

## Data sheet

# Seated valves (PN 16)

## VF 2 - 2-way valve, flange

## VF 3 - 3-way valve, flange

## Description



VF 2 and VF 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) 55/56 or AMV(E) 65x actuators
- DN 125, 150 with AMV(E) 55/56, AMV(E) 65x or AMV(E) 85/86 actuators
- DN 200-300 with AME 685 or AME 855 actuators

Combinations of actuators is evident under section "Dimension".

**Features:**

- Soft sealing design DN15-80, 200-300
- 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 15-300
- $k_{vs}$  0.63 -1350 m<sup>3</sup>/h
- PN 16
- Up to close A-AB
- Down to close A-AB (VF 3 DN 200-300)
- Temperature:
  - Circulation water/glycolic water up to 50 %:
    - 2 (-10\*) ... 130 °C (DN 15-100)
    - 2 (-10\*) ... 200 °C (DN 125, 150)
    - 2 (-10\*) ... 130 °C (DN 200-300)
  - \* At temperatures from -10 °C up to +2 °C use stem heater*
- Flange connections PN 16
- Compliance with Pressure Equipment Directive 97/23/EC

**Ordering**

Example:  
2-way valve; DN 15;  $k_{vs}$  1.6; PN 16;  
 $T_{max}$  130 °C; flange connection;

- 1x VF 2 DN 15 valve  
Code No.: **065Z0273**

**2-way valve VF 2**

DN	$k_{vs}$ (m <sup>3</sup> /h)	$T_{max.}$ (°C)	Code No.
15	0.63	130	<b>065Z0271</b>
	1.0		<b>065Z0272</b>
	1.6		<b>065Z0273</b>
	2.5		<b>065Z0274</b>
	4.0		<b>065Z0275</b>
20	6.3		<b>065Z0276</b>
25	10		<b>065Z0277</b>
32	16		<b>065Z0278</b>
40	25		<b>065Z0279</b>
50	40		<b>065Z0280</b>
65	63	<b>065Z0281</b>	
80	100	<b>065Z0282</b>	
100	145	<b>065B3205</b>	
125	220	200	<b>065B3230</b>
150	320		<b>065B3255</b>

**3-way valve VF 3**

DN	$k_{vs}$ (m <sup>3</sup> /h)	$T_{max.}$ (°C)	Code No.
15	0.63	130	<b>065Z0251</b>
	1.0		<b>065Z0252</b>
	1.6		<b>065Z0253</b>
	2.5		<b>065Z0254</b>
	4.0		<b>065Z0255</b>
20	6.3		<b>065Z0256</b>
25	10		<b>065Z0257</b>
32	16		<b>065Z0258</b>
40	25		<b>065Z0259</b>
50	40		<b>065Z0260</b>
65	63	<b>065Z0261</b>	
80	100	<b>065Z0262</b>	
100	145	<b>065B1685</b>	
125	220	200	<b>065B3125</b>
150	320		<b>065B3150</b>
200	630	130	<b>065B4200</b>
250	1000		<b>065B4250</b>
300	1350		<b>065B4300</b>

**Accessories - Adapter**

DN	Actuators	max.Δp (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	Adapter
15-80	AMV(E) 335, 435	24/40	<b>065Z0315</b>	/
15-50	AMV(E) 438 SU			<b>enclosed</b>
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>	/
125, 150	AMV(E) 55, 56, 65x	24/40	<b>065Z7022</b>	/
125, 150	AMV(E) 85, 86	24/20	<b>065Z7021</b>	/
200-300	AME 685, 855			/

**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>
	125, 150	<b>065B0007</b>
	200-300	<b>065B3530</b>

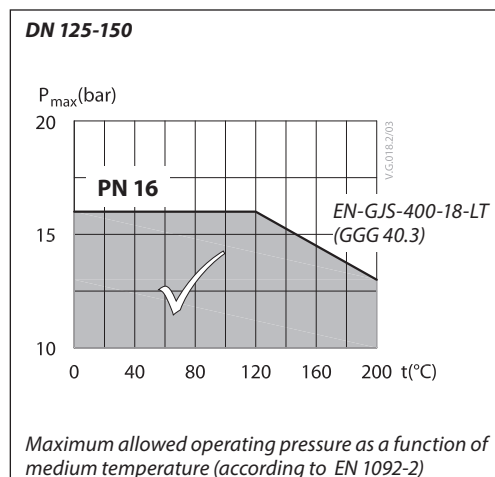
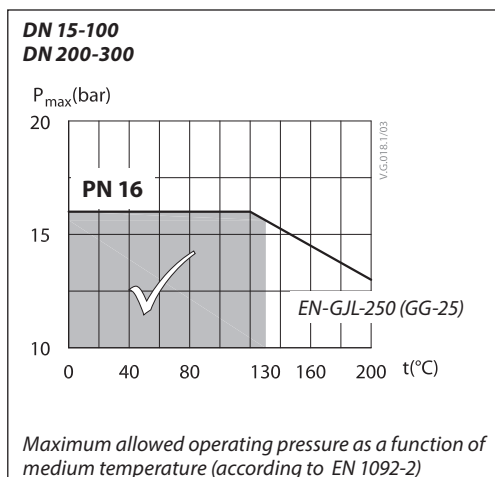
**Technical data**

Nominal diameter	DN	15				20	25	32	40	50	65	80	100	125	150	200	250	300											
$k_{VS}$ 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	220	320	630	1000	1350										
Stroke	mm	10				15				20				30				40				57				73			
Control range		30:1				50:1				100:1								>50:1											
Control characteristic		LOG: port A-AB; LIN: port B-AB																											
Cavitation factor z		≥ 0.4																											
Leakage	A-AB	≤ 0.03 % of $k_{VS}$												≤ 0.05 % of $k_{VS}$				≤ 0.01 % of $k_{VS}$											
	B-AB	≤ 1.0 % of $k_{VS}$																											
Nominal pressure	PN	16																											
Max. closing pressure <sup>1)</sup>		for VF 2 (up to DN 150) and for VF 3 (in mixing applications)																											
AMV(E) 335/435 (400 N)	bar	4										2.5																	
AMV(E) 25 (SU/SD)/438 SU (450 N)																													
AMV(E) 35 (600 N)																													
AMV(E) 25 (1000 N)																													
AMV(E) 55/65x (2000 N)												-	1.5	1.0	0.5	-	-	-											
AMV(E) 56 (1500 N)												2.5	1.0	0.5	0.2	-	-	-											
AMV(E) 85/86 (5000 N)		-										-	-	3.0	1.5	-	-	-											
AME 685 (5000 N)												-	-	-	-	1.5	1.2	0.8											
AME 855 (15000N)												-	-	-	-	5.0	4.0	2.5											
Max. closing pressure <sup>1)</sup>		for VF 3 (diverting applications)																											
AMV(E) 335/435 (400 N)	bar	1										0.6																	
AMV(E) 25 (SU/SD)/438 SU (450 N)																													
AMV(E) 35 (600 N)																													
AMV(E) 25 (1000 N)																													
AMV(E) 55/65x (2000 N)												-	0.3	0.6	0.5	-	-	-											
AMV(E) 56 (1500 N)												0.6	0.3	0.5	0.2	-	-	-											
AMV(E) 85/86 (5000 N)		-										-	-	0.6	0.6	-	-	-											
AME 685 (5000 N)												-	-	-	-	1.2	1.0	0.5											
AME 855 (15000N)												-	-	-	-	4.0	3.5	2.0											
Medium		Circulation water/glycolic water up to 50 %																											
Medium pH		Min. 7, Max. 10																											
Medium temperature <sup>2)</sup>	°C	2 (-10) ... 130						2 (-10) ... 200						2 (-10) ... 130															
Connections		Flange PN 16 acc. to EN 1092-2																											
<b>Materials</b>																													
Valve body		Grey cast iron EN-GJL-250 (GG-25)										Ductile iron EN-GJS-400-18-LT (GGG 40.3)				Grey cast iron EN-GJL-250 (GG-25)													
Valve stem		Stainless steel																											
Valve cone		Brass						Red bronze CuSn5Zn5Pb5 (Rg 6)				GGG 40				non-magnetic stainless steel													
Stuffing box sealing		EPDM										PFTE				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)

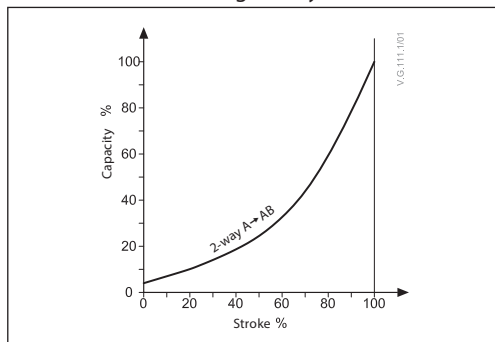
<sup>2)</sup> At temperatures from -10 up to +2 °C use stem heater

Pressure temperature diagram

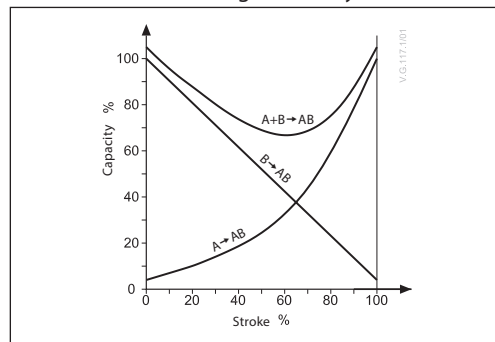


Valve characteristics

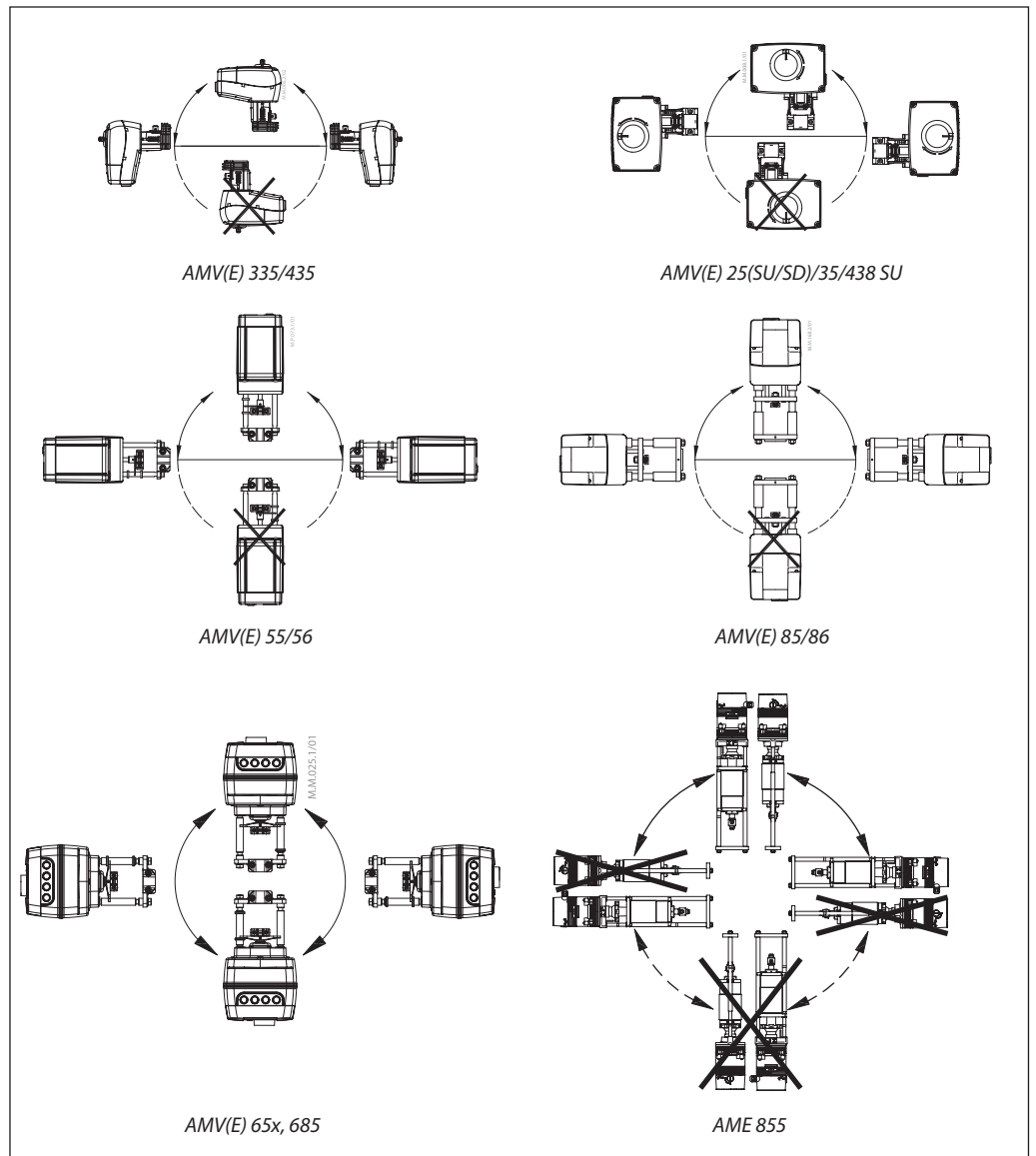
Valve characteristics log (2-way)



Valve characteristics log/lin (3-way)



Installation



**Installation** (continuous)

$T_{max} \leq 150 \text{ }^\circ\text{C}$  for AMV(E) 25 (SU/SD), 35  
 $T_{max} \leq 200 \text{ }^\circ\text{C}$  for other AMV(E)  
 $T_{max} = 150 \dots 200 \text{ }^\circ\text{C}$  AMV(E) 25 (SU/SD), 35

**Valve mounting**

Before mounting the valve be sure that the pipes are clean and free from abrasion.

It is essential that the pipes are lined up squarely with the valve at each connection and that they are free from vibrations.

Install the motorized control valves with the actuator in a vertical or horizontal position in accordance to recommendations described in Installation above.

Leave sufficient clearance to facilitate the dismantling of the actuator from the valve body for maintenance purposes.

Note that the actuator may be rotated up to  $360^\circ$  with respect to the valve body by loosening the retaining fixture. After this operation retighten.

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)

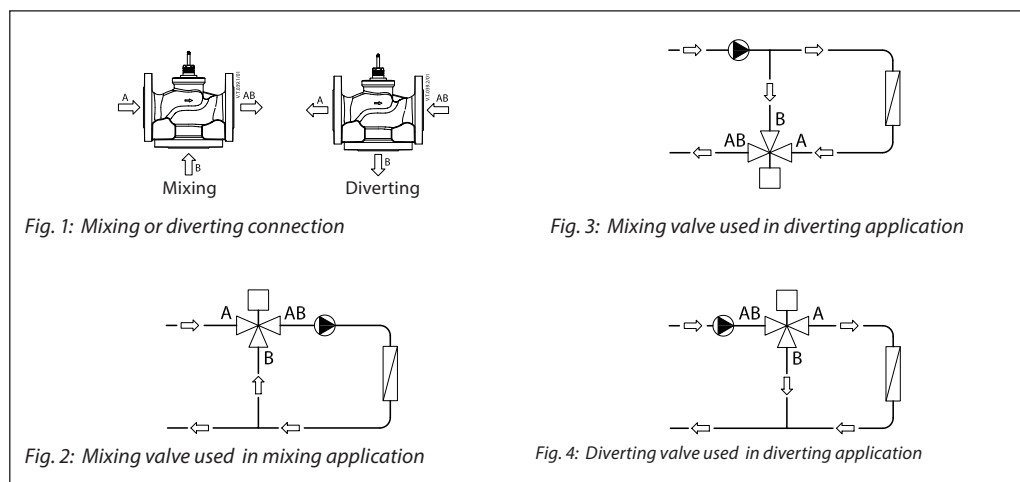
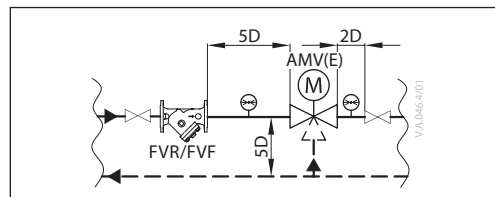


Fig. 1: Mixing or diverting connection

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**

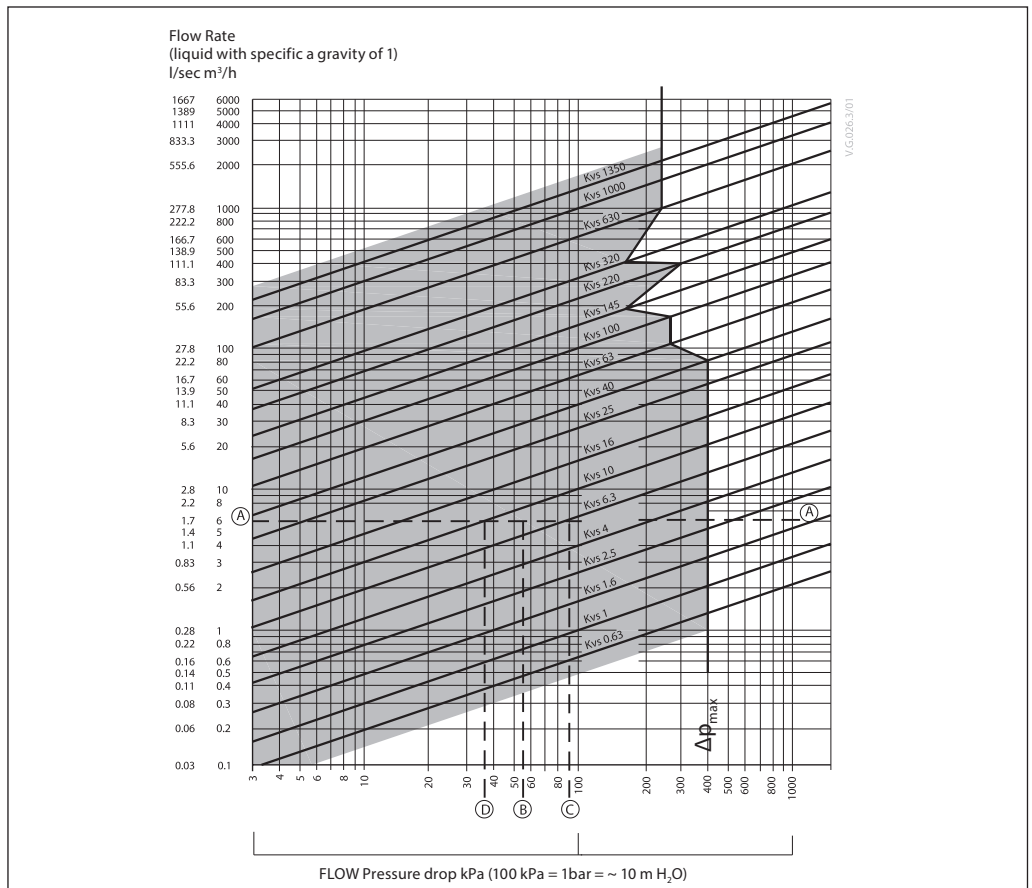
3-way valve can be used either as mixing or diverting valve (fig.1).

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):

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

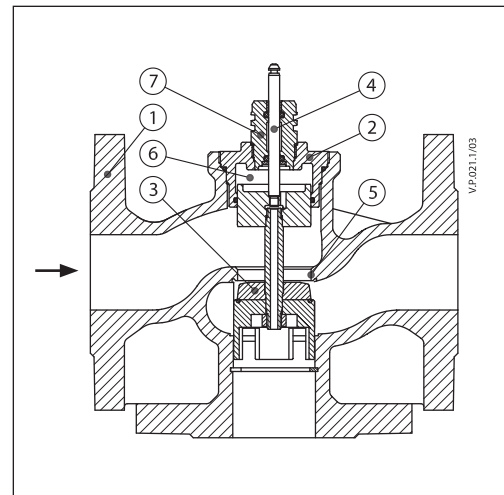
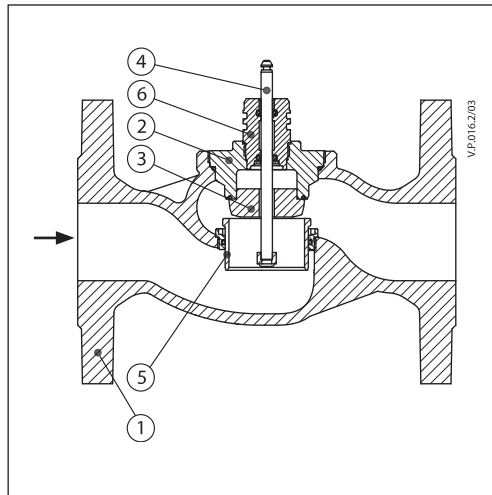
Generally, for a 3 port application, the smaller valve would be selected (resulting in a valve authority higher than 0.5 and therefore improved control). However, this will increase the total pressure and should be checked by the system designer for compatibility with available pump heads, etc. The ideal authority is 0.5 with a preferred range of between 0.4 and 0.7.

**Design**

*(Design variations are possible)*

**VF 2 DN 15-80**

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

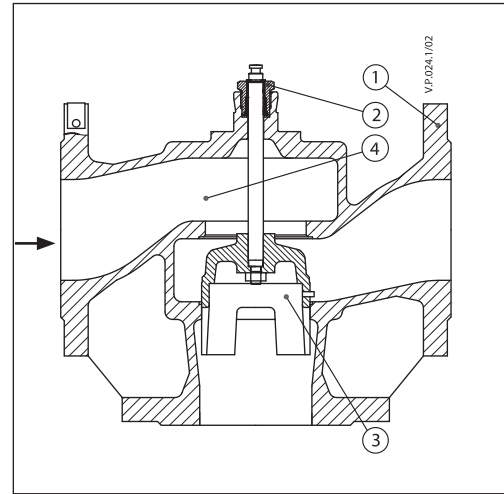
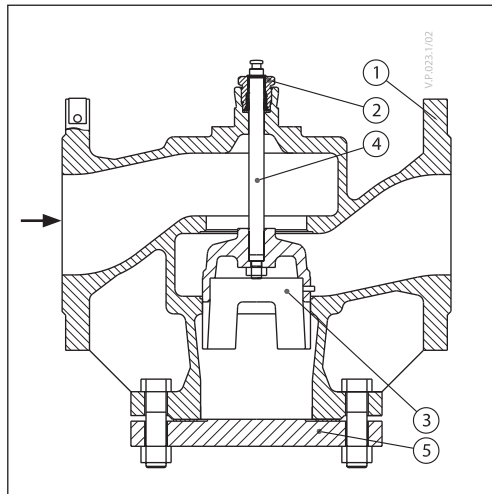


**VF 3 DN 15-80**

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

**VF 2 DN 100**

1. Valve body
2. Stuffing box
3. Valve cone
4. Valve stem
5. Blind flange

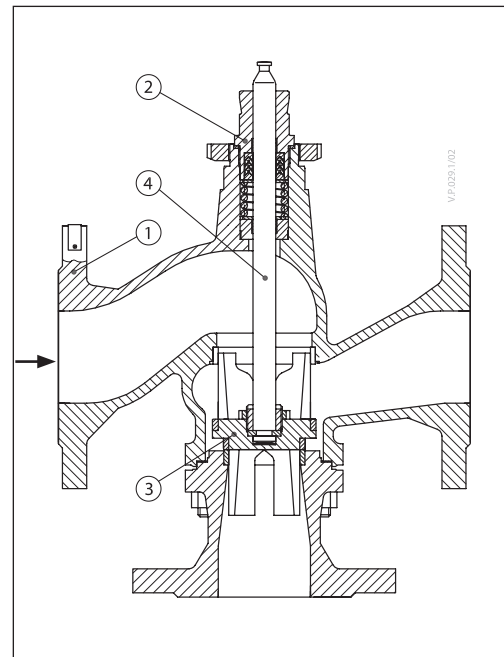
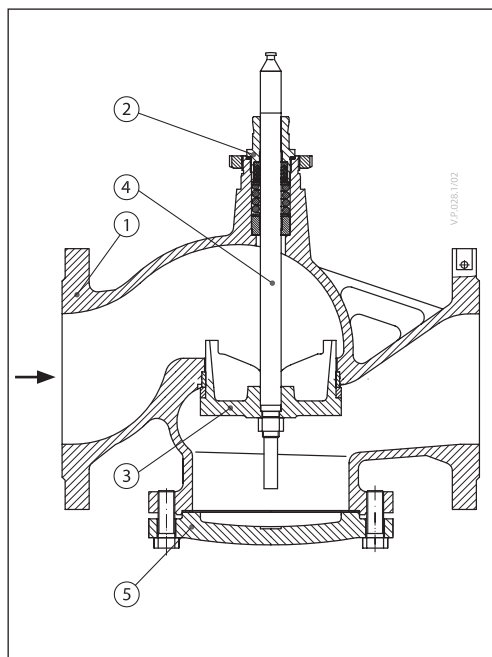


**VF 3 DN 100**

1. Valve body
2. Stuffing box
3. Valve cone
4. Valve stem

**VF 2 DN 125-150**

1. Valve body
2. Stuffing box
3. Valve cone
4. Valve stem
5. Blind flange



**VF 3 DN 125-150**

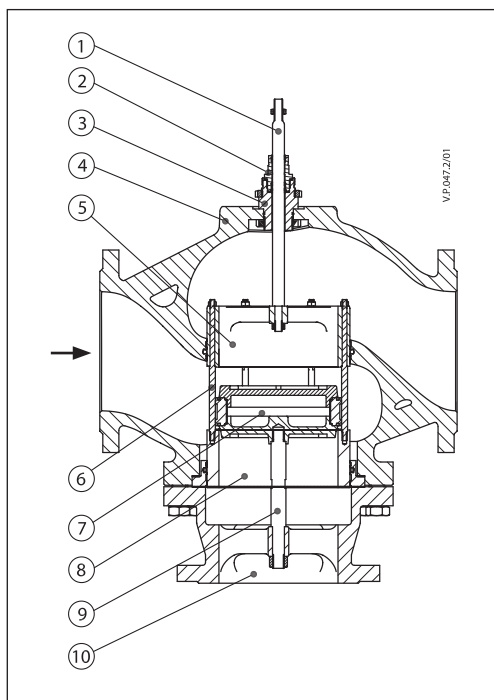
1. Valve body
2. Stuffing box
3. Valve cone
4. Valve stem



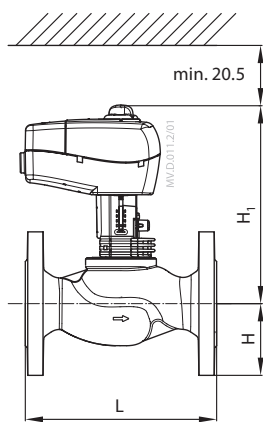
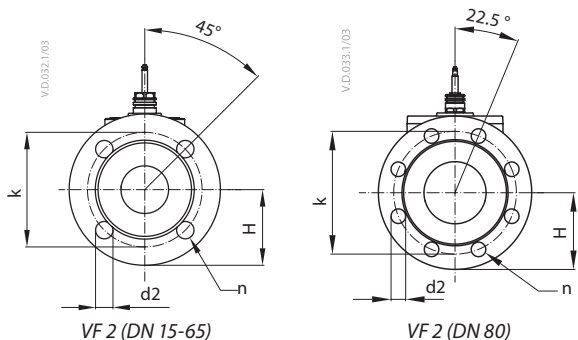
Design (continuous)

**VF 3 DN 200-300**

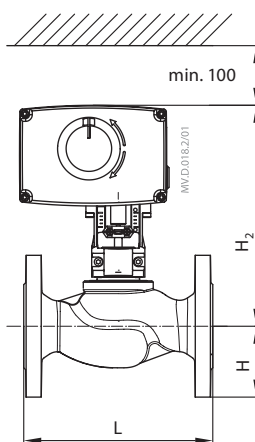
- 1. Stem
- 2. Stuffing box
- 3. Insert body
- 4. Valve body
- 5. Seat A
- 6. Studdle stem
- 7. Cone component
- 8. Seat B
- 9. Support stem
- 10. Valve body extension



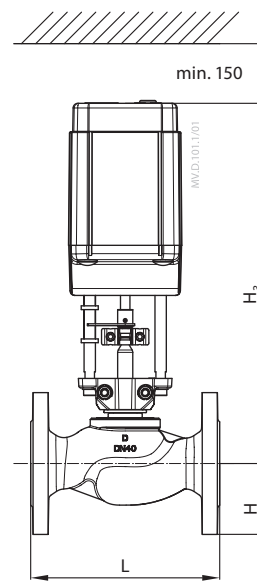
Dimensions



AMV(E) 335, 435 +  
VF 2 (DN 15-80)



AMV(E) 438 SU +  
VF 2 (DN 15-50)  
AMV(E) 25 (SU/SD), 35 +  
VF 2 (DN 15-50) +  
adapter **065Z0311**

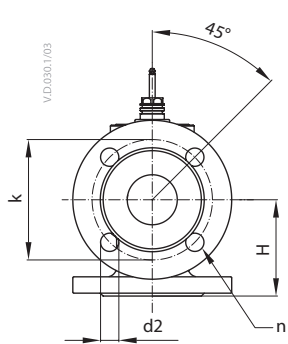


AMV(E) 56 +  
VF 2 (DN 65-80) +  
adapter **065Z0312**

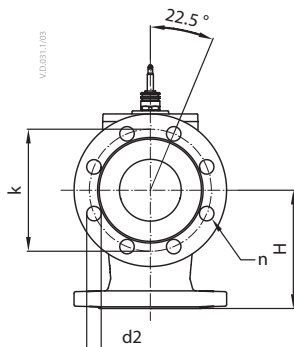
Type	DN	L	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	k	d2	n	Weight (kg)
VF 2	15	130	47.5	191	216	-	65	14	4	1.93
	20	150	52.5	194	218	-	75	14	4	2.65
	25	160	57.5	197	222	-	85	14	4	3.23
	32	180	70	202	226	-	100	19	4	4.97
	40	200	75	213	237	-	110	19	4	6.59
	50	230	82.5	218	242	-	125	19	4	8.53
	65	290	92.5	254	-	428	145	19	4	15.92
80	310	100	258	-	432	160	19	8	18.13	

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

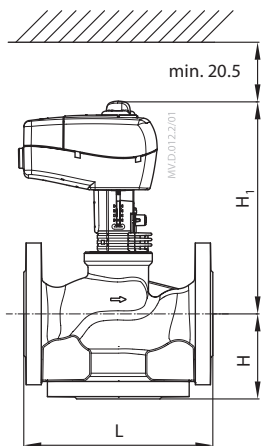
Dimensions (continued)



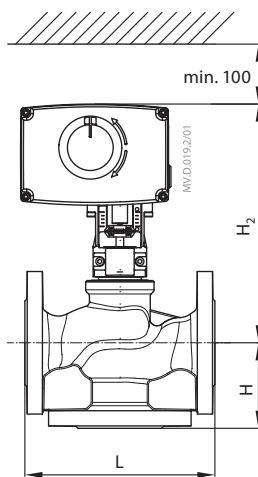
VF 3 (DN 15-65)



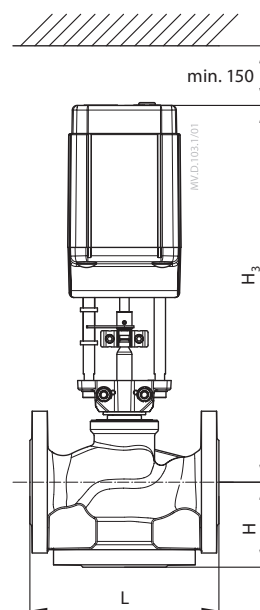
VF 3 (DN 80)



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



AMV(E) 438 SU +  
VF 3 (DN 15-50)  
AMV(E) 25 (SU/SD), 35 +  
VF 3 (DN 15-50) +  
adapter 065Z0311

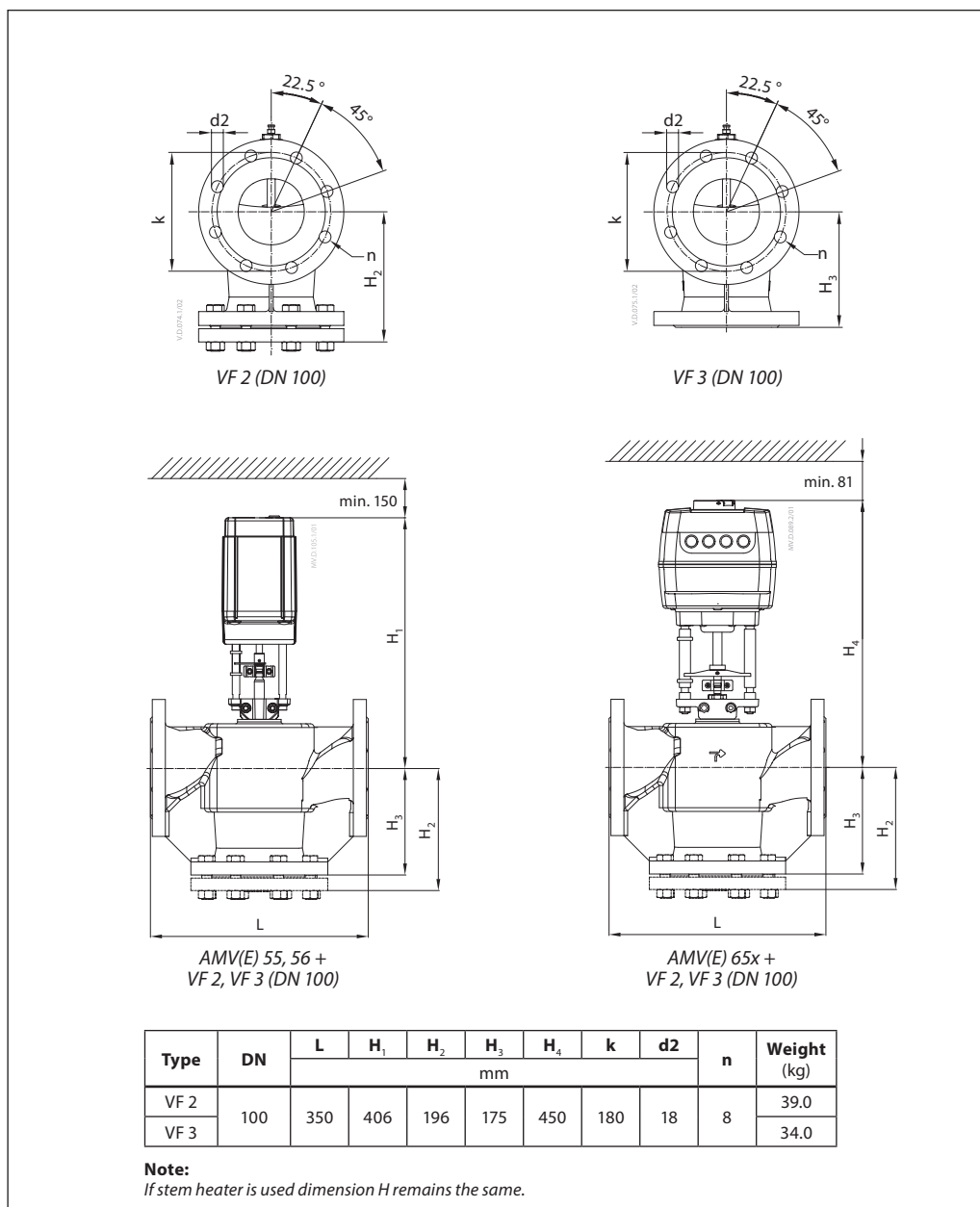


AMV(E) 56 +  
VF 3 (DN 65-80) +  
adapter 065Z0312

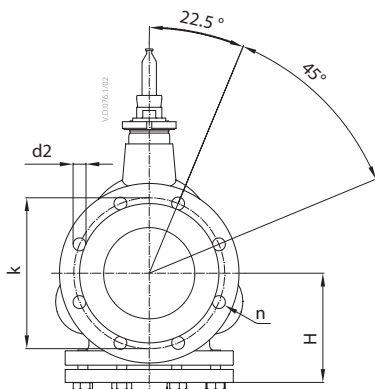
Type	DN	L	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	k	d2	n	Weight (kg)
VF 3	15	130	63	191	216	-	65	14	4	2.61
	20	150	70	194	218	-	75	14	4	3.55
	25	160	75	197	222	-	85	14	4	4.54
	32	180	80	202	226	-	100	19	4	6.90
	40	200	90	230	255	-	110	19	4	9.05
	50	230	100	243	267	-	125	19	4	12.79
	65	290	120	254	-	428	145	19	4	19.18
80	310	155	270	-	444	160	19	8	23.73	

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

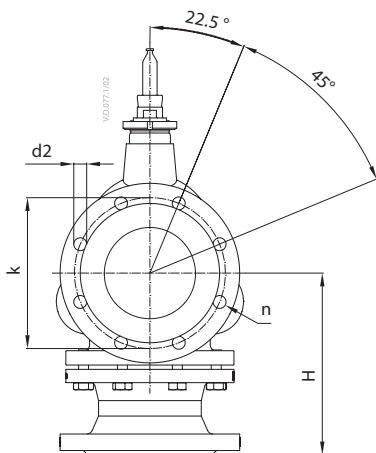
Dimensions (continued)



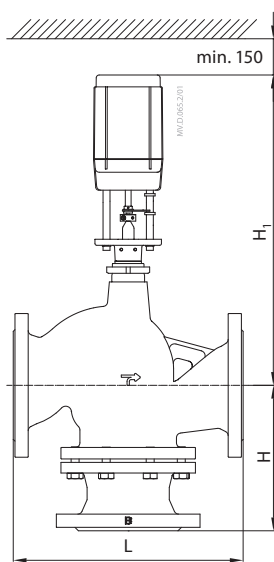
Dimensions (continued)



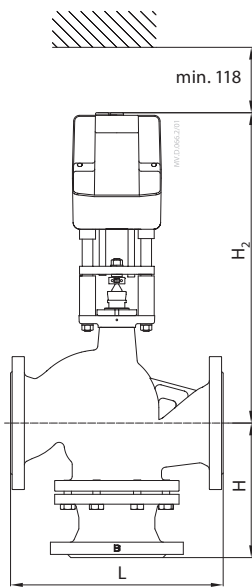
VF 2 (DN 125, 150)



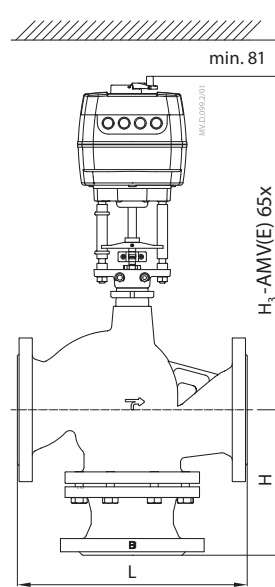
VF 3 (DN 125, 150)



AMV(E) 55, 56 +  
VF 2, VF 3 (DN 125, 150)



AMV(E) 85, 86 +  
VF 2, VF 3 (DN 125, 150)

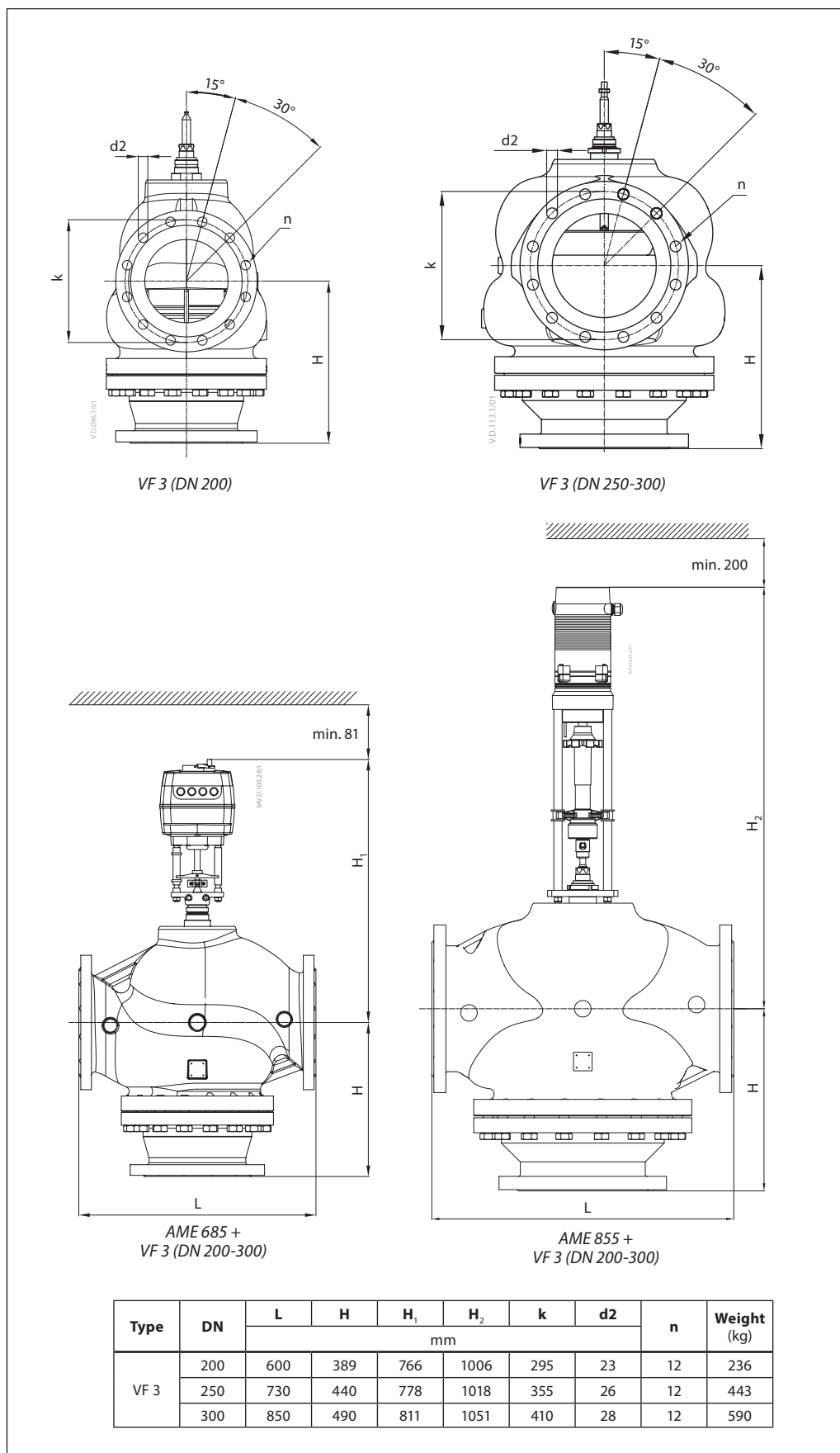


AMV(E) 65x +  
VF 2, VF 3 (DN 125, 150)

Type	DN	L	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	k	d2	n	Weight (kg)
VF 2	125	400	160	555	629	595	210	18	8	54.0
	150	480	200	560	682	648	240	22	8	79.0
VF 3	125	400	250	555	629	595	210	18	8	65.3
	150	480	300	560	682	648	240	22	8	92.0

**Note:**  
If stem heater is used dimensions H<sub>1</sub> and H<sub>2</sub> remain the same.

Dimensions (continued)







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