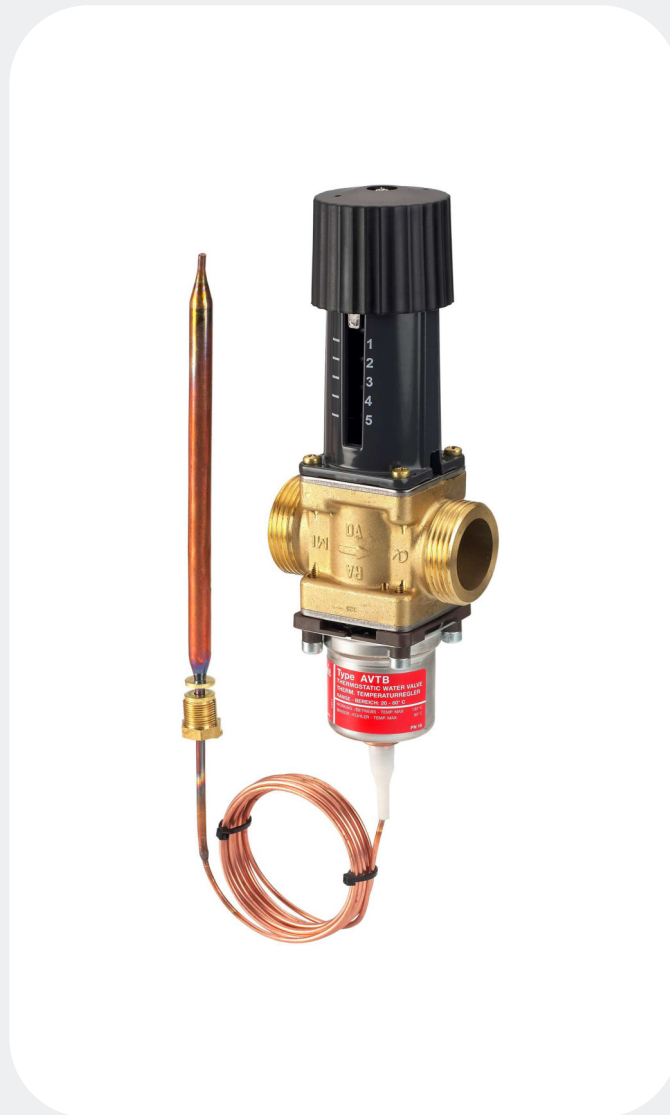




Temperature controllers

AVTB

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.

Features & benefits

- Automatically regulates water temperature in tanks and heat exchangers.
- Wide setting range for flexible temperature control applications.
- Suitable for water and glycolic systems up to 130°C.

Ordering

Product code numbers

Type	Pressure class	Valve size	Temperature setting range [°C] [Min]	Temperature setting range [°C] [Max]	Kvs values [m³/h]	Connection types	Connection size	Code number
AVTB			20	60				003N0130
AVTB			30	100				003N0131
AVTB	PN 16	DN 15	0	30	1.90	Internal thread	Rp 1/2	003N2232
AVTB	PN 16	DN 20			3.40	Internal thread	Rp 1/2	003N3030
AVTB	PN 16	DN 20	0	30	3.40	Internal thread	Rp 3/4	003N3232
AVTB	PN 16	DN 25	0	30	5.50	Internal thread	Rp 1	003N4232
AVTB	PN 16	DN 15	0	30	1.90	External Thread	G 3/4 A	003N5101
AVTB	PN 16	DN 20	0	30	3.40	External Thread	G 1 A	003N5102
AVTB	PN 16	DN 25	0	30	5.50	External Thread	G 1 1/4 A	003N5103
AVTB	PN 16	DN 15	20	65	1.90	External Thread	G 3/4 A	003N5104
AVTB	PN 16	DN 15	30	65	1.90	External Thread	G 3/4 A	003N5127
AVTB	PN 16	DN 20	30	65	3.40	External Thread	G 1 A	003N5128
AVTB	PN 16	DN 25	30	65	5.50	External Thread	G 1 1/4 A	003N5129
AVTB	PN 16	DN 15	30	100	1.90	External Thread	G 3/4 A	003N5141
AVTB	PN 16	DN 20	30	100	3.40	External Thread	G 1 A	003N5142
AVTB	PN 16	DN 25	30	100	5.50	External Thread	G 1 1/4 A	003N5143
AVTB	PN 16	DN 15	30	100	1.90	External Thread	G 3/4 A	003N5144
AVTB	PN 16	DN 20	30	100	3.40	External Thread	G 1 A	003N5145
AVTB	PN 16	DN 25	30	100	5.50	External Thread	G 1 1/4 A	003N5146
AVTB	PN 16	DN 20	0	30	1.90	Internal thread	NPT 1/2	003N6032
AVTB	PN 16	DN 15	50	90	1.90	Internal thread	NPT 1/2	003N6272
AVTB	PN 16	DN 20	0	30	3.40	Internal thread	NPT 3/4	003N7032
AVTB	PN 16	DN 20	50	90	3.40	Internal thread	NPT 3/4	003N7272
AVTB	PN 16	DN 25	0	30	3.40	Internal thread	NPT 1	003N8032
AVTB	PN 16	DN 15	30	100	1.90	Internal thread	Rp 1/2	003N8141
AVTB	PN 16	DN 20	30	100	3.40	Internal thread	Rp 3/4	003N8142
AVTB	PN 16	DN 25	30	100	5.50	Internal thread	Rp 1	003N8143
AVTB	PN 16	DN 15	30	100	1.90	Internal thread	Rp 1/2	003N8144
AVTB	PN 16	DN 20	30	100	3.40	Internal thread	Rp 3/4	003N8145
AVTB	PN 16	DN 25	30	100	5.50	Internal thread	Rp 1	003N8146
AVTB	PN 16	DN 15	30	65	1.90	Internal thread	Rp 1/2	003N8151
AVTB	PN 16	DN 20	30	65	3.40	Internal thread	Rp 3/4	003N8152
AVTB	PN 16	DN 25	30	65	5.50	Internal thread	Rp 1	003N8153
AVTB	PN 16	DN 25	50	90	5.50	Internal thread	NPT 1	003N8272
AVTB (fast)	PN 16	DN 15	20	60	1.90	Internal thread	Rp 1/2	003N2252
AVTB (fast)	PN 16	DN 20	20	60	3.40	Internal thread	Rp 3/4	003N3252
AVTB (fast)	PN 16	DN 25	20	60	5.50	Internal thread	Rp 1	003N4252
AVTB (fast)	PN 16	DN 15	20	60	1.90	External Thread	G 3/4 A	003N5111
AVTB (fast)	PN 16	DN 20	20	60	3.40	External Thread	G 1 A	003N5112
AVTB (fast)	PN 16	DN 25	20	60	5.50	External Thread	G 1 1/4 A	003N5113
AVTB (fast)	PN 16	DN 15	20	60	1.90	External Thread	G 3/4 A	003N5114

AVTB (fast)	PN 16	DN 20	20	60	3.40	External Thread	G 1 A	003N5115
AVTB (fast)	PN 16	DN 25	20	60	5.50	External Thread	G 1 1/4 A	003N5116
AVTB (fast)	PN 16	DN 15	20	60	1.90	Internal thread	NPT 1/2	003N6252
AVTB (fast)	PN 16	DN 20	20	60	3.40	Internal thread	NPT 3/4	003N7252
AVTB (fast)	PN 16	DN 15	20	60	1.90	Internal thread	Rp 1/2	003N8229
AVTB (fast)	PN 16	DN 20	20	60	3.40	Internal thread	Rp 3/4	003N8230
AVTB (fast)	PN 16	DN 25	20	60	5.50	Internal thread	NPT 1	003N8252
AVTB (fast)	PN 16	DN 25	20	60	5.50	Internal thread	Rp 1	003N8253

Note:

1. **AVTB** Controller is a complete controller including sensor stuffing box. The immersion pocket is an accessory.
2. **003N5114, 003N5115, 003N5116:** Includes 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. **003N5141, 003N5142, 003N5143:** Includes small sensor Ø 9.5 × 150. Capillary tube length 2.3 m.
4. **003N5101, 003N5102, 003N5103:** Includes sensor Ø 18 × 210; available on request.
5. 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**

Accessories code numbers

Type	Description	Code number
Accessory	Sensor pocket, Type designation: Sensor pocket, Connection type: G, Connection size [in]: 3/4, Packing format: Multi pack, Quantity per packing format: 72	003N0050
Accessory	Sensor pocket, Type designation: Sensor pocket, Connection type: NPT, Connection size [in]: 3/4 - 14, Packing format: Multi pack, Quantity per packing format: 60	003N0053
Accessory	Product Type: Accessory, Capillary tube gland, Capillary tube gland size [in]: 3/4, Capillary tube gland type: NPT, Packing format: Multi pack, Quantity per packing format: 120	003N0056
Accessory	Sensor pocket, Type designation: Sensor pocket, Connection type: R, Connection size [in]: 3/4, Packing format: Multi pack, Quantity per packing format: 72	003N0192
Accessory	Sensor pocket, Type designation: Sensor pocket, Connection type: R, Connection size [in]: 1/2, Packing format: Multi pack, Quantity per packing format: 60	003N0196
Immersion pockets	AVTB,RAVI Im.pock.1/2brass182ex.gland	013U0290
Thread tailpieces	Tailpiece ext.thr R1/2 PN25 DN15 (G3/4) Tailpiece ext.thr R1/2 PN25 (G3/4)	003H6902
Thread tailpieces	Tailpiece ext.thr R3/4 PN25 DN20 (G1)	003H6903
Thread tailpieces	Tailpiece ext.thr R1 PN25 DN25 (G11/4)	003H6904
Washers	AVTB Insulating disk	003N4022
Weld-on tailpieces	Tailpiece weld-on PN25 DN15 (G3/4)	003H6908
Weld-on tailpieces	Tailpiece weld-on PN25 DN20 (G1)	003H6909
Weld-on tailpieces	Tailpiece weld-on PN25 DN25 (G11/4)	003H6910

Note:

1. **003N4022:** For details see [Installation](#).

Spare parts code numbers

Type	Description	Code number
Spare part	Product Type: Spare part, Used for product: AVTB; AVTA, Type designation: Thermostatic element, Thermostatic element	003N0062
Spare part	Product Type: Spare part, Used for product: AVTB; AVTA, Type designation: Thermostatic element, Thermostatic element	003N0075
Spare part	Product Type: Spare part, Used for product: AVTB; AVTA, Type designation: Thermostatic element, Thermostatic element	003N0078
AVTB	AVTB Thermost.act. 20-60 2m 9,5x180mm	003N0130
AVTB	AVTB Thermost.act 30-100 2,3m #9,5x150mm	003N0131
Spare part	Product Type: Spare part, Used for product: AVTB; FJVA; AVTA, Type designation: Plastic hand knob, Hand knob	003N0520
Repair sets	AVTB, FJV, AVD(S)A Repair set DN15	003N4006
Repair sets	AVTB, FJV, AVD(S)A Repair set DN20	003N4007
Repair sets	AVTB, FJV, AVD(S)A Repair set DN25	003N4008
Stuffing box kits	AVTB, RAVI/K Hs.S.st.bxR1/2M14x1 12.6x4x6 AVTB RAVI/K Adapt. R1/2 M14x1 Gasket fi12.6/4 x 6	013U8102

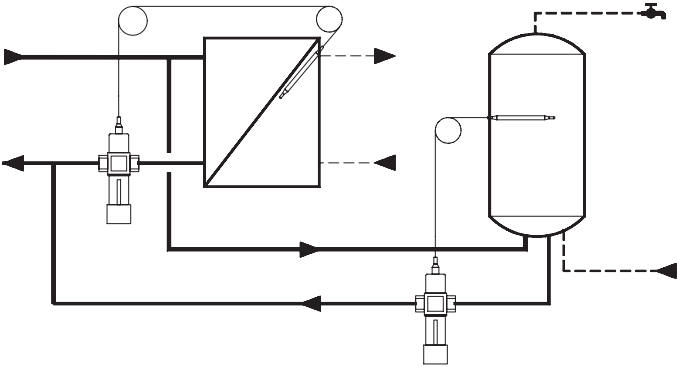
Note:

1. **013U8102** — For thermostatic actuators 20 ... 60°C and 30 ... 100°C; code includes housing and gasket of sensor stuffing box.



Overview

Application examples



Slow control system, setting range 30 ... 100°C
Fast control system, setting range 0 ... 30°C/20 ... 60°C

Functions

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	

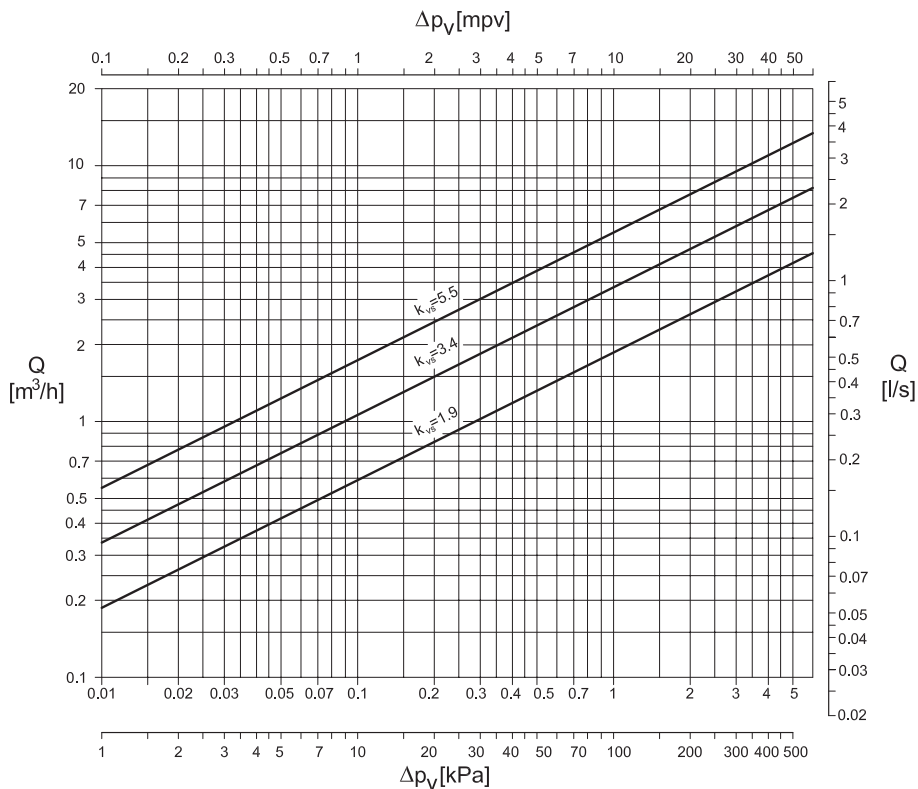
Product details

General data

Technical data

Nominal diameter	DN	15	20	25
k _{VS} value	m ³ /h	1.9	3.4	5.5
Cavitation factor z		0.4	0.4	0.4
Nominal pressure	PN	16	16	16
Max. differential pressure	bar	10	10	10
Medium		Circulation water/glycolic water up to 30%	Circulation water/glycolic water up to 30%	Circulation water/glycolic water up to 30%
Medium pH		Min. 7, max. 10	Min. 7, max. 10	Min. 7, max. 10
Medium temperature	°C	2 ... 130	2 ... 130	2 ... 130
Connections, valve		Internal and external thread	Internal and external thread	Internal and external thread
Connections, tailpieces		Weld-on and external thread	Weld-on and external thread	Weld-on and external thread

Sizing



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

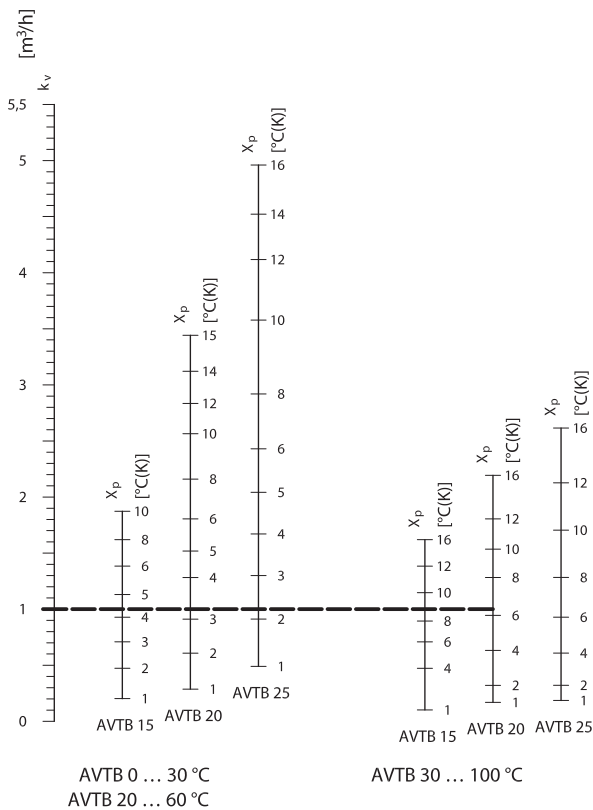
$$k_v = \frac{Q}{\sqrt{\Delta p}} = \frac{1.3}{\sqrt{1.7}} = 1.0 \text{ m}^3/\text{h}$$

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.

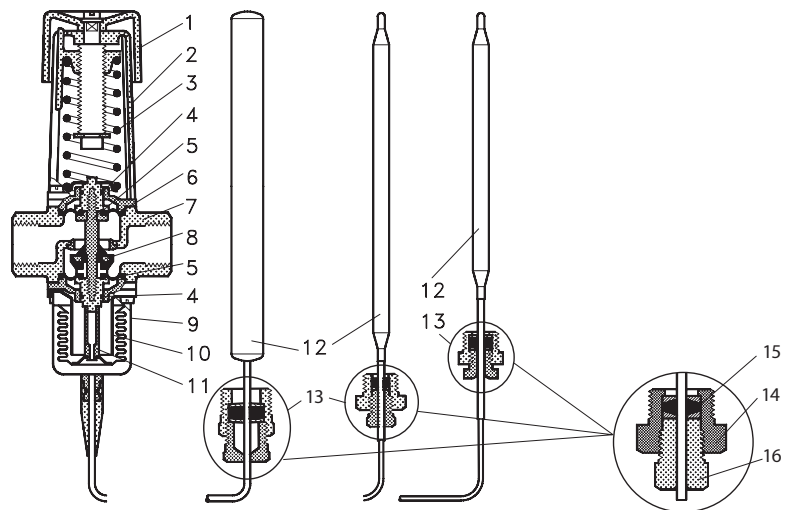


AVTB diagram to determine valve size, temperature range and proportional band (X_p).

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

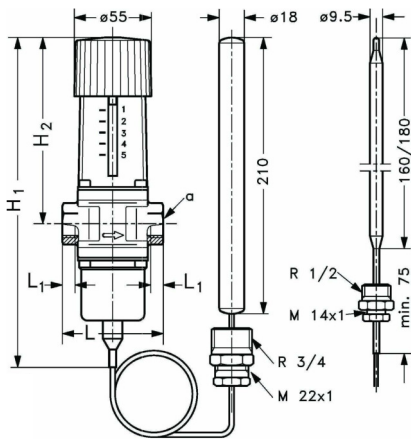




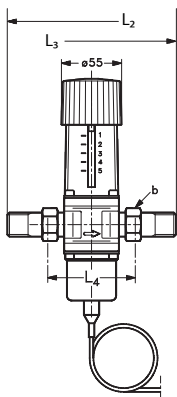
Materials

Valve body, internal thread	MS 58, hot-pressed, DIN 17660, W.No. 2.0402, CuZn40Pb2
Valve body, 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
Sensor charge, 20 ... 60 °C	Butane R600, C4H10
Sensor charge, 30 ... 100 °C	Carbon dioxide, CO2

Dimensions

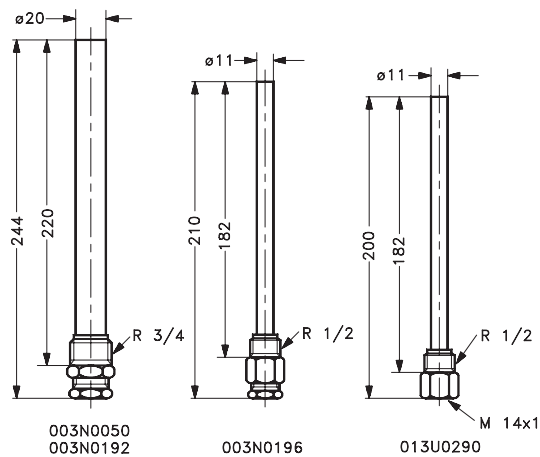


AVTB with internal thread

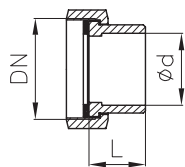


AVTB with external thread

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

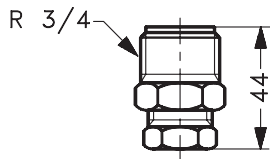


Immersion pockets

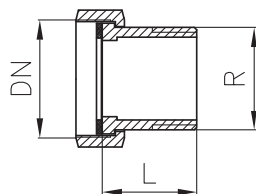


Weld-on tailpieces

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



Sensor stuffing box



External thread tailpieces

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

Installation

Installation positions

Temperature controller

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

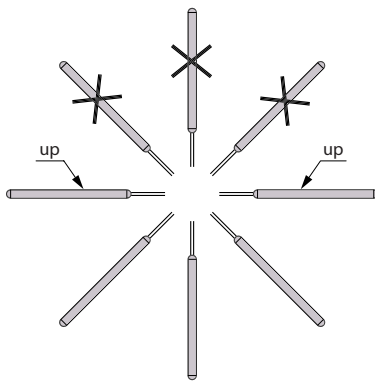
AVTB 20 ... 60 must always be installed in the return line (sensor warmer than valve).

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.

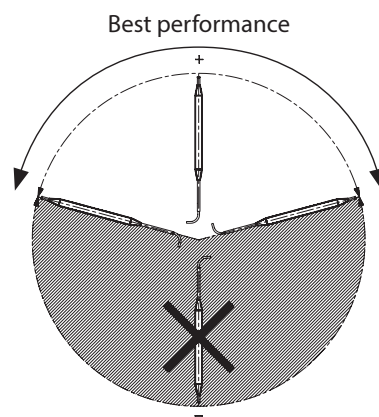
AVTB 0 ... 30 and 30 ... 100 can be installed either in flow or in return line.

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.

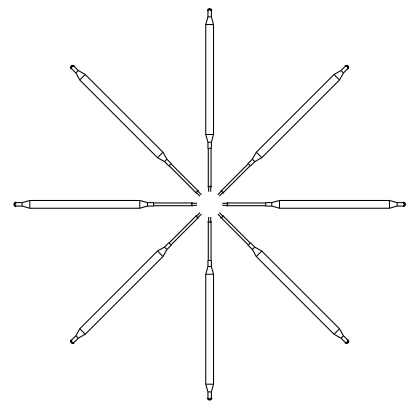
Temperature sensor



Sensor Ø 18 × 210 mm ²⁾
(AVTB 0 ... 30 °C)



Sensor Ø 9.5 × 180 mm ¹⁾
(AVTB 20 ... 60 °C)



Sensor Ø 9.5 × 150 mm ²⁾
(AVTB 30 ... 100 °C)

¹⁾ The sensor is to be mounted where the system temperature is warmer than the temperature in the valve body.

²⁾ The sensor can be mounted where the system temperature is either warmer or colder than the temperature in the valve body.

Certificates, declarations and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Issuer	Approval topic
EAC Declaration	EAC KZ 7100841.13.12.02363	EAC - Eurasian Customs Union	MD
UA Declaration	Danfoss UA 10.01.23 Heat Control Valves	Danfoss	
Manufacturer's Declaration	Danfoss MD 090922EN0808101.01	Danfoss	Pressure
Manufacturer's Declaration	Danfoss MD 003N9613.AB	Danfoss	Pressure
Export Control Declaration	Temperature controllers	Danfoss	
Export Control Declaration	Actuators pressure flow and temperature	Danfoss	
Pressure Safety Certificate	Certificate B (UA.TR.131.B.2655-26) Control valves	Academtest LLC	Pressure
Pressure Safety Certificate	Certificate D (UA.TR.131.B.2655-26) Control valves	Academtest LLC	Pressure
Pressure Safety Certificate	Declaration Control valves	Danfoss	Pressure
Manufacturer's Declaration	Danfoss MD 003N9614.AB	Danfoss	China RoHS
EU Declaration	Packaging EU Declaration of Conformity 260707EN0801	Danfoss	Packaging

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