



Motorized control valves

STM / VG(F) / AVT

Description

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

VG(F) - valve with flange

Controller closes on rising temperature. The controllers are type-tested acc. to EN 14597 and protect against exceeding temperatures.

Features & benefits

- Provides self-acting temperature control and monitoring for various heating systems.
- Versatile use in district heating, standard heating, and drinking water systems.



TR(TW)700



STW871

Ordering

Product code numbers

Table: Type VG, VGF

Type	Valve size	Kvs values [m ³ /h]	Connection types	Connection standard	Connection size	Pressure class	Code number
VG	DN 15	0.40	External Thread	ISO 228/1	G 3/4 A	PN 25	065B0770
VG	DN 15	1.00	External Thread	ISO 228/1	G 3/4 A	PN 25	065B0771
VG	DN 15	1.60	External Thread	ISO 228/1	G 3/4 A	PN 25	065B0772
VG	DN 15	2.50	External Thread	ISO 228/1	G 3/4 A	PN 25	065B0773
VG	DN 15	4.00	External Thread	ISO 228/1	G 3/4 A	PN 25	065B0774
VG	DN 20	6.30	External Thread	ISO 228/1	G 1 A	PN 25	065B0775
VG	DN 25	8.00	External Thread	ISO 228/1	G 1 1/4 A	PN 25	065B0776
VG	DN 32	12.50	External Thread	ISO 228/1	G 1 3/4 A	PN 25	065B0777
VG	DN 40	16.00	External Thread	ISO 228/1	G 2 A	PN 25	065B0778
VG	DN 50	20.00	External Thread	ISO 228/1	G 2 1/2 A	PN 25	065B0779
VGF	DN 15	4.00	Flange	EN 1092-2	15	PN 25	065B0780
VGF	DN 20	6.30	Flange	EN 1092-2	20	PN 25	065B0781
VGF	DN 25	8.00	Flange	EN 1092-2	25	PN 25	065B0782
VGF	DN 32	12.50	Flange	EN 1092-2	32	PN 25	065B0783
VGF	DN 40	20.00	Flange	EN 1092-2	40	PN 25	065B0784
VGF	DN 50	25.00	Flange	EN 1092-2	50	PN 25	065B0785

Table: Type AVT, AVT (fast), STM

Type	Temperature setting range [°C] [Min]	Temperature setting range [°C] [Max]	Temperature sensor length [mm]	Sensor connection	Code number
AVT	-10	40	170	M14x1 / R1/2 ext thread acc. DIN 2999	065-0596
AVT	20	70	170	M14x1 / R1/2 ext thread acc. DIN 2999	065-0597
AVT	40	90	170	M14x1 / R1/2 ext thread acc. DIN 2999	065-0598
AVT	60	110	170	M14x1 / R1/2 ext thread acc. DIN 2999	065-0599
AVT	-10	40	210	M22x1 / R3/4 ext thread acc. DIN 2999	065-0600
AVT	20	70	210	M22x1 / R3/4 ext thread acc. DIN 2999	065-0601
AVT	40	90	210	M22x1 / R3/4 ext thread acc. DIN 2999	065-0602
AVT	60	110	210	M22x1 / R3/4 ext thread acc. DIN 2999	065-0603
AVT (fast)	10	45	255	M22x1 / R3/4 ext thread acc. DIN 2999	065-0604
AVT (fast)	35	70	255	R 3/4 conic ext. thread acc. to DIN 2999	065-0605
AVT (fast)	60	100	255	R 3/4 conic ext. thread acc. to DIN 2999	065-0606
AVT (fast)	85	125	255	R 3/4 conic ext. thread acc. to DIN 2999	065-0607
STM	30	110	210	M22x1 / R3/4 ext thread acc. DIN 2999	065-0608
STM	20	75	210	M22x1 / R3/4 ext thread acc. DIN 2999	065-0609
STM	40	95	210	M22x1 / R3/4 ext thread acc. DIN 2999	065-0610

Note:

1. For **STM** Safety temperature monitor (actuator) the following applies:

Codes **065-0608, 065-0609, 065-0610: Sensor connection** - Conic male thread EN 10226-1

2. For **AVT** Thermostatic actuator, the following applies:

Codes **065-0600, 065-0601, 065-0602, 065-0603: Sensor connection** - Conic male thread EN 10226-1

Codes **065-0604, 065-0605, 065-0606, 065-0607: Sensor connection** - Conic male thread EN 10226-1, without immersion pocket

Example - 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

- 1x VG DN 15 valve.

Code No: **065B0772**

Example - 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

- 1x VG DN 15 valve.

Code No: **065B0772**

- 1x STM monitor, 30 ... 110 °C.

Code No: **065-0608**

Option:

- 1x Weld-on tailpieces.

Code No: **003H6908**

All products will be delivered separately.

- 1x STM monitor, 30 ... 110 °C.

Code No: **065-0608**

- 1x AVT thermostatic actuator, 40 ... 90 °C.

Code No: **065-0598**

- 1x K2 Combination piece.

Code No: **003H6855**

Option:

- 1x Weld-on tailpieces.

Code No: **003H6908**

All products will be delivered separately.

Accessories code numbers

Table: Type Adapters, Combination pieces, Flange tailpieces, Immersion pockets, Stuffing box kits, Thread tailpieces, Weld-on tailpieces

Type	Description	Code number
Weld-on tailpieces	Tailpiece weld-on PN25 DN15 (G3/4)	003H6908
Weld-on tailpieces	Tailpiece weld-on PN25 DN20 (G1)	003H6909
Weld-on tailpieces	Tailpiece weld-on PN25 DN25 (G1 1/4)	003H6910
Weld-on tailpieces	Tailpiece weld-on PN25 DN32 (G1 3/4)	003H6911
Weld-on tailpieces	WELD-ON TAILPIECE VM2 DN40	065B2006
Weld-on tailpieces	065Z7075 TAILPIECE VM2 DN50	065B2007
Thread tailpieces	Tailpiece ext.thr R1/2 PN25 DN15 (G3/4) Tailpiece ext.thr R1/2 PN25 (G3/4)	003H6902
Thread tailpieces	Tailpiece ext.thr R3/4 PN25 DN20 (G1)	003H6903
Thread tailpieces	Tailpiece ext.thr R1 PN25 DN25 (G1 1/4)	003H6904
Thread tailpieces	Tailpiece ext.th R1 1/4 PN25 DN32 (G1 3/4)	003H6905
Thread tailpieces	TAILPIECE WITH EXT. THR. VM2 DN40	065B2004
Thread tailpieces	TAILPIECE WITH EXT. THR. VM2 DN50	065B2005
Stuffing box kits	Sensor stuffingbox set for AVT(-U) R 3/4	065-4421
Immersion pockets	Imm.pocket, AVT; RAVI/K, 9.5mm,Brass(Sens.170)PN25 Imm.pocket ,AVT; RAVI/K, 9.5mm,Brass(Sens.170)PN25	065-4414
Immersion pockets	Imm.pocket,AVT; RAVI/K,9.5mm,SS(Sensor 170),PN25	065-4415
Immersion pockets	Imm.pocket,AVT,16mm,Brass(Sens.210),PN25	065-4416
Immersion pockets	Imm.pocket,AVT,16mm,SS(Sensor 210),PN25	065-4417
Flange tailpieces	Tailpiece flange PN25 DN15 (G3/4)	003H6915
Flange tailpieces	Tailpiece flange PN25 DN20 (G1)	003H6916
Flange tailpieces	Tailpiece flange PN25 DN25 (G1 1/4)	003H6917
Combination pieces	Combination Piece K2, M45 / 2 x M45	003H6855
Combination pieces	Combination Piece K3, M45 / 3 x M45	003H6856
Adapters	Adapter M34 / M45	003H6927

Note:

1. **Immersion pockets** - Not for AVT thermostatic actuator code numbers: **065-0604, 065-0605, 065-0606, 065-0607**

Spare parts code numbers

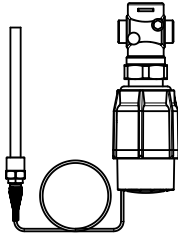
Type	Description	Code number
Valve Inserts	Valve insert PN25 15/0,4 VG-flow	003H6869
Valve Inserts	Valve insert PN25 15/1,0 VG-flow	003H6870
Valve Inserts	Valve insert PN25 15/1,6 VG-flow	003H6871
Valve Inserts	Valve insert PN25 15/2,5 VG-flow	003H6872

Valve Inserts	Valve insert PN25 15/4,0 20/4,0 VG-flow	003H6873
Valve Inserts	Valve insert PN25 20/6,3 25/6,3 VG-flow	003H6874
Valve Inserts	Valve insert PN25 25/8 32/10 VG-flow	003H6875
Valve Inserts	Valve ins PN25 32/12,5 40/16 50/20 VGflo	003H6876
Stuffing box kits	Sensor stuffingbox set for AVT R 1/2#	065-4420
Stuffing box kits	Sensor stuffingbox set for AVT(-U) R 3/4	065-4421

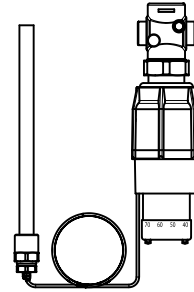
Overview

Product portfolio

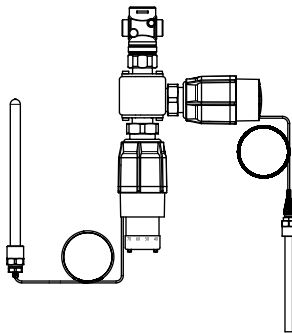
Combinations



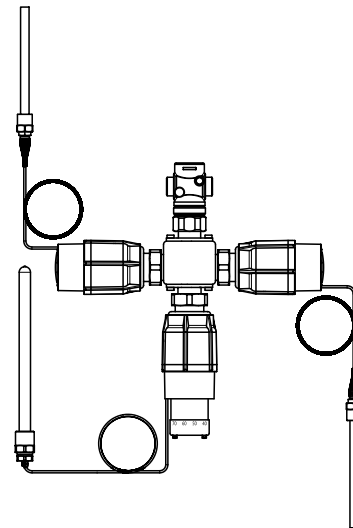
AVT / VG - temperature controller



STM / VG - safety temperature monitor



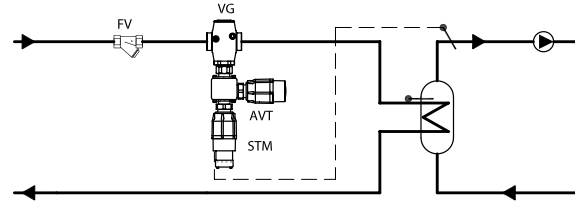
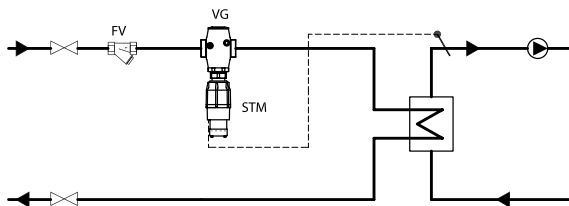
STM / AVT / VG - temperature controller with safety temperature monitor



STM / AVT / AVT / VG - two temperature controllers with safety temperature monitor

Application examples

- 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





Functions

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.

Product details

General data

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	5	5	5	5	5	10	10	10
Control ratio		> 1:50	> 1:50	> 1:50	> 1:50	> 1:50	> 1:50	> 1:50	> 1:50	> 1:50	> 1:50
Control characteristic		linear									
Cavitation factor z		≥ 0.6	≥ 0.6	≥ 0.6	≥ 0.6	≥ 0.6	≥ 0.6	≥ 0.55	≥ 0.55	≥ 0.5	≥ 0.5
Leakage acc. to standard IEC 534	% of k _{VS}	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.05	≤ 0.05	≤ 0.05
Nominal pressure	PN	25	25	25	25	25	25	25	25	25	25
Max. differential pressure	bar	20	20	20	20	20	20	20	16	16	16
Medium		Circulation water / glycolic water up to 30 %									
Medium pH		Min. 7, max. 10									
Medium temperature	°C	2 ... 150									
Connections, valve		External thread									
Connections, valve		-					Flange				
Connections, tailpieces		Weld-on and external thread									
Connections, tailpieces		Flange							-		

¹⁾ Flange valve body

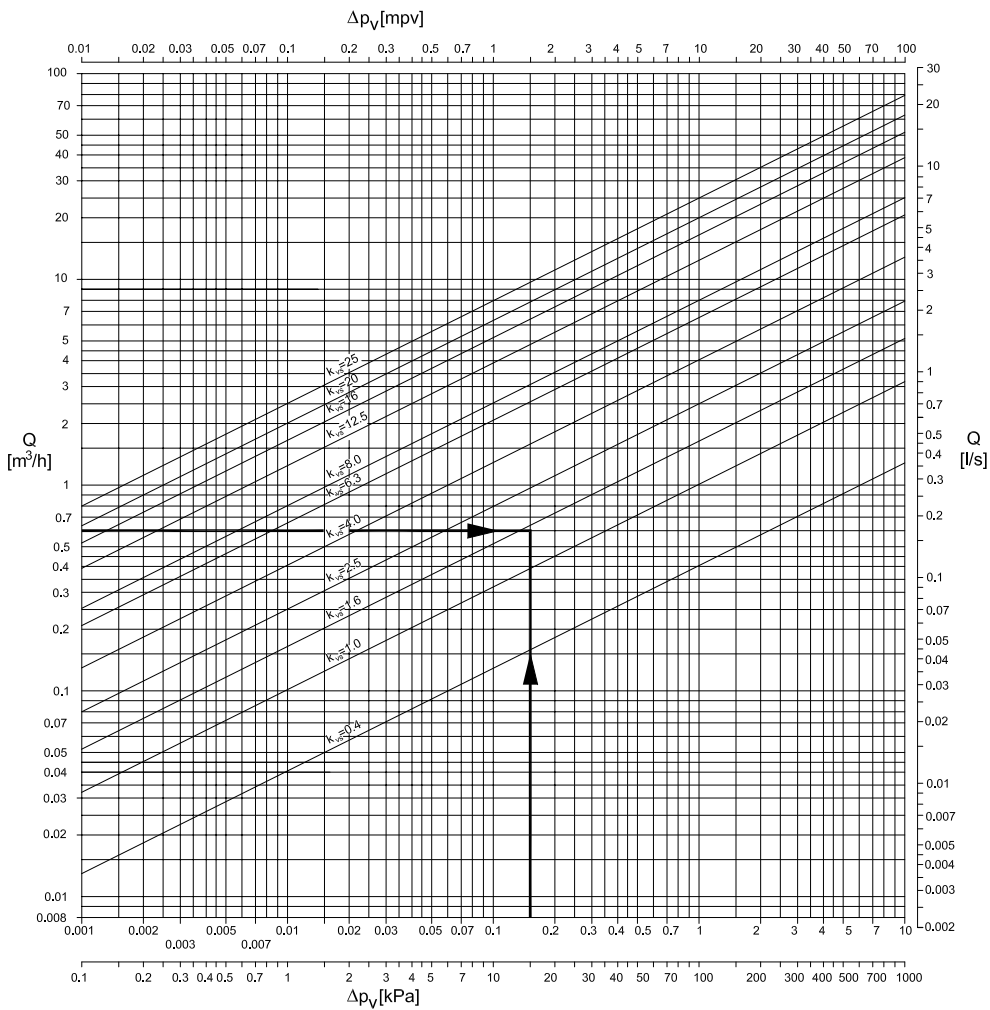
STM Safety temperature monitor (actuator)

Limit range X_t	°C	20 ... 75 / 40 ... 95 / 30 ... 110
Time constant T acc. to EN 14597	s	max. 100
Gain K_v	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

AVT Thermostatic actuator

Setting range X_t	°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_t	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)

Valve sizing



Given data:

$$P_{\max} = 14 \text{ kW}$$

$$\Delta t = 20 \text{ K}$$

$$\Delta p_v = 0.15 \text{ bar}$$

$P_{\max}$ - 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:

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

$$Q_{\max} = 0.6 \text{ m}^3/\text{h}$$

k_v value is calculated according to formula:

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

$$k_v = 1.5 \text{ m}^3/\text{h}$$

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

or read from the sizing diagram by taking a line through Q

scale ($0.6 \text{ m}^3/\text{h}$) and Δp_v scale (0.15 bar) to intersect k_v -scale at

$1.5 \text{ m}^3/\text{h}$

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

Solution:

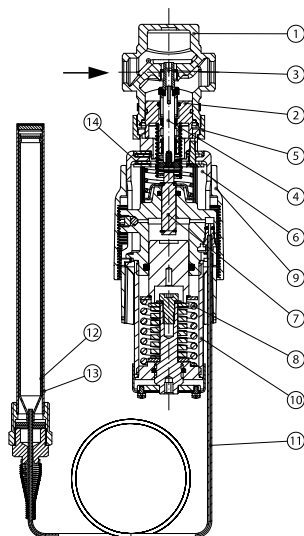
The example selects:

1. ext. thread valve VG DN 15, k_{vs} value 1.6
2. flange valve VGF DN 15, k_{vs} value 1.6

Design

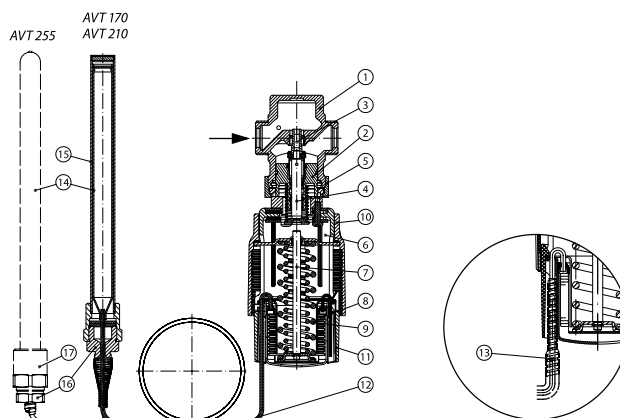
STM / VGF

- 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



Materials

VG, VGF valves

Nominal diameter	DN 15, 20, 25	DN 32, 40, 50
Valve body, thread	Red bronze CuSn5ZnPb (Rg5)	Ductile iron EN-GJS-400-18-LT (GGG 40.3)
Valve body, flange	Ductile iron EN-GJS-400-18-LT (GGG 40.3) (except DN 15 ($\leq k_{vs}$ 2.5): not available)	Ductile iron EN-GJS-400-18-LT (GGG 40.3)
Valve seat	Stainless steel, mat. No. 1.4571	Stainless steel, mat. No. 1.4571
Valve cone	Dezincing free brass CuZn36Pb2As	Dezincing free brass CuZn36Pb2As
Sealing	EPDM	EPDM
Pressure relieve system	Piston	Piston



STM Safety temperature monitor (actuator)

Temperature sensor	Cooper
Immersion pocket: Ms design	Brass, nickel-plated
Immersion pocket: Stainless steel design	mat. No. 1.4435
Handle for temp. setting	Polyamide, glass fiber-reinforced
Scale carrier	Polyamide

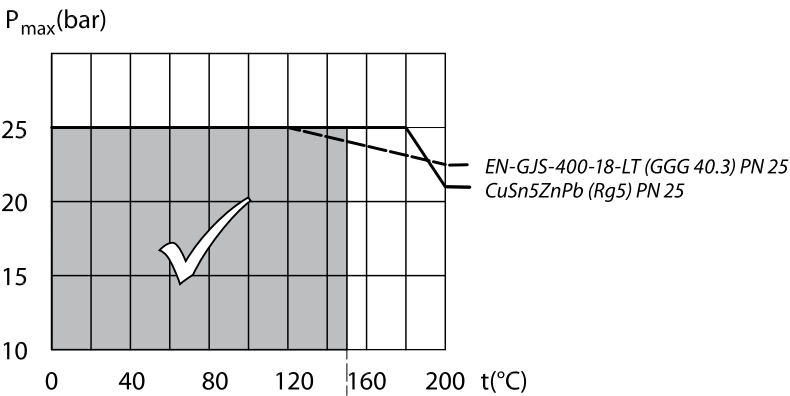
AVT Thermostatic actuator

Temperature sensor	Cooper
Immersion pocket ¹⁾ : Ms design	Brass, nickel-plated
Immersion pocket ¹⁾ : 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

Pressure and temperature data

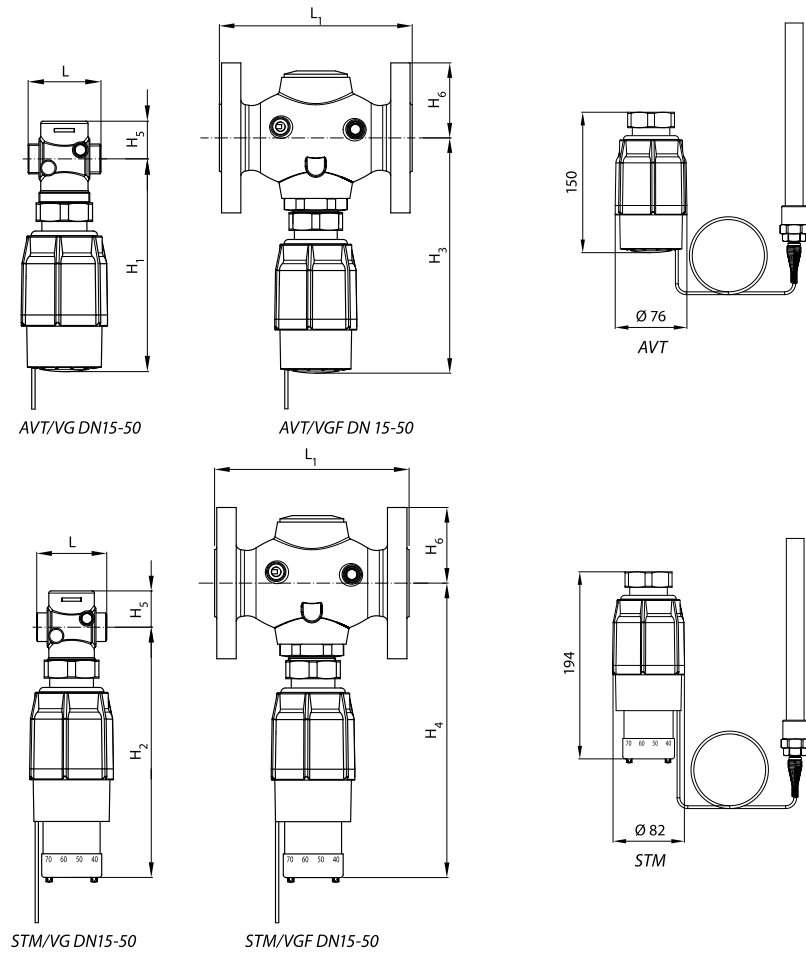
Pressure temperature diagram



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



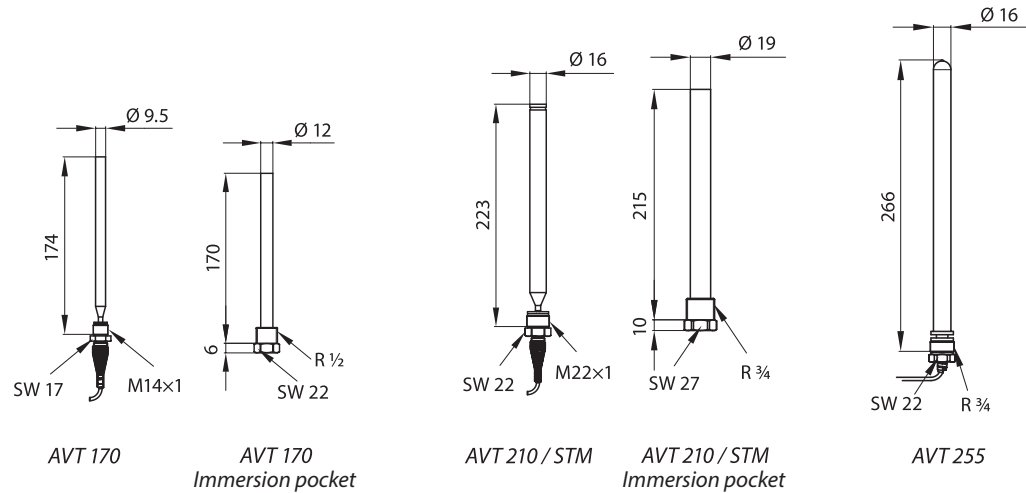
Dimensions

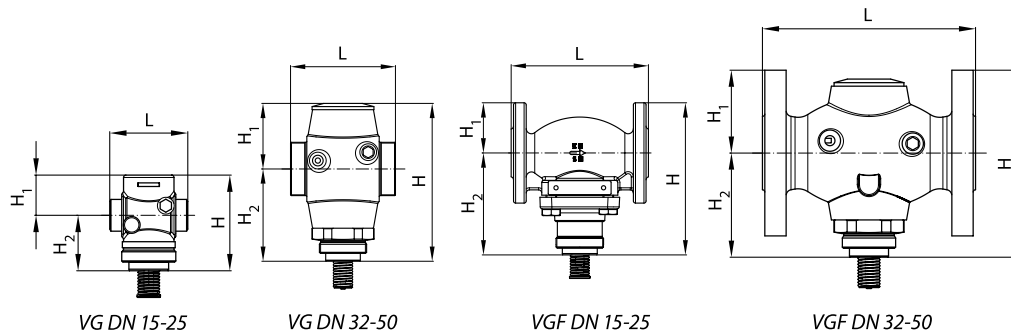


DN	L	L ₁	H ₁	H ₂	H ₃	H ₄	H ₅	H ₆
15	65	130	180	224	229	274	34	47
20	70	150	180	224	229	274	34	52
25	75	160	180	224	229	274	37	57
32	100	180	221	266	221	266	62	70
40	110	200	221	266	221	266	62	75
50	130	230	221	266	221	266	62	82

AVT, STM

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



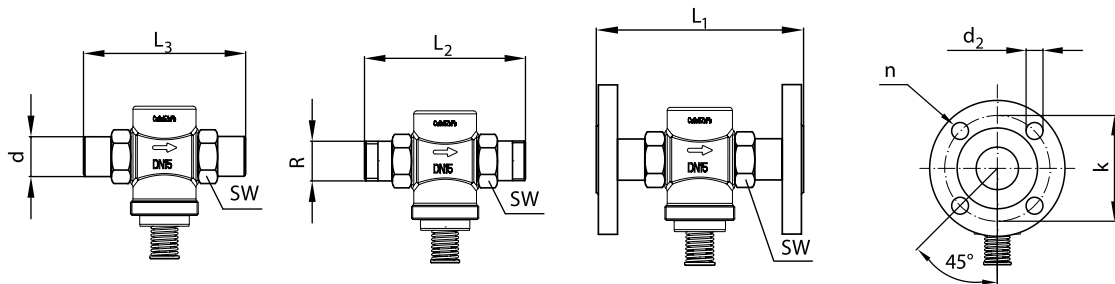
**VG**

DN	L	H	H ₁	H ₂	Weight
	mm	mm	mm	mm	kg
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
	mm	mm	mm	mm	kg
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

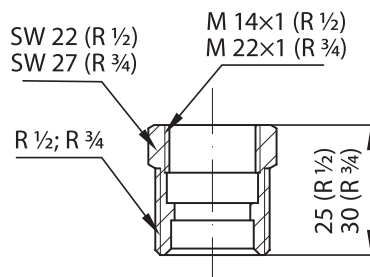
Note: other flange dimensions - see table for tailpieces



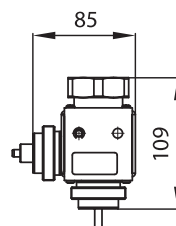
DN	R ¹⁾	SW	d	L ₁ ²⁾	L ₂	L ₃	k	d ₂	n
		mm	mm	mm	mm	mm	mm	mm	
15	½	32 (G ¾ A)	21	130	131	139	65	14	4
20	¾	41 (G 1 A)	26	150	144	154	75	14	4
25	1	50 (G 1 ¼ A)	33	160	160	159	85	14	4
32	1 ¼	63 (G 1 ¾ A)	42	-	177	184	100	18	4
40	1 ½	70 (G 2 A)	47	-	195	204	110	18	4
50	2	82 (G 2 ½ A)	60	-	252	234	125	18	4

¹⁾ Conical ext. thread acc. to EN 10226-1

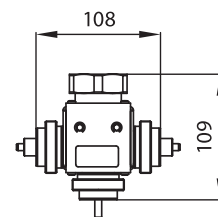
²⁾ Flanges PN 25, acc. to EN 1092-2



Housing of sensor stuffing box



Combination piece K2



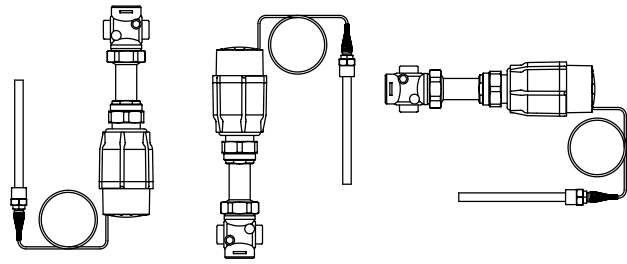
Combination piece K3

Installation

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.

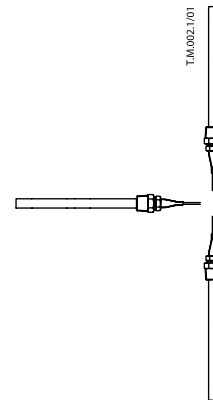


Temperature sensor

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

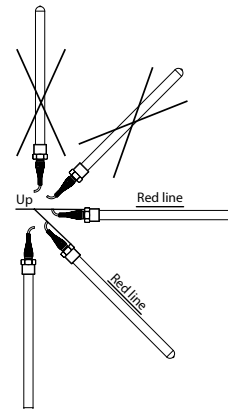
Temperature sensors 170 mm R $\frac{1}{2}$ and 210 mm R $\frac{3}{4}$

- 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 drawing on the right.



Certificates, declarations and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Issuer	Approval topic
EAC Declaration	EAC KZ 7100841.13.12.02339	EAC - Eurasian Customs Union	MD
UA Declaration	Danfoss UA 10.01.23 Heat Control Valves	Danfoss	
Electrical Safety Certificate	DIN CERTCO STW871	DIN CERTCO	
Electrical Safety Certificate	TR(TW)700	DIN CERTCO	
Export Control Declaration	Actuators pressure flow and temperature	Danfoss	
Pressure Safety Certificate	Certificate B (UA.TR.131.B.2655-26) Control valves	Academtest LLC	Pressure
Pressure Safety Certificate	Certificate D (UA.TR.131.B.2655-26) Control valves	Academtest LLC	Pressure
Pressure Safety Certificate	Declaration Control valves	Danfoss	Pressure
EU Declaration	PL08-28_230612EN0854103_EU declaration of conformity_rev6_Control Valves.docx.pdf	Danfoss	Pressure
EU Declaration	Packaging EU Declaration of Conformity 260707EN0801	Danfoss	Packaging

Contact details

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