

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 m³/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

¹⁾ Complete controller including sensor stuffing box. The immersion pocket is an accessory.

²⁾ 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.

³⁾ Including small sensor Ø 9.5 × 150. Capillary tube length 2.3 m.

⁴⁾ Including sensor Ø 18 × 210; available on request

Example:

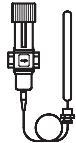
Temperature controller; DN 15; k_{VS} 1.9; PN 16; setting range 30 ... 100°C; T_{max} 130 °C; ext. thread

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

Option:

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

AVTB Controller

	DN	Setting range (°C)	k_{VS} (m ³ /h)	Max. sensor temp. (°C)	Internal thread		External thread	
					Connection ISO 7/1	Code No. ¹⁾	Connection ISO 228/1	Code No. ¹⁾
	15	0 ... 30	1.9	55	R _p 1/2	003N2232 ⁴⁾	G 3/4 A	003N5101 ⁴⁾
		20 ... 60		90		003N8229 ²⁾		003N5114 ²⁾
		30 ... 100		130		003N8141 ³⁾		003N5141 ³⁾
	20	0 ... 30	3.4	55	R _p 3/4	003N3232 ⁴⁾	G 1 A	003N5102 ⁴⁾
		20 ... 60		90		003N8230 ²⁾		003N5115 ²⁾
		30 ... 100		130		003N8142 ³⁾		003N5142 ³⁾
	25	0 ... 30	5.5	55	R _p 1	003N4232 ⁴⁾	G 1 1/4 A	003N5103 ⁴⁾
		20 ... 60		90		003N8253 ²⁾		003N5116 ²⁾
		30 ... 100		130		003N8143 ³⁾		003N5143 ³⁾

Capillary tube length: 2 m.

Service kits

Type designation	for	Code No.
Repair set 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 ¹⁾

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

Ordering (continuous)

Accessories

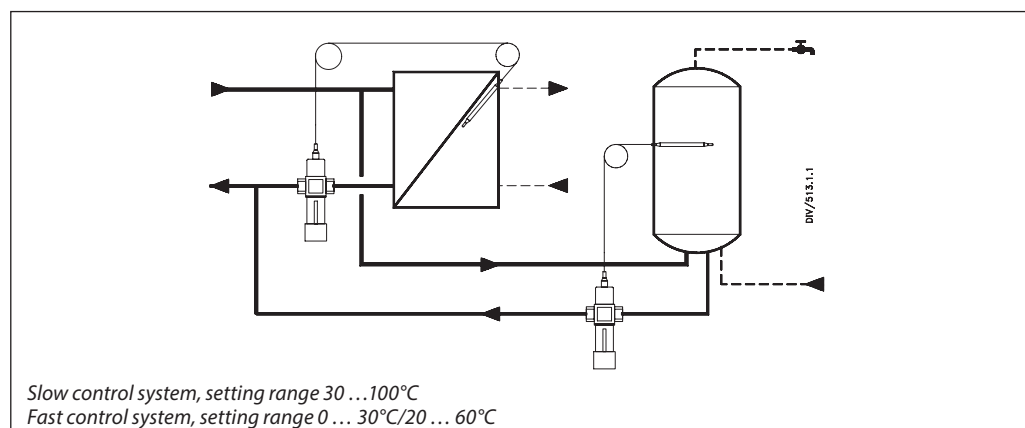
Picture	Type designations	DN	Connection		Code No.
	Weld-on taipieces	15	-		003H6908
		20			003H6909
		25			003H6910
	External thread taipieces	15	Con. ext. thread acc. to EN 10226-1	R 1/2"	003H6902
		20		R 3/4"	003H6903
		25		R 1"	003H6904
	Immersion pocket	R _p 1/2 x M14 x 1 mm, brass 182 mm, without sens.stuff. box			013U0290
		R _p 1/2 x M18 x 1.5 mm, st. steel 182 mm, with sens.stuff. box			003N0196
		R _p 3/4 x M22 x 1 mm, brass 220 mm, with sens.stuff. box			003N0050
		R _p 3/4 x M22 x 1 mm, st. steel 220 mm, with sens.stuff. box			003N0192
	Insulation disk ¹⁾			003N4022	

¹⁾ For details see "Installation positions" section

Technical data

Nominal diameter	DN	15	20	25
k _{vs} value	m³/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.

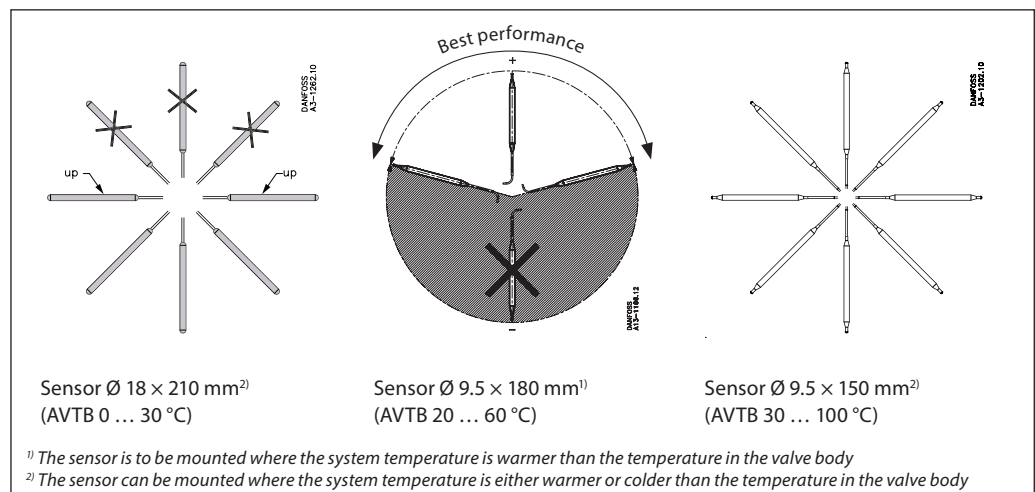
AVTB 20 ... 60 must always be installed in the return line (sensor warmer than valve).

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.

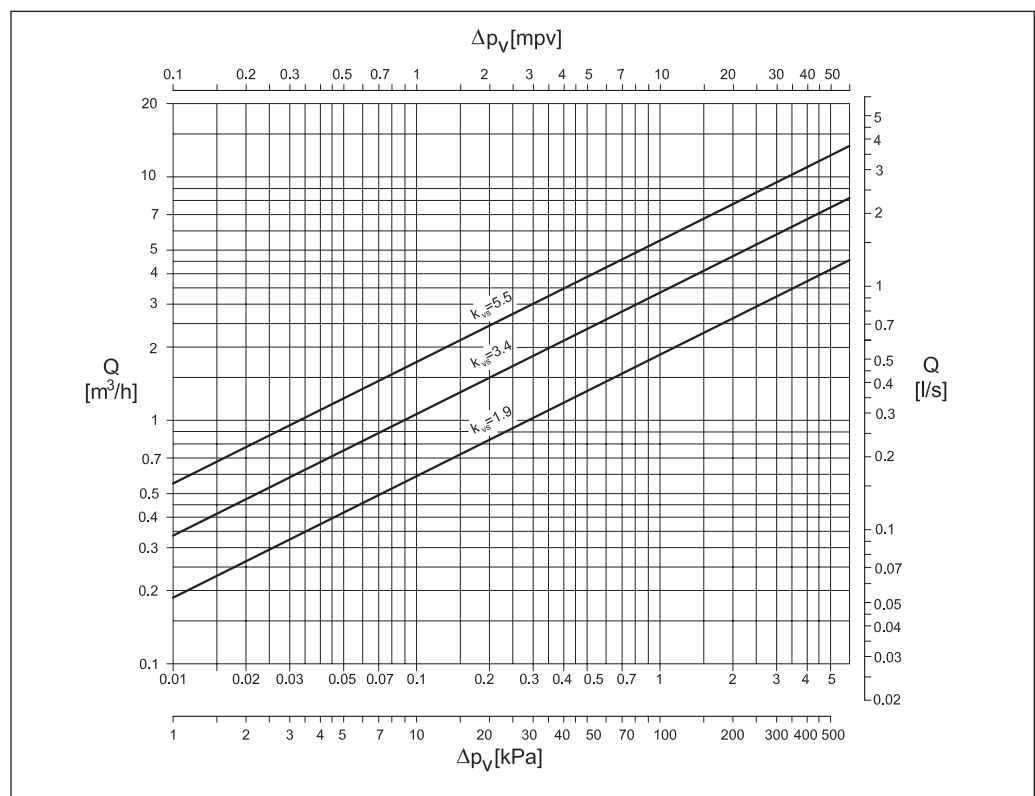
AVTB 0 ... 30 and 30 ... 100 can be installed either in flow or in return line.

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.

Temperature Sensor



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 Δt : 20 K

Differential pressure Δp across the valve: 1.7 bar

Max. hot water temperature: 55°C

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

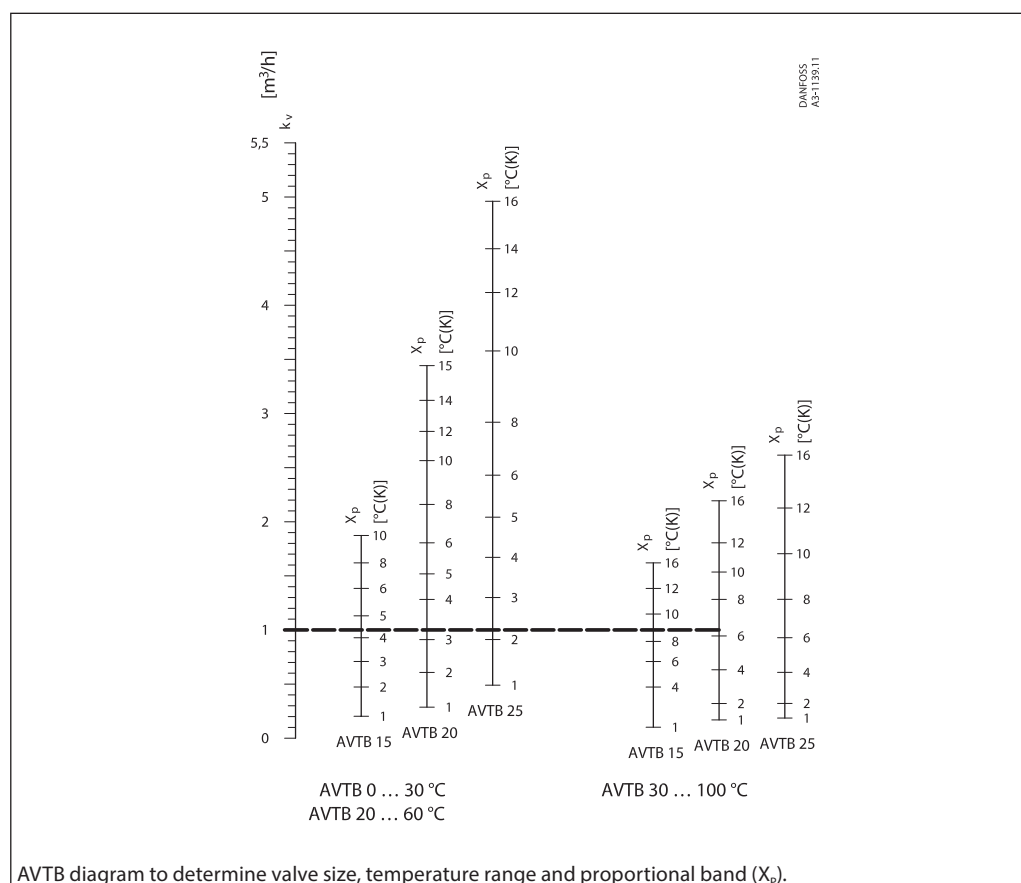
Calculated k_v value is 1 m³/h.

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.

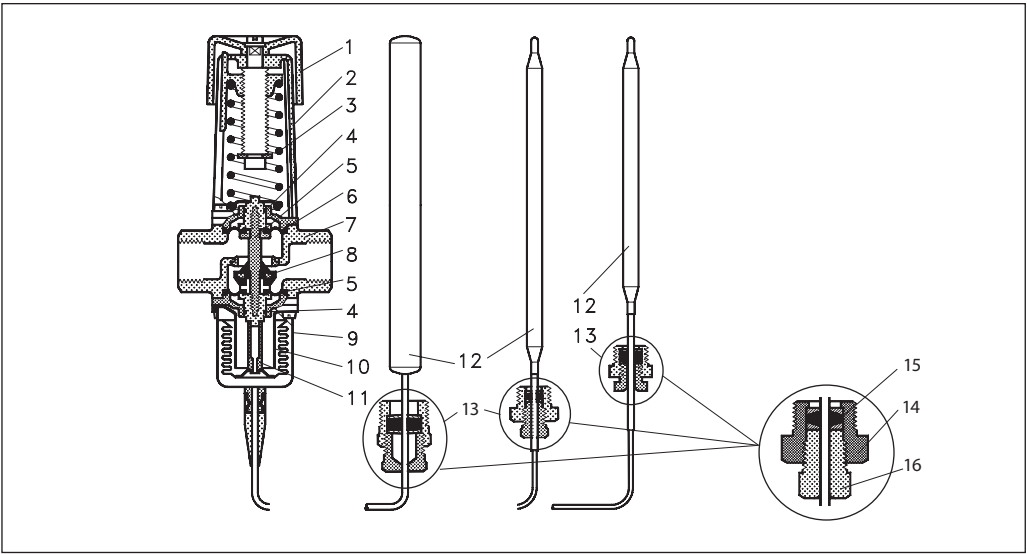
To ensure the most stable control an AVTB 15 with a range 30 ... 100 °C should be chosen. The water in the hot water tank will reach the closing temperature (55°C) only when there has been no hot water demand for some time.



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

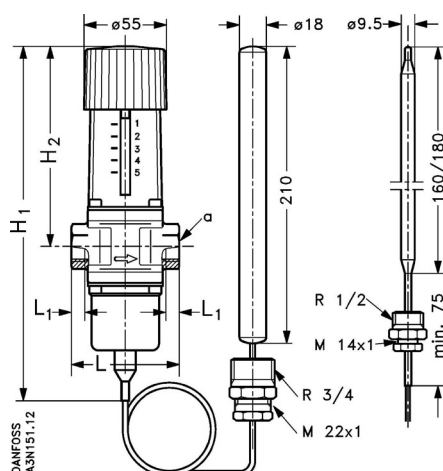
Temperature setting

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

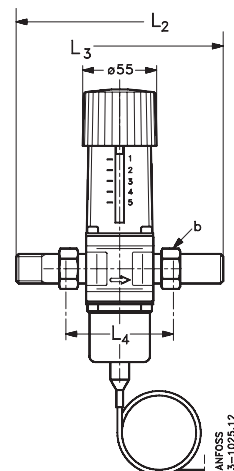
The values given are approximate.

Scale setting	1	2	3	4	5	
Closing temperature (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

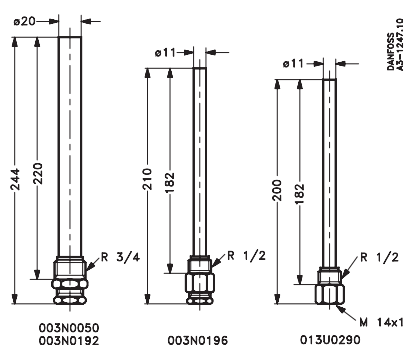
AVTB with internal thread



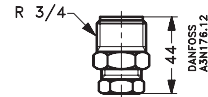
AVTB with external thread



Type	H ₁ mm	H ₂ mm	L mm	L ₁ mm	L ₂ mm	L ₃ mm	L ₄ mm	a ISO 7/1 (int. thread)	b ISO 228/1 (ext. thread)
AVTB 15	246	135	72	14	141	149	75	R _p ½	G ¾A
AVTB 20	246	135	90	16	154	164	80	R _p ¾	G 1A
AVTB 25	246	135	95	19	168	167	83	R _p 1	G 1¼A

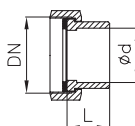


Immersion pockets



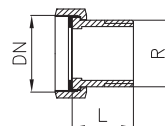
Sensor stuffing box

Weld-on tailpieces



G (mm)	Ød (mm)	L (mm)	Weight (kg)
15	15	35	0.18
20	20	40	0.26
25	27	40	0.38

External thread tailpieces



G (")	R (")	L (mm)	Weight (kg)
¾	½	25.5	0.17
1	¾	27.5	0.27
1 ¼	1	32.5	0.45

All trademarks in this material are property of Danfoss A/S or Danfoss group companies. Danfoss and the Danfoss logo are trademarks of Danfoss A/S. All rights reserved.