

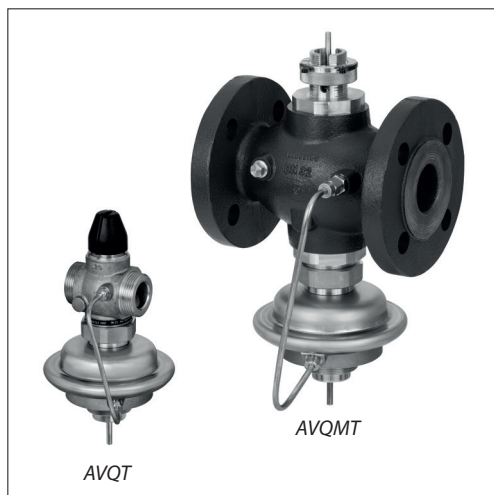
Data sheet

Flow and temperature controller with / without integrated control valve (PN 25)

AVQT - flow and temperature controller

AVQMT - flow and temperature controller with integrated pressure independent control valve

Description



AVQT is a self-acting flow and temperature controller primarily for use in district heating systems. The controller closes on rising temperature or when set max. flow is reached.

AVQMT 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 reached.

AVQT controller can be combined with AVT or STM thermostatic actuators.

AVQMT 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 AVQT and AVQMT have a control valve with adjustable flow restrictor, connection neck for thermostat, connection neck for electrical actuator (AVQMT only), and a pressure actuator with one control diaphragm.

AVQMT is 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.

AVQMT controllers combined with AMV(E) 13, AMV(E) 23(SL) or AMV(E) 33 electrical actuators are type-tested acc. to EN 14597.

AVQT and AVQMT controllers combined with AVT or STM thermostatic actuators are type-tested acc. to EN 14597.

Controllers combined with STM thermostatic actuators 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 EN 14597

Main data:

- DN 15-50
- k_{vs} 0.4-25 m³/h
- Flow range: 0.03-15 m³/h
- PN 25
- Setting ranges:
 - 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
 - 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

- **AVT (or STM) / AVQT** controller:
Flow and temperature controller,
DN 15; k_{vs} 1.6; PN 25; setting
range 40 ... 90 °C; flow restrictor
 Δp 0.2 bar; T_{max} 150 °C; ext. thread

- 1x AVQT DN 15 controller
Code No: **003H6759**
- 1x AVT thermostatic actuator,
40 ... 90 °C
Code No: **065-0598**

Option:

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

The controller AVQT will be delivered completely assembled, inclusive impulse tube between valve and actuator. Thermostatic actuator AVT will be delivered separately.
In case of safety temp. monitoring STM should be ordered instead of AVT.

Example 2

- **AVT (or STM) / AVQMT** controller:
Flow and temperature controller with integrated control valve;
DN 15; k_{vs} 1.6; PN 25; setting
range 40 ... 90 °C; flow restrictor
 Δp 0.2 bar; T_{max} 150 °C; ext. thread

- 1x AVQMT DN 15 controller
Code No: **003H6772**
- 1x AVT thermostatic actuator,
40 ... 90 °C
Code No: **065-0598**

Option:

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

The controller AVQMT 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

AVQT Controller

Picture	DN (mm)	k_{vs} (m ³ /h)	Connection		Code No.
	15	1.6	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	003H6759
		2.5			003H6760
		4.0			003H6761
		6.3		G 1 A	003H6762
	20	8.0		G 1 ¼ A	003H6763
	32	12.5	Flanges PN 25, acc. to EN 1092-2		003H6767
	40	20			003H6768
	50	25			003H6769

Note: Other controllers available on special request.

AVQMT Controller

Picture	DN (mm)	k_{vs} (m ³ /h)	Connection		Code No.
	15	0.4	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	003H6770
		1.0			003H6771
		1.6			003H6772
		2.5			003H6773
		4.0			003H6774
	20	6.3		G 1 A	003H6775
	25	8.0		G 1 ¼ A	003H6776
	32	12.5		G 1 ¾ A	003H6777
	40	16		G 2 A	003H6778
	50	20		G 2 ½ A	003H6779
	32	12.5	Flanges PN 25, acc. to EN 1092-2		003H6780
	40	20			003H6781
	50	25			003H6782

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

STM Safety temperature monitor (actuator)

Picture	For valves	Setting 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

Ordering (continuous)

Example 3

- **STM / AVT / AVQT** controller:
Flow and temperature controller
with safety temperature monitor,
DN 15; k_{vs} 1.6; PN 25; setting range
40 ... 90 °C; limit range 30 ... 110 °C;
flow restrictor Δp 0.2 bar;
 T_{max} 150 °C; ext. thread

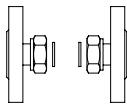
- 1× AVQT DN 15 controller
Code No: **003H6759**
- 1× AVT thermostatic actuator,
40 ... 90 °C
Code No: **065-0598**
- 1× STM monitor, 30 ... 110 °C
Code No: **065-0608**
- 1× K2 Combination piece
Code No: **003H6855**

Option:

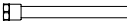
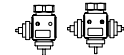
- 1× Weld-on tailpieces
Code No: **003H6908**

The controller AVQT will be
delivered completely assembled,
inclusive impulse tube between
valve and actuator. Combination
piece K2, thermostatic actuators
AVT and STM will be delivered

Accessories for valves

Picture	Type designation	DN	Connection	Code No.
	Weld-on tailpieces	15	-	003H6908
		20		003H6909
		25		003H6910
		32		003H6911
		40		003H6912
		50		003H6913
	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
		32		R 1 1/4 003H6905
		40		R 1 1/2 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	For controllers	Material	Code No.
	Immersion pocket PN 25	AVT / AVQ(M)T DN 15 - 25	Brass	065-4414 ¹⁾
			Stainless steel, mat. No. 1.4571	065-4415 ¹⁾
		AVT / AVQ(M)T DN 32 - 50 STM / AVQ(M)T 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 actuators code numbers: **065-0604, 065-0605, 065-0606, 065-0607**

Service kits

Picture	Type designation	DN	k_{vs} (m³/h)	Code No.
	Valve insert ¹⁾	15	0.4	003H6861
			1.0	003H6862
			1.6	003H6863
			2.5	003H6864
			4.0	003H6865
		20	6.3	003H6996
		25	8.0	003H6867
		32 / 40 / 50	12.5 / 16 / 20	003H6868
	Control valve insert ²⁾	15	0.4	003H6886
			1.0	003H6887
			1.6	003H6888
			2.5	003H6889
			4.0	003H6890
		20	6.3	003H6891
		25	8.0	003H6892
				32 / 40 / 50
	Housing of sensor stuffing box	for sensors		
		AVT R ½"		065-4420
		AVT R ¾"		065-4421
	Type designation	Δp setting range (bar)		Code No.
	Actuator ¹⁾	0.2		003H6843
	Type designation			Code No.
	Locking ring (Rounding order value-5pc) ²⁾			003G6400

¹⁾ For AVQT and AVQMT controllers

²⁾ For AVQMT controllers

Technical data

Valve AVQT

Nominal diameter			DN	15			20	25	32	40	50
k _{VS} value of dp controller			m³/h	1.6	2.5	4.0	6.3	8.0	12.5	20	25
Range of max. flow setting	Δp _b ¹⁾ = 0.2 bar	Q _{min}		0.03	0.07	0.07	0.16	0.2	0.4	0.8	0.8
		Q _{max}		0.9	1.6	2.4	3.5	4.5	10	12	15
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							
Δp required for Q _{max} ²⁾			bar	0.5	0.6	0.6	0.5	0.5	0.8	0.6	0.6
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	thread	Red bronze CuSn5ZnPb (Rg5)						Ductile iron EN-GJS-400-18-LT (GGG 40.3)			
	flange	-									
Valve seat			Stainless steel, mat. No. 1.4571								
Valve cone			Dezincing free brass CuZn36Pb2As								
Sealing			EPDM								
Pressure relieve system			Piston								

¹⁾ Δp_b - differential pressure over flow restrictor

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

Valve AVQMT

Nominal diameter			DN	15					20	25	32	40	50
k _{VS} value of dp controller			m ³ /h	0.4	1.0	1.6	2.5	4.0	6.3	8.0	12.5	16/20 ¹⁾	20/25 ¹⁾
Range of flow setting	Δp _{MCV} = 0.2 bar	Q _{min}		0.015	0.02	0.03	0.07	0.07	0.16	0.2	0.4	0.8	0.8
		Q _{max}		0.18	0.4	0.9	1.6	2.4	3.5	4.5	10	10.5/12 ¹⁾	12/14 ¹⁾
Available Δp required for Q _{max} ²⁾			bar	0.4	0.4	0.5	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 ¹⁾										
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								Ext. thread and 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	-										
Valve seat			Stainless steel, mat. No. 1.4571										
Valve cone			Dezincing free brass CuZn36Pb2As										
Sealing DP			EPDM										
Sealing MCV			Metal								EPDM		
Pressure relieve system		Control valve insert	-								Piston		
		Valve insert	Piston										

Note:

DP - diff. pressure controller

MCV - control valve

¹⁾ Flanged version

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

Technical data (continuous)

Actuator

Type		AVQT, AVQMT
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 x 1 mm

AVT Thermostatic actuator

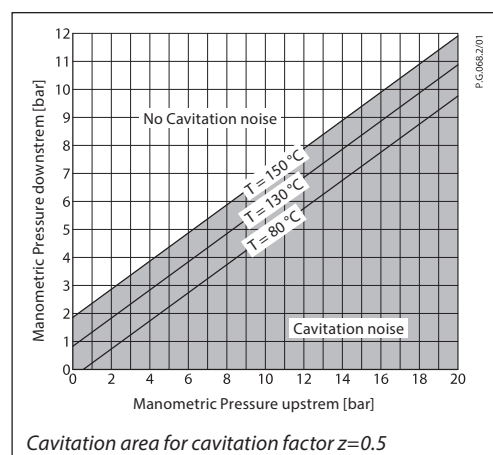
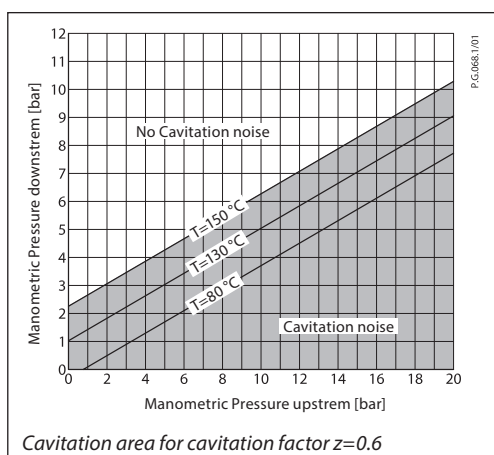
Setting range X _s	°C	−10 ... 40 / 20 ... 70 / 40 ... 90 / 60 ... 110 10 ... 45 / 35 ... 70 / 60 ... 100 / 85 ... 125
Time constant T acc. to EN 14597	s	max. 50 (170 mm, 210 mm), max. 30 (255 mm)
Gain K _s	mm/°K	0.2 (170 mm); 0.3 (210 mm); 0.7 (255 mm)
Max. adm. temperature at sensor		50 °C above maximum setpoint
Max. amb. temperature at thermostat	°C	0 ... 70
Nominal pressure sensor	PN	25
Nominal pressure immersion pocket		
Capillary tube length		5 m (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

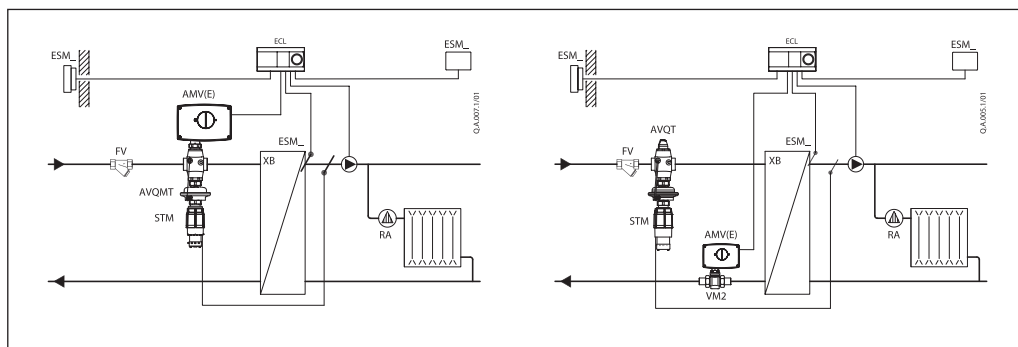
STM Safety temperature monitor (actuator)

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

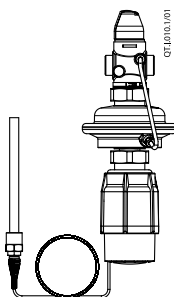
Technical data (continuous)



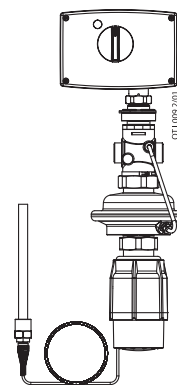
Application principles



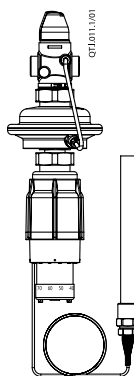
Combinations



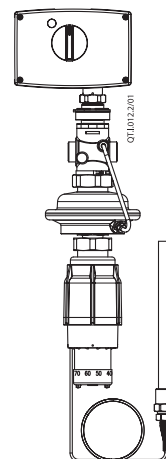
AVT / AVQT
- Flow and temperature controller



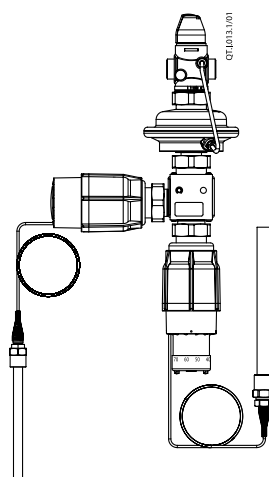
AVT / AVQMT / AMV(E)
- Flow and temperature controller with electrical actuator



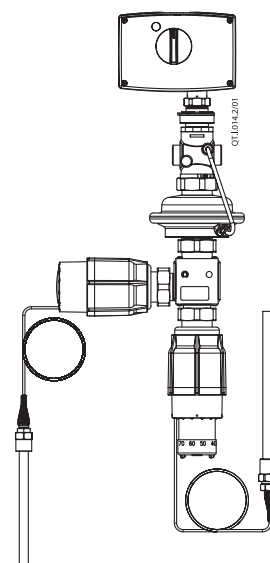
STM / AVQT
- Flow controller with safety temperature monitor



STM / AVQMT / AMV(E)
- Flow controller with safety temperature monitor and electrical actuator



STM / AVT / AVQT
- Flow and temperature controller with safety temperature monitor



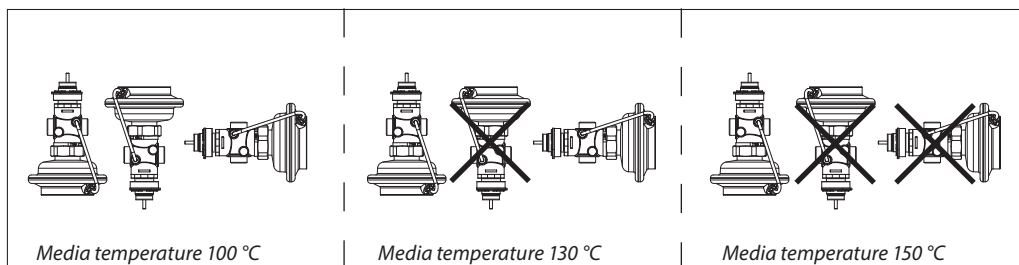
STM / AVT / AVQMT / AMV(E)
- Flow and temperature controller with safety temperature monitor and electrical actuator

Installation positions

Flow and temperature controller with / without 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!

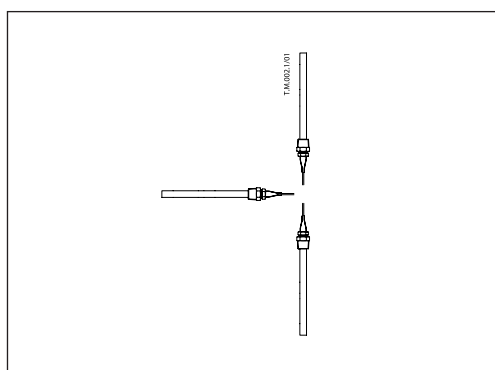
Installation positions for electrical actuators AMV(E) have to be observed as well. Please see relevant Data sheet.

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.

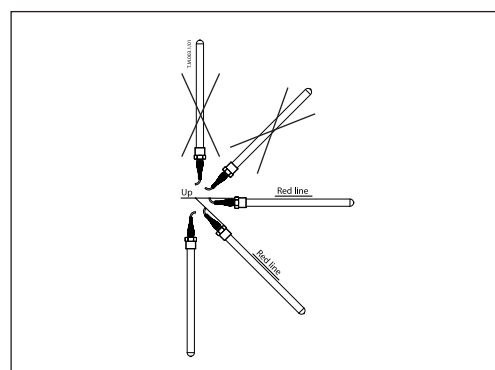
Temperature sensors 170 mm R $\frac{1}{2}$ and 210 mm R $\frac{3}{4}$

- The temperature sensor may be installed in any position.

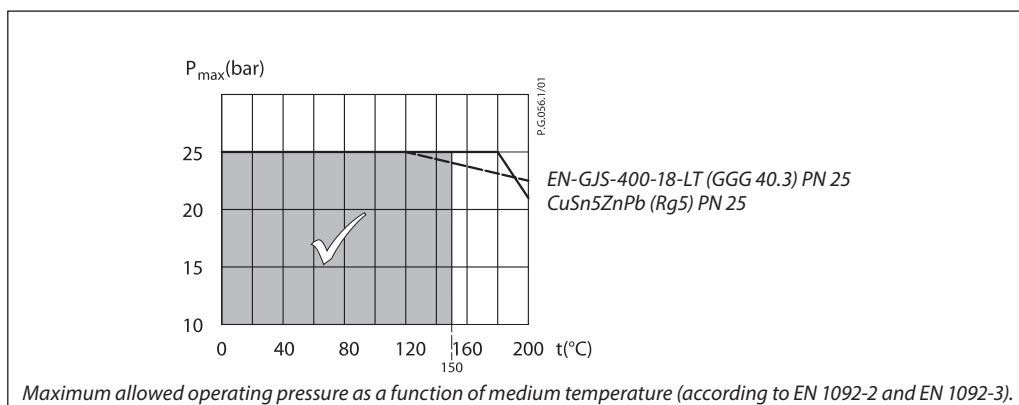


Temperature sensor 255 mm R $\frac{3}{4}$

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

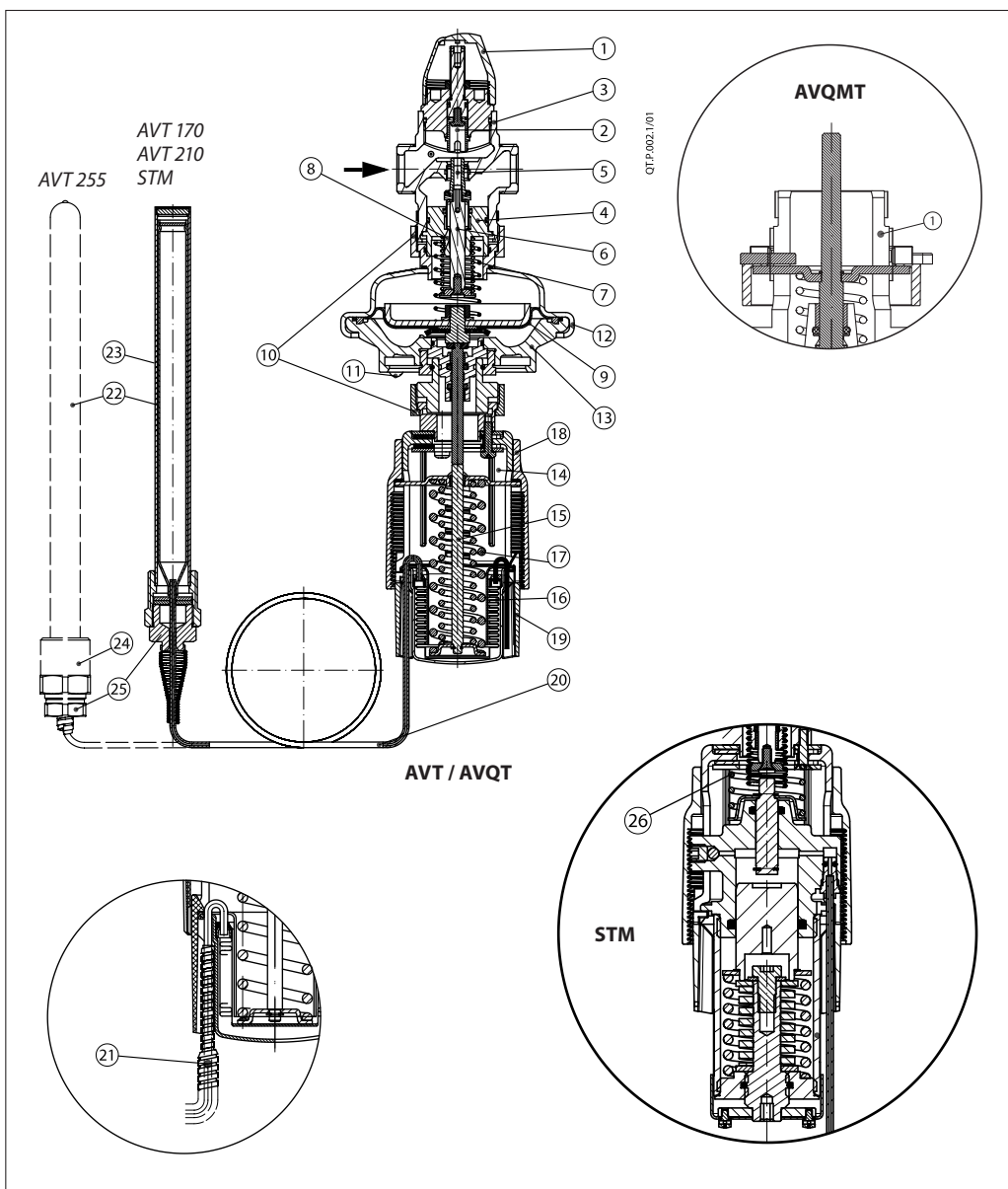


Pressure temperature diagram



Design

1. Cover (AVQT)
Control valve insert (AVQMT)
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 / without integrated control valve (AVQT, AVQMT)

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 for AVQMT:

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 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 valve cone moves towards the seat (valve closes), by decreasing of medium temperature control valve 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

Max flow limiting

Max flow limiting 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)

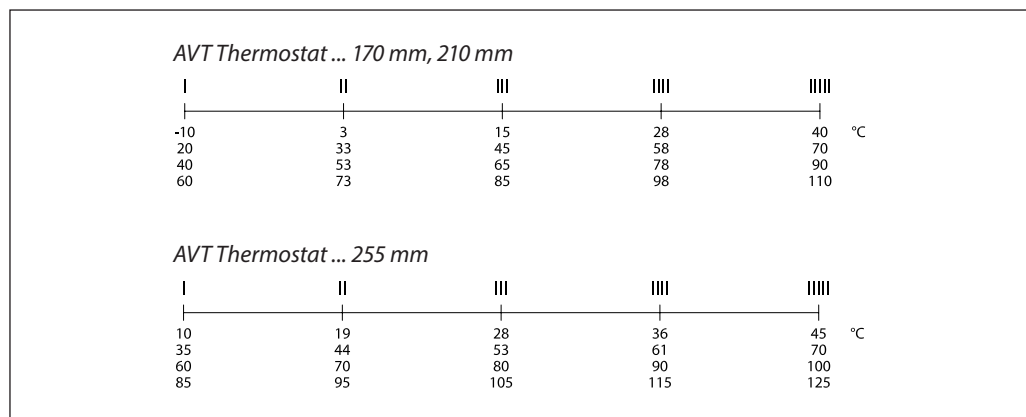
Limit setting is being done by the adjustment of the setting spring for temperature control. The adjustment can be done by means of handle for limit setting and/or temperature indicators.

Adjustment diagram

Temperature setting

Relation between scale numbers 1-5 and closing temperature.

Note: The values given are approximate

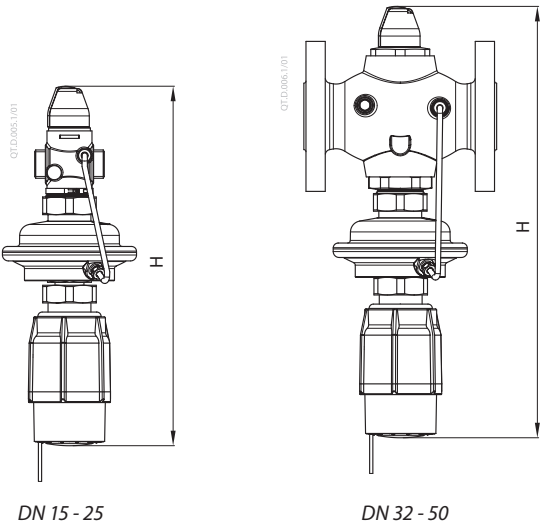


Note:

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

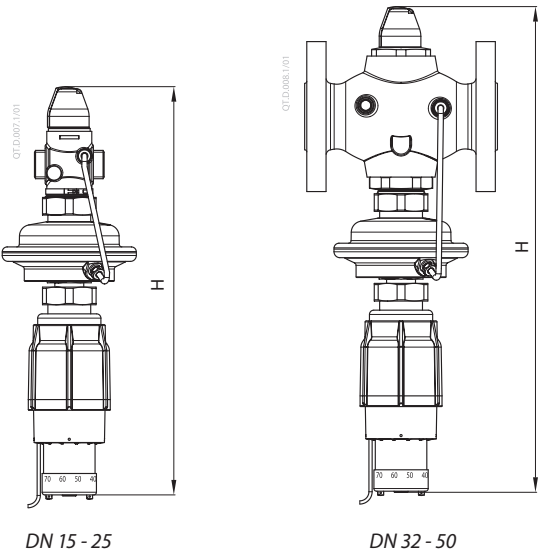
Dimensions

AVT / AVQT



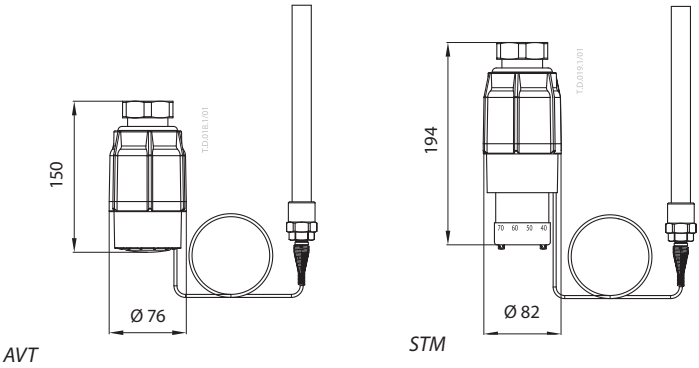
DN		15	20	25	32	40	50
H	mm	325	325	328	383	383	383
Weight (AVT)	kg	1.3 (sensor 170 mm), 1.5 (210 mm), 1.6 (255 mm)					

STM / AVQT



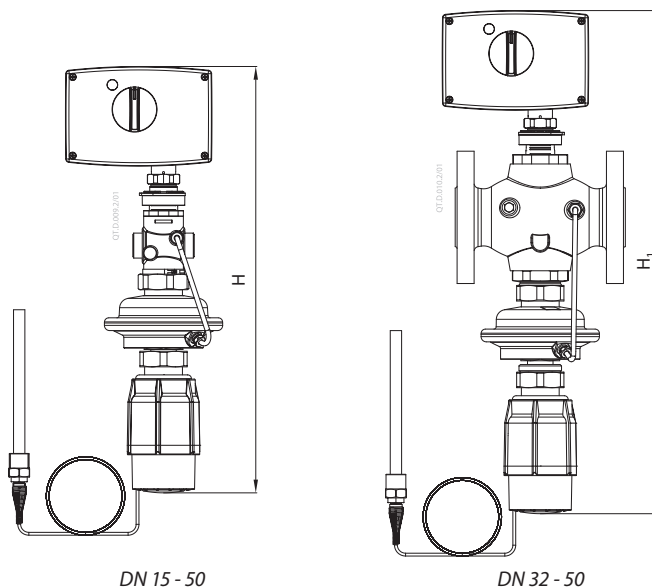
DN		15	20	25	32	40	50
H	mm	369	369	372	427	427	427
Weight (STM)	kg	2.6 (sensor 210 mm)					

AVT, STM



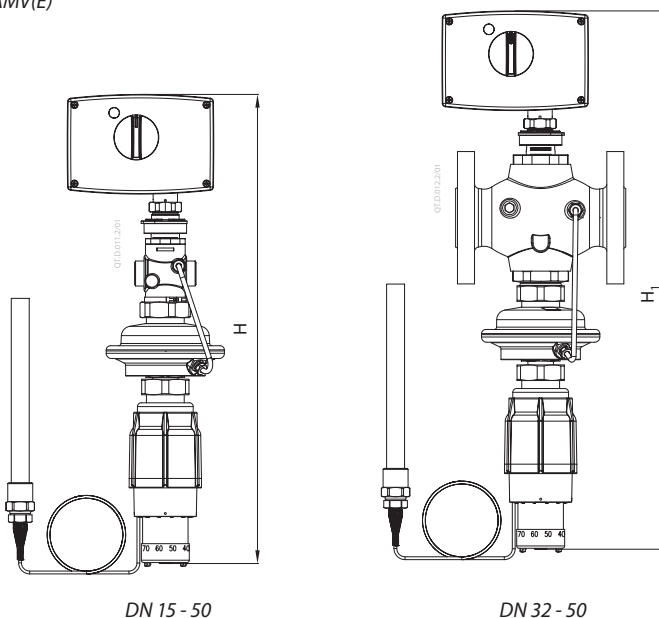
Dimensions (continuous)

AVT / AVQMT / AMV(E)



DN			15	20	25	32	40	50
H	AMV(E) 10	mm	341	-	-	-	-	-
	AMV(E) 13		338	-	-	-	-	-
	AMV(E) 2./3.		451	451	454	521	521	521
	AMV 150		339	-	-	-	-	-
H ₁	AMV(E) 2./3.		-	-	-	521	521	521

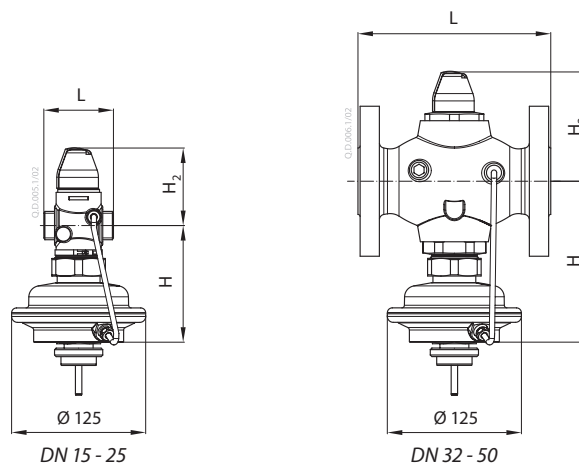
STM / AVQMT / AMV(E)



DN			15	20	25	32	40	50
H	AMV(E) 10	mm	485	-	-	-	-	-
	AMV(E) 13		482	-	-	-	-	-
	AMV(E) 2./3.		495	495	498	565	565	565
	AMV 150		483	-	-	-	-	-
H ₁	AMV(E) 2./3.		-	-	-	565	565	565

Dimensions (continuous)

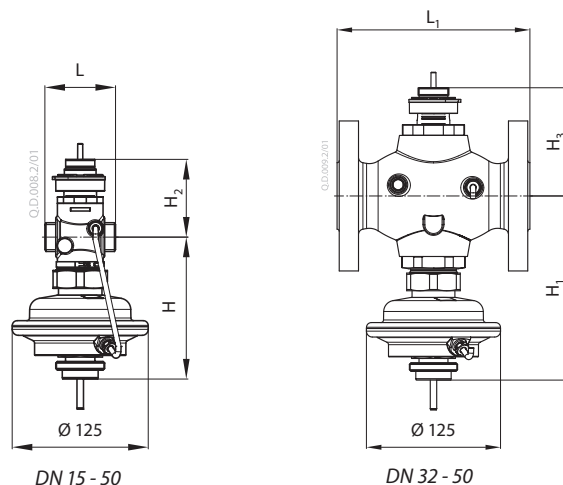
AVQT



DN		15	20	25	32	40	50
L	mm	65	70	75	180	200	230
H		109	109	109	150	150	150
H ₂		88	88	91	150	150	150
Weight (thread)	kg	2.8	2.8	3.0	-	-	-
Weight (flange)		-	-	-	10.0	11.5	13.6

Note: other flange dimensions - see table for tailpieces

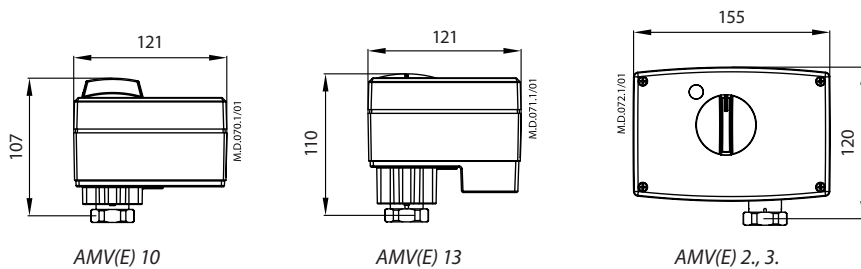
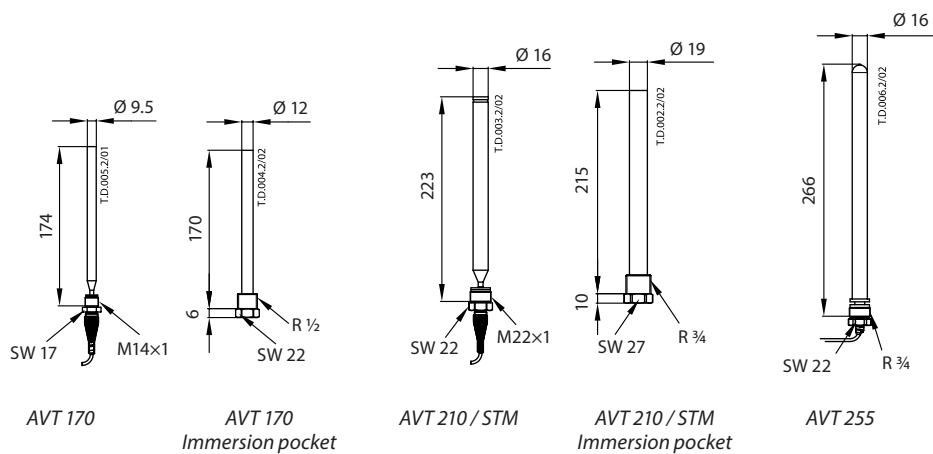
AVQMT



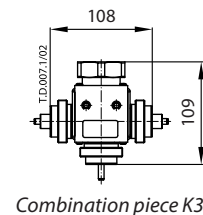
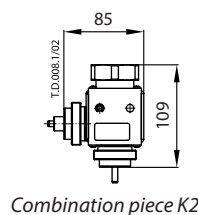
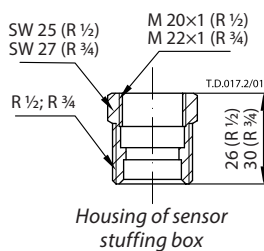
DN		15	20	25	32	40	50
L	mm	65	70	75	100	110	130
L ₁		-	-	-	180	200	230
H		131	131	131	172	172	172
H ₁	mm	-	-	-	172	172	172
H ₂		72	72	75	101	101	101
H ₃		-	-	-	101	101	101
Weight (thread)	kg	3.1	3.2	3.3	5.9	6.1	6.7
Weight (flange)		-	-	-	10.4	11.9	14.0

Note: other flange dimensions - see table for tailpieces

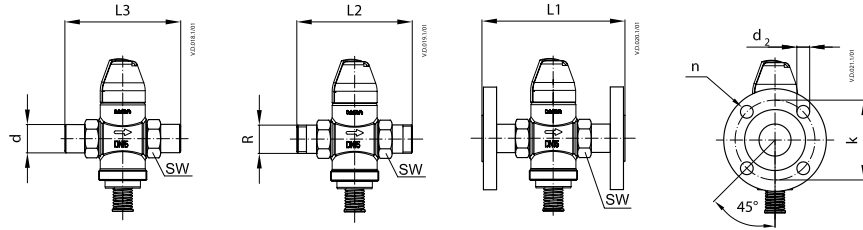
Dimensions (continuous)



Type		AMV(E) 10	AMV(E) 13	AMV(E) 20	AMV(E) 23	AMV(E) 30	AMV(E) 33
Weight	kg	0.6	0.8	1.4	1.9	1.4	1.9



Dimensions (continuous)



DN	R ¹⁾	SW	d	L ₁ ²⁾	L ₂	L ₃	k	d ₂	n
mm									
15	½	32 (G ¾A)	21	130	120	139	65	14	4
20	¾	41 (G 1A)	26	150	131	154	75	14	4
25	1	50 (G 1¼A)	33	160	145	159	85	14	4
32	1¼	63 (G 1¾A)	42	-	177	184	100	18	4
40	1 ½	70 (G 2A)	47	-	200	204	110	18	4
50	2	82 (G 2½A)	60	-	244	234	125	18	4

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

²⁾ Flanges PN 25, acc. to EN 1092-2

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