

## Data sheet

# Temperature controller AVTB (PN 16)

### Description



AVTB is self-acting temperature controller used to control the water temperature in hot water tanks, heat exchangers, oil preheaters, etc. Controller closes on rising temperature.

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

#### Main data:

- DN 15, 20, 25
- $k_{vs}$  1,9; 3,4; 5,5 m<sup>3</sup>/h
- PN 16
- Setting range:  
0 ... 30 °C/20 ... 60 °C/30 ... 100 °C
- Temperature:
  - Circulation water/glycolic water up to 30%:  
2 ... 130 °C
- Connections:
  - Int. thread
  - Ext. thread (weld-on and ext. thread tailpieces)
- Flow or return mounting, depending on sensor type.

### Ordering

#### AVTB Controller

| Picture | DN | Setting range (°C) | $k_{vs}$ (m <sup>3</sup> /h) | Max. sensor temp. (°C) | Internal thread    |                        | External thread      |                        |
|---------|----|--------------------|------------------------------|------------------------|--------------------|------------------------|----------------------|------------------------|
|         |    |                    |                              |                        | Connection ISO 7/1 | Code No. <sup>1)</sup> | Connection ISO 228/1 | Code No. <sup>1)</sup> |
|         | 15 | 0 ... 30           | 1,9                          | 55                     | R <sub>p</sub> 1/2 | 003N2232 <sup>4)</sup> | G 3/4 A              | 003N5101 <sup>4)</sup> |
|         |    | 20 ... 60          |                              | 90                     |                    | 003N8229 <sup>2)</sup> |                      | 003N5114 <sup>2)</sup> |
|         |    | 30 ... 100         |                              | 130                    |                    | 003N8141 <sup>3)</sup> |                      | 003N5141 <sup>3)</sup> |
|         | 20 | 0 ... 30           | 3,4                          | 55                     | R <sub>p</sub> 3/4 | 003N3232 <sup>4)</sup> | G 1 A                | 003N5102 <sup>4)</sup> |
|         |    | 20 ... 60          |                              | 90                     |                    | 003N8230 <sup>2)</sup> |                      | 003N5115 <sup>2)</sup> |
|         |    | 30 ... 100         |                              | 130                    |                    | 003N8142 <sup>3)</sup> |                      | 003N5142 <sup>3)</sup> |
|         | 25 | 0 ... 30           | 5,5                          | 55                     | R <sub>p</sub> 1   | 003N4232 <sup>4)</sup> | G 1 1/4 A            | 003N5103 <sup>4)</sup> |
|         |    | 20 ... 60          |                              | 90                     |                    | 003N8253 <sup>2)</sup> |                      | 003N5116 <sup>2)</sup> |
|         |    | 30 ... 100         |                              | 130                    |                    | 003N8143 <sup>3)</sup> |                      | 003N5143 <sup>3)</sup> |

<sup>1)</sup> Complete controller including sensor stuffing box. The immersion pocket is an accessory.

<sup>2)</sup> Including small sensor Ø 9,5 × 180. The sensor is to be mounted where the system temperature is warmer than the temperature in the valve housing. Insulation disk is factory mounted on the controller.

<sup>3)</sup> Including small sensor Ø 9,5 × 150. Capillary tube length 2,3 m.

<sup>4)</sup> Including sensor Ø 18 × 210; available on request

Capillary tube length: 2 m.

#### Example:

Temperature controller; DN 15;  $k_{vs}$  1,9; PN 16; setting range 30 ... 100 °C;  $T_{max}$  130 °C; ext. thread

- 1× AVTB DN 15 Controller  
Code No: **003N5141**

#### Option:

- 1× Imm. pocket, brass  
Code No: **013U0290**
- 1× Weld-on tailpieces  
Code No: **003H6908**

#### Service kits

| Picture   | Type designation  | for                    | Code No. |
|---|---|------------------------|----------|
|   | Repair set<br>Two diaphragms, two O-rings, one rubber cone, one tube of grease and eight valve cover screws | DN 15                  | 003N4006 |
|   |   | DN 20                  | 003N4007 |
|   |   | DN 25                  | 003N4008 |
|   | Thermostatic actuator 0 ... 30 °C, sensor Ø 18 × 210, 2m  |                        | 003N0075 |
|   | Thermostatic actuator 20 ... 60 °C, sensor Ø 9,5 × 180, 2m  |                        | 003N0130 |
| Thermostatic actuator 30 ... 100 °C, sensor Ø 9,5 × 150, 2.3m                     |   | 003N0131               |          |
| Housing of sensor stuffing box, R 1/2 × M14 × 1 mm, rubber EPDM Ø 12,6 × 4 × 6 mm |   | 013U8102 <sup>1)</sup> |          |

<sup>1)</sup> For thermostatic actuators 20 ... 60 °C and 30 ... 100 °C; code includes housing and gasket of sensor stuffing box

Ordering (continuous)

Accessories

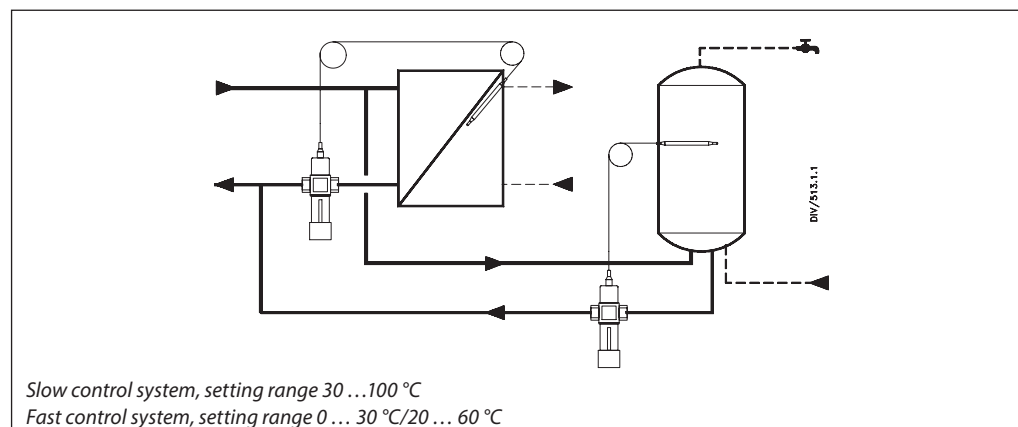
| Picture | Type designations             | DN  | Connection                          | Code No.        |
|---------|-------------------------------|---|-------------------------------------|-----------------|
|         | Weld-on tailpieces            | 15  | -                                   | 003H6908        |
|         |                               | 20  |                                     | 003H6909        |
|         |                               | 25  |                                     | 003H6910        |
|         | External thread tailpieces    | 15  | Con. ext. thread acc. to EN 10226-1 | R 1/2" 003H6902 |
|         |                               | 20  |                                     | R 3/4" 003H6903 |
|         |                               | 25  |                                     | R 1" 003H6904   |
|         | Immersion pocket              | R <sub>p</sub> 1/2 × M14 × 1 mm, brass 182 mm, without sens.stuff. box    |                                     | 013U0290        |
|         |                               | R <sub>p</sub> 1/2 × M18 × 1,5 mm, st. steel 182 mm, with sens.stuff. box |                                     | 003N0196        |
|         |                               | R <sub>p</sub> 3/4 × M22 × 1 mm, brass 220 mm, with sens.stuff. box       |                                     | 003N0050        |
|         |                               | R <sub>p</sub> 3/4 × M22 × 1 mm, st. steel 220 mm, with sens.stuff. box   |                                     | 003N0192        |
|         | Insulation disk <sup>1)</sup> |   |                                     | 003N4022        |

<sup>1)</sup> For details see "Installation positions" section

Technical data

| Nominal diameter           | DN                | 15   | 20  | 25  |
|----------------------------|-------------------|--|-----|-----|
| k <sub>vs</sub> value      | m <sup>3</sup> /h | 1,9  | 3,4 | 5,5 |
| Cavitation factor z        |                   | 0,4  |     |     |
| Nominal pressure           | PN                | 16   |     |     |
| Max. differential pressure | bar               | 10   |     |     |
| Medium                     |                   | Circulation water/glycolic water up to 30%             |     |     |
| Medium pH                  |                   | Min. 7, max. 10  |     |     |
| Medium temperature         | °C                | 2 ... 130  |     |     |
| Connections                | valve             | Internal and external thread                           |     |     |
|                            | tailpieces        | Weld-on and external thread                            |     |     |
| Materials                  |                   |  |     |     |
| Valve body                 | internal thread   | MS 58, hot-pressed, DIN 17660, W.No. 2.0402, CuZn40Pb2 |     |     |
|                            | external thread   | Dezincing-free brass, BS 2872/CZ132                    |     |     |
| Valve seat                 |                   | Cr Ni steel, DIN 17440, W.No. 1.4301                   |     |     |
| Valve cone                 |                   | NBR-rubber   |     |     |
| Spindle                    |                   | Dezincing-free brass, BS 2872/CZ132                    |     |     |
| Other metal parts          |                   | Dezincing-free brass, BS 2874/CZ132                    |     |     |
| Diaphragms, O-rings        |                   | EPDM-rubber  |     |     |
| Temperature sensor         |                   | Copper   |     |     |
| Sensor charge              | 0 ... 30 °C       | R 152 A, C2H4F2  |     |     |
|                            | 20 ... 60 °C      | Butane R600, C4H10                                     |     |     |
|                            | 30 ... 100 °C     | Carbon dioxide, CO2                                    |     |     |

Application principle



Installation positions

Temperature controller

The controller can be installed in any position, with flow in the direction of the cast-in arrow.

AVTB 0 ... 30 and 30 ... 100 can be installed either in flow or in return line.

AVTB 20 ... 60 must always be installed in the return line (sensor warmer than valve).

With AVTB 30 ... 100, if temperature variations of more than 20 °C occur at the valve, insulation disk (003N4022) must be installed between thermostatic actuator and valve body.

If AVTB 20 ... 60 has been installed in the return line from a service water heat exchanger (where for certain periods the return temperature approaches the sensor temperature) the installation of insulation disk is recommended (003N4022). **Insulation disk is factory mounted on the product.**

Temperature sensor

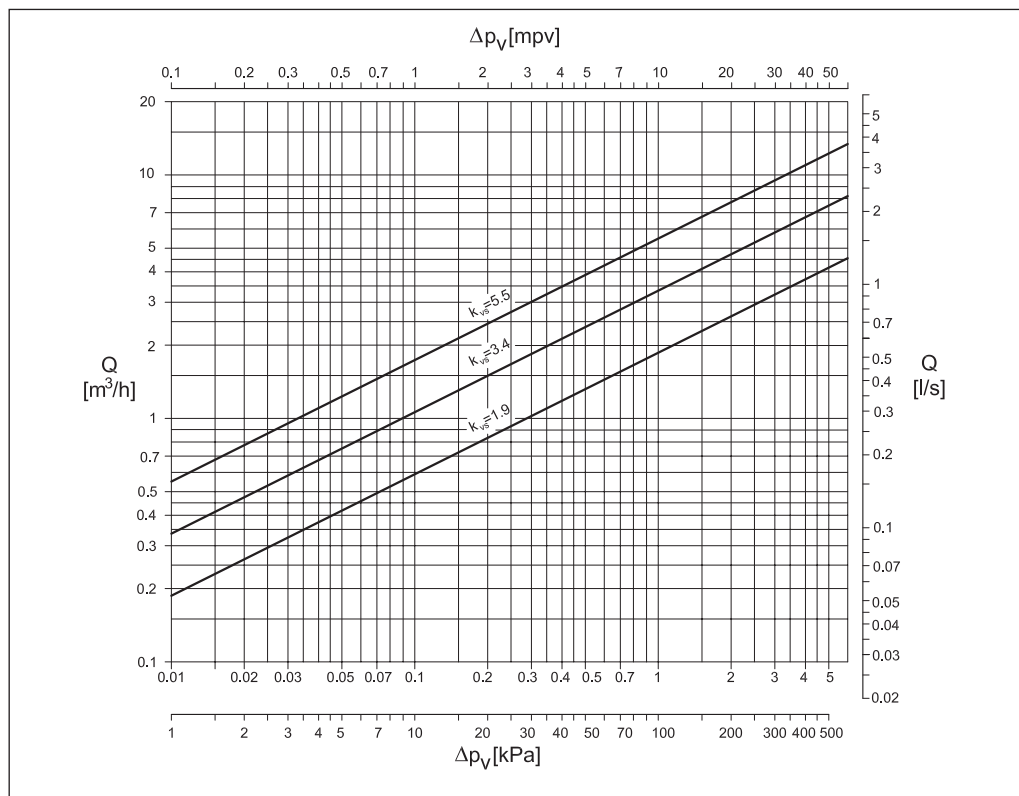
Sensor Ø 18 × 210 mm<sup>2)</sup>  
(AVTB 0 ... 30 °C)

Sensor Ø 9,5 × 180 mm<sup>1)</sup>  
(AVTB 20 ... 60 °C)

Sensor Ø 9,5 × 150 mm<sup>2)</sup>  
(AVTB 30 ... 100 °C)

<sup>1)</sup> The sensor is to be mounted where the system temperature is warmer than the temperature in the valve body  
<sup>2)</sup> The sensor can be mounted where the system temperature is either warmer or colder than the temperature in the valve body

Sizing



Sizing (continuous)

**Example**

Hot water temperature control in hot water tanks.

Primary medium: Water  
 Given:  
 Load: 31 kW (26500 kcal/h)  
 Primary temperature drop  $\Delta t$ : 20 K  
 Differential pressure  $\Delta p$  across the valve: 1,7 bar  
 Max. hot water temperature: 55 °C

$$\text{Water volume } Q: \frac{31 \times 0,86}{20} = 1,3 \text{ m}^3/\text{h}$$

**Required:**

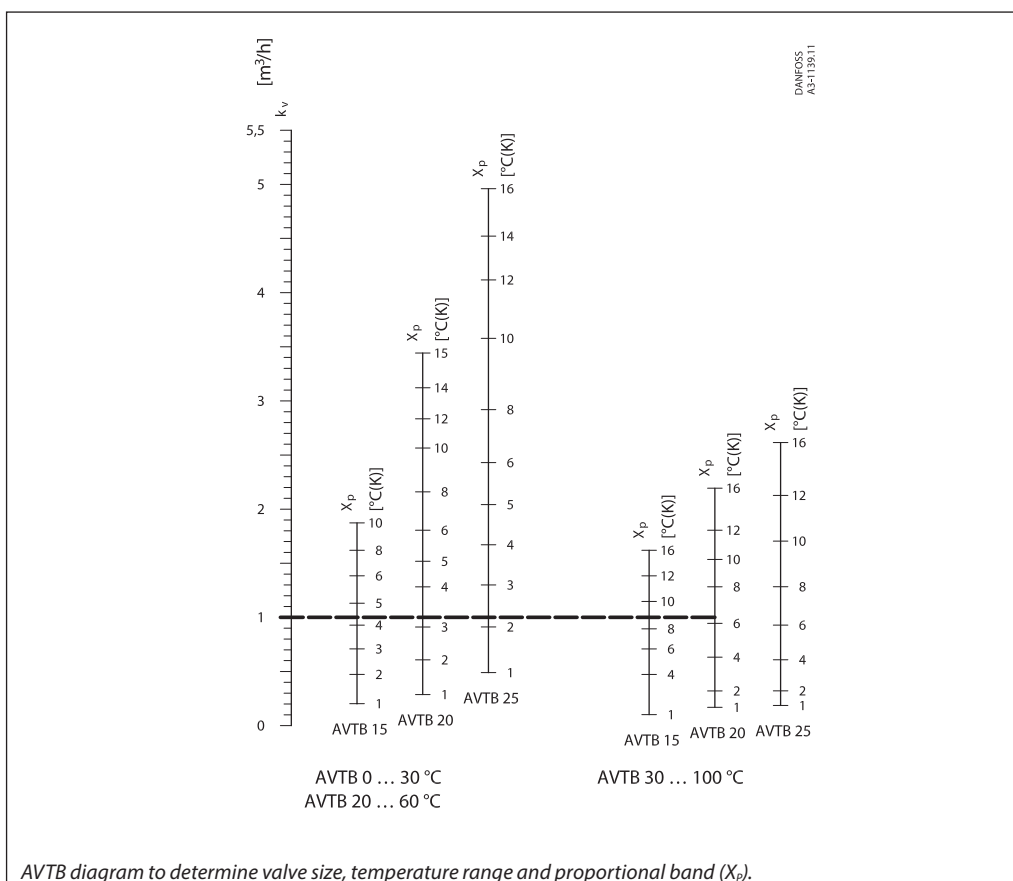
The correct valve size

$$k_v = \frac{Q}{\sqrt{\Delta p}} = \frac{1,3}{\sqrt{1,7}} = 1,0 \text{ m}^3/\text{h}$$

**Temperature range and P-band**

Calculated  $k_v$  value is 1 m<sup>3</sup>/h. From this value on the  $k_v$  scale in the AVTB diagram, take a line horizontally to intersect the columns for recommended sizing range. Select the smallest possible valve, here an AVTB 15. A temperature range of 30 ... 100 °C can be assumed as suitable for this example. The P-band ( $X_p$ ) and final temperature range can also be read from the AVTB diagram. The required closing temperature can be read from the scale for the valve selected. However, there are two temperature ranges that meet the requirement for a closing temperature of 55 °C.  $X_p$  is 9 K for the range 30 ... 100 °C, which means that the controller will yield the calculated capacity at a sensor temperature of 55 °C minus 9 K = 46 °C. For the range 20 ... 60 °C  $X_p$  = 4 K. This means that the controller will yield the calculated capacity at 55 °C minus 4 K = 51 °C.

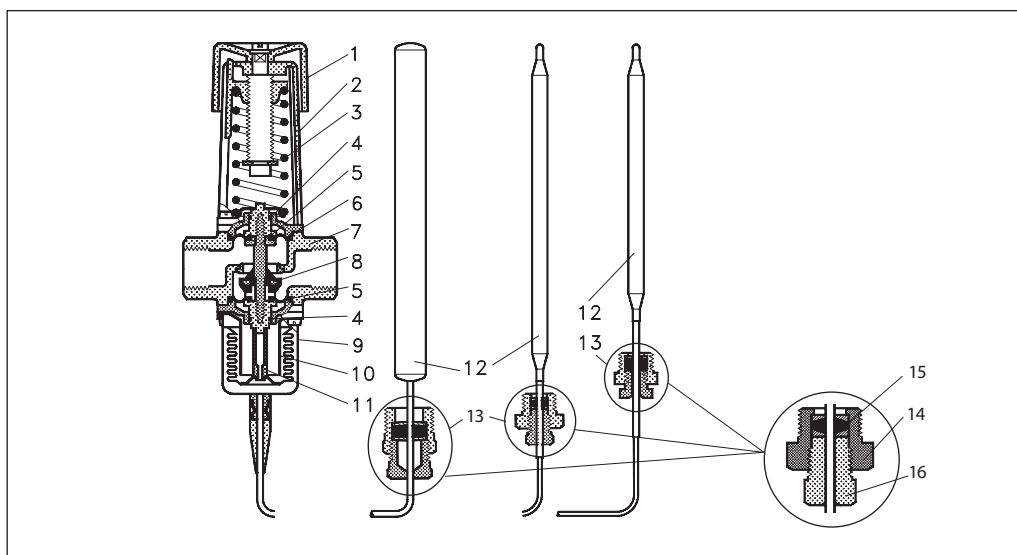
To ensure the most stable control an AVTB 15 with a range 30 ... 100 °C should be chosen. The water in the hot water tank will reach the closing temperature (55 °C) only when there has been no hot water demand for some time.



Note: The values stated are mean values

**Design**

- 1. Handle for temperature setting
- 2. Spring housing
- 3. Setting spring
- 4. O-ring
- 5. Diaphragm
- 6. Spindle
- 7. Valve body
- 8. Valve cone
- 9. Bellows
- 10. Bellows stop
- 11. Pressure stem
- 12. Temperature sensor
- 13. Sensor stuffing box
- 14. Housing of sensor stuffing box
- 15. Gasket of sensor stuffing box
- 16. Sealing bolt of sensor stuffing box



**Settings**

*Temperature setting*

Relation between scale numbers 1-5 and the closing temperature.

The values given are approximate.

| Scale setting                        | 1  | 2  | 3  | 4  | 5  |     |    |
|--------------------------------------|----|----|----|----|----|-----|----|
| Closing temperature<br>(0 ... 30 °C) |    | 0  | 3  | 15 | 23 | 30  | °C |
| (20 ... 60 °C)                       | 20 | 35 | 50 | 60 | 70 |     |    |
| (30 ... 100 °C)                      | 30 | 35 | 55 | 75 | 95 | 120 |    |

Dimensions

