Data sheet

Motorized control valves

VRB 2 / VRB 3

Seated valves (PN 16)

Description

VRB valves provide a quality, cost effective solution for most water and chilled applications.

The valves are designed to be combined with following actuators:

- With AMV(E) 335, AMV(E) 435 or AMV(E) 438 SU actuators.
- With AMV(E) 25, 25 SU/SD, 35 actuators (with adapter 065Z0311).

Combinations of actuators is evident under section “Dimension”.

Features & benefits

- Bubble tight design
- Snap mechanical connection together with AMV(E) 335, AMV(E) 435
- Dedicated 2 and 3-port valve
- Suitable for diverting applications (3-port)

Ordering

Product code numbers

Type	Description	Diameter [mm]	Kvs values [m³/h]	Connection types	Code number	VVS DK
VRB 2	VRB 2 PN16 15/0,63 2-way seated ext. thr	15	0.63	External Thread	065Z0171	461002044
VRB 2	VRB 2 PN16 15/0,63 2-way seated int. thr	15	0.63	Internal thread	065Z0231	461003044
VRB 2	VRB 2 PN16 15/1 2-way seated ext. thr	15	1.00	External Thread	065Z0172	461002054
VRB 2	VRB 2 PN16 15/1 2-way seated int. thr	15	1.00	Internal thread	065Z0232	461003054
VRB 2	VRB 2 PN16 15/1,6 2-way seated ext. thr	15	1.60	External Thread	065Z0173	461002064
VRB 2	VRB 2 PN16 15/1,6 2-way seated int. thr	15	1.60	Internal thread	065Z0233	461003064
VRB 2	VRB 2 PN16 15/2,5 2-way seated ext. thr	15	2.50	External Thread	065Z0174	461002074
VRB 2	VRB 2 PN16 15/2,5 2-way seated int. thr	15	2.50	Internal thread	065Z0234	461003074
VRB 2	VRB 2 PN16 15/4 2-way seated ext. thr	15	4.00	External Thread	065Z0175	461002084
VRB 2	VRB 2 PN16 15/4 2-way seated int. thr	15	4.00	Internal thread	065Z0235	461003084
VRB 2	VRB 2 PN16 20/6,3 2-way seated ext. thr	20	6.30	External Thread	065Z0176	461002106
VRB 2	VRB 2 PN16 20/6,3 2-way seated int. thr	20	6.30	Internal thread	065Z0236	461003106
VRB 2	VRB 2 PN16 25/10 2-way seated ext. thr	25	10.00	External Thread	065Z0177	461002108
VRB 2	VRB 2 PN16 25/10 2-way seated int. thr	25	10.00	Internal thread	065Z0237	461003108
VRB 2	VRB 2 PN16 32/16 2-way seated ext. thr	32	16.00	External Thread	065Z0178	461002110
VRB 2	VRB 2 PN16 32/16 2-way seated int. thr	32	16.00	Internal thread	065Z0238	461003110
VRB 2	VRB 2 PN16 40/25 2-way seated ext. thr	40	25.00	External Thread	065Z0179	461002111
VRB 2	VRB 2 PN16 40/25 2-way seated int. thr	40	25.00	Internal thread	065Z0239	461003111
VRB 2	VRB 2 PN16 50/40 2-way seated ext. thr	50	40.00	External Thread	065Z0180	461002112
VRB 2	VRB 2 PN16 50/40 2-way seated int. thr	50	40.00	Internal thread	065Z0240	461003112
VRB 3	VRB 3 PN16 15/0,63 3-way seated ext. thr	15	0.63	External Thread	065Z0151	461012044
VRB 3	VRB 3 PN16 15/0,63 3-way seated int. thr	15	0.63	Internal thread	065Z0211	461013044
VRB 3	VRB 3 PN16 15/1 3-way seated ext. thr	15	1.00	External Thread	065Z0152	461012054
VRB 3	VRB 3 PN16 15/1 3-way seated int. thr	15	1.00	Internal thread	065Z0212	461013054
VRB 3	VRB 3 PN16 15/1,6 3-way seated ext. thr	15	1.60	External Thread	065Z0153	461012064
VRB 3	VRB 3 PN16 15/1,6 3-way seated int. thr	15	1.60	Internal thread	065Z0213	461013064
VRB 3	VRB 3 PN16 15/2,5 3-way seated ext. thr	15	2.50	External Thread	065Z0154	461012074
VRB 3	VRB 3 PN16 15/2,5 3-way seated int. thr	15	2.50	Internal thread	065Z0214	461013074
VRB 3	VRB 3 PN16 15/4 3-way seated ext. thr	15	4.00	External Thread	065Z0155	461012084
VRB 3	VRB 3 PN16 15/4 3-way seated int. thr	15	4.00	Internal thread	065Z0215	461013084
VRB 3	VRB 3 PN16 20/6,3 3-way seated ext. thr	20	6.30	External Thread	065Z0156	461012106
VRB 3	VRB 3 PN16 20/6,3 3-way seated int. thr	20	6.30	Internal thread	065Z0216	461013106
VRB 3	VRB 3 PN16 25/10 3-way seated ext. thr	25	10.00	External Thread	065Z0157	461012108
VRB 3	VRB 3 PN16 25/10 3-way seated int. thr	25	10.00	Internal thread	065Z0217	461013108
VRB 3	VRB 3 PN16 32/16 3-way seated ext. thr	32	16.00	External Thread	065Z0158	461012110
VRB 3	VRB 3 PN16 32/16 3-way seated int. thr	32	16.00	Internal thread	065Z0218	461013110
VRB 3	VRB 3 PN16 40/25 3-way seated ext. thr	40	25.00	External Thread	065Z0159	461012111
VRB 3	VRB 3 PN16 40/25 3-way seated int. thr	40	25.00	Internal thread	065Z0219	461013111
VRB 3	VRB 3 PN16 50/40 3-way seated ext. thr	50	40.00	External Thread	065Z0160	461012112
VRB 3	VRB 3 PN16 50/40 3-way seated int. thr	50	40.00	Internal thread	065Z0220	461013112

Example: 3-way valve; DN 15; k_{VS} 1,6; PN 16; T_{max} 130 °C; ext. thread *Option:*

- 1× VRB 3 DN 15 valve
Code No.: ***065Z0153***

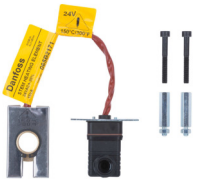
- 3× Tailpieces
Code No.: ***065Z0291***

Accessories code numbers

065Z0293

Tailpiece DN25 PN16 int.thread Rp1

Tailpiece DN25 PN16 int.thread Rp1



065B2171

STEM HEATER

STEM HEATER

065Z0315

Stem heater for AMV(E) 335/435, AME 435 QM, NovoCon M

Stem heater for AMV(E) 335/435, AME 435 QM, NovoCon M

065Z0323

Valve stuff.box VRB,VRG,VF,VL DN25 g200

Valve stuff.box VRB,VRG,VF,VL DN25 g200

065Z0311

AdapAMx15/16/25/35-VRB/G,VF/L2009dn15-50

AdapAMx15/16/25/35-VRB/G,VF/L2009dn15-50

065Z0291

Tailpiece DN15 PN16 int.thread Rp#

Tailpiece DN15 PN16 int.thread Rp#

065Z0321

Valve stuff.box VRB,VRG,VF,VL DN15 g200

Valve stuff.box VRB,VRG,VF,VL DN15 g200

065Z0292

Tailpiece DN20 PN16 int.thread Rp#

Tailpiece DN20 PN16 int.thread Rp#

065Z0322

Valve stuff.box VRB,VRG,VF,VL DN20 g200

Valve stuff.box VRB,VRG,VF,VL DN20 g200

065Z0295

Tailpiece DN40 PN16 int.thread Rp1#

Tailpiece DN40 PN16 int.thread Rp1#

065Z0325

Valve stuff.box VRB,VRG,VF,VL DN40,50g0

Valve stuff.box VRB,VRG,VF,VL DN40,50g0

065Z0294

Tailpiece DN32 PN16 int.thread Rp1¼

Tailpiece DN32 PN16 int.thread Rp1¼

065Z0324

Valve stuff.box VRB,VRG,VF,VL DN32 g200

Valve stuff.box VRB,VRG,VF,VL DN32 g200

065Z0296

Tailpiece DN50 PN16 int.thread Rp2

Tailpiece DN50 PN16 int.thread Rp2

Note:

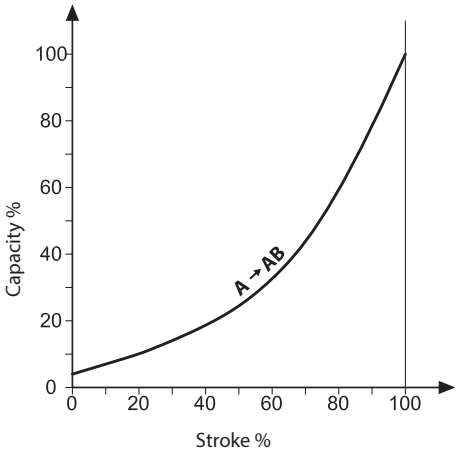
[1] 1 tailpiece internal thread for VRB ext. thread (Ms - CuZn39Pb3)

[2] AMV(E) 25(SU/SD)/35 can only be used in a combination with adapter 065Z0311

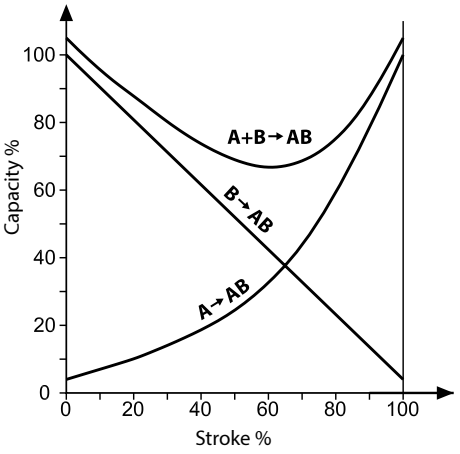
Functions

Valve characteristics

Valve characteristics log (2-way)



Valve characteristics log/lin (3-way)



Product details

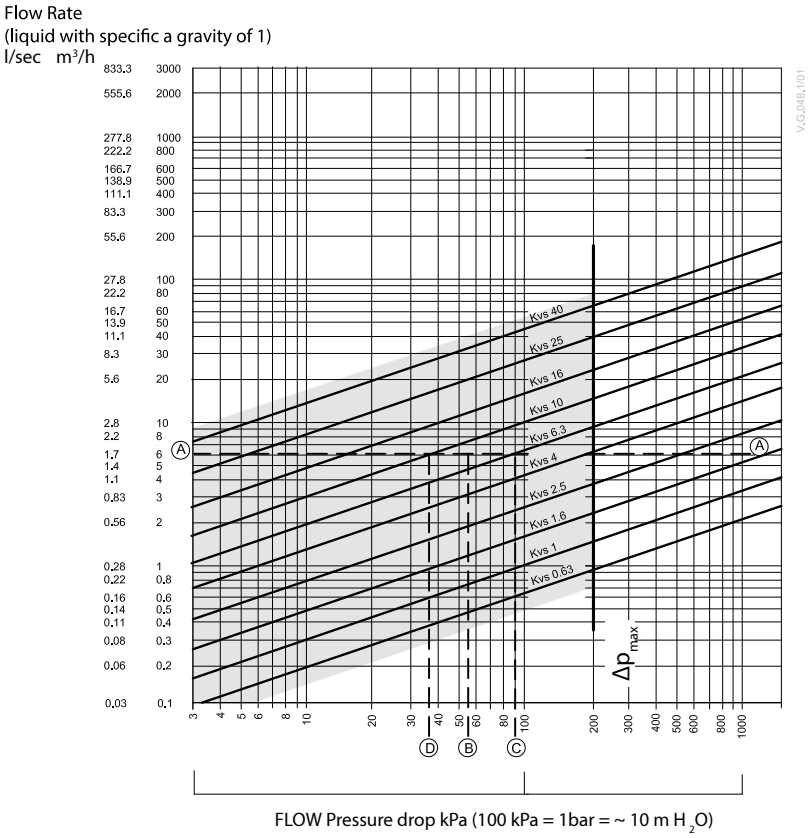
General data

Technical data

Nominal diameter	DN	15					20	25	32	40	50
k_{VS} value	m^3/h	0.63	1.0	1.6	2.5	4.0	6.3	10	16	25	40
Stroke	mm	10							15		
Control range		30:1	50:1				100:1				
Control characteristic		LOG: port A-AB; LIN: port B-AB									
Cavitation factor z		≥ 0,4									
Leakage		A - AB bubble tight design									
		B - AB ≤ 1.0 % of k_{VS}									
Nominal pressure	PN	16									
Max. closing pressure	bar	Mixing: 4									
		Diverting: 1									
Medium		Circulation water / glycolic water up to 50 %									
Medium pH		Min. 7, Max. 10									
Medium temperature	°C	2 (–10 [1])) … 130									
Connections		Int. and ext. thread									

[1] *At temperatures from –10 up to +2 °C use stem heater*

Sizing



Example

Design data:

Flow rate: 6 m³/h

System pressure drop: 55 kPa

Locate the horizontal line representing a flow rate of 6 m³/h (line A-A). The valve authority is given by the equation:

$$\text{Valve authority, } a = \frac{\Delta p_1}{\Delta p_1 + \Delta p_2}$$

Where:

Δp_1 = pressure drop across the fully open valve

Δp_2 = pressure drop across the rest of the circuit with a full open valve

The ideal valve would give a pressure drop equal to the system pressure drop (i.e. an authority of 0,5):

if: $\Delta p_1 = \Delta p_2$

$$a = \frac{\Delta p_1}{\Delta p_1 + \Delta p_2} = 0.5$$

In this example an authority of 0,5 would be given by a valve having a pressure drop of 55 kPa at that flow rate (point B). The intersection of line A–A with a vertical line drawn from B lies between two diagonal lines; this means that no ideally-sized valve is available.

The intersection of line A–A with the diagonal lines gives the pressure drops stated by real, rather than ideal, valves. In this case, a valve with kVS 6,3 would give a pressure drop of 90,7 kPa (point C):

$$\text{hence valve authority} = \frac{90.7}{90.7+55} = 0.62$$

The second largest valve, with k_{VS} 10, would give a pressure drop of 36 kPa (point D):

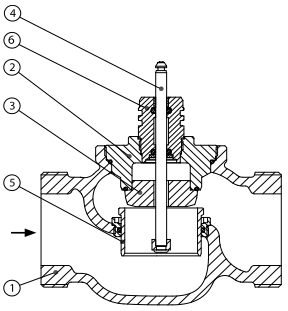
$$\text{hence valve authority} = \frac{36}{36+55} = 0.395$$

Generally, for a 3 port application, the smaller valve would be selected (resulting in a valve authority higher than 0,5 and therefore improved control). However, this will increase the total pressure and should be checked by the system designer for compatibility with available pump heads, etc. The ideal authority is 0,5 with a preferred range of between 0,4 and 0,7.

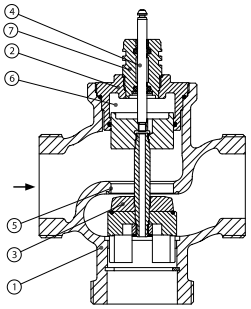
Design

(Design variations are possible)

VRB 2
1. Valve body
2. Valve insert
3. Valve cone
4. Valve stem
5. Moving valve seat (pressure relieved)
6. Stuffing box



VRB 3
1. Valve body
2. Valve insert
3. Valve cone
4. Valve stem
5. Valve seat
6. Pressure relieve chamber
7. Stuffing box

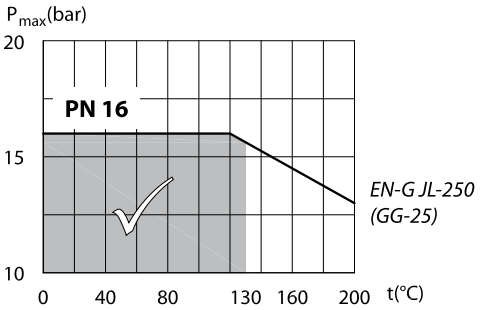


Materials

Valve body	Red bronze CuSn5ZN5Pb5 (Rg5)
Valve stem	Stainless steel
Valve cone	Brass
Stuffing box sealing	EPDM

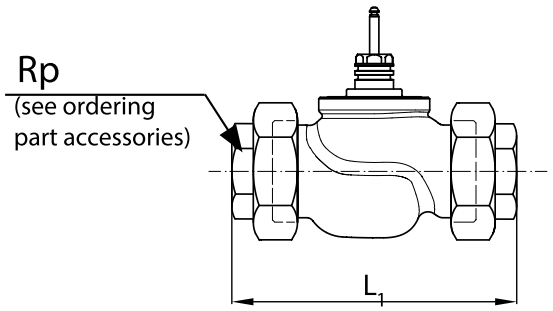
Pressure and temperature data

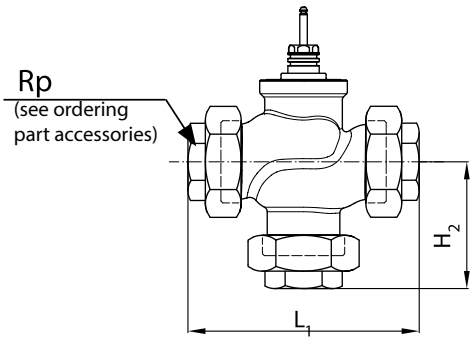
Pressure temperature diagram

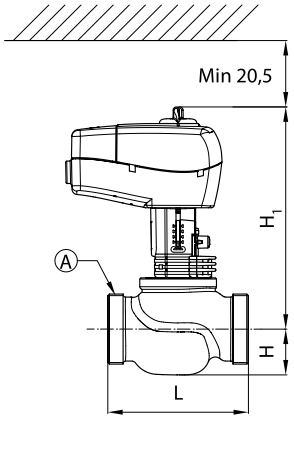


Maximum allowed operating pressure as a function of medium temperature.

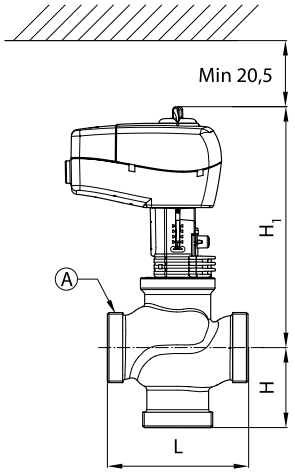
Dimensions



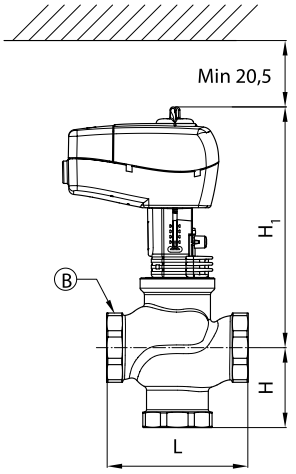




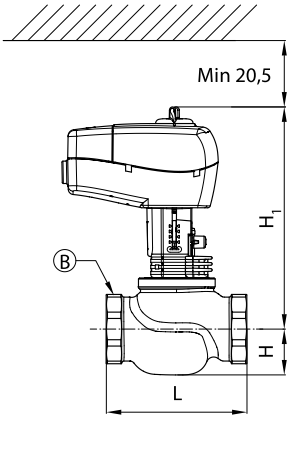
AMV(E) 335, 435 + VRB 2



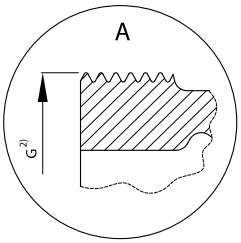
AMV(E) 335, 435 + VRB 3

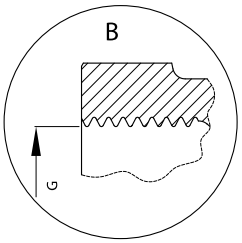


AMV(E) 335, 435 + VRB 2



AMV(E) 335, 435 + VRB 3



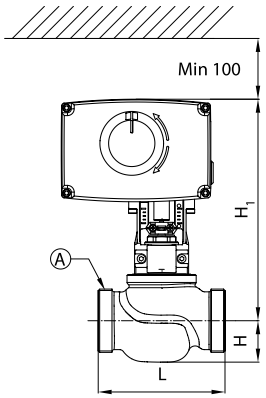


Type	DN	Connection		L	H	H_1	L_1	H_2	Weight (kg)	
		Rp 1)	G 2)	mm					ext. thread	int. thread
VRB 2	15	½	1	80	25	191	128	-	0.61	0.60
	20	¾	1 ¼	80	29	194	128		0.78	0.77
	25	1	1 ½	95	29	197	151		1.00	0.98
	32	1 ¼	2	112	33	202	178		1.57	1.43
	40	1 ½	2 ¼	132	43	213	201		2.62	2.54
	50	2	2 ¾	160	47	217	234		3.76	3.49
VRB 3	15	½	1	80	40	191	128	64	0.70	0.71
	20	¾	1 ¼	80	45	194	128	69	0.93	0.91
	25	1	1 ½	95	50	197	151	78	1.21	1.15
	32	1 ¼	2	112	58	202	178	91	1.95	1.81
	40	1 ½	2 ¼	132	75	230	201	110	3.39	3.35
	50	2	2 ¾	160	83	243	234	120	5.46	5.13

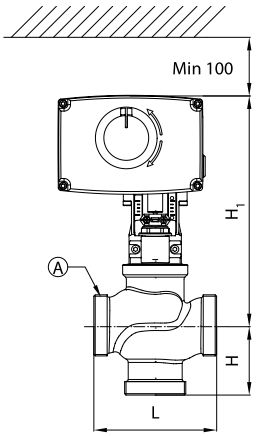
1) Rp … internal thread EN 10226-1

2) G … external thread DIN ISO 228/01

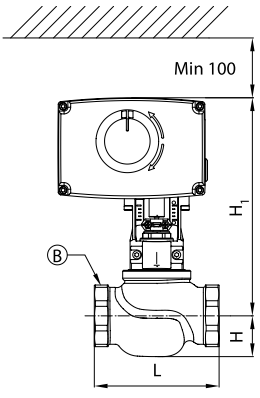
If stem heater is used dimension H1 is increased for 31 mm.



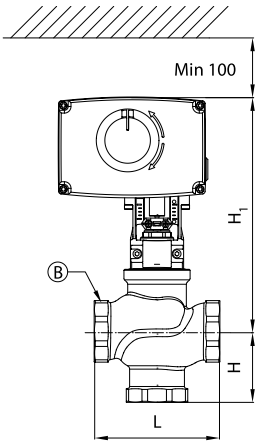
AMV(E) 438 SU + VRB 2
AMV(E) 25/35 +VRB 2 +
*adapter **065Z0311***



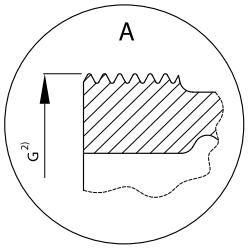
AMV(E) 438 SU + VRB 2
AMV(E) 25/35 +VRB 2 +
adapter **065Z0311**

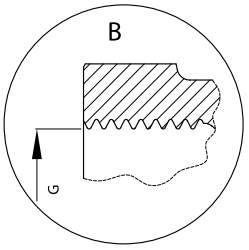


AMV(E) 438 SU + VRB 2
AMV(E) 25/35 +VRB 2 +
*adapter **065Z0311***



AMV(E) 438 SU + VRB 3
AMV(E) 25/35 +VRB 3 +
*adapter **065Z0311***





Type	DN	Connection		L	H	H1
		Rp [1]	G [2]	mm		
VRB 2	15	½	1	80	25	216
	20	¾	1 ¼	80	29	218
	25	1	1 ½	95	29	222
	32	1 ¼	2	112	35	226
	40	1 ½	2 ¼	132	43	237
	50	2	2 ¾	160	47	242
VRB 3	15	½	1	80	40	216
	20	¾	1 ¼	80	45	218
	25	1	1 ½	95	50	222
	32	1 ¼	2	112	58	226
	40	1 ½	2 ¼	132	75	255
	50	2	2 ¾	160	83	268

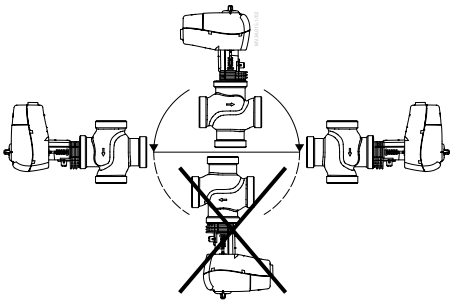
[1] *Rp … internal thread EN 10226-1*

[2] *G … external thread DIN ISO 228/01*

If stem heater is used dimension H1 is increased for 5 mm.

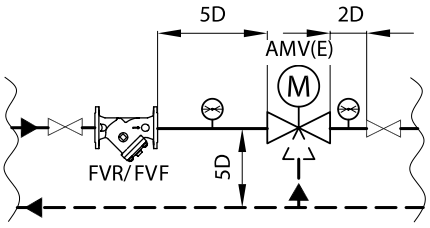
Installation

Valve mounting
Before valve mounting the pipes have to be cleaned and free from abrasion. Valve must be mounted according to flow direction as indicated on valve body, except by diverting, where valve can be mounted oposite to the flow direction (flow oposite to indication on the valve body). Mechanical loads of the valve body caused by the pipes are not allowed. Valve should be free of vibrations as well.



Installation of the valve with the actuator is allowed in horizontal position or upwards. Installation downwards is not allowed.

Always install the valve with the arrow on the body in the same direction as the flow. In order to avoid turbulence, which will affect the measuring accuracy, it is recommended to have a straight length of pipe up and down stream from the valve as shown (D - diameter of pipe).



Note: Install a strainer upstream of the valve (e.g. Danfoss FVR/FVF)

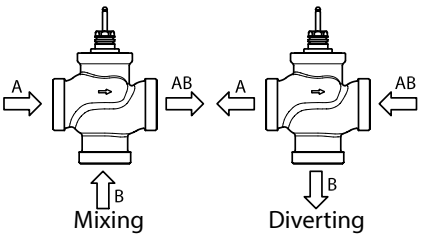


Fig. 1: Mixing or diverting connection

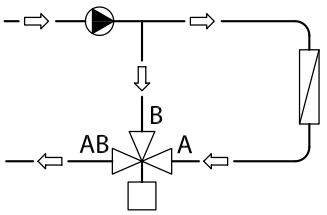


Fig. 3: Mixing valve used in diverting application

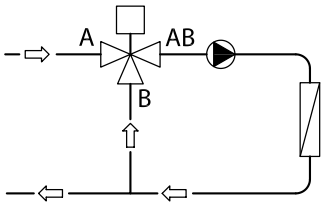


Fig. 2: Mixing valve used in mixing application

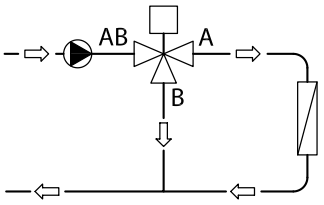


Fig. 4: Diverting valve used in diverting application

Mixing or diverting connection
3-way valve can be used either as mixing or diverting valve (fig.1).
If 3-way valve is installed as mixing valve meaning that A and B ports are inlet ports, and AB port is outlet port it can be installed in mixing (fig.2) or diverting application (fig.3).
3-way valve can be also installed as diverting valve in diverting application (fig.4) meaning that AB port is inlet and A and B ports are outlets.

Note: Maximal closing pressure for mixing and diverting installation are not the same. Please refer to values stated in Technical data section.

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	Certification body	Approval topic
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UA Declaration	Danfoss UA 10.01.23 Heat Control Valves	Danfoss	
Export Control Declaration	Butterfly, other valves, Manual balancing valves, one pipe solution valves and hot water balancing valves	Danfoss	
EAC Declaration	EAC KZ 7100841.13.12.02339	EAC - Eurasian Customs Union	MD

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