

Data sheet

Flow and temperature controller with integrated control valve, WE-version (PN 25)

AVQM-WE - flow controller with integrated control valve

AVQMT-WE - flow and temperature controller with integrated control valve

Description



AVQM-WE is a self-acting flow controller with integrated control valve primarily for use in district heating systems. The controller closes when set max. flow is exceeded.

AVQMT-WE is a self-acting flow and temperature controller with integrated control valve primarily for use in district heating systems. The controller closes on rising temperature or when set max. flow is exceeded.

All controllers have special designed (pressure relieved) control valve insert.

AVQM-WE controller can be combined with Danfoss electrical actuators AMV(E) (and controlled by ECL electronic controllers).

AVQMT-WE controller can be combined with Danfoss electrical actuators AMV(E) (and controlled by ECL electronic controllers) and with AVT or STM thermostatic actuators.

The controllers have a control valve with adjustable flow restrictor, connection neck for electrical actuator, connection neck for thermostat (AVQMT-WE only), and an actuator with one control diaphragm.

AVQM-WE and AVQMT-WE are used together with Danfoss electrical actuators:

- AMV 150 ¹⁾
- AMV(E) 10 ¹⁾ / AMV(E) 20 / AMV(E) 30
- AMV(E) 13 ¹⁾ / AMV(E) 23 / AMV(E) 33 with spring return function
- AMV 20 SL / AMV 23 SL / AMV 30 SL with stroke limitation

¹⁾ AMV 150 / AMV(E) 10 / AMV(E) 13 can be combined with DN 15 controller only.

AVQM(T)-WE combined with AMV(E) 13, AMV(E) 23 (SL) or AMV(E) 33 (SL) has been approved according to DIN 32730. The controllers combined with AVT and STM thermostats are type-tested acc. to EN 14597.

Controllers combined with STM thermostats protect systems 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} 2.5-25 m³/h
- PN 25
- Setting ranges:
 - AVT thermostat:
 - 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
 - STM monitor
 - 20 ... 75 °C / 40 ... 95 °C / 30 ... 110 °C
- Flow restrictor Δp : 0.2 bar
- Temperature:
 - Circulation 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 -

AVQM-WE controller:

Flow controller with integrated control valve; DN 15; k_{vs} 2.5; PN 25; flow restrictor Δp 0.2 bar; T_{max} 150 °C; ext. thread

- 1x AVQM-WE DN 15 controller
Code No: **003H7080**

Option:

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

The controller will be delivered completely assembled, inclusive impulse tube between valve and actuator. Electrical actuator AMV(E) must be ordered separately.

Example 2 -

AVT (or STM) / AVQMT-WE controller:

Flow and temperature controller with integrated control valve, DN 15; k_{vs} 2.5; PN 25; setting range 40 ... 90 °C; flow restrictor Δp 0.2 bar; T_{max} 150 °C; ext. thread

- 1x AVQMT-WE DN 15 controller
Code No: **003H7084**
- 1x AVT thermostatic actuator, 40 ... 90 °C
Code No: **065-0598**

Option:

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

The controller AVQMT-WE will be delivered completely assembled, inclusive impulse tube between valve and actuator. Thermostatic actuator AVT will be delivered separately. Electrical actuator AMV(E) must be ordered separately. In case of safety temp. monitoring STM should be ordered instead of AVT.

AVQM-WE Controller

Picture	DN (mm)	k_{vs} (m ³ /h)	Connection		Code No.
	15	2.5	Cylindr. ext. thread acc. to ISO 228/1	G 3/4 A	003H7080
		4.0			003H7081
	20	6.3		G 1 A	003H7082
	25	8.0		G 1 1/4 A	003H7083
	32	12.5	Flanges PN 25, acc. to EN 1092-2		003H7088
	40	20			003H7089
	50	25			003H7090

AVQMT-WE Controller

Picture	DN (mm)	k_{vs} (m ³ /h)	Connection		Code No.
	15	2.5	Cylindr. ext. thread acc. to ISO 228/1	G 3/4 A	003H7084
		4.0			003H7085
	20	6.3		G 1 A	003H7086
	25	8.0		G 1 1/4 A	003H7087

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 1/2 ¹⁾	065-0596
		20 ... 70		065-0597
		40 ... 90		065-0598
		60 ... 110		065-0599
		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

STM Safety temperature monitor (actuator)

Picture	For valves	Limit range (°C)	Temperature sensor with brass immersion pocket, length, connection	Code No.
	DN 15-25	30 ... 110	210 mm, R 3/4 ¹⁾	065-0608
		20 ... 75		065-0609
		40 ... 95		065-0610

¹⁾ conic male thread EN 10226-1

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		003H6915
		20			003H6916
		25			003H6917

Ordering (continuous)

Example 3 -

STM / AVT / AVQMT-WE controller:
Flow and temperature controller
with safety temperature monitor
and integrated control valve,
DN 15, k_{vs} 2.5; PN 25; setting range
40 ... 90 °C; limit range 30 ... 110 °C;
flow restrictor Δp 0.2 bar;
 T_{max} 150 °C; ext. thread

- 1x AVQMT-WE DN 15 controller
Code No: **003H6787**
- 1x AVT thermostatic actuator,
40 ... 90 °C
Code No: **065-0598**
- 1x STM monitor, 30 ... 110 °C
Code No: **065-0608**
- 1x K2 Combination piece
Code No: **003H6855**

Option:

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

The controller AVQMT-WE will be
delivered completely assembled,
inclusive impulse tube between
valve and actuator. Combination
piece K2, thermostats AVT and STM
will be delivered separately.
Electrical actuator AMV(E) must be
ordered separately.

Accessories for thermostats

Picture	Type designation	PN	For thermostats	Material	Code No.
	Immersion pocket	25	AVT	Brass	065-4414 ¹⁾
			AVT	Stainless steel, mat. No. 1.4571	065-4415 ¹⁾
	Combination piece K2		STM	Brass	065-4416 ¹⁾
			STM	Stainless steel, mat. No. 1.4435	065-4417 ¹⁾
					003H6855

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

Service kits

Picture	Type designation	DN	k_{vs} (m ³ /h)	Code No.
	Valve insert ¹⁾	15	2.5	003H6863
			4.0	003H6864
		20	6.3	003H6865
		25	8.0	003H6866
		32/40/50	12.5/20/25	003H6868
	Control valve insert ¹⁾	15	2.5	003H6988
			4.0	003H6989
		20	6.3	003H6990
		25	8.0	003H6991
		32/40/50	12.5/20/25	003H6992
	Type designation	For controller		Code No.
	Actuator	AVQM-WE		003H6841
		AVQMT-WE		003H6843
	Housing of sensor stuffing box	for sensors		
		AVT R ½		065-4420
		AVT R ¾		065-4421

¹⁾ For AVQM-WE and AVQMT-WE controllers

Technical data

Valve

Nominal diameter			DN	15	20	25	32	40	50	
k _{VS} value of dp controller			m ³ /h	2.5	4.0	6.3	8.0	12.5	16/20 ¹⁾	20/25 ¹⁾
Range of max. flow setting	Δp _{MCV} = 0.2 bar	Q _{min}		0.07	0.07	0.16	0.2	0.4	0.8	0.8
		Q _{max}		1.6	2.4	3.5	4.5	10	10.5/12 ¹⁾	12/14 ¹⁾
Available Δp required for Q _{max} ²⁾			bar	0.6	0.6	0.5	0.5	0.8	0.8/0.6 ¹⁾	0.8/0.6 ¹⁾
Stroke			mm	5		7		10		
Control valve authority				1 (100%) in the range of flow setting						
Control characteristic				Logarithmic						
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						
Min. differential pressure			bar	see remark ²⁾						
Max. differential pressure				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, external thread and flange				/		
Materials										
Valve body				Red bronze CuSn5ZnPb (Rg5)				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 DP, CV				EPDM						
Pressure relieve system	Control valve insert			Piston						
	Valve insert									

Note:

DP - diff. pressure controller, MCV - control valve

¹⁾ Flanged version

²⁾ For flows smaller than Q_{max} → Δp_{min} = $\left(\frac{Q}{k_{VS}}\right)^2 + \Delta p_{MCV}$

Technical data (continuous)

Actuator

Type		AVQM-WE, AVQMT-WE
Actuator size	cm ²	54
Nominal pressure	PN	25
Flow restrictor diff. pressure	bar	0.2
Materials		
Housing	Upper housing of actuator	Stainless steel, mat. No.1.4301
	Lower housing of actuator	Dezincing free brass CuZn36Pb2As
Diaphragm		EPDM
Impulse tube		Copper tube Ø 6 × 1 mm

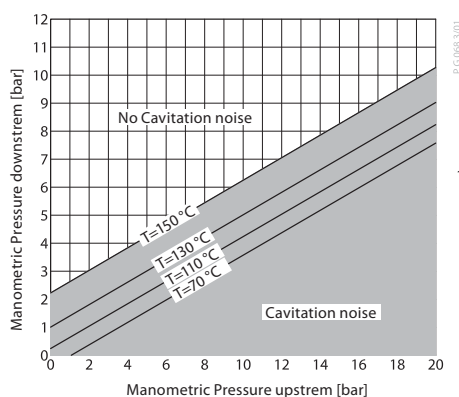
AVT Thermostatic actuator

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, max. 30 (255 mm)
Gain K _s	mm/°K	0.2 (170 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 immerison pocket		
Capillary tube length		5 m (170 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)
Handle for temp. setting		Polyamide, glass fiber-reinforced
Scale carrier		Polyamide

¹⁾ for sensor 170

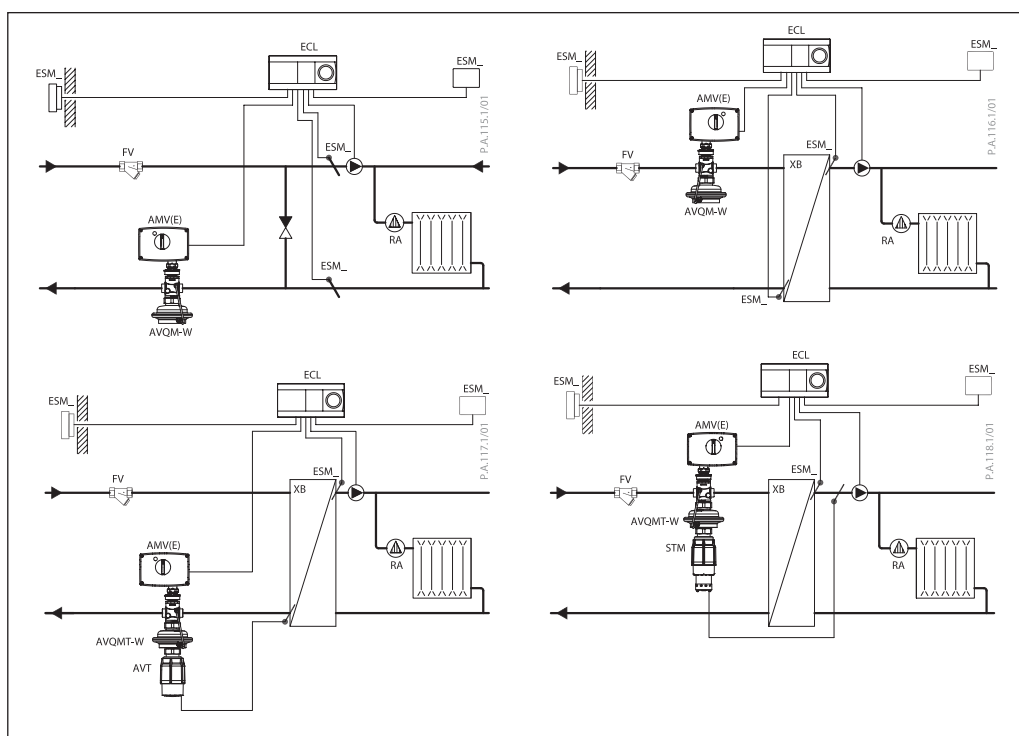
STM Safety temperature monitor (actuator)

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 immerison 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

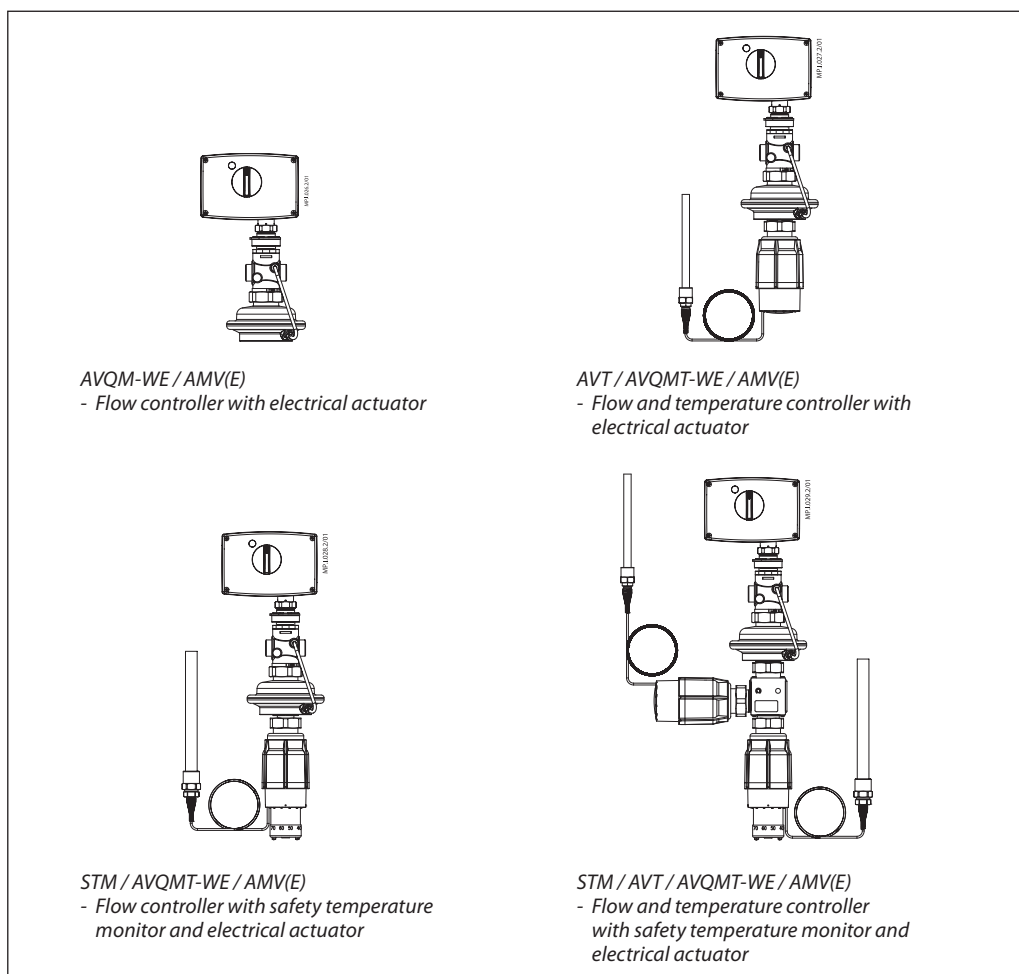


Cavitation area for cavitation factor $z = 0.6$

Application principles

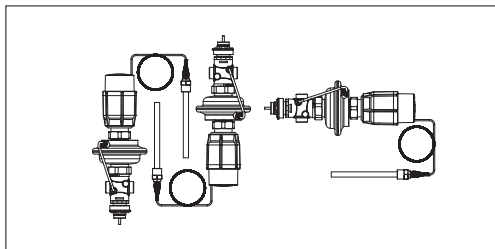


Combinations

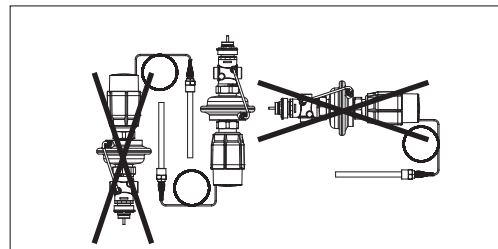


Installation positions

Flow and temperature controller with integrated control valve (with AVT or STM)
Up to medium temperature of 100 °C the controllers can be installed in any position.



For higher temperatures the controllers have to be installed in horizontal pipes only, with a pressure and temperature actuator oriented downwards.



Electrical actuator

Note!

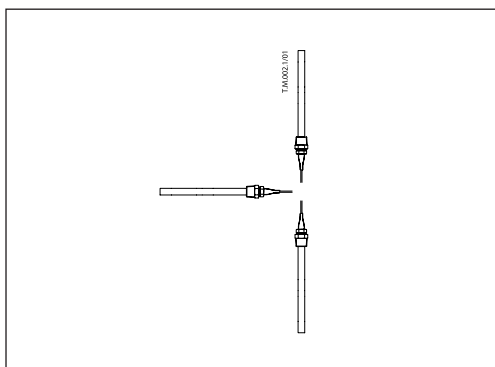
Installation positions for electrical actuators AMV(E) have to be observed as well. Please see relevant Data sheet.

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.

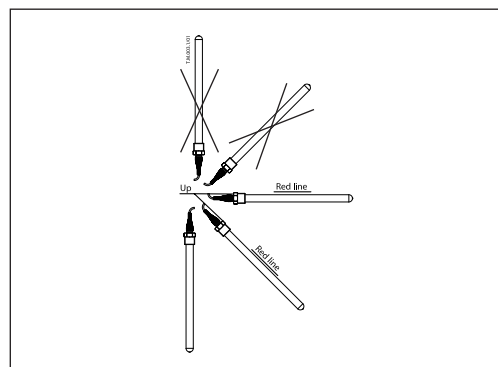
Temperature sensors 170 mm R $\frac{1}{2}$

- The temperature sensor may be installed in any position.

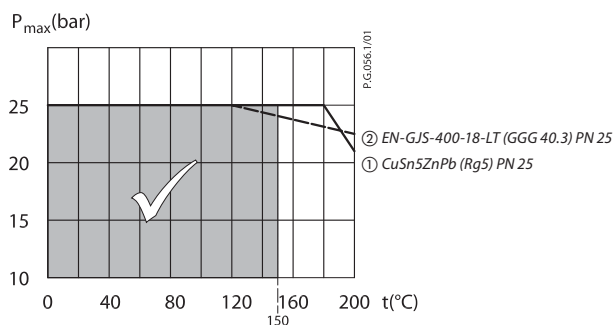


Temperature sensor 255 mm R $\frac{3}{4}$

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



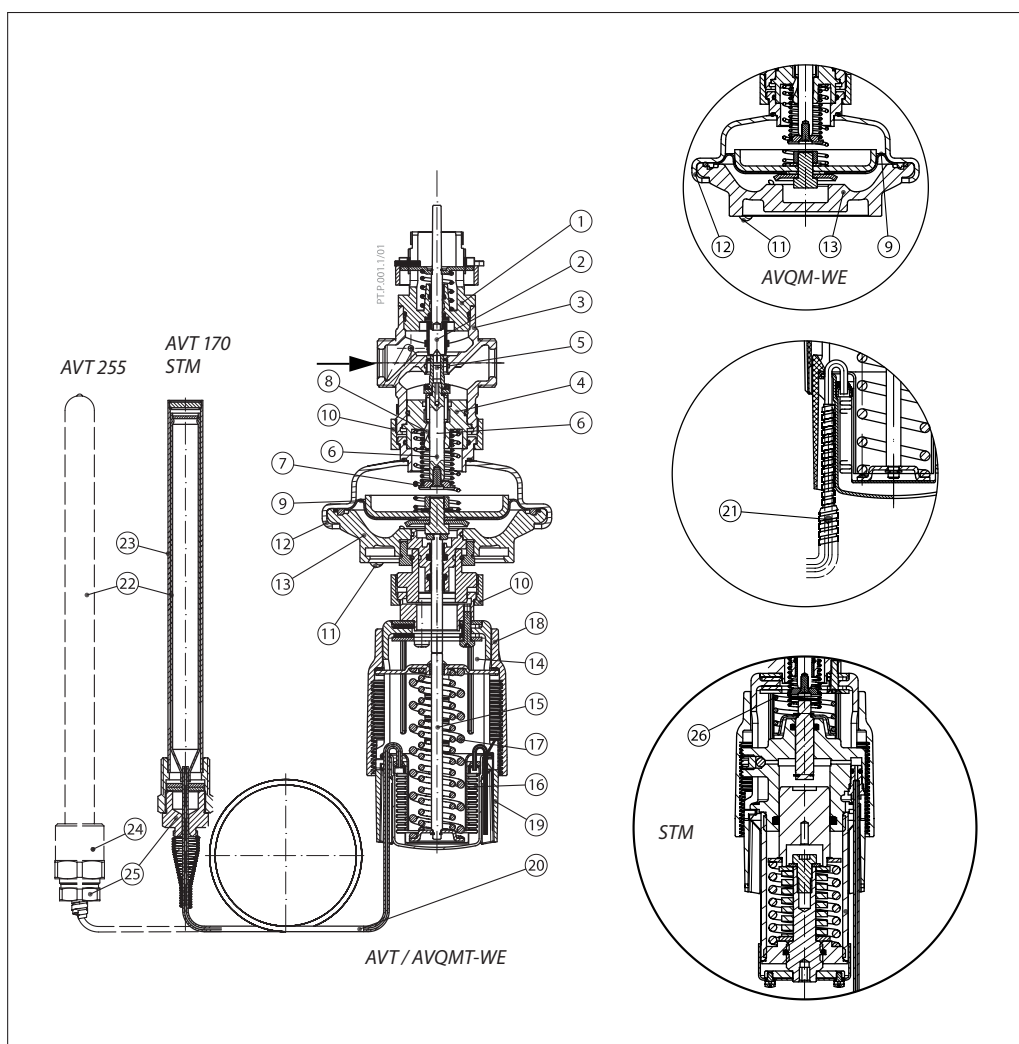
Pressure temperature diagram



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

Design

1. Control valve insert
2. Adjustable flow restrictor
3. Valve body
4. Valve insert
5. Pressure relieved valve cone
6. Valve stem
7. Built-in spring for flow rate control
8. Control drain
9. Control diaphragm
10. Union nut
11. Impulse tube
12. Upper casing of diaphragm
13. Lower casing of diaphragm
14. Thermostat AVT, STM
15. Thermostat stem
16. Bellows
17. Setting spring for temperature control
18. Handle for temperature setting, prepared for sealing
19. Scale carrier
20. Capillary tube
21. Flexible protected pipe (at 255mm only)
22. Temperature sensor
23. Immersion pocket
24. Sensor stuffing box
25. Housing of sensor stuffing box
26. Safety spring



Function

Flow and temperature controller with integrated control valve (AVQM-WE, AVQMT-WE)

Flow volume causes pressure drop across the adjustable flow restrictor. Resulting pressures are being transferred through the impulse tubes and/or control drain in the actuator stem to the actuator chambers and act on control diaphragm for flow control. The flow restrictor diff. pressure is controlled and limited by means of built-in spring for flow control. Control valve closes on rising differential pressure and opens on falling differential pressure to control max flow.

Additionally the electrical actuator will operate from zero to set max. flow according to the load.

Safety Temperature Monitor (STM)

- Function
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.

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)

- Function
By increasing of medium temperature control 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

Flow setting

Flow setting is being done by the adjustment of the flow restrictor position. The adjustment can be performed on the basis of flow adjustment diagram (see relevant instructions) and/or by the means of heat meter.

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)

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

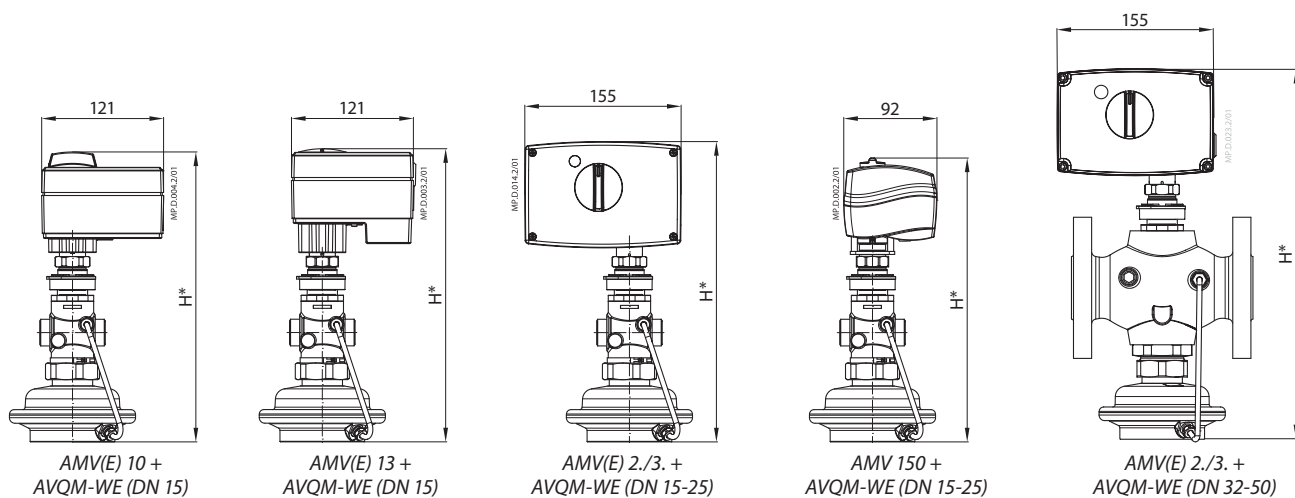
AVT Thermostat ... 170 mm				
I	II	III	IIII	IIIII
-10	3	15	28	40 °C
20	33	45	58	70
40	53	65	78	90
60	73	85	98	110

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

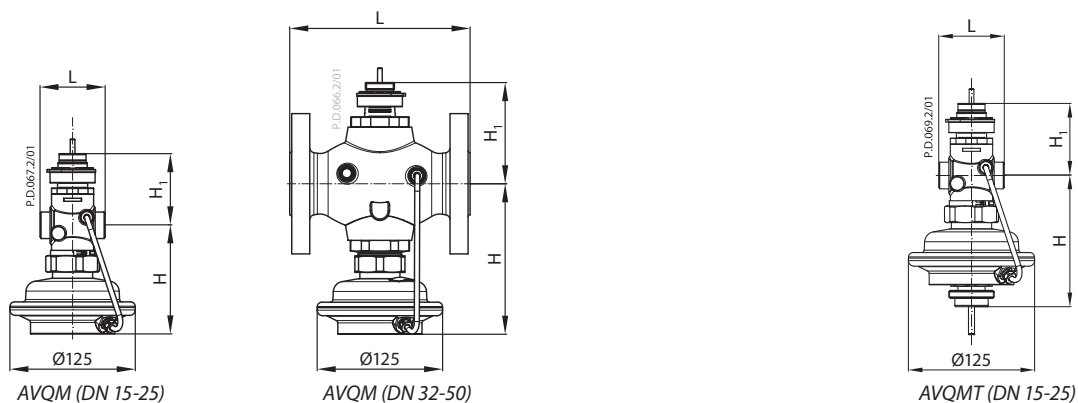
Note:

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

Dimensions

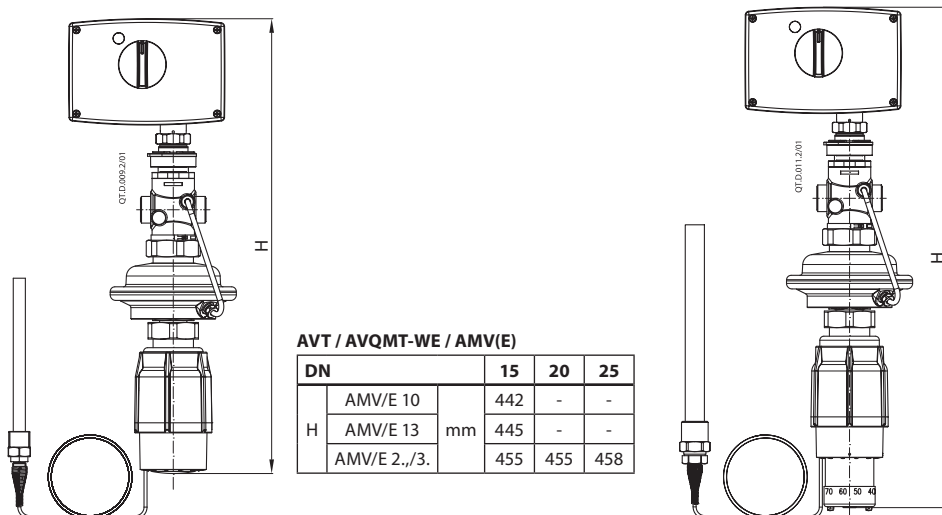


Type	DN			15	20	25	32	40	50
AVQM-WE	H*	AMV(E) 10	mm	292	-	-	-	-	-
		AMV(E) 13		295	-	-	-	-	-
		AMV(E) 2./3.		305	305	308	386	386	386
		AMV 150		293	-	-	-	-	-



Type	DN	15	20	25	32	40	50
AVQM-WE	L	65	70	75	180	200	230
	H	109	109	109	150	150	150
	H ₁	76	76	79	101	101	101
	Valve weight	3.0	3.0	3.2	10.3	11.8	13.9

Type	DN	15	20	25
AVQMT-WE	L	65	70	75
	H	131	131	131
	H ₁	76	76	79



AVT / AVQMT-WE / AMV(E)					
DN			15	20	25
H	AMV/E 10	mm	442	-	-
	AMV/E 13		445	-	-
	AMV/E 2../3.		455	455	458

STM / AVQMT-WE / AMV(E)				15	20	25
DN						
H	AMV/E 10	mm	486	-	-	
	AMV/E 13		489	-	-	
	AMV/E 2./3.		499	499	502	

Adjustment diagram

Temperature setting

Relation between scale numbers 1-5 and closing temperature.

Note: The values given are approximate

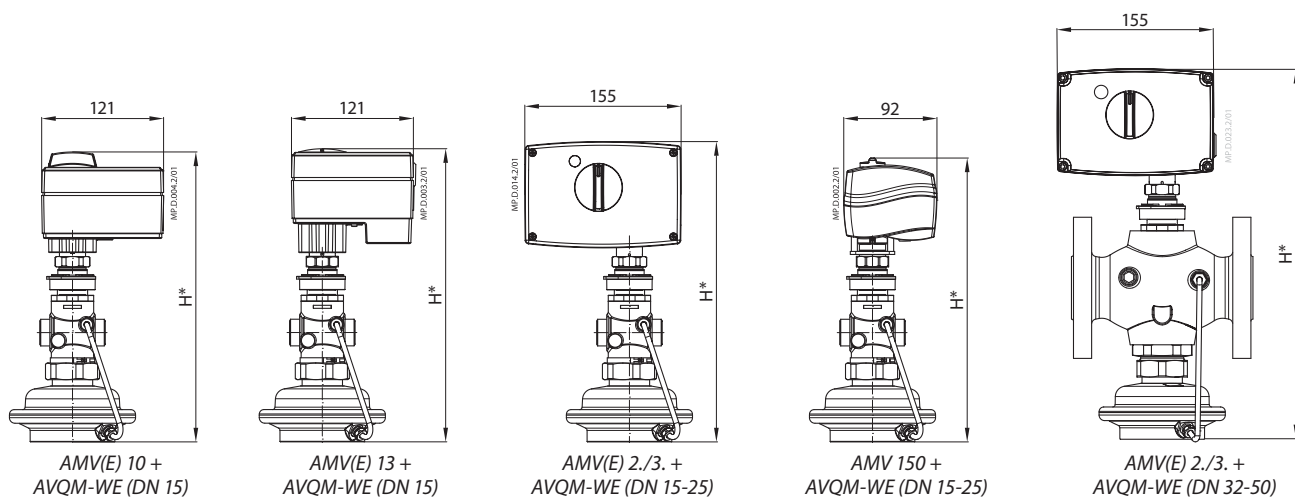
AVT Thermostat ... 170 mm				
I	II	III	IIII	IIIII
-10	3	15	28	40 °C
20	33	45	58	70
40	53	65	78	90
60	73	85	98	110

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

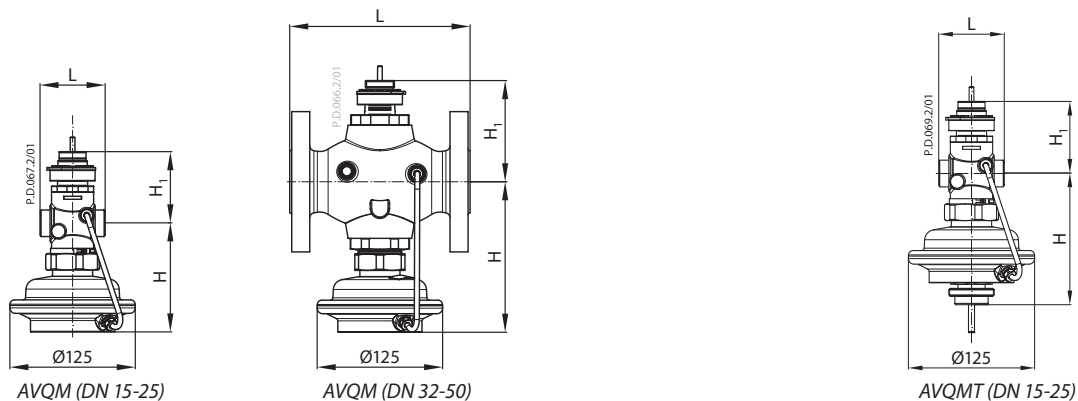
Note:

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

Dimensions

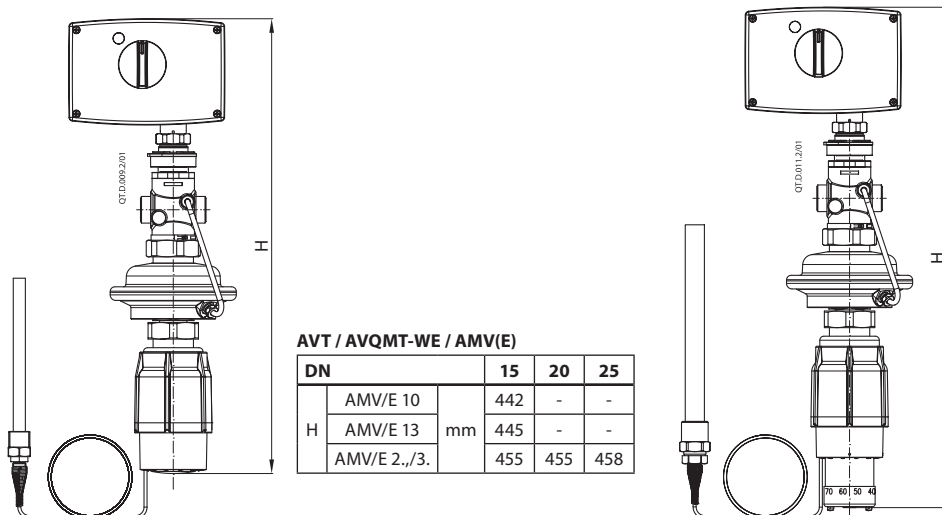


Type	DN			15	20	25	32	40	50
AVQM-WE	H*	AMV(E) 10	mm	292	-	-	-	-	-
		AMV(E) 13		295	-	-	-	-	-
		AMV(E) 2./3.		305	305	308	386	386	386
		AMV 150		293	-	-	-	-	-



Type	DN	15	20	25	32	40	50
AVQM-WE	L	65	70	75	180	200	230
	H	109	109	109	150	150	150
	H ₁	76	76	79	101	101	101
	Valve weight	3.0	3.0	3.2	10.3	11.8	13.9

Type	DN	15	20	25
AVQMT-WE	L	65	70	75
	H	131	131	131
	H ₁	76	76	79



DN	15	20	25
AMV(E) 10	442	-	-
AMV(E) 13	445	-	-
AMV(E) 2./3.	455	455	458

DN	15	20	25
AMV(E) 10	486	-	-
AMV(E) 13	489	-	-
AMV(E) 2./3.	499	499	502



Danfoss A/S

Climate Solutions • climatesolutions.danfoss.com • +45 7488 2222 • E-Mail: climatesolutions@danfoss.com

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