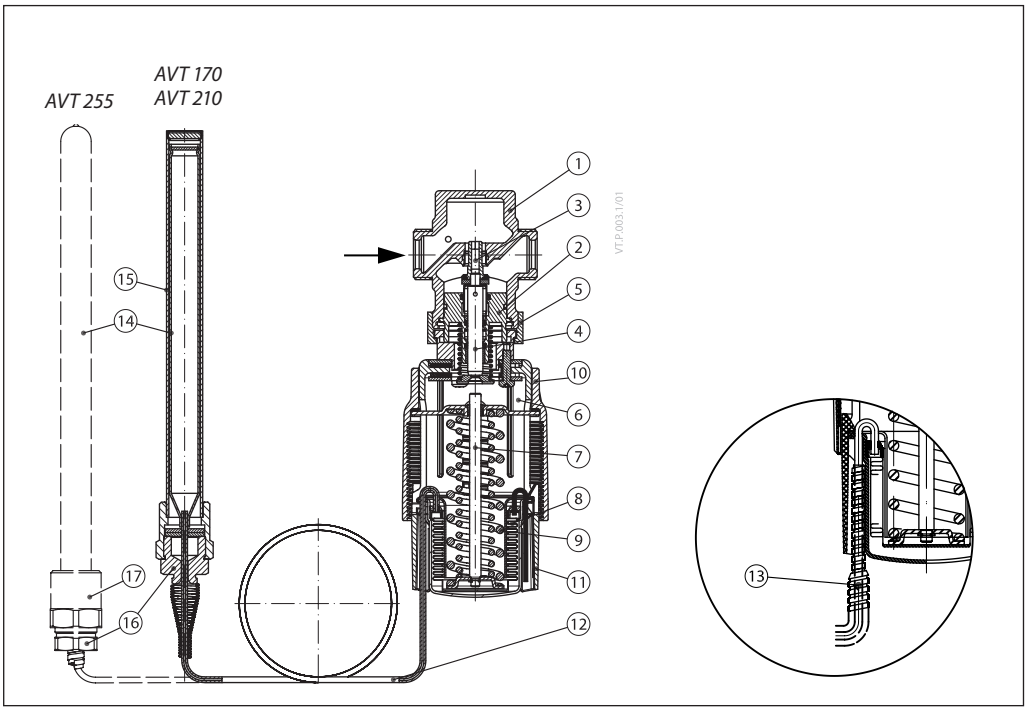
STM / VGF

1. Valve VG(F)
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Union nut
6. Safety temp. monitor STM
7. Thermostat stem
8. Setting spring for temperature control
9. Handle for limit setting, prepared for sealing
10. Scale carrier
11. Capillary tube
12. Temperature sensor
13. Immersion pocket
14. Safety spring



AVT / VG(F)

1. Valve VG(F)
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Union nut
6. Thermostatic actuator AVT
7. Thermostat stem
8. Bellows
9. Setting spring for temperature control
10. Handle for temperature setting, prepared for sealing
11. Scale carrier
12. Capillary tube
13. Flexible protected pipe (only at AVT 255 mm)
14. Temperature sensor
15. Immersion pocket
16. Sensor stuffing box
17. Housing of sensor stuffing box



Function

Mode of Operation

The safety temperature monitor is proportional temperature controller which controls temperature and protects the system against exceeding temperatures. The valve cone is soft sealed and pressure relieved.

Safety Temperature Monitor (STM/VG(F))

- Function
  In case the temperature at the temperature sensor exceeds the adjusted set point, safety temperature monitor interrupts energy supply by closing the valve. As soon as the temperature at the temperature sensor drops, the valve opens automatically.

  Handle for limit setting can be sealed.

- Extended safety function
  If there is a leakage in the area of the temperature sensor, the capillary tube, or the thermostat, the valve closes by a safety spring in the safety thermostat. In this case safety temperature monitor (actuator) must be replaced.
- Physical Function Principle
  The safety temperature monitor operates in accordance with the liquid expansion principle. The temperature sensor, the capillary tube and the bellows are filled with liquid. As the temperature at the temperature sensor rises, the liquid expands, the thermostat stem moves out and closes the valve.

Temperature Controller (AVT/VG(F))

- Function
  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.

- Physical Function Principle
  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 the valve.

Settings

Temperature setting (AVT)
Temperature setting is being done by the adjustment of the setting spring for temperature control. The adjustment can be done by means of handle for temperature setting and/or temperature indicators.

Limit setting (STM / VG(F)
Limit setting is being done by the adjustment of the setting spring for temperature control. The adjustment can be done by means of handle for limit setting and/or temperature indicators.

Adjustment diagram

Temperature setting
Relation between scale numbers 1-5 and closing temperature.

Note: *The values given are approximate*

AVT Thermostat ... 170 mm, 210 mm

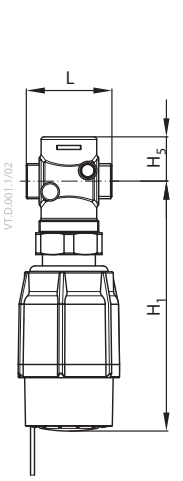
I	II	III	IIII	IIIII	
-10	3	15	28	40	°C
20	33	45	58	70	
40	53	65	78	90	
60	73	85	98	110	

AVT Thermostat ... 255 mm

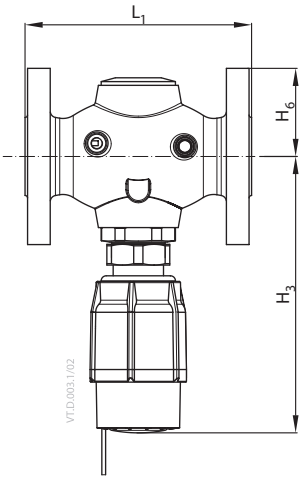
I	II	III	IIII	IIIII	
10	19	28	36	45	°C
35	44	53	61	70	
60	70	80	90	100	
85	95	105	115	125	

Note:
STM Safety temperature monitor (actuator):
temperature scale is already written on the product

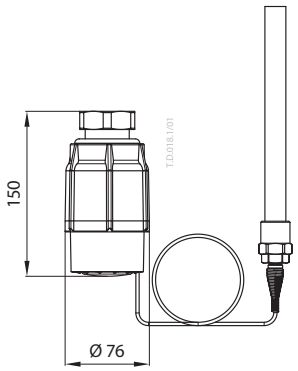
Dimensions



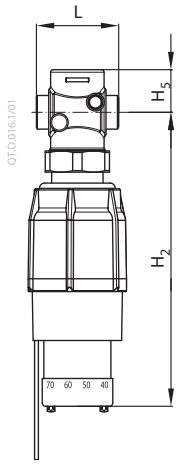
AVT/VG DN15-50



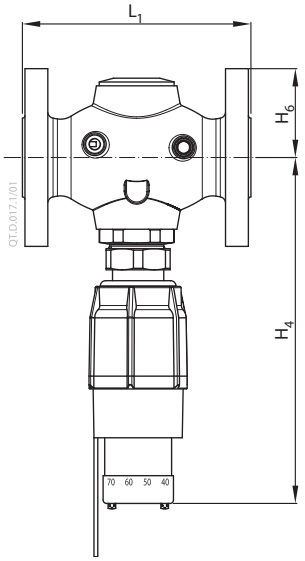
AVT/VGF DN 15-50



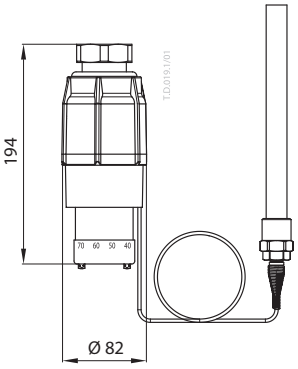
AVT



STM/VG DN15-50



STM/VGF DN15-50

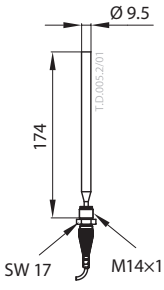


STM

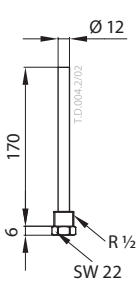
DN	L	L_1	H_1	H_2	H_3	H_4	H_5	H_6
15	65	130	180	224	229	274	34	47
20	70	150	180	224	229	274	34	52
25	75	160	180	224	229	274	37	57
32	100	180	221	266	221	266	62	70
40	110	200	221	266	221	266	62	75
50	130	230	221	266	221	266	62	82

AVT, STM

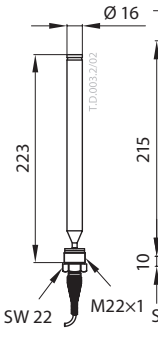
Type		Weight	
		AVT	STM
sensor 170 mm	kg	1.4	-
sensor 210 mm		1.5	2.6
sensor 255 mm		1.6	-



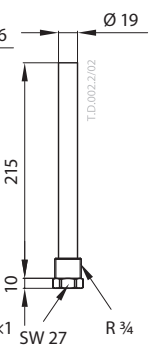
AVT 170



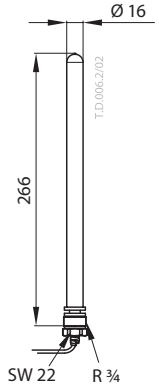
AVT 170
Immersion pocket



AVT 210 / STM

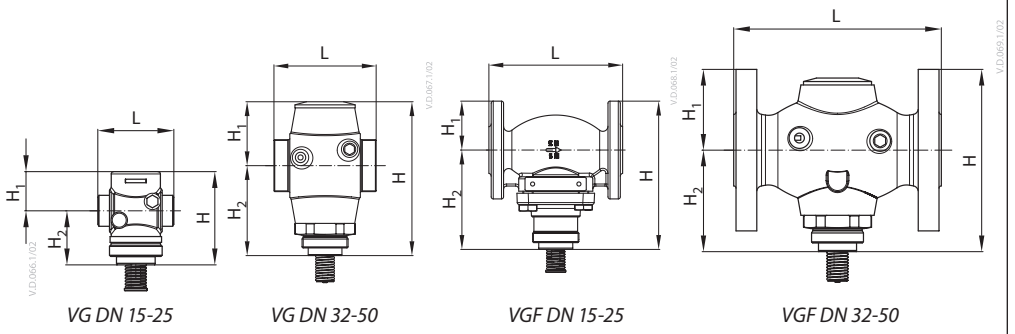


AVT 210 / STM
Immersion pocket



AVT 255

Dimensions *(continuous)*



VG DN 15-25 *VG DN 32-50* *VGF DN 15-25* *VGF DN 32-50*

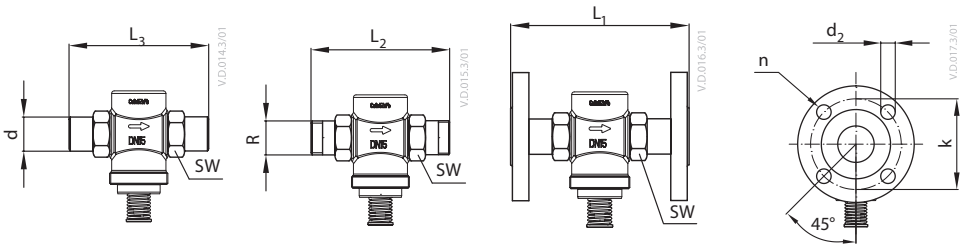
VG

DN	L	H	H_1	H_2	Weight (kg)
	mm				
15	65	80	34	46	0.7
20	70	80	34	46	0.8
25	75	83	37	46	0.9
32	100	151	63	88	3.0
40	110	151	63	88	3.1
50	130	151	63	88	3.8

VGF

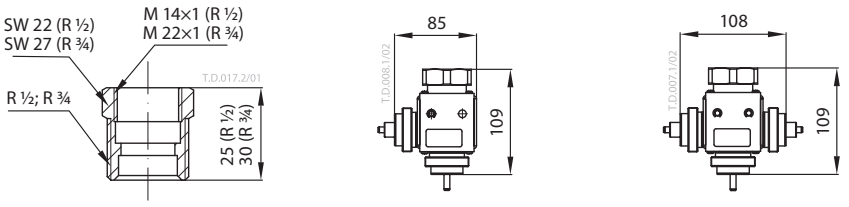
DN	L	H	H_1	H_2	Weight (kg)
	mm				
15	130	144	48	96	3.3
20	150	149	53	96	4.1
25	160	154	58	96	4.7
32	180	158	70	88	7.5
40	200	163	75	88	9.0
50	230	171	83	88	11.1

***Note**: other flange dimensions - see table for tailpieces*



DN	R [1]	SW	d	L_1 [2]	L_2	L_3	k	d_2	n
		mm							
15	½	32 (G ¾A)	21	130	131	139	65	14	4
20	¾	41 (G 1A)	26	150	144	154	75	14	4
25	1	50 (G 1¼A)	33	160	160	159	85	14	4
32	1¼	63 (G 1¾A)	42	-	177	184	100	18	4
40	1 ½	70 (G 2A)	47	-	195	204	110	18	4
50	2	82 (G 2½A)	60	-	252	234	125	18	4

[1] Conical ext. thread acc. to EN 10226-1
[2] Flanges PN 25, acc. to EN 1092-2



Housing of sensor stuffing box *Combination piece K2* *Combination piece K3*