

## Data sheet

# Temperature controller for cooling (NC) (PN 25)

**AVT / VGU** - external thread

**AVT / VGUF** - flange

### Description



The AVT / VGU(F) is a self-acting proportional temperature controller developed primarily for cooling applications.

Controller opens on rising temperature.

The controller has a control valve VGU(F), thermostatic actuator and handle for temperature setting. Thermostatic actuator consist of bellows, capillary tube and sensor.

The temperature controller is type-tested according to EN 14597.

#### Main data:

- DN 15-50
- $k_{vs}$  4,0-25 m<sup>3</sup>/h
- PN 25
- Setting ranges:  
-10 ... 40 °C / 20 ... 70 °C / 40 ... 90 °C / 60 ... 110 °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:*  
Temperature controller for cooling,  
DN 15;  $k_{vs}$  4,0; PN 25; setting range  
-10 ... 40 °C;  $T_{max}$  150 °C; ext. thread

- 1x VGU DN 15 valve  
Code No: **065B0791**
- 1x AVT thermostatic actuator,  
-10 ... 40 °C  
Code No: **065-0596**

#### Option:

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

### VGU, VGUF valve

Picture	DN (mm)	$k_{vs}$ (m <sup>3</sup> /h)	Connection	Code No.	
	15	4,0	Cylindrical external thread acc. to ISO 228/1	G ¾ A	<b>065B0791</b>
	20	6,3		G 1 A	<b>065B0792</b>
	25	8,0		G 1¼ A	<b>065B0793</b>
	32	12,5		G 1¾ A	<b>065B0794</b>
	40	16		G 2 A	<b>065B0795</b>
	50	20		G 2½ A	<b>065B0796</b>
	32	12,5	Flanges PN 25, acc. to EN 1092-2		<b>065B0797</b>
	40	20			<b>065B0798</b>
	50	25			<b>065B0799</b>

**Ordering (continuous)**
**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>	<b>065-0596</b>
		20 ... 70		<b>065-0597</b>
		40 ... 90		<b>065-0598</b>
		60 ... 110		<b>065-0599</b>
	DN 32-50	-10 ... +40	210 mm, R 3/4 <sup>1)</sup>	<b>065-0600</b>
		20 ... 70		<b>065-0601</b>
		40 ... 90		<b>065-0602</b>
		60 ... 110		<b>065-0603</b>
	DN 15-50	10 ... 45	255 mm, R 3/4 <sup>1) 2) 3)</sup>	<b>065-0604</b>
		35 ... 70		<b>065-0605</b>
		60 ... 100		<b>065-0606</b>
		85 ... 125		<b>065-0607</b>

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

<sup>2)</sup> without immersion pocket

<sup>3)</sup> setting range is for aprox. 5-10 °C higher as stated (see Adjustment diagram section)

**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>065F6061</b>
		50		R 2 <b>065F6062</b>
				Flange tailpieces
20	<b>003H6916</b>			
25	<b>003H6917</b>			
	Adapter <sup>1)</sup>		M45 × 1,5 mm / M30 × 1,5 mm	<b>003H6928</b>

<sup>1)</sup> Adapter for VGU(F) combinations with electrical actuators type AMV(E) 20, 23, 30, 33.

**Accessories for thermostats**

Picture	Type designation	PN	For valves	Material	Code No.
	Immersion pocket	25	DN 15-25	Brass	<b>065-4414</b> <sup>1)</sup>
				Stainless steel, mat. No. 1.4571	<b>065-4415</b> <sup>1)</sup>
			DN 32-50	Brass	<b>065-4416</b> <sup>1)</sup>
				Stainless steel, mat. No. 1.4435	<b>065-4417</b> <sup>1)</sup>

<sup>1)</sup> Not for AVT thermostatic actuator code number: **065-0604, 065-0605, 065-0606, 065-0607**
**Service kits**

Picture	Type designation	for sensors	Code No.
	Housing of sensor stuffing box	AVT R 1/2	<b>065-4420</b>
		AVT R 3/4	<b>065-4421</b>

Technical data

Valves

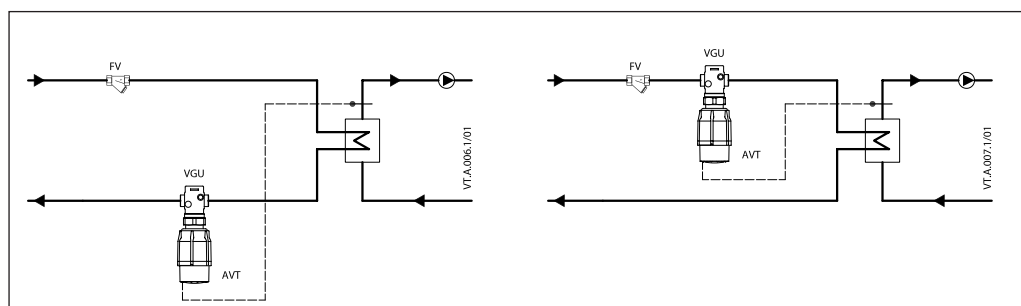
Nominal diameter		DN	15	20	25	32	40	50
$k_{vs}$ value		m <sup>3</sup> /h	4,0	6,3	8,0	12,5	20	25
Stroke		mm	5					
Control ratio			>1:50					
Control characteristic			linear					
Cavitation factor z			≥ 0,6		≥ 0,55		≥ 0,5	
Leakage acc. to standard IEC 534		% of $k_{vs}$	≤ 0,02			≤ 0,05		
Nominal pressure		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			External thread and flange		
	tailpieces		Weld-on and external thread					
				Flange			-	
<b>Materials</b>								
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			EPDM					
Pressure relieve system			Piston					

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 sensor	°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

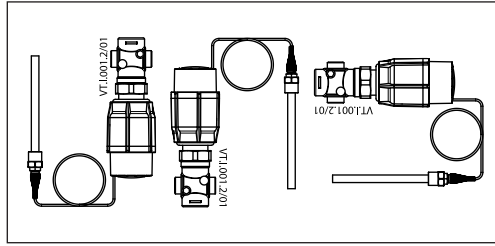
<sup>1)</sup> for sensor 170 and 210 mm

Application principles



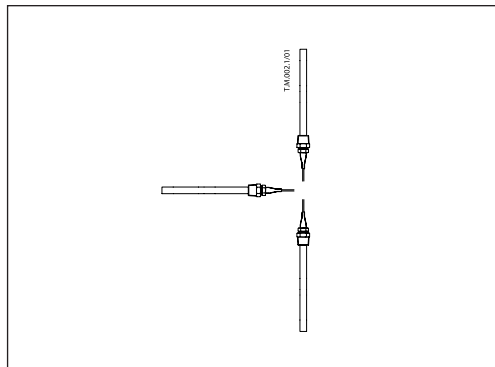
Installation positions

*Temperature controller*  
 Temperature controller AVT / VGU(F) can be installed in any position.

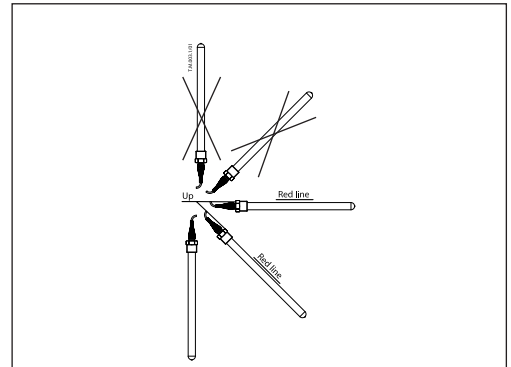


*Temperature sensor*  
 The place of installation must be chosen in a way that the temperature of the medium is directly taken without any delay. Avoid overheating of temperature sensor. The temperature sensor must be immersed into the medium in its full length.

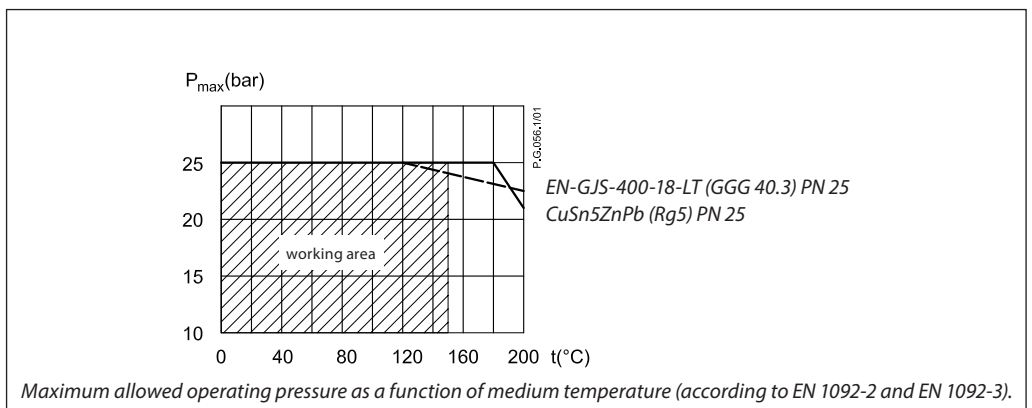
*Temperature sensors 170 mm R 1/2 and 210 mm R 3/4*  
 - The temperature sensor may be installed in any position.



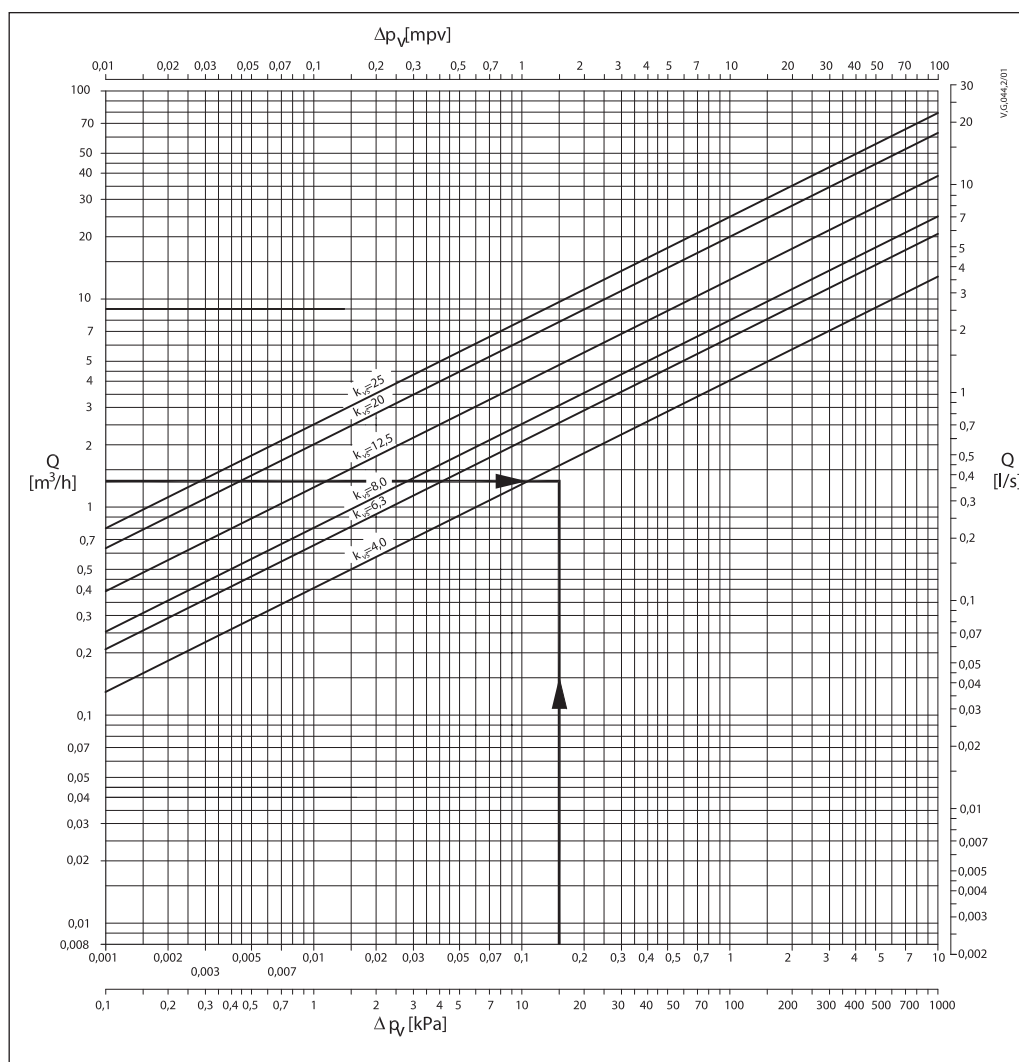
*Temperature sensor 255 mm R 3/4*  
 - The temperature sensor must be installed as shown on the picture.



Pressure temperature diagram



Valve sizing



Given data:

$$P_{\max} = 10 \text{ kW}$$

$$\Delta t = 6 \text{ K}$$

$$\Delta p_v = 0,15 \text{ bar}$$

$P_{\max}$  - cooling power (kW)

$\Delta t$  - temperature difference (K)

$\Delta p_v$  - differential pressure across the valve

Maximum flow  $Q_{\max}$  (m<sup>3</sup>/h) through the valve is calculated according to formula:

$$Q_{\max} = \frac{P_{\max} \times 0,86}{\Delta t} = \frac{10 \times 0,86}{6}$$

$$Q_{\max} = 1,43 \text{ m}^3/\text{h}$$

$k_v$  value is calculated according to formula:

$$k_v = \frac{Q_{\max}}{\sqrt{\Delta p_v}} = \frac{1,43}{\sqrt{0,15}}$$

$$k_v = 3,7 \text{ m}^3/\text{h}$$

Chosen  $k_{vS} = 4,0 \text{ m}^3/\text{h}$

or

read from the sizing diagram by taking a line through Q scale (1,43 m<sup>3</sup>/h) and  $\Delta p_v$  scale (0,15 bar) to intersect  $k_v$ -scale at 3,7 m<sup>3</sup>/h

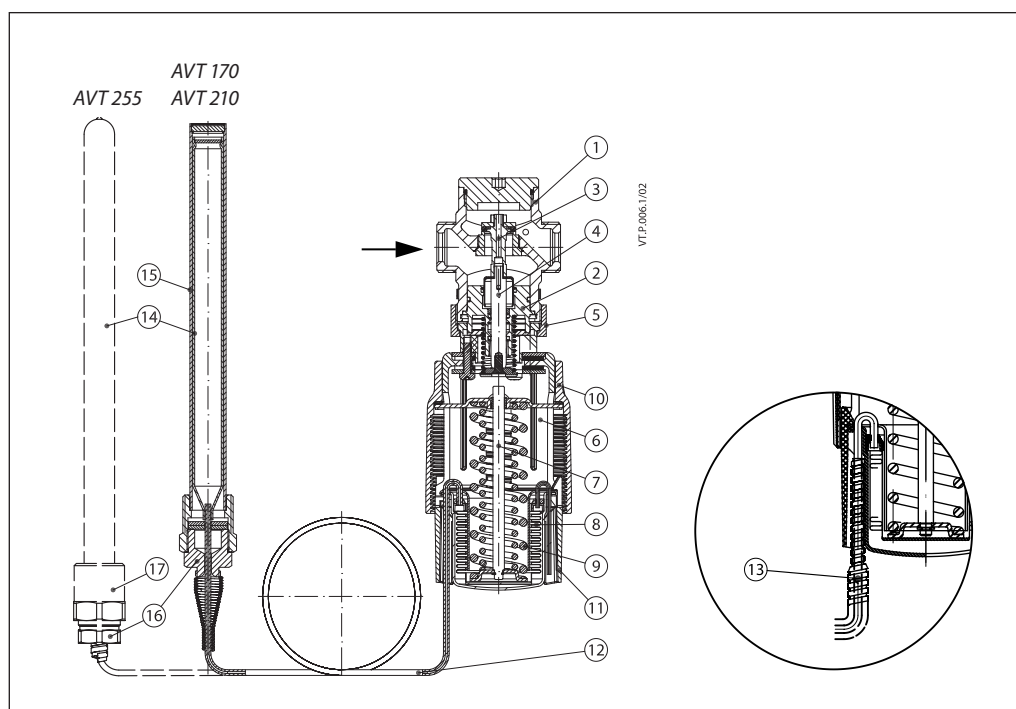
Chosen  $k_{vS} = 4,0 \text{ m}^3/\text{h}$

**Solution:**

The example selects ext. thread valve VGU DN 15,  $k_{vS}$  value 4,0.

**Design**

1. Valve VGU(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**

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.

By increasing of medium temperature valve cone moves away the seat (valve opens by decreasing of medium temperature valve cone moves towards from the seat (valve closes).

Handle for temperature setting can be sealed.

**Settings**

*Temperature setting*

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.

**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	

Dimensions

**AVT**

DN	L	L <sub>1</sub>	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>
	mm					
15	65	-	180	-	34	-
20	70	-	180	-	34	-
25	75	-	180	-	37	-
32	-	180	-	221	-	70
40	-	200	-	221	-	75
50	-	230	-	221	-	82

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

Type	Weight
sensor 170 mm	1,3
sensor 210 mm	1,5
sensor 255 mm	1,6

**VGU DN 15-25**

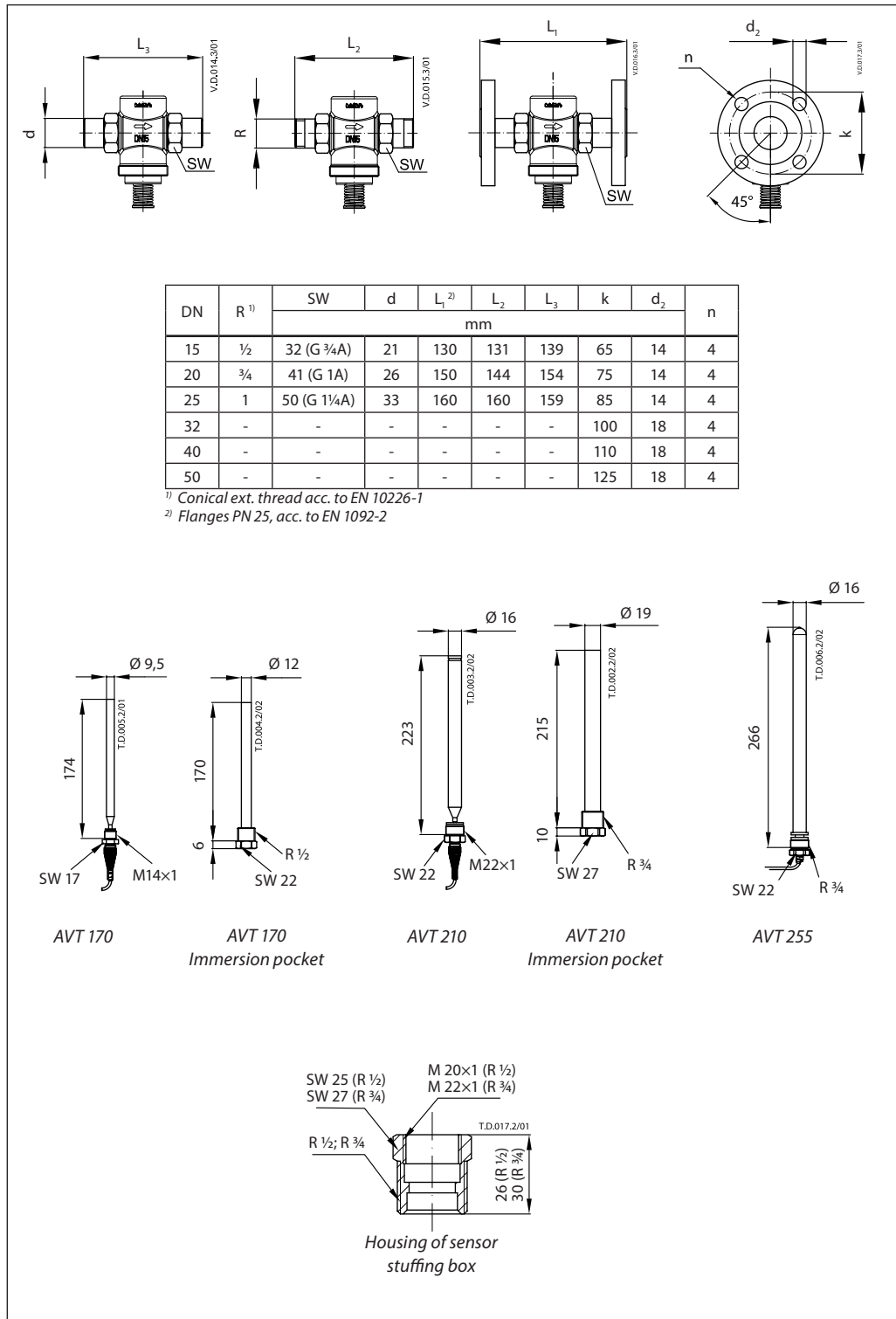
DN	L	H	H <sub>1</sub>	H <sub>2</sub>	Weight (kg)
	mm				
15	65	102	34	46	0,7
20	70	102	34	46	0,8
25	75	106	37	46	0,9

**VGUF DN 32-50**

DN	L	H	H <sub>1</sub>	H <sub>2</sub>	Weight (kg)
	mm				
32	180	185	70	88	7,5
40	200	190	75	88	9,0
50	230	197	83	88	11,1

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

Dimensions (continuous)



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