

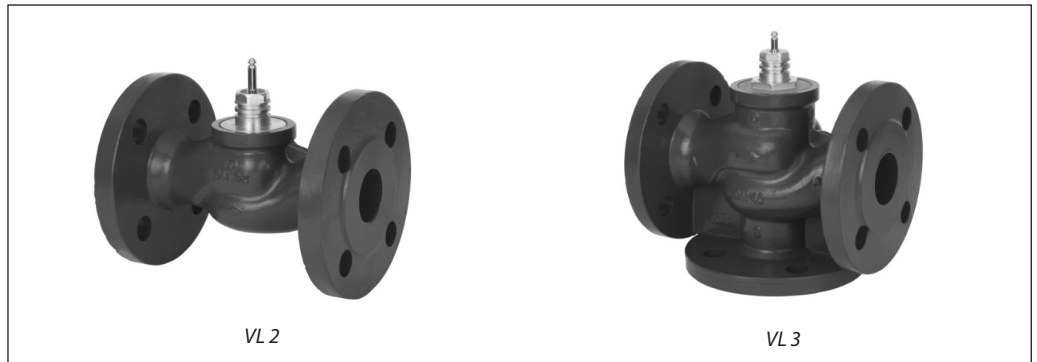
Data sheet

# Seated valves (PN 6)

## VL 2 – 2-way valve, flange

## VL 3 – 3-way valve, flange

Description



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. With AMV(E) 25 (SU/SD) or AMV(E) 35 actuators (with adapter **065Z0311**).
- DN 65-80 with AMV(E) 335 or AMV(E) 435 actuators. With AMV(E) 56 actuator (with adapter **065Z0312**).
- DN 100 with AMV(E) 55 or AMV(E) 56, AMV(E) 655, AMV(E) 658 SU/SD or AMV(E) 659 SD actuators.

Combinations with other actuators could be seen under Accessories.

**Features:**

- Bubble tight design DN 15-80
- Snap mechanical connection together with AMV(E) 335, AMV(E) 435
- Dedicated 2 and 3-port valve
- Suitable for diverting applications (3-port)

**Main data:**

- DN 15-100
- $k_{vs}$  0,63-145 m<sup>3</sup>/h
- PN 6
- Temperature:
  - Circulation water/glycolic water up to 50 %: 2 (-10 <sup>1)</sup> ... 120 °C
  - <sup>1)</sup> At temperatures from -10 °C up to +2 °C use stem heater
- Flange PN 6 connections

**Ordering**

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

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

2-way valve **VL 2**

DN	$k_{vs}$ (m <sup>3</sup> /h)	$T_{max}$ (°C)	Code No.
15	0.63	120	<b>065Z0371</b>
	1.0		<b>065Z0372</b>
	1.6		<b>065Z0373</b>
	2.5		<b>065Z0374</b>
	4.0		<b>065Z0375</b>
20	6.3		<b>065Z0376</b>
25	10		<b>065Z0377</b>
32	16		<b>065Z0378</b>
40	25		<b>065Z0379</b>
50	40		<b>065Z0380</b>
65	63	<b>065Z0381</b>	
80	100	<b>065Z0382</b>	
100	145	<b>065Z3426</b>	

3-way valve **VL 3**

DN	$k_{vs}$ (m <sup>3</sup> /h)	$T_{max}$ (°C)	Code No.
15	0.63	120	<b>065Z0351</b>
	1.0		<b>065Z0352</b>
	1.6		<b>065Z0353</b>
	2.5		<b>065Z0354</b>
	4.0		<b>065Z0355</b>
20	6.3		<b>065Z0356</b>
25	10		<b>065Z0357</b>
32	16		<b>065Z0358</b>
40	25		<b>065Z0359</b>
50	40		<b>065Z0360</b>
65	63	<b>065Z0361</b>	
80	100	<b>065Z0362</b>	
100	145	<b>065Z3413</b>	

**Ordering (continued)**
**Accessories - Adapter**

DN	Actuators	max. $\Delta p$ (bar)	Code No.
15-50	AMV(E) 25, 35	4.0	<b>065Z0311</b>
65-80	AMV(E) 56	2.5	<b>065Z0312</b>

**Accessories - Stem heater**

DN	Actuators	Power supply (V/VA)	Code No. Stem Heater	Code No. Adapter
15-80	AMV(E) 335, 435	24/40	<b>065Z0315</b>	/
15-50	AMV(E) 438 SU			enclosed
15-50	AMV(E) 25/35			<b>065Z0311</b>
65-80	AMV(E) 56			<b>065Z0312</b>
100	AMV(E) 55, 56, 65x	24/15	<b>065Z7020</b>	/

**Service kits**

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

**Technical data**

Nominal diameter	DN	15		20	25	32	40	50	65	80	100			
$k_{vs}$ value	m <sup>3</sup> /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		$\geq 0,4$												
Leakage		A - AB bubble tight design										0.05 % of $k_{vs}$		
		B - AB $\leq 1.0$ % of $k_{vs}$												
Nominal pressure	PN	6												
Max. closing pressure <sup>1)</sup> (mixing)	bar	4								2.5		1.0 <sup>2)</sup>		
Max. closing pressure <sup>1)</sup> (diverting)		1								0.6		0.3 <sup>2)</sup>		
Medium		Circulation water / glycolic water up to 50 %												
Medium pH		Min. 7, Max. 10												
Medium temperature	°C	2(-10 <sup>3)</sup> ) ... 120												
Connections		Flange PN 6 acc. to EN 1092-2												
<b>Materials</b>														
Valve body		Grey cast iron EN-GJL-250 (GG-25)												
Valve stem		Stainless steel												
Valve cone		Brass <sup>4)</sup>												
Stuffing box sealing		EPDM												

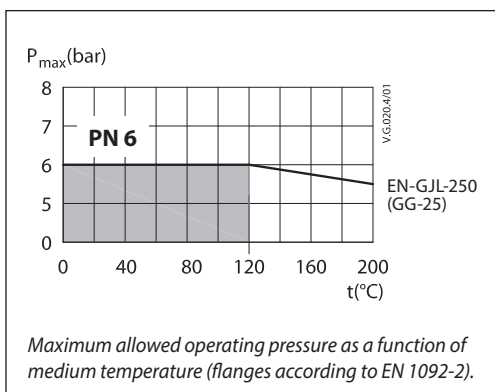
<sup>1)</sup> Maximum permissible differential pressure across the valve referred for the whole actuating range of motorised valve (a function of actuator's performance)

<sup>2)</sup> for actuator AMV(E) 55

<sup>3)</sup> At temperatures from -10 up to +2 °C use stem heater

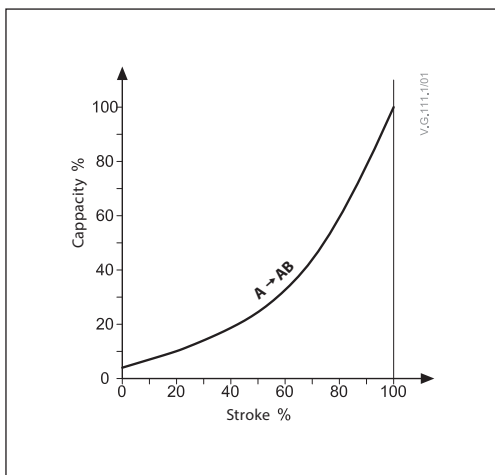
<sup>4)</sup> At DN 100 red bronze CuSn5Zn5Pb5 (Rg 5)

Pressure temperature diagram

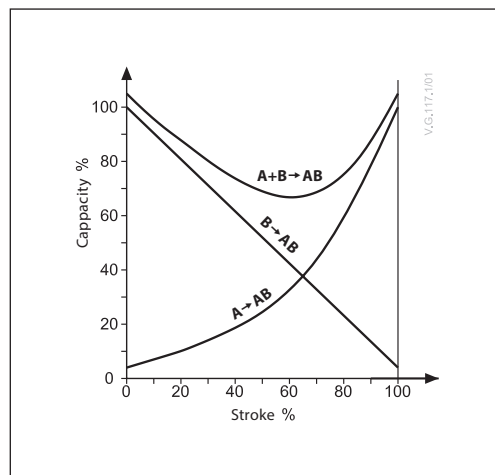


Valve characteristics

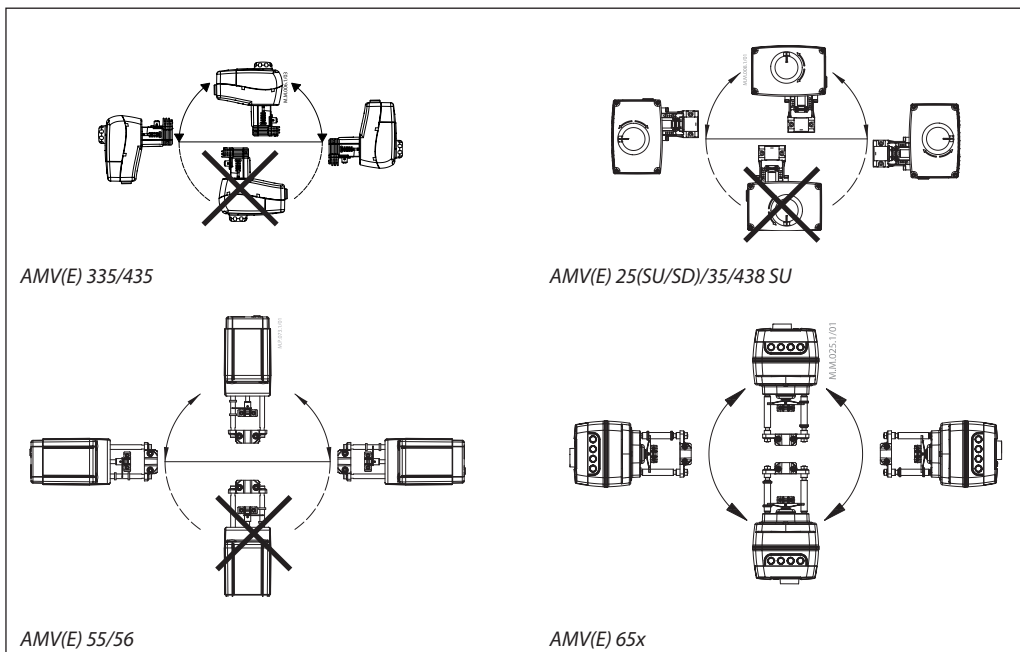
Valve characteristics log (2-way)



Valve characteristics log/lin (3-way)



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.

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)**

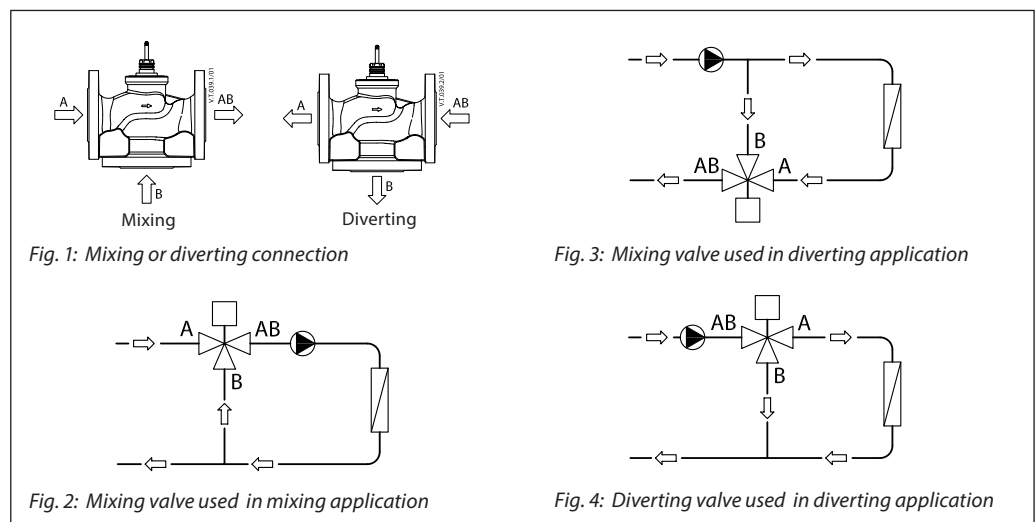
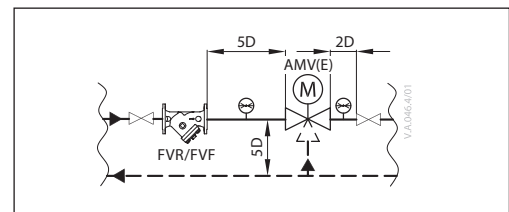


Fig. 1: Mixing or diverting connection

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).

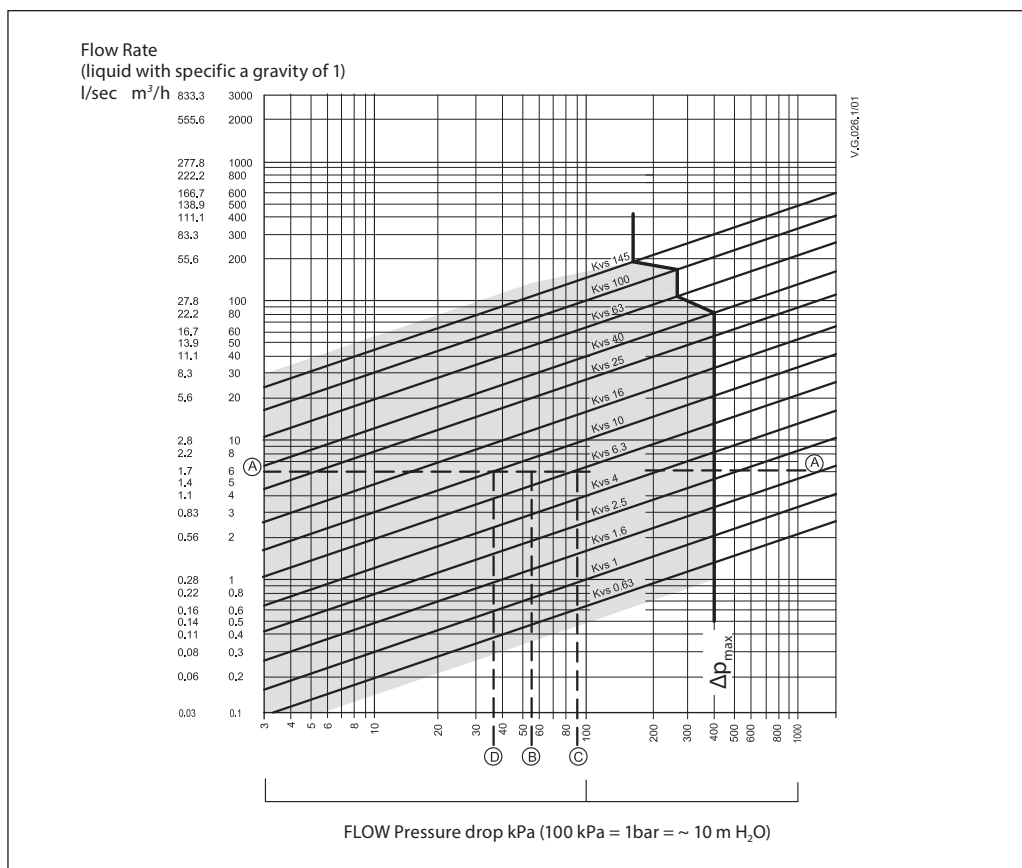
If 3-way valve is installed as mixing valve meaning that A and B ports are inlet ports, and AB port is outlet port it can be installed in mixing (fig.2) or diverting application (fig.3).

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.**

Sizing



Example

Design data:

Flow rate: 6 m<sup>3</sup>/h  
System pressure drop: 55 kPa

Locate the horizontal line representing a flow rate of 6 m<sup>3</sup>/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:

$\Delta p_1$  = pressure drop across the fully open valve  
 $\Delta p_2$  = 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:

$$\Delta p_1 = \Delta p_2$$

$$a = \frac{\Delta p_1}{2 \times \Delta p_2} = 0.5$$

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  $k_{vs}$  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):

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

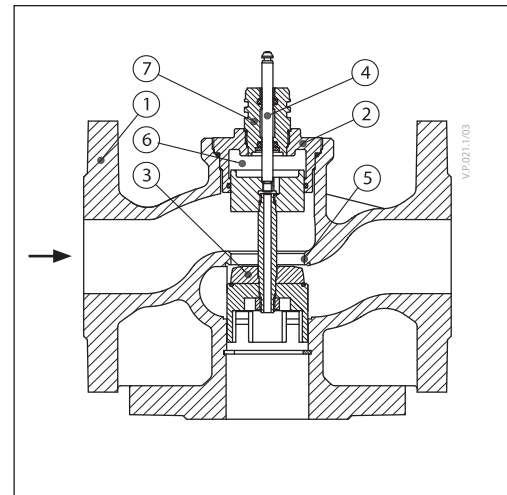
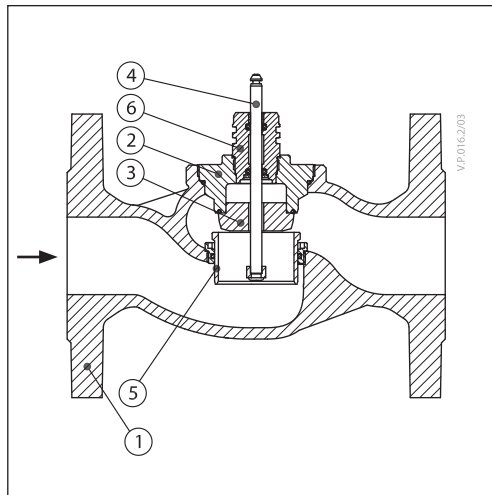
Generally, for a 3 port application, the smaller valve would be selected (resulting in a valve authority higher than 0,5 and therefore improved control). However, this will increase the total pressure and should be checked by the system designer for compatibility with available pump heads, etc. The ideal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

**Design**

*(Design variations are possible)*

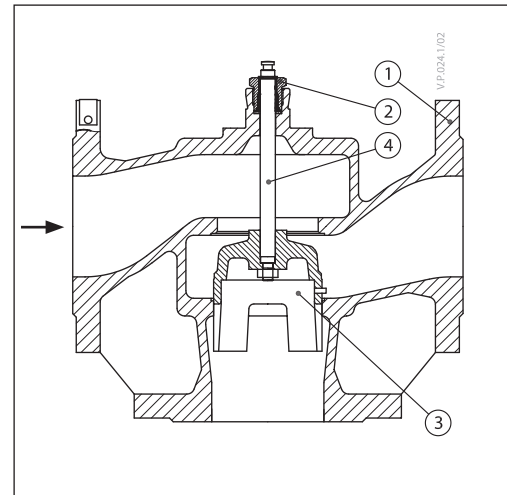
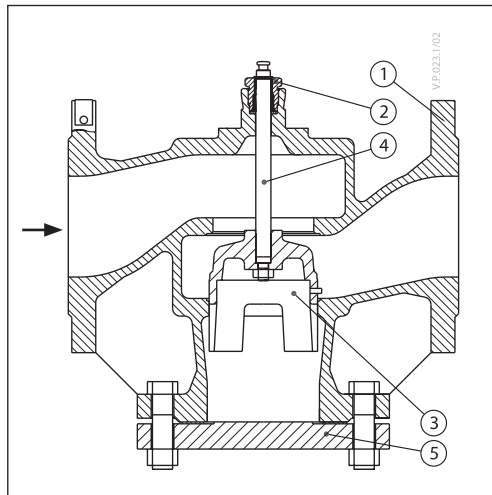
**VL 2 DN 15-80**

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



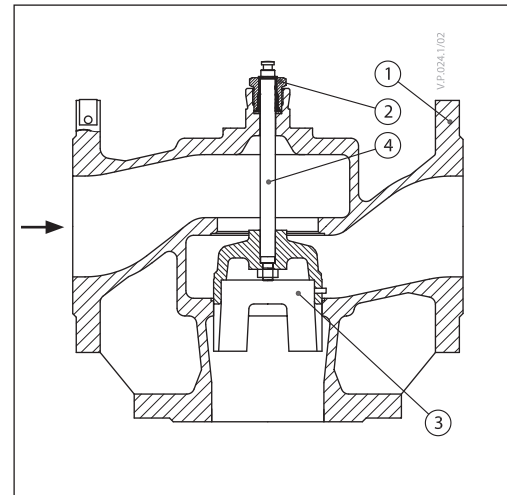
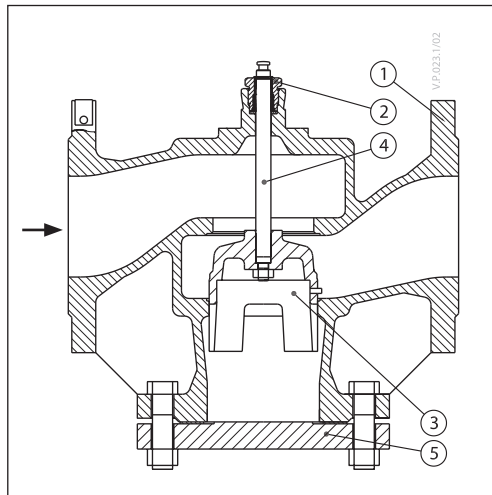
**VL 3 DN 15-80**

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



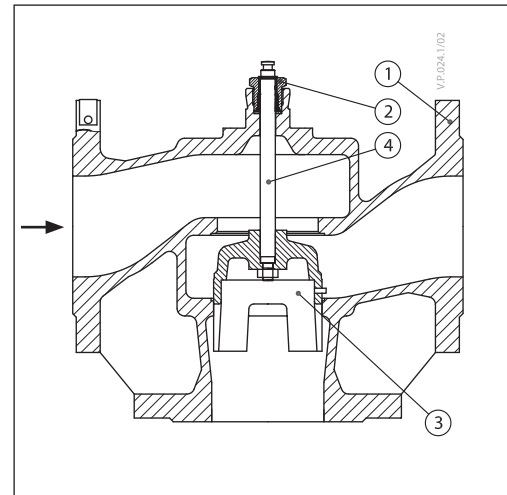
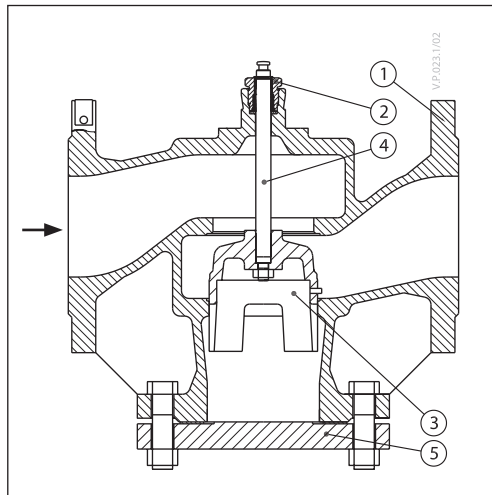
**VL 2 DN 100**

- 1. Valve body
- 2. Valve insert
- 3. Valve cone
- 4. Valve stem
- 8. Blind flange

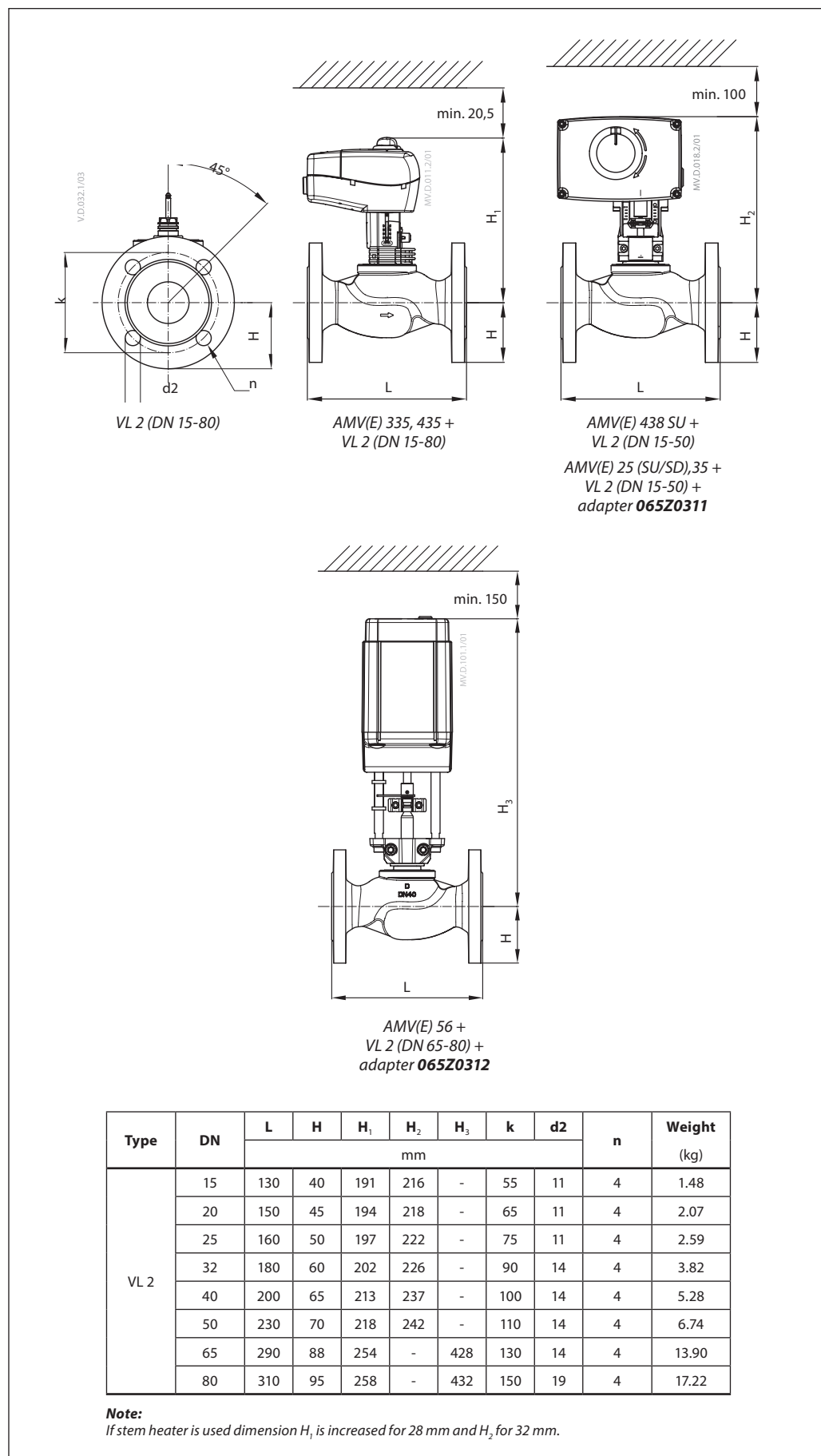


**VL 3 DN 100**

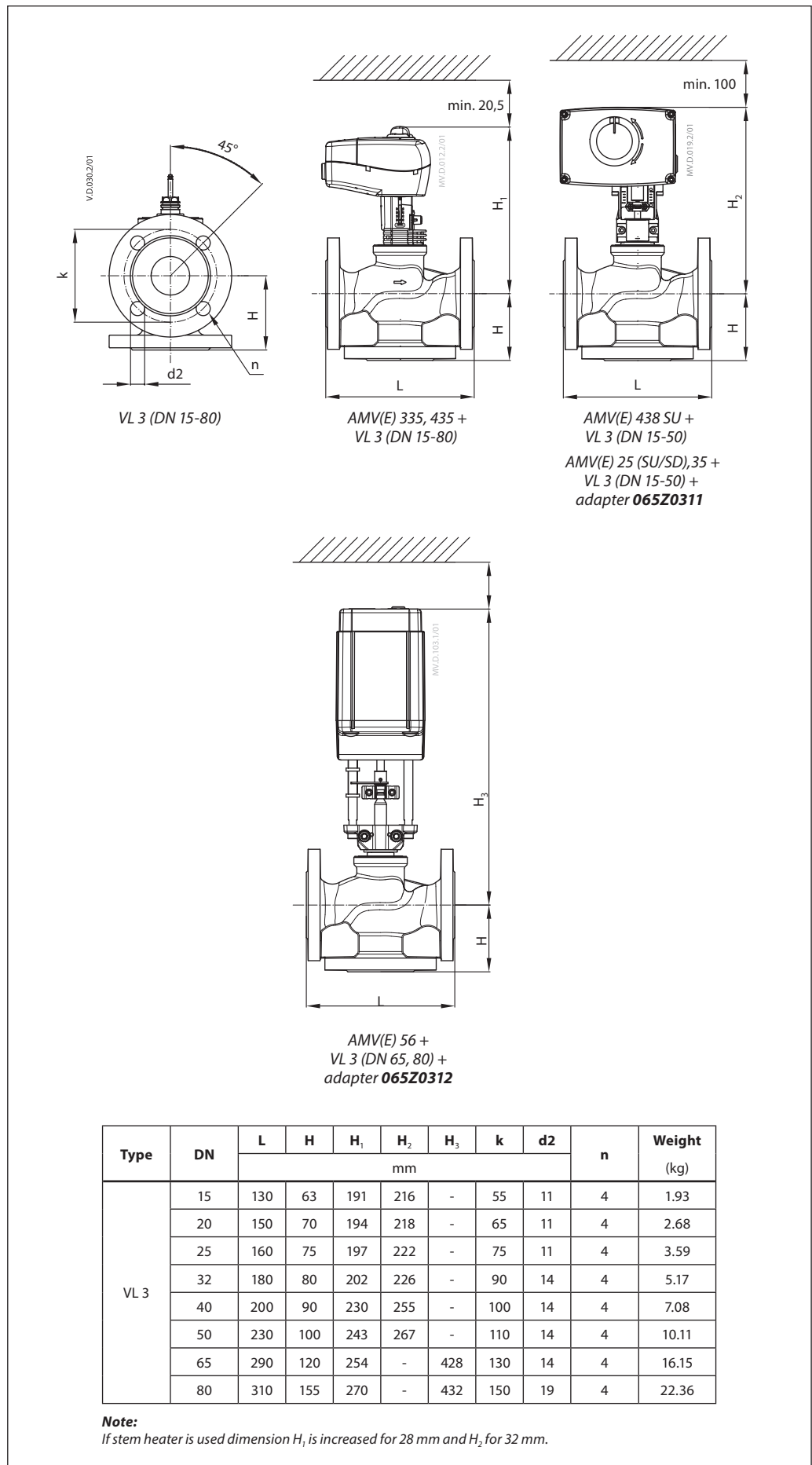
- 1. Valve body
- 2. Valve insert
- 3. Valve cone
- 4. Valve stem



Dimensions



Dimensions (continued)

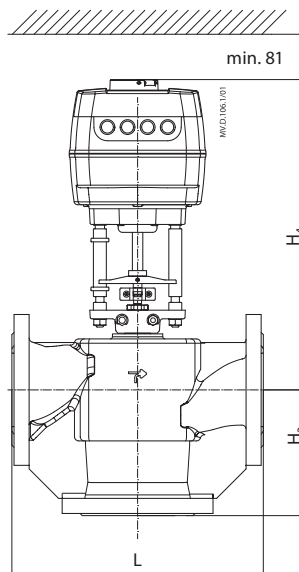
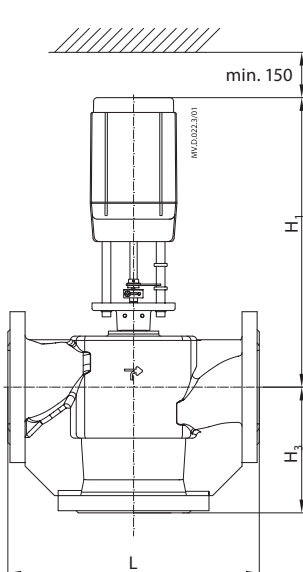
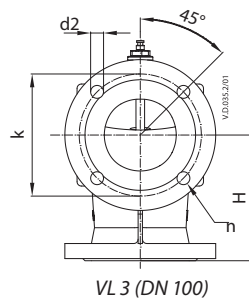
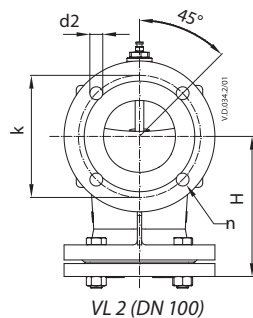


Type	DN	L	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	k	d2	n	Weight (kg)
VL 3	15	130	63	191	216	-	55	11	4	1.93
	20	150	70	194	218	-	65	11	4	2.68
	25	160	75	197	222	-	75	11	4	3.59
	32	180	80	202	226	-	90	14	4	5.17
	40	200	90	230	255	-	100	14	4	7.08
	50	230	100	243	267	-	110	14	4	10.11
	65	290	120	254	-	428	130	14	4	16.15
80	310	155	270	-	432	150	19	4	22.36	

**Note:**  
 If stem heater is used dimension H<sub>1</sub> is increased for 28 mm and H<sub>2</sub> for 32 mm.



Dimensions (continued)



Type	DN	L	H	H1	H2	H3	k	d2	n	Weight (kg)
VL 2	100	350	196	406	317	450	170	18	4	39.0
VL 3			175							34.0

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







**Danfoss A/S**

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