

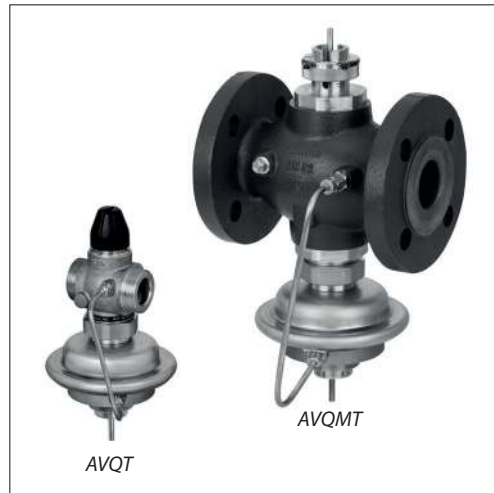
## Data sheet

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

<sup>1)</sup> 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 4753

### Main data:

- DN 15-50
- $k_{vs}$  0.4-25 m<sup>3</sup>/h
- Flow range: 0.03-15 m<sup>3</sup>/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  $\Delta p$ : 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  
 $\Delta p$  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  
 $\Delta p$  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 of AVT.

**AVQT Controller**

Picture	DN (mm)	$k_{vs}$ (m <sup>3</sup> /h)	Connection	Code No.	
	15	1.6	Cylindr. ext. thread acc. to ISO 228/1	G 3/4 A	
		2.5			
		4.0			
		20		6.3	G 1 A
		25		8.0	G 1 1/4 A
	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 <sup>3</sup> /h)	Connection	Code No.	
	15	0.4	Cylindr. ext. thread acc. to ISO 228/1	G 3/4 A	
		1.0			
		1.6			
		2.5			
		4.0			
		20		6.3	G 1 A
		25		8.0	G 1 1/4 A
		32		12.5	G 1 3/4 A
		40		16	G 2 A
		50		20	G 2 1/2 A
	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 1/2 <sup>1)</sup>	065-0596
		20 ... 70		065-0597
		40 ... 90		065-0598
		60 ... 110		065-0599
	DN 32 - 50	-10 ... +40	210 mm, R 3/4 <sup>1)</sup>	065-0600
		20 ... 70		065-0601
		40 ... 90		065-0602
		60 ... 110		065-0603
	DN 15 - 50	10 ... 45	255 mm, R 3/4 <sup>1) 2)</sup>	065-0604
		35 ... 70		065-0605
		60 ... 100		065-0606
		85 ... 125		065-0607

<sup>1)</sup> conic male thread EN 10226-1

<sup>2)</sup> 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 3/4 <sup>1)</sup>	065-0608
		20 ... 75		065-0609
		40 ... 95		065-0610

<sup>1)</sup> 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  $\Delta p$  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**
- 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 AVQT will be  
delivered completely assembled,  
inclusive impulse tube between  
valve and actuator. Combination  
piece K2, thermostatic actuators  
AVT and STM will be delivered  
separately.

**Accessories for valves**

Picture	Type designation	DN	Connection	Code No.
	Weld-on tailpieces	15	-	<b>003H6908</b>
		20		<b>003H6909</b>
		25		<b>003H6910</b>
		32		<b>003H6911</b>
		40		<b>003H6912</b>
		50		<b>003H6913</b>
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R 1/2 <b>003H6902</b>
		20		R 3/4 <b>003H6903</b>
		25		R 1 <b>003H6904</b>
		32		R 1 1/4 <b>003H6905</b>
		40		R 1 1/2 <b>065B2004</b>
		50		R 2 <b>065B2005</b>
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2	<b>003H6915</b>
		20		<b>003H6916</b>
		25		<b>003H6917</b>

**Accessories for thermostats**

Picture	Type designation	For controllers	Material	Code No.
	Immersion pocket PN 25	AVT / AVQ(M)T DN 15 - 25	Brass	<b>065-4414</b> <sup>1)</sup>
			Stainless steel, mat. No. 1.4571	<b>065-4415</b> <sup>1)</sup>
		AVT / AVQ(M)T DN 32 - 50 STM / AVQ(M)T DN 15 - 50	Brass	<b>065-4416</b> <sup>1)</sup>
			Stainless steel, mat. No. 1.4435	<b>065-4417</b> <sup>1)</sup>
	Combination piece K2			<b>003H6855</b>
	Combination piece K3			<b>003H6856</b>

<sup>1)</sup> Not for AVT thermostatic actuators code numbers: **065-0604, 065-0605, 065-0606, 065-0607**

**Service kits**

Picture	Type designation	DN	$k_{vs}$ (m <sup>3</sup> /h)	Code No.		
	Valve insert <sup>1)</sup>	15	0.4	<b>003H6861</b>		
			1.0	<b>003H6862</b>		
			1.6	<b>003H6863</b>		
			2.5	<b>003H6864</b>		
			4.0	<b>003H6865</b>		
		20	6.3	<b>003H6996</b>		
		25	8.0	<b>003H6867</b>		
	Control valve insert <sup>2)</sup>	15	0.4	<b>003H6886</b>		
			1.0	<b>003H6887</b>		
			1.6	<b>003H6888</b>		
			2.5	<b>003H6889</b>		
			4.0	<b>003H6890</b>		
		20	6.3	<b>003H6891</b>		
		25	8.0	<b>003H6892</b>		
		32 / 40 / 50	12.5 / 16 / 20	<b>003H6885</b>		
			Housing of sensor stuffing box	<b>for sensors</b>		
				AVT R 1/2"		<b>065-4420</b>
				AVT R 3/4"		<b>065-4421</b>
	Type designation	<b><math>\Delta p</math> setting range (bar)</b>		<b>Code No.</b>		
		Actuator <sup>1)</sup>	0.2		<b>003H6843</b>	

<sup>1)</sup> For AVQT and AVQMT controllers

<sup>2)</sup> For AVQMT controllers

Technical data

Valve AVQT

Nominal diameter		DN	15			20	25	32	40	50	
k <sub>VS</sub> value of dp controller		m <sup>3</sup> /h	1.6	2.5	4.0	6.3	8.0	12.5	20	25	
Range of max. flow setting	Δp <sub>b</sub> <sup>1)</sup> = 0.2 bar		Q <sub>min</sub>	0.03	0.07	0.07	0.16	0.2	0.4	0.8	0.8
			Q <sub>max</sub>	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 <sub>VS</sub>	≤ 0.02					≤ 0.05			
Nominal pressure		PN	25								
Δp required for Q <sub>max</sub> <sup>2)</sup>		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					-			
<b>Materials</b>											
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								

<sup>1)</sup> Δp<sub>b</sub> - differential pressure over flow restrictor

<sup>2)</sup> For flows smaller than Q<sub>max</sub> > Δp<sub>min</sub> =  $\left(\frac{Q}{k_{VS}}\right)^2 + \Delta p_b$

Valve AVQMT

Nominal diameter		DN	15			20	25	32	40	50			
k <sub>VS</sub> value of dp controller		m <sup>3</sup> /h	0.4	1.0	1.6	2.5	4.0	6.3	8.0	12.5	16/20 <sup>1)</sup>	20/25 <sup>1)</sup>	
Range of flow setting	Δp <sub>MCV</sub> = 0.2 bar		Q <sub>min</sub>	0.015	0.02	0.03	0.07	0.07	0.16	0.2	0.4	0.8	0.8
			Q <sub>max</sub>	0.18	0.4	0.9	1.6	2.4	3.5	4.5	10	10.5/12 <sup>1)</sup>	12/14 <sup>1)</sup>
Available Δp required for Q <sub>max</sub> <sup>2)</sup>		bar	0.4	0.4	0.5	0.6	0.6	0.5	0.5	0.8	0.8	0.8/0.6 <sup>1)</sup>	
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 <sub>VS</sub>	≤ 0.02					≤ 0.05					
Nominal pressure		PN	25										
Min. differential pressure		bar	see remark <sup>1)</sup>										
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					-					
<b>Materials</b>													
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

<sup>1)</sup> Flanged version

<sup>2)</sup> For flows smaller than Q<sub>max</sub> > Δp<sub>min</sub> =  $\left(\frac{Q}{k_{VS}}\right)^2 + \Delta p_b$

**Technical data** (continuous)

**Actuator**

Type		AVQT, AVQMT
Actuator size	cm <sup>2</sup>	54
Nominal pressure	PN	25
Flow restrictor diff. pressure	bar	0.2
<b>Materials</b>		
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**

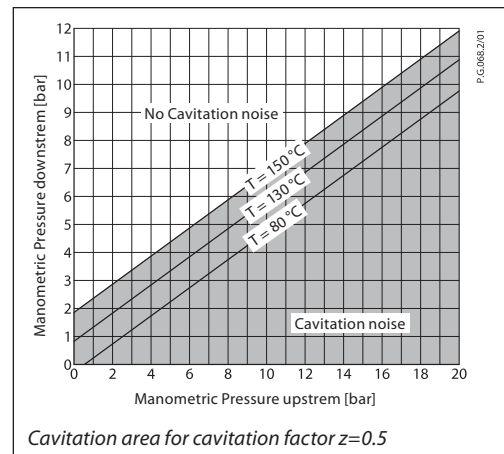
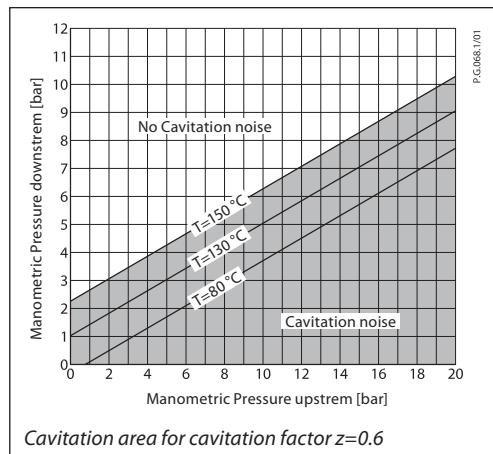
Setting range X <sub>s</sub>	°C	-10 ... 40 / 20 ... 70 / 40 ... 90 / 60 ... 110 10 ... 45 / 35 ... 70 / 60 ... 100 / 85 ... 125
Time constant T acc. to EN 14597	s	max. 50 (170 mm, 210 mm), max. 30 (255 mm)
Gain K <sub>s</sub>	mm/°K	0.2 (170 mm); 0.3 (210 mm); 0.7 (255 mm)
Max. adm. temperature at sensor		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)
<b>Materials</b>		
Temperature sensor		Cooper
Immersion pocket <sup>1)</sup>	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

<sup>1)</sup> for sensor 170 and 210 mm

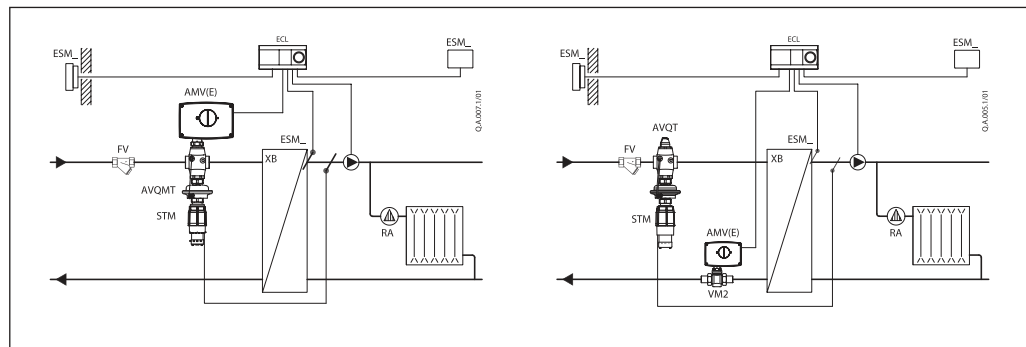
**STM Safety temperature monitor (actuator)**

Limit range X <sub>s</sub>	°C	20 ... 75 / 40 ... 95 / 30 ... 110
Time constant T acc. to EN 14597	s	max. 100
Gain K <sub>s</sub>	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
<b>Materials</b>		
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

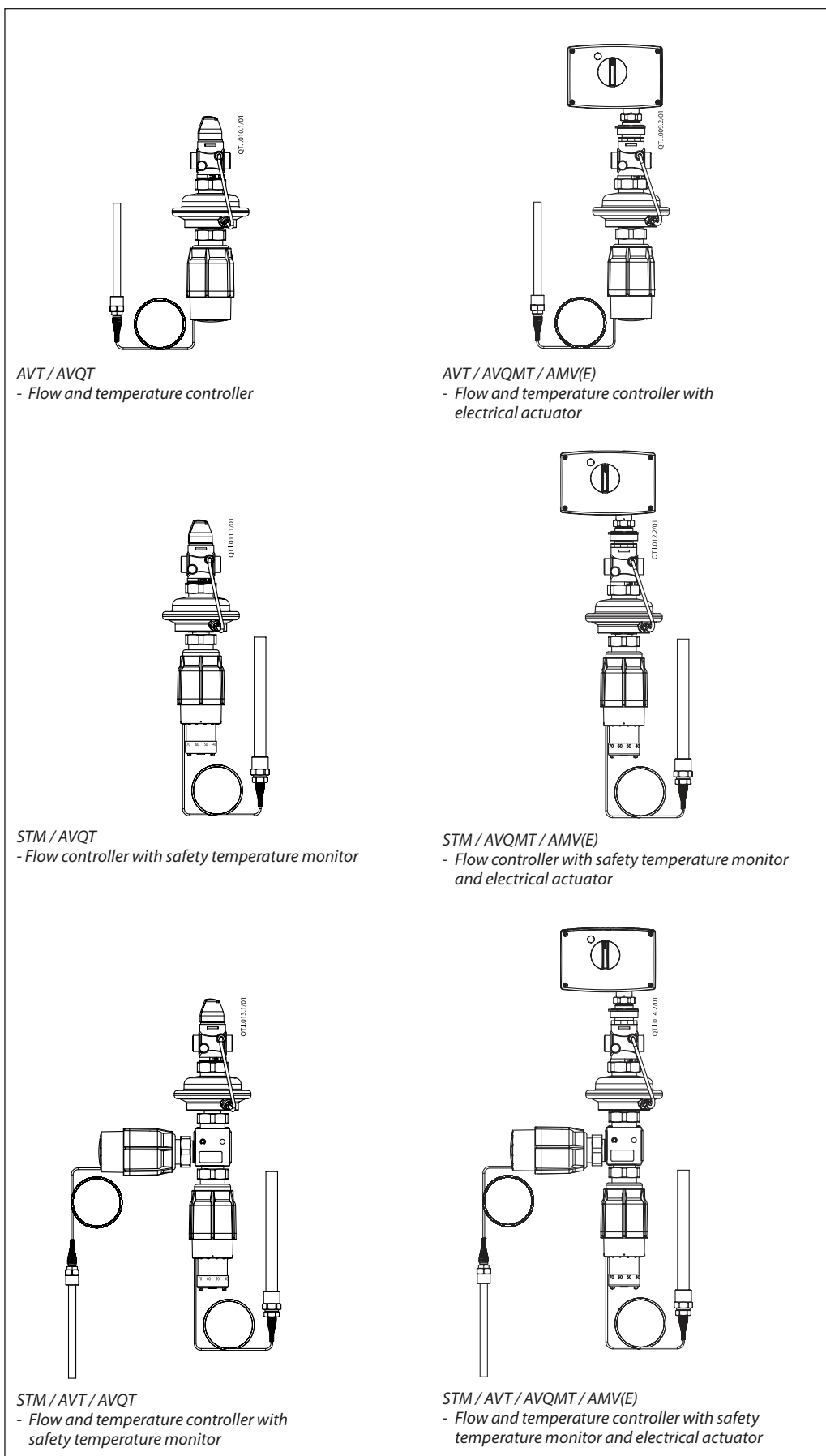
Technical data (continuous)



Application principles



Combinations

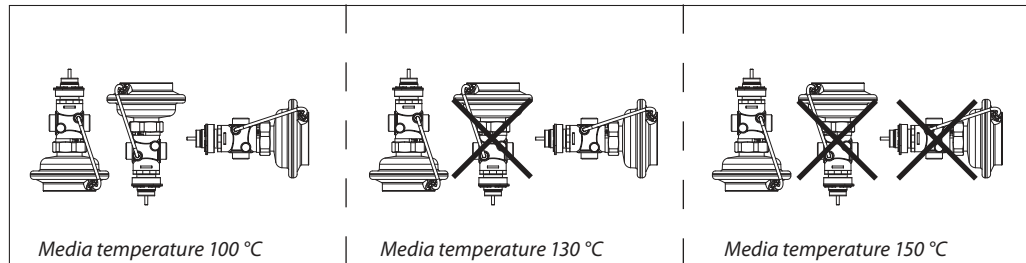


**Installation positions**

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!**

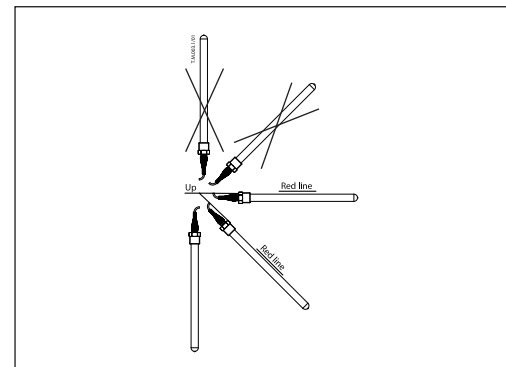
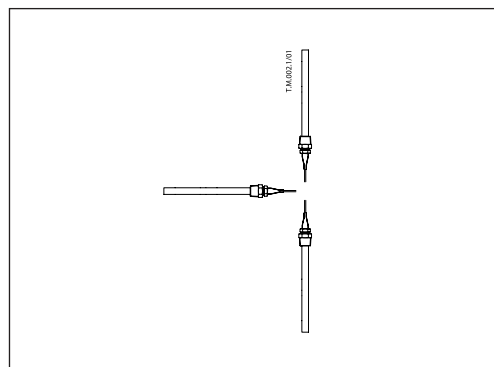
Installation positions for electrical actuators AMV(E) have to be observed as well. Please see relevant Data sheet.

**Temperature sensor**

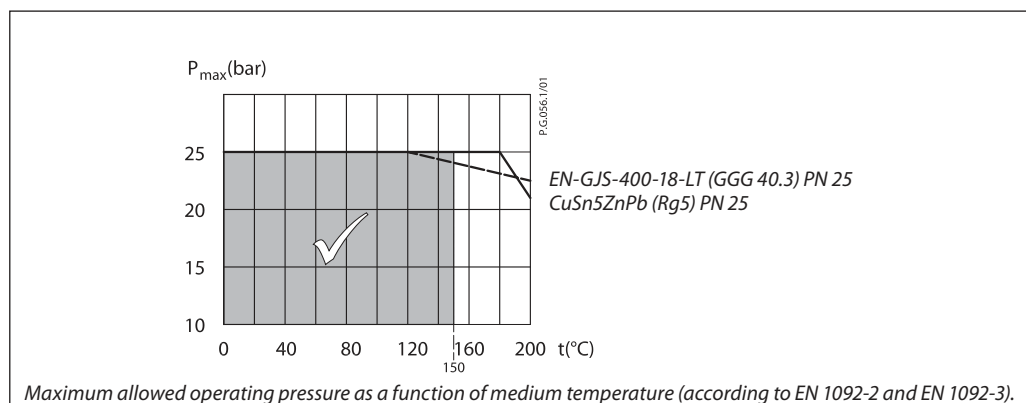
The place of installation must be chosen in a way that the temperature of the medium is directly taken without any delay. Avoid overheating of temperature sensor. The temperature sensor must be immersed into the medium in its full length.

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.



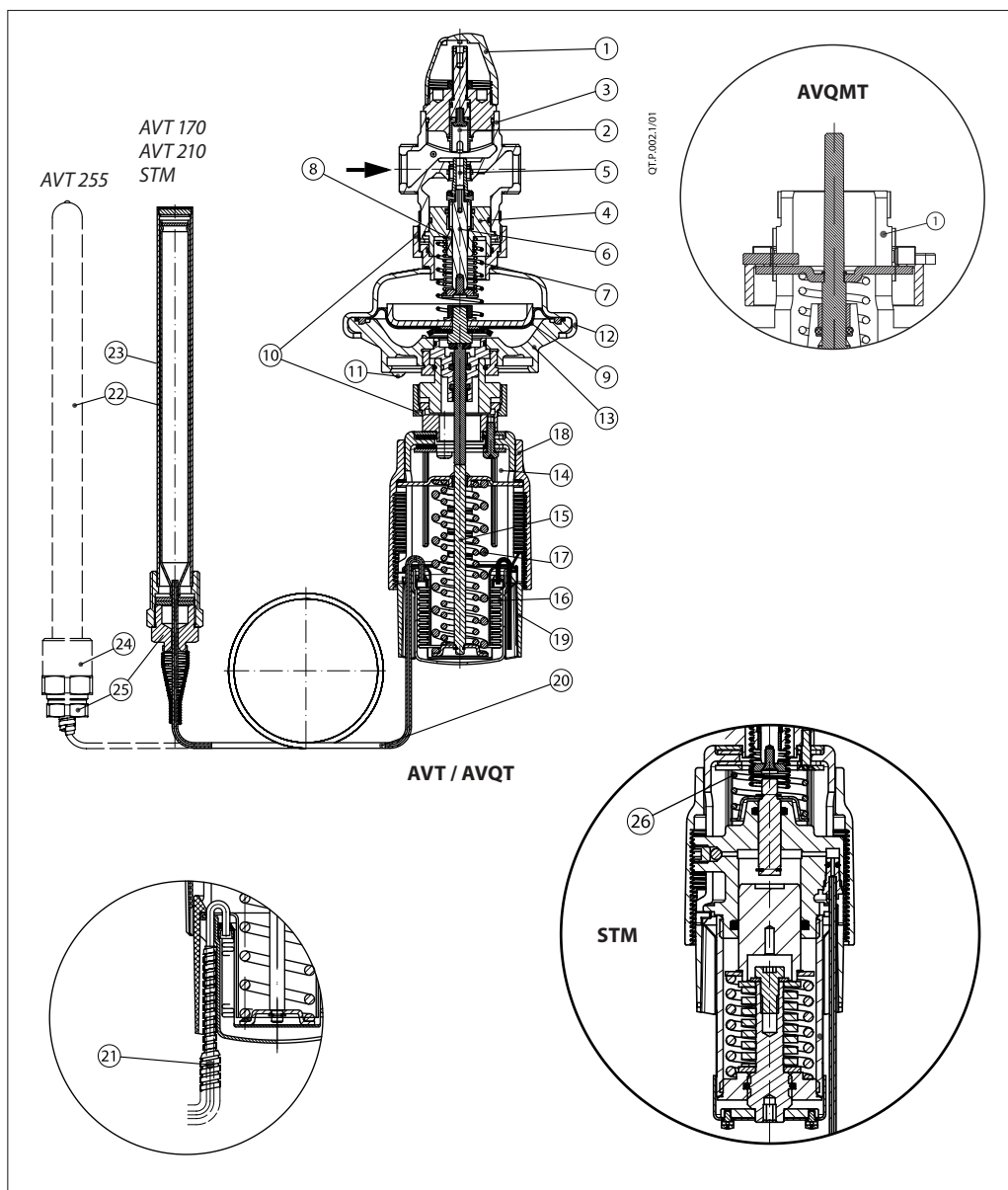
**Pressure temperature diagram**





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.

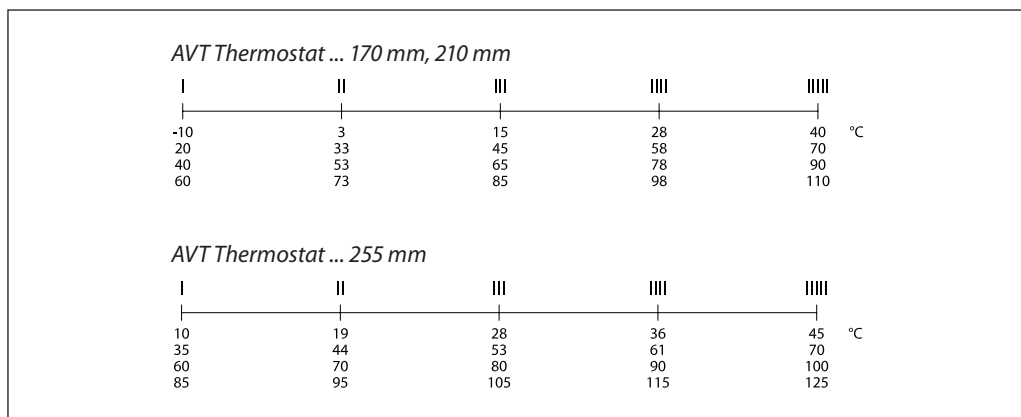
*Limit setting (STM)*

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.

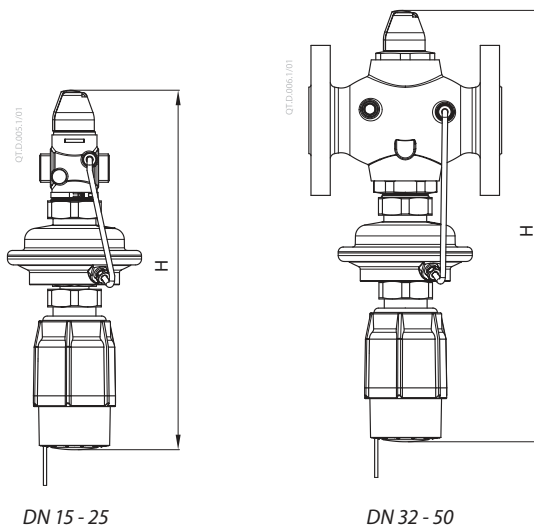
**Note:** *The values given are approximate*



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

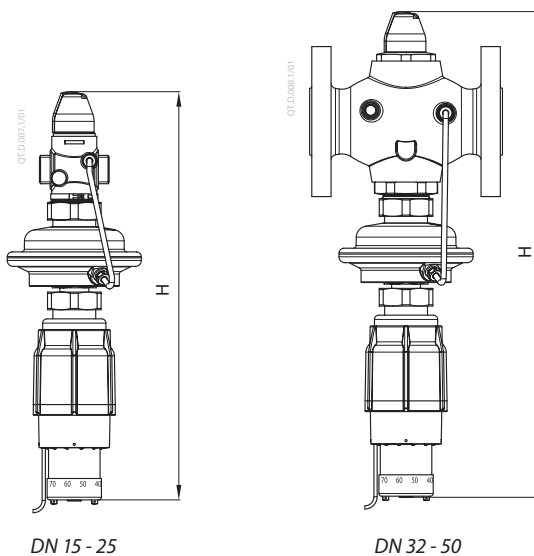
Dimensions

AVT / AVQT



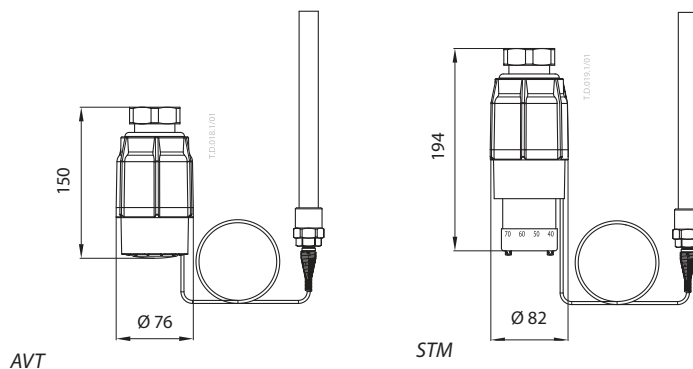
<b>DN</b>		<b>15</b>	<b>20</b>	<b>25</b>	<b>32</b>	<b>40</b>	<b>50</b>
H	mm	325	325	328	383	383	383
Weight (AVT)	kg	1.3 (sensor 170 mm), 1.5 (210 mm), 1.6 (255 mm)					

STM / AVQT



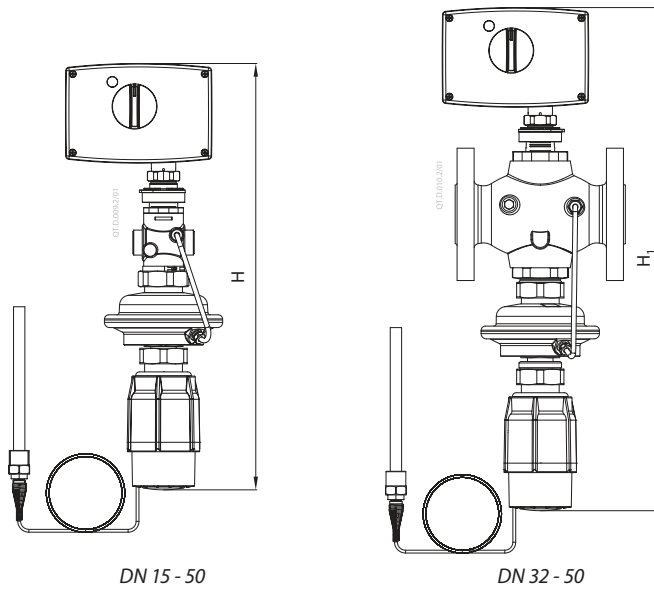
<b>DN</b>		<b>15</b>	<b>20</b>	<b>25</b>	<b>32</b>	<b>40</b>	<b>50</b>
H	mm	369	369	372	427	427	427
Weight (STM)	kg	2.6 (sensor 210 mm)					

AVT, STM



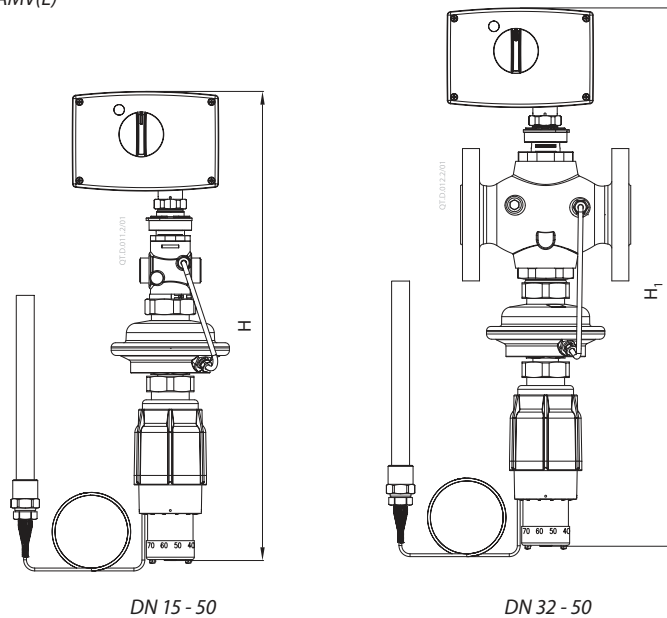
Dimensions (continuous)

AVT / AVQMT / AMV(E)



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

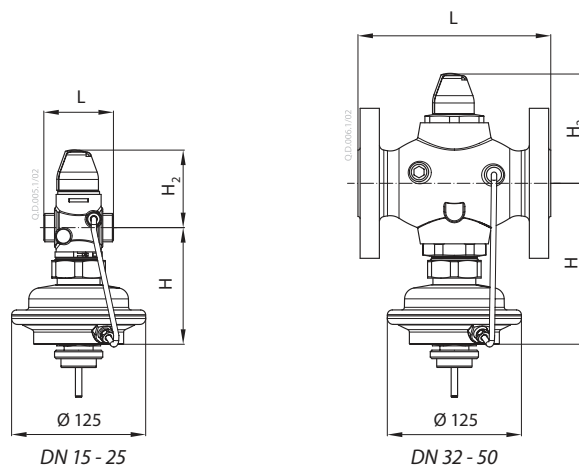
STM / AVQMT / AMV(E)



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

Dimensions (continuous)

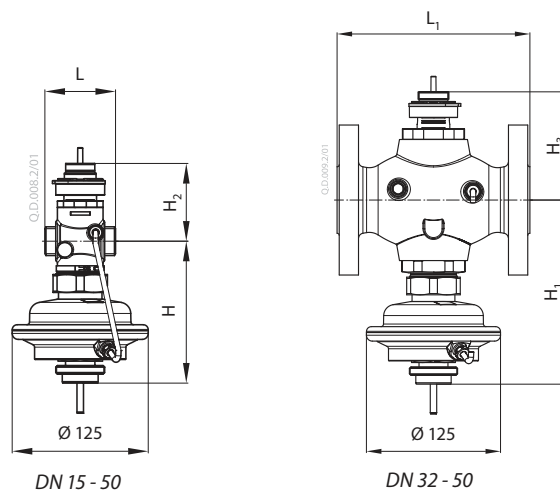
AVQT



DN		15	20	25	32	40	50
L	mm	65	70	75	180	200	230
H		109	109	109	150	150	150
H <sub>2</sub>		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

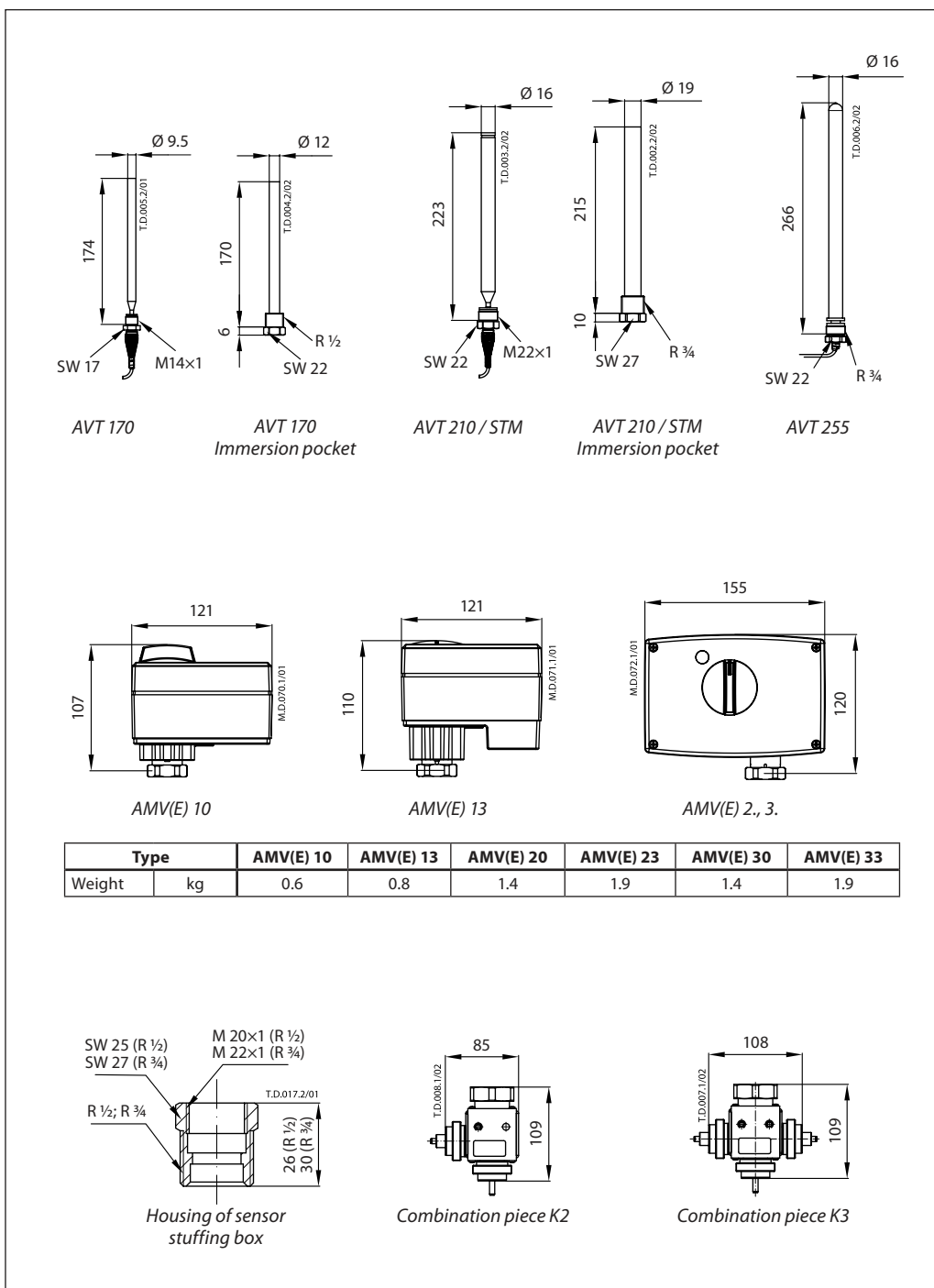
AVQMT



DN		15	20	25	32	40	50
L	mm	65	70	75	100	110	130
L <sub>1</sub>		-	-	-	180	200	230
H		131	131	131	172	172	172
H <sub>1</sub>	mm	-	-	-	172	172	172
H <sub>2</sub>		72	72	75	101	101	101
H <sub>3</sub>		-	-	-	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)



Dimensions (continuous)

