

Data sheet

# Temperature controller (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>  | 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) 3)</sup>                                  | 065-0604 |
|         |            | 35 ... 70          |  | 065-0605 |
|         |            | 60 ... 100         |  | 065-0606 |
|         |            | 85 ... 125         |  | 065-0607 |

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

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

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

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 065F6061 |
|         |                            | 50 |  | R 2 065F6062     |
|         | Flange tailpieces          | 15 | Flanges PN 25, acc. to EN 1092-2       | 003H6915         |
|         |                            | 20 |  | 003H6916         |
|         |                            | 25 |  | 003H6917         |
|         | Adapter <sup>1)</sup>      |    | M45 x 1.5 mm / M30 x 1.5 mm            | 003H6928         |

<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                            | 065-4414 <sup>1)</sup> |
|         |                  |    |            | Stainless steel, mat. No. 1.4571 | 065-4415 <sup>1)</sup> |
|         |                  |    | DN 32-50   | Brass                            | 065-4416 <sup>1)</sup> |
|         |                  |    |            | Stainless steel, mat. No. 1.4435 | 065-4417 <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   | 065-4420 |
|         |                                | AVT R 3/4   | 065-4421 |

Technical data

Valves

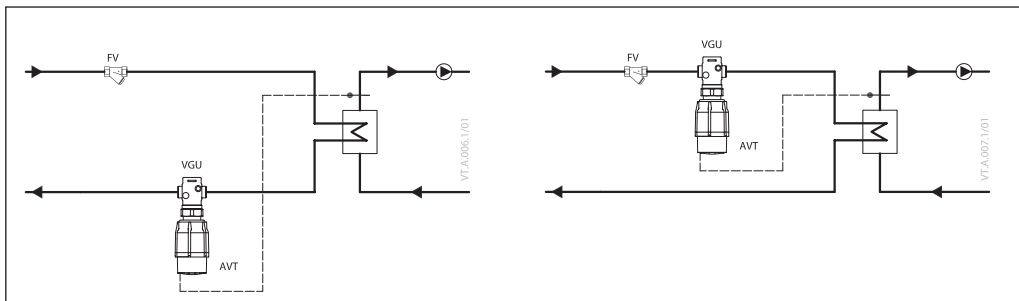
| Nominal diameter                 | DN                | 15   | 20  | 25     | 32                                       | 40    | 50 |
|----------------------------------|-------------------|--|-----|--------|--|-------|----|
| $k_{vs}$ value                   | m <sup>3</sup> /h | 4.0  | 6.3 | 8.0    | 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<br>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  |

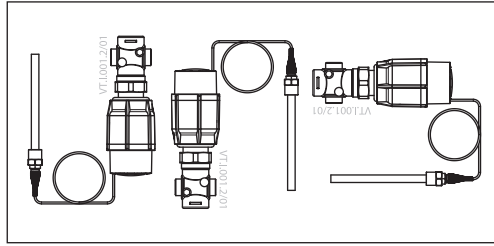
<sup>1)</sup> for sensor 170 and 210 mm

Application principles



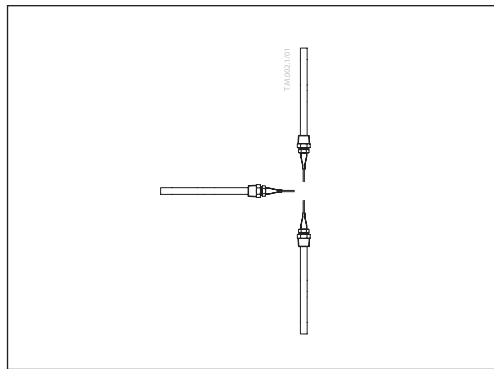
**Installation positions**

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

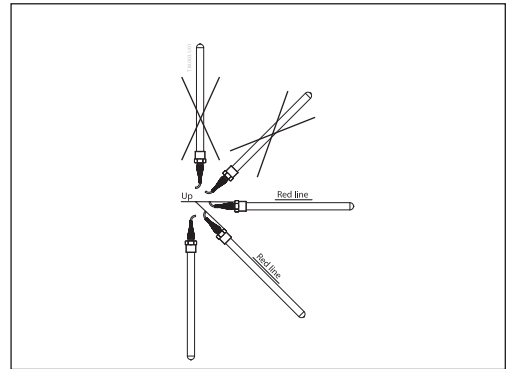


*Temperature sensor*  
 The place of installation must be chosen in a way that the temperature of the medium is directly taken without any delay. Avoid overheating of temperature sensor. The temperature sensor must be immersed into the medium in its full length.

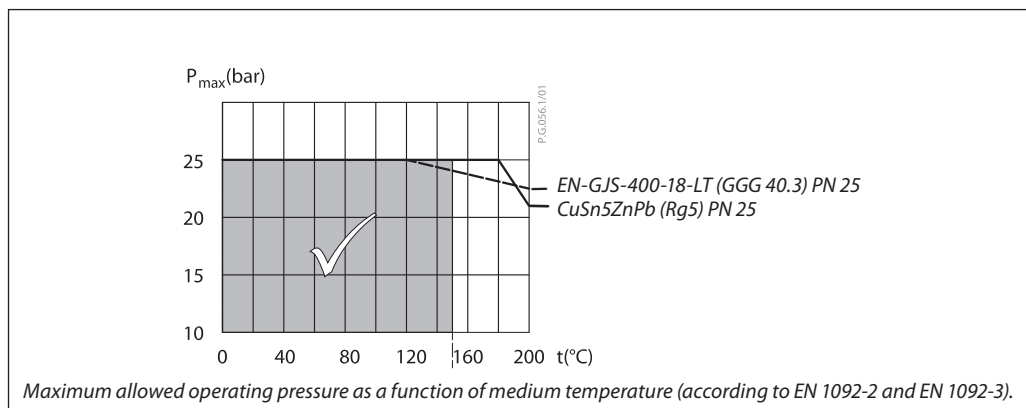
*Temperature sensors 170 mm R 1/2 and 210 mm R 3/4*  
 - The temperature sensor may be installed in any position.



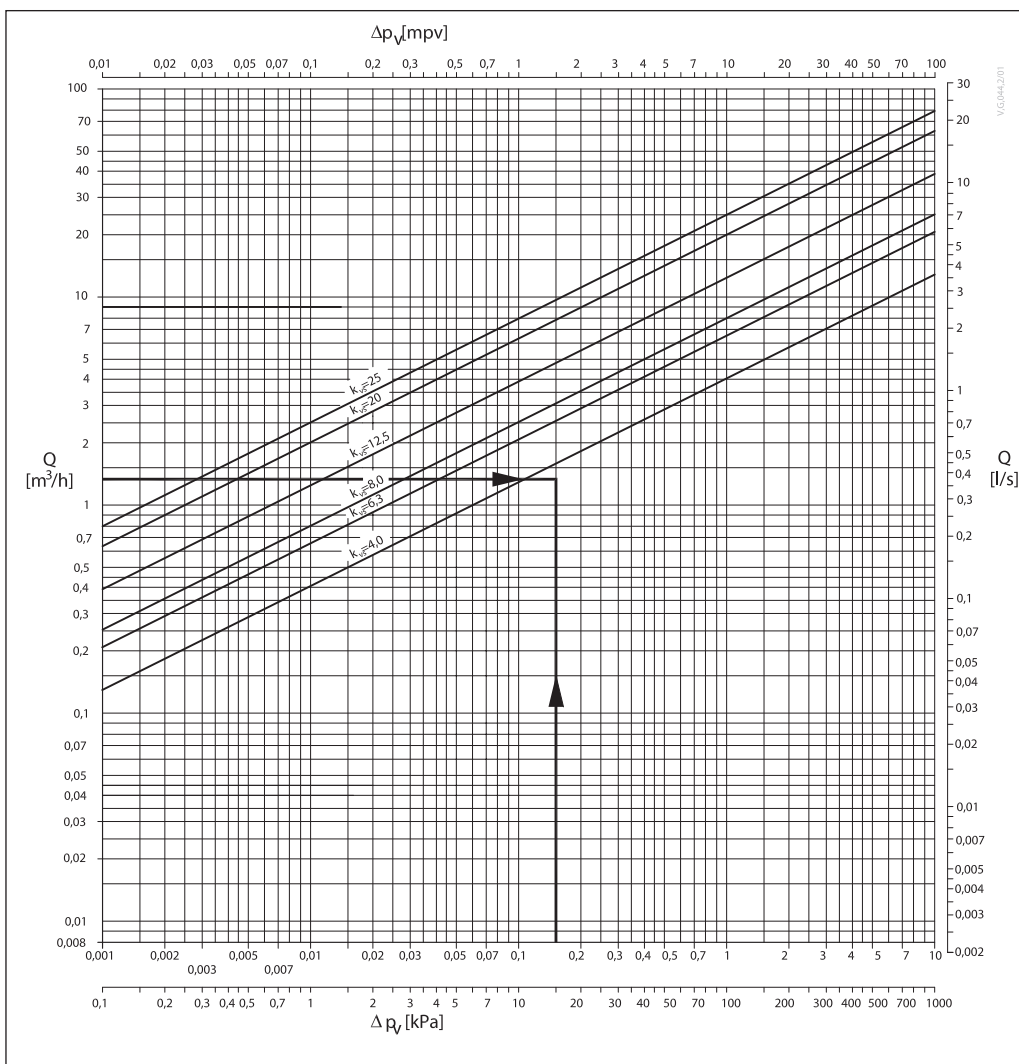
*Temperature sensor 255 mm R 3/4*  
 - The temperature sensor must be installed as shown on the picture.



**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  $Q_{max}$  (m³/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

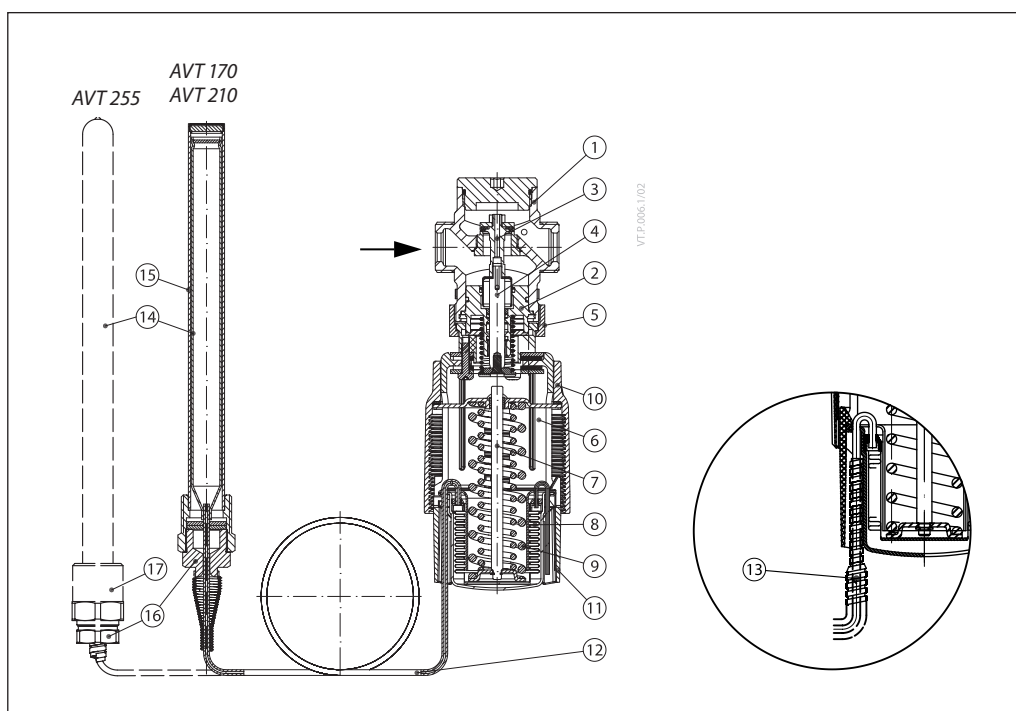
read from the sizing diagram by taking a line through Q scale (1.43 m³/h) and  $\Delta p_v$  scale (0.15 bar) to intersect  $k_v$ -scale at 3.7 m³/h  
 Chosen  $k_{vS} = 4.0 \text{ m}^3/\text{h}$

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 | °C |
| -10                               | 3  | 15  | 28   | 40    |    |
| 20                                | 33 | 45  | 58   | 70    |    |
| 40                                | 53 | 65  | 78   | 90    |    |
| 60                                | 73 | 85  | 98   | 110   |    |

| AVT Thermostat ... 255 mm |    |     |      |       |    |
|---------------------------|----|-----|------|-------|----|
| I                         | II | III | IIII | IIIII | °C |
| 10                        | 19 | 28  | 36   | 45    |    |
| 35                        | 44 | 53  | 61   | 70    |    |
| 60                        | 70 | 80  | 90   | 100   |    |
| 85                        | 95 | 105 | 115  | 125   |    |

Dimensions

Technical drawings of AVT, VGU, and VGUF temperature controllers showing front and side views with dimension lines for L, L<sub>1</sub>, H, H<sub>1</sub>, H<sub>2</sub>, H<sub>3</sub>.

| 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 | 100 | 180            | 221 | 221            | 63             | 70             |
| 40 | 110 | 200            | 221 | 221            | 63             | 75             |
| 50 | 130 | 230            | 221 | 221            | 63             | 82             |

| Type          | Weight |     |
|---------------|--------|-----|
| sensor 170 mm | kg     |     |
| sensor 210 mm |        | 1.3 |
| sensor 255 mm |        | 1.5 |
|               | 1.6    |     |

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

Technical drawings of VGU and VGUF temperature controllers showing front and side views with dimension lines for L, H, H<sub>1</sub>, H<sub>2</sub>.

| DN | L   | H   | H <sub>1</sub> | H <sub>2</sub> | Weight (kg) |
|----|-----|-----|----------------|----------------|-------------|
| 15 | 65  | 80  | 34             | 46             | 0.7         |
| 20 | 70  | 80  | 34             | 46             | 0.8         |
| 25 | 75  | 83  | 37             | 46             | 0.9         |
| 32 | 100 | 154 | 63             | 91             | 3.2         |
| 40 | 110 | 154 | 63             | 91             | 3.3         |
| 50 | 130 | 154 | 63             | 91             | 4.1         |

| DN | L   | H   | H <sub>1</sub> | H <sub>2</sub> | Weight (kg) |
|----|-----|-----|----------------|----------------|-------------|
| 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

Data sheet

Temperature controller AVT / VGU(F) (PN 25)

Dimensions (continuous)

