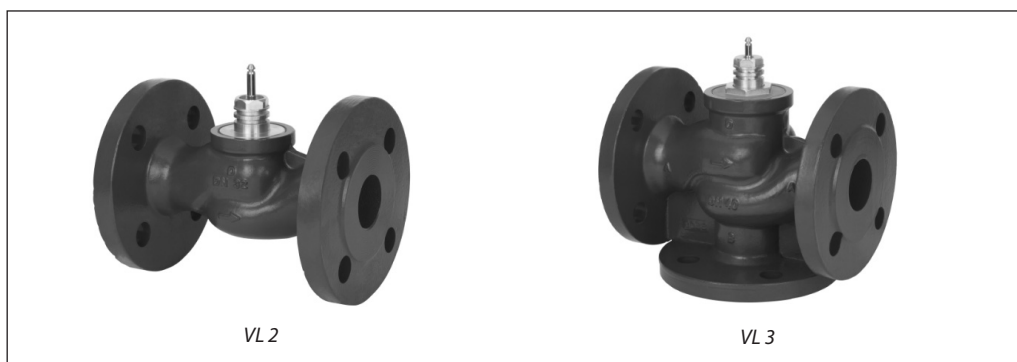# Data sheet

Seated valves (PN 6)

VL 2 – 2-way valve, flange
VL 3 – 3-way valve, flange

Description

VL 2

VL 3

VL 2 and VL 3 valves provide a quality, cost effective solution for most water and chilled applications.

The valves are designed to be combined with following actuators:
- DN 15-50   with AMV(E) 335, AMV(E) 435 or AMV(E) 438 SU actuators
- DN 65-80   with AMV(E) 335 or AMV(E) 435 actuators
- DN 100   with AMV(E) 55 or AMV(E) 56, AMV 423, AMV 523 actuators

Combinations with other actuators could be seen under Accessories.

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

Main data:
- DN 15-100
- k_{VS} 0,63-145 m³/h
- PN 6
- Temperature:
  - Circulation water/glycolic water up to 50 %: 2 (−10 [1]) … 120 °C
  [1] At temperatures from −10 °C up to +2 °C use stem heater
- Flange PN 6 connections
- Compliance with Pressure Equipment Directive 97/23/EC

Ordering

Example:
2-way valve; DN 15; k_{VS} 1,6; PN 6; T_{max} 120 °C; flange connection

- 1× VL 2 DN 15 valve
  Code No.: **065Z0373**

2-way valve **VL 2**

DN	k_{VS} (m³/h)	T_{max} (°C)	Code No.
	0,63		**065Z0371**
	1,0		**065Z0372**
15	1,6		**065Z0373**
	2,5		**065Z0374**
	4,0		**065Z0375**
20	6,3		**065Z0376**
25	10	120	**065Z0377**
32	16		**065Z0378**
40	25		**065Z0379**
50	40		**065Z0380**
65	63		**065Z0381**
80	100		**065Z0382**
100	145		**065Z3426**

3-way valve **VL 3**

DN	k_{VS} (m³/h)	T_{max} (°C)	Code No.
	0,63		**065Z0351**
	1,0		**065Z0352**
15	1,6		**065Z0353**
	2,5		**065Z0354**
	4,0		**065Z0355**
20	6,3		**065Z0356**
25	10	120	**065Z0357**
32	16		**065Z0358**
40	25		**065Z0359**
50	40		**065Z0360**
65	63		**065Z0361**
80	100		**065Z0362**
100	145		**065Z3413**

Ordering (continued)

Accessories - **Adapter**

DN	Actuators	max. Δp (bar)	Code No.
15-50	AMV(E) 15, 25, 35, 323, 423, 523	4,0	**065Z0311**
65-80	AMV(E) 55, 56, 323, 423, 523	2,5	**065Z0312**

Accessories - **Stem heater**

DN	Actuators	Power supply	Code No. Stem Heater	Code No. Adapter
15-80	AMV(E) 335, 435			/
15-50	AMV(E) 438 SU			**enclosed**
15-50	AMV(E) 25/35	24 V	**065Z0315**	**065Z0311**
65-80	AMV(E) 55, 56			**065Z0312**
100	AMV(E) 55, 56		**065Z7020**	/
100	AMV 423, 523		/	/

Service kits

Type	DN	Code No.
	15	**065Z0321**
	20	**065Z0322**
	25	**065Z0323**
Stuffing box	32	**065Z0324**
	40/50	**065Z0325**
	65/80	**065Z0327**
	100	**065B1360**

Technical data

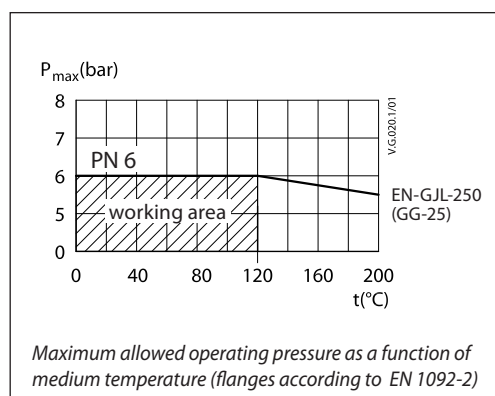| Nominal diameter	DN	15					20	25	32	40	50	65	80	100
k_{VS} value	m³/h	0,63	1,0	1,6	2,5	4,0	6,3	10	16	25	40	63	100	145
Stroke	mm	10								15		20		30
Control range		30:1		50:1			100:1								
Control characteristic		LOG: port A-AB; LIN: port B-AB													
Cavitation factor z		≥ 0,4													
Leakage		A - AB bubble tight design												0,05 % of k_{VS}
		B - AB ≤ 1,0 % of k_{VS}												
Nominal pressure	PN	6												
Max. closing pressure [1] (mixing)	bar	4										2,5		1,0 [2]
Max. closing pressure [1] (diverting)		1										0,6		0,3 [2]
Medium		Circulation water / glycolic water up to 50 %												
Medium pH		Min. 7, Max. 10												
Medium temperature	ºC	2(−10 [3]) … 120												
Connections		Flange PN 6 acc. to EN 1092-2												
Materials														
Valve body		Grey cast iron EN-GJL-250 (GG-25)												
Valve stem		Stainless steel												
Valve cone		Brass [4]												
Stuffing box sealing		EPDM												

[1] *Maximum permissible differential pressure across the valve reffered for the whole actuating range of motorised valve (a function of actuator's performance)*
[2] *for actuator AMV(E) 55*
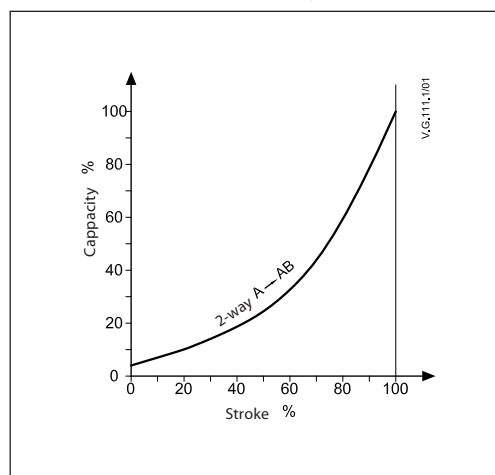[3] *At temperatures from −10 up to +2 °C use stem heater*
[4] *At DN 100 red bronze CuSn5Zn5Pb5 (Rg 5)*

Data sheet   **Seated valves VL 2, VL 3**

Pressure temperature diagram

P_{max}(bar)

$$P_{max}(bar)$$

Maximum allowed operating pressure as a function of medium temperature (flanges according to EN 1092-2)
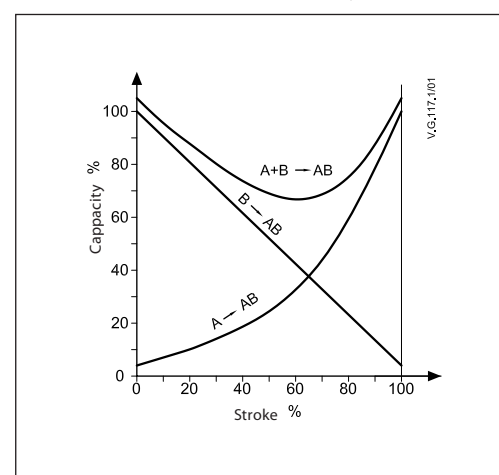
Valve characteristics

Valve characteristics log (2-way)

Valve characteristics log/lin (3-way)

Disposal

The valve must be dismantled and the elements sorted into various material groups before disposal.

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. 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.
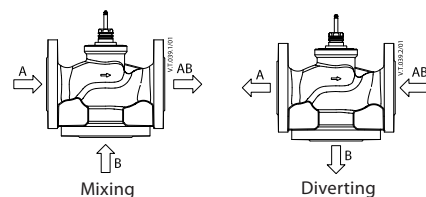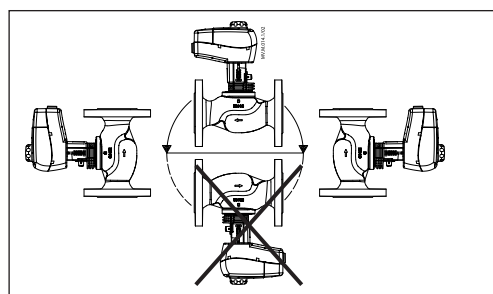
Mixing   Diverting

Fig. 1: Mixing or diverting connection
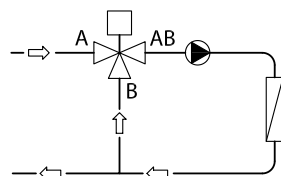
Fig. 2: Mixing valve used in mixing application
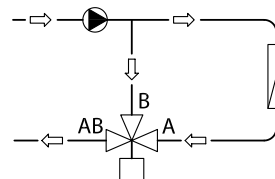
Fig. 3: Mixing valve used in diverting application
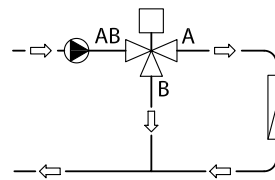
Fig. 4: Diverting valve used in diverting application

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:
Only valves DN 15-100 are suitable for diverting installation. Maximal closing pressure for mixing and diverting installation are not the same. Please refer to values stated in Technical data section.

Sizing

Flow Rate

(liquid with specific a gravity of 1)

FLOW Pressure drop kPa (100 kPa = 1bar = ~ 10 m H₂O)
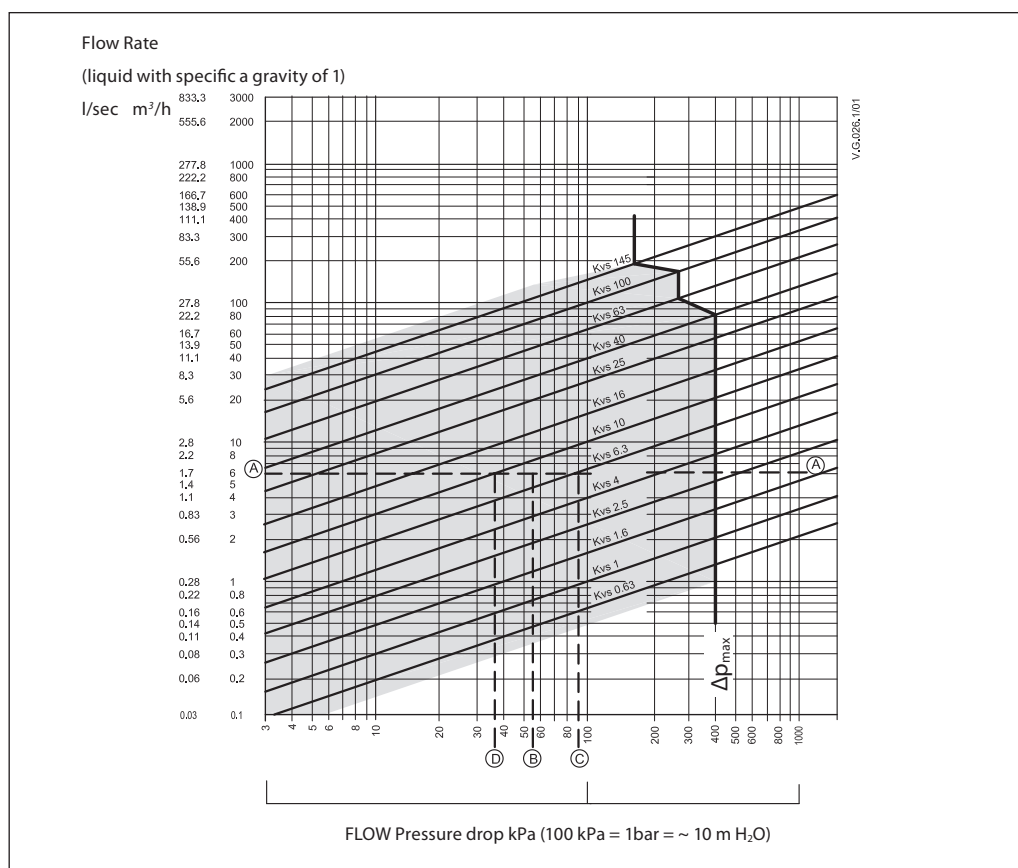
Example

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:

$$\text{Valve authority, } a = \frac{\Delta p1}{\Delta p1 + \Delta p2}$$

Where:
$\Delta p1$ = pressure drop across the fully open valve
$\Delta p2$ = 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:

$$\Delta p1 = \Delta p2$$

$$a = \frac{\Delta p1}{2 \times \Delta p1} = 0,5$$

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 k_{VS} 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.
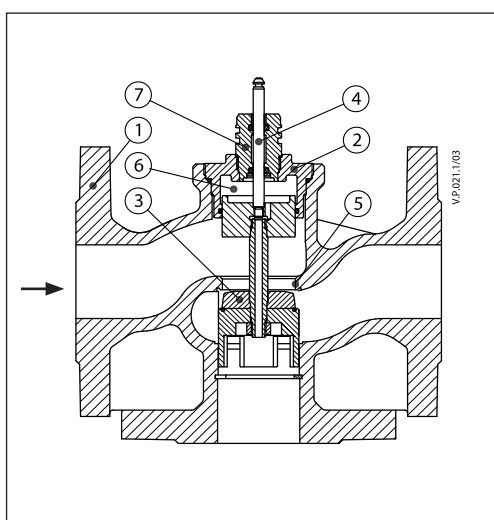
Data sheet **Seated valves VL 2, VL 3**

Design

(Design variations are possible)

VL 2

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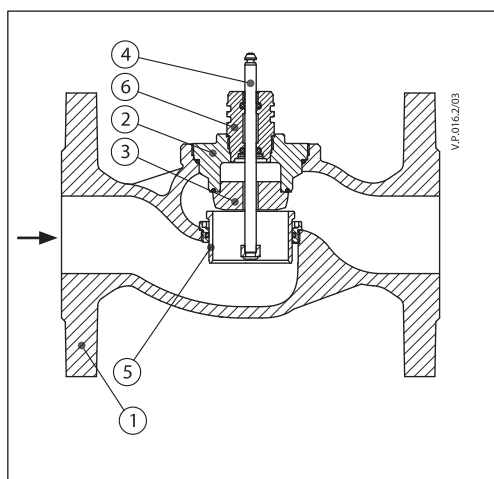
VL 3

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

VD.LS.F6.02 © Danfoss 11/2013

Data sheet   **Seated valves VL 2, VL 3**
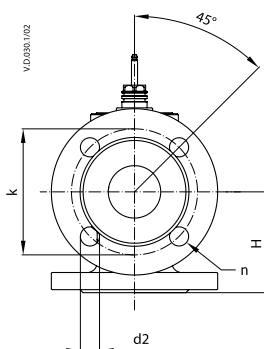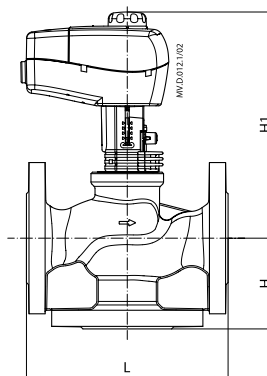
Dimensions
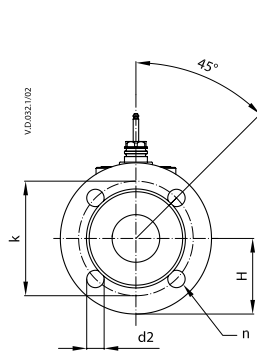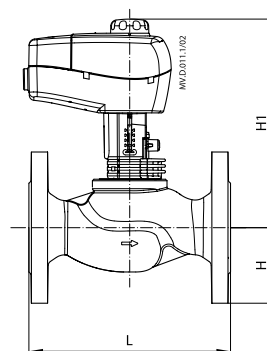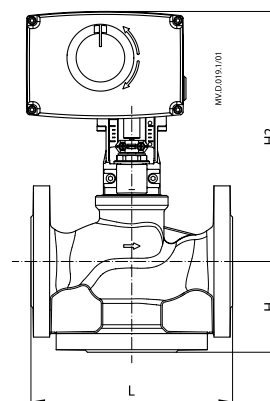

VL 2 (DN 15-80)

AMV(E) 335, 435 +
VL 2 (DN 15-80)
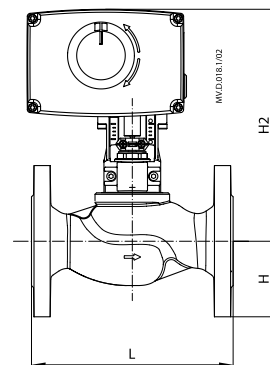
AMV(E) 438 SU +
VL 2 (DN 15-50)

VL 3 (DN 15-80)

AMV(E) 335, 435 +
VL 3 (DN 15-80)

AMV(E) 438 SU +
VL 3 (DN 15-50)

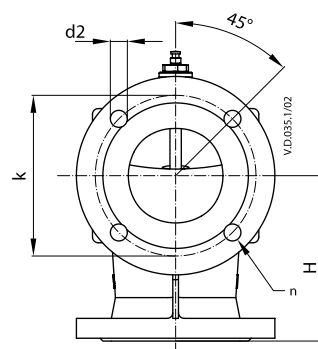| Type	DN	L	H	H1	H2	k	d2	n	Weight
		mm							(kg)
VL 2	15	130	40	191	216	55	11	4	1,48
	20	150	45	194	218	65	11	4	2,07
	25	160	50	197	222	75	11	4	2,59
	32	180	60	202	226	90	14	4	3,82
	40	200	65	213	237	100	14	4	5,28
	50	230	70	218	242	110	14	4	6,74
	65	290	88	254	-	130	14	4	13,90
	80	310	95	258	-	150	19	4	17,22
VL 3	15	130	63	191	216	55	11	4	1,93
	20	150	70	194	218	65	11	4	2,68
	25	160	75	197	222	75	11	4	3,59
	32	180	80	202	226	90	14	4	5,17
	40	200	90	230	255	100	14	4	7,08
	50	230	100	243	267	110	14	4	10,11
	65	290	120	254	-	130	14	4	16,15
	80	310	155	270	-	150	19	4	22,36

Note:
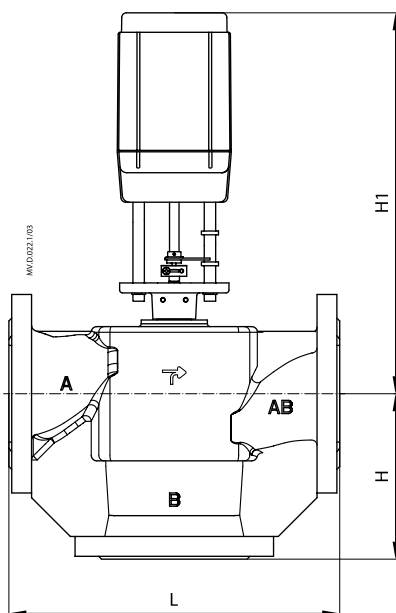*If stem heater is used dimension H is increased for 31 mm, dimension H2 is increased for 5 mm,*
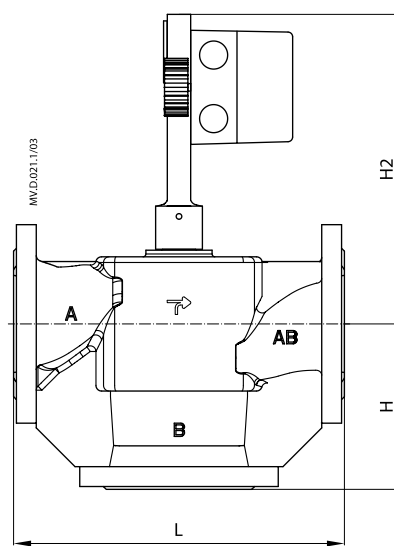
Dimensions *(continued)*
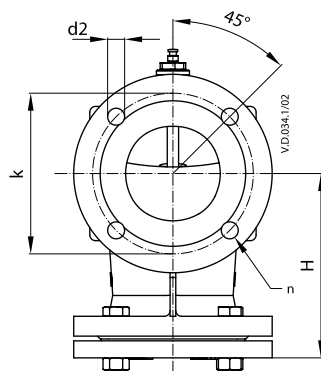
VL 2 (DN 100)

VL 3 (DN 100)

AMV(E) 55, 56 +
VL 2, VL 3 (DN 100)

AMV 423, 523 +
VL 2, VL 3 (DN 100)

Type	DN	L	H	H1	H2	k	d2	n	Weight
				mm					(kg)
VL 2	100	350	196	406	317	170	18	4	39,0
VL 3			175						34,0

Note:
If stem heater is used dimension H remains the same.