Data sheet

2-way control valves - for steam VFS 2

Description

VFS 2 valves are a range of 2 port flanged valves for chilled water, LPHW, MPHW, HPHW (low, medium or high pressure hot water) and steam applications. These valves may be used with glycol concentrations of up to 50 %.

Main data:
- PN 25
- Flanged connections DN 15 to 100 mm
- Suitable for water or steam (max. Δp = 6 bar) 2 (-10*) to 200 °C.

  ** At temperatures from -10 °C till +2 °C use stem heater (see accessories ordering below).*
- Suitable for use with glycolic water up to 50 % .
- Logarithmic characteristic
- Suitable for use with AMV(E) 15, 16, 25, 35, 25 SU/SD, 55, 56, 85, 86 and AMV 323, 423 or 523 actuators.
- In compliance with PED directive 97/23/EC.

Ordering

DN	k_{vs} (m³/h)	Code No.
15	0.4	**065B1510**
	0.63	**065B1511**
	1.0	**065B1512**
	1.6	**065B1513**
	2.5	**065B1514**
	4.0	**065B1515**
20	6.3	**065B1520**
25	10	**065B1525**
32	16	**065B1532**
40	25	**065B1540**
50	40	**065B1550**
65	63	**065B3365**
80	100	**065B3380**
100	145	**065B3400**

Accessories

Type	Code No.
Stem heater 24 V (AMV/AME 15, 16, 25, 35 and valves VFS DN 15 - 50)	**065B2171**
Stem heater 24 V (AMV/AME 55, 56 and valves DN 65 - 100)	**065Z7020**
Stem heater 24 V (AMV/AME 85, 86 and valves DN 65 - 100)	**065Z7021**
Adapter (VFS DN 15-50) (for media temperatures over 150 °C)	**065Z7548**

Spare parts - stuffing box

DN	Code No.
15	**065B0001** 1)
20	
25	
32	
40	
50	
65	**065B0006** 2)
80	
100	

1) Four PTFE rings
Seal for valve cover
Gland ring
Washer
Instructions

2) Three PFTE rings
Gland ring
Instructions

Technical data

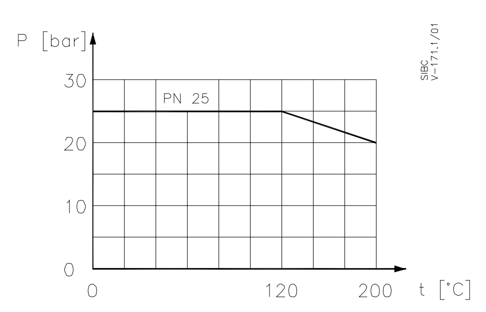
Nominal pressure	PN 25
Control characteristic	logarithmic
Medium	Circulation water / Glycolic water up to 50 % / **Steam (max. Δp = 6 bar)**
Medium temperature	2 (-10*) ... 200 °C
Leakage	max. 0.05 % of k_{vs}
Control range	k_{vs} 0.4 - 0.63: min. 30:1 / k_{vs} 1.0 - 4.0: min. 50:1 / DN 20 -DN 100 min. 100:1
Connection	Flange ISO 7005-2

* *At temperatures from -10 °C till +2 °C use stem heater .*

Material

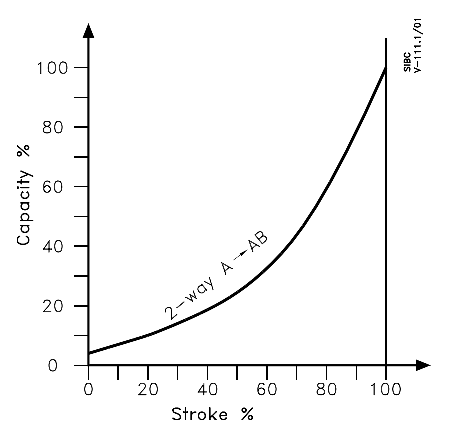
Body and cover	Ductile iron EN-GJS-400-18-LT (GGG 40.3)
Cone, seat and spindle	Stainless steel
Gland seal	Replaceable PTFE rings

Pressure temperature diagram



Maximum allowed operating pressure as a function of medium temperature.

Valve characteristics - logarithmic



Max. closing pressure [1)] and recommended Δp [2)]

Valve		Actuator type							
DN	Stroke mm	AMV(E) 15	AMV(E) 16	AMV(E) 25 [AMV(E) 25 SU/SD*]	AMV(E) 35, AMV 323	AMV 423, 523	AMV(E) 85,86	AMV(E) 55	AMV(E) 56
		max. closing pressure [1)] (bar)							
15	15	25	9	25 [22*]	25	25	-	-	-
15 (k_{vs} 4.0)	15	17	9	25 [16*]	20	25	-	-	-
20	15	11	4	25 [10*]	13	25	-	-	-
25	15	6	2	16 [5*]	8	20	-	-	-
32	15	3	1	9 [2.5*]	5	11	-	-	-
40	15	2		6 [2*]	3	7	-	-	-
50	15	1		3 [0.5*]	2	4	-	-	-
65	40					2	13	4.5	3
80	40					1	8	3	2
100	40					0.5	5	1.5	1

NOTE:

1) Max. Δp is the physical limit of differential pressure the valve will close against. Max. Δp for stem application is 6 bar.

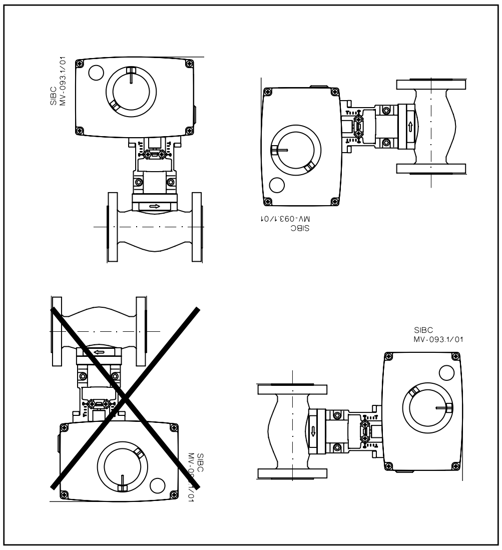
2) The recommended Δp is based on the generation of noise, plug erosion etc.
Max. recommended Δp is 4 bar.
If max. closing pressure is smaller than 4 bar than the recommended Δp is the same as closing Δp.

* Values in parantheses **[ ]** are based on the force of the actuator AMV(E) 25 SU/SD only.

Installation

Hydraulic connections
Mount according to flow direction as indicated on valve body.

Valve mounting
Before mounting the valve be sure that the pipes are clean and free from swarf. 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 but not upside down. Leave sufficient clearance to facilitate the dismantling of the actuator from the valve body for maintenance purposes.
The valve must not be installed in an explosive atmosphere or at an ambient temperature higher than 50 °C or lower than 2 °C. It must not be subject to steam jets, water jets or dripping liquid.

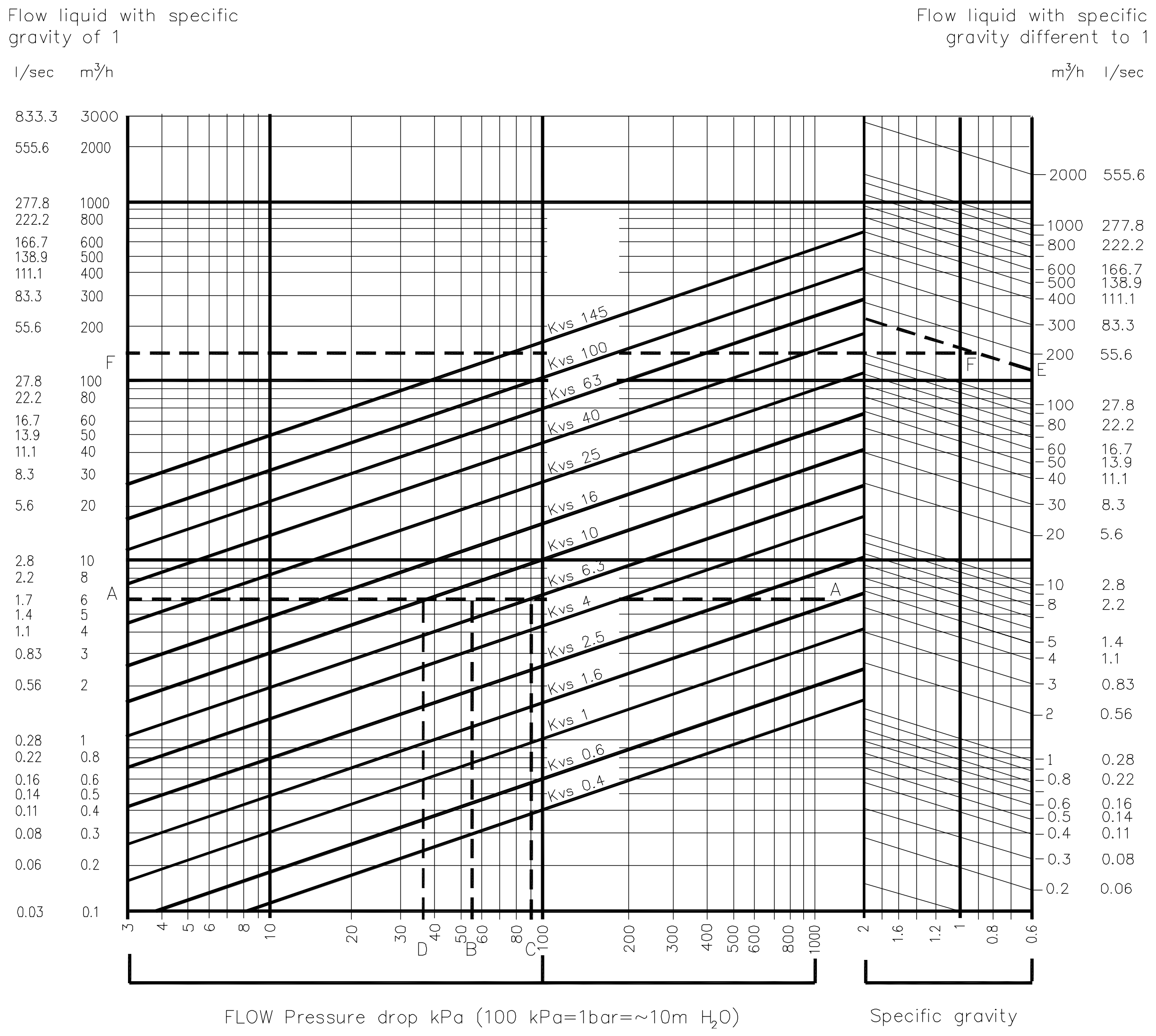


Note *that the actuator may be rotated up to 360° with respect to the valve body by loosening the retaining fixture. After this operation retighten.*

Disposal

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

Control valve sizing diagram for fluids



Control valve sizing diagram for fluids
(continued)

Examples

1 For fluids with specific gravity of 1 (e.g. water)

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:
∆P1 = pressure drop across the fully open valve
∆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 ∆P1 = ∆P2,
a = ∆P1/2*∆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 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 kvs 10, would give a pressure drop of 36 kPa (point D):

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

Generally, the smaller valve would be selected (resulting in a valve authority higher than 0.5 and therefore improved controlability). 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.

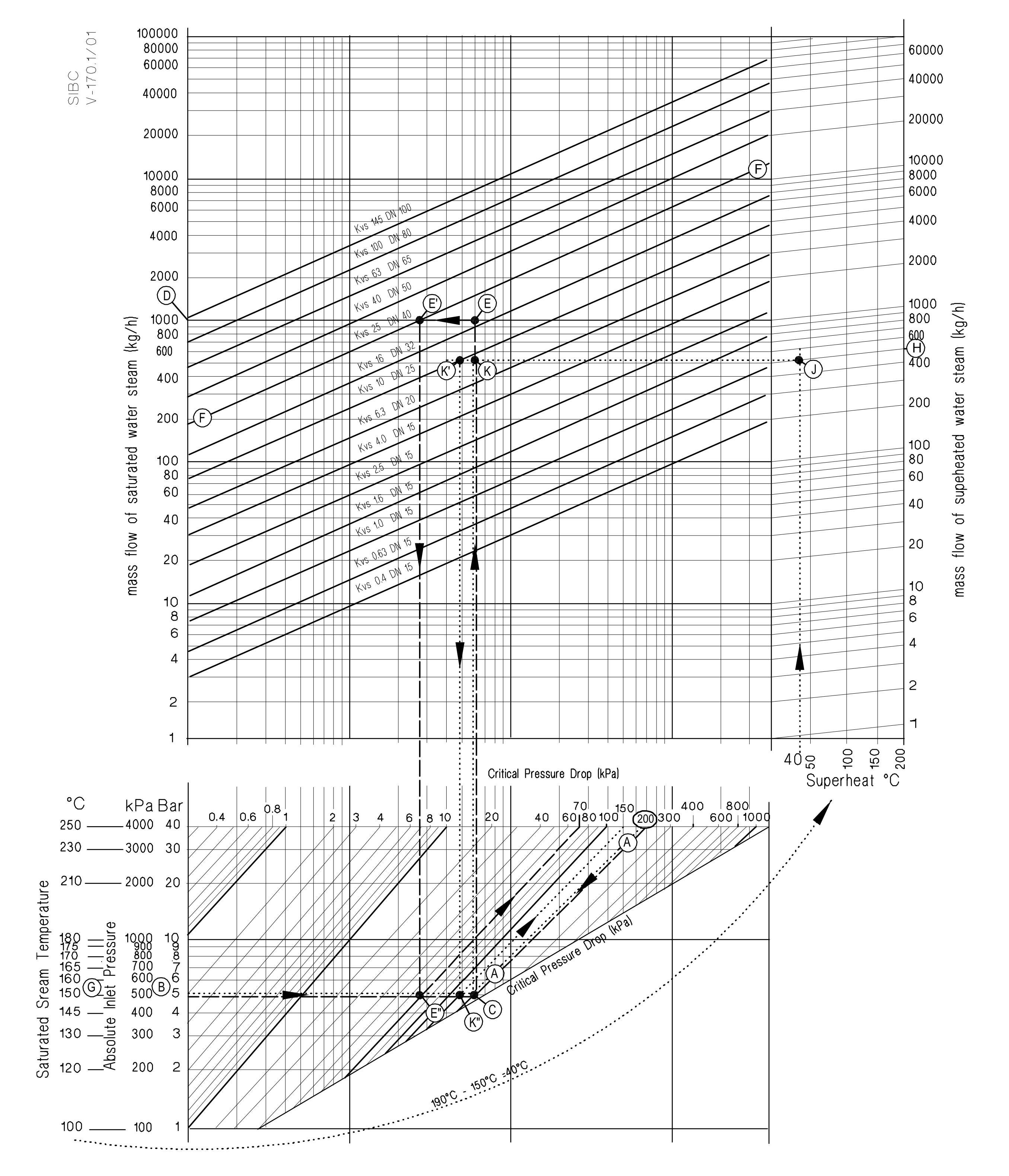
2 For fluids with specific gravity different from 1

Design data:
Flow rate: 6 m³/h of fluid, S.G. 0.9
System pressure drop: 10 kPa

For this example, the left hand axis of the diagram must be ignored. Starting from the RH axis, the flow rate of 6 m³/h is located (point E). The intersection of the diagonal line from point E with a vertical line from S.G. = 0.9 gives the starting point for the effective flow rate line F-F. The process then continues as for Example 1, so 10 kPa intersects F-F nearest to the kvs 16 diagonal. The intersection of F-F with kvs 16 gives a valve pressure drop of 12.7 kPa (point G).

Control valve sizing diagram for steam

Max. Δp in low pressure steam application variance from 0.5 bar to 6 bar (see page 2)



Steam valve sizing is based on 40 % of the absolute steam pressure (immediately upstream of the valve), being dropped across the valve when fully open. At this condition the steam is travelling at or close to its critical velocity (approx. 300 m/s) and throttling will occur over the full valve stroke. If the steam is travelling slower than this then the first part of the valve stroke will merely increase the velocity of the steam without reducing the volumetric flow.

Control valve sizing diagram for steam
(continued)

1 For saturated steam

Design data:
Flow rate: 700 kg/h
Absolute inlet pressure: 5 bar (500 kPa)

- follow dashed line -

The absolute inlet pressure is 500 kPa. 40% of this is 200 kPa.

Locate the diagonal line corresponding to the pressure drop of 200 kPa (line A-A).

Read the absolute inlet pressure on the lower left hand scale (point B), and draw a horizontal line across until it meets the pressure drop diagonal (A-A) at point C.

From this point extend a vertical line upwards until it meets the horizontal line representing the steam flow of 700 kg/h from point D. The intersection of this is point E.

The nearest diagonal kvs line above this is line F-F with a kvs of 25 (point E'). If the ideal valve size is not available the next largest size should be selected to ensure design flow.

The pressure drop through valve at the flow rate is found by the intersection of the 700 kg/h line with F-F (point E') and dropping a vertical; this actually hits the horizontal line for 500 kPa (point E'') inlet pressure at a pressure drop diagonal of 90 kPa. This is only 18% of the inlet pressure and the control quality will not be good until the valve has partially closed. As with all steam valves this compromise is necessary since the next smaller valve would not pass the required flow (maximum flow would have been about 600 kg/h).

The maximum flow for same inlet pressure is found by extending the vertical line (C-E) through point E until it crosses the kvs 25 line F-F and reading off the flow (900 kg/h).

2 For superheated steam

Design data:
Flow rate: 500 kg/h
Absolute inlet pressure: 5 bar (500 kPa)
Steam temperature: 190 °C

The procedure for superheated steam is much the same as for saturated steam, but uses a different flow scale which slightly elevates the readings according to the degree of superheat.

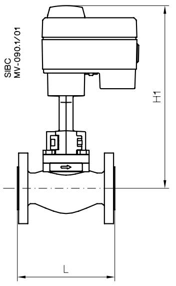
- follow dotted line -

As before, the diagonal pressure drop line A-A is located as before for 40 % of 500 (200 kg/h). The horizontal inlet pressure line through point B is now extended to the left to read off the corresponding saturated steam temperature at point G (150 °C). The difference between the saturated steam temperature and the superheated steam temperature is 190 °C - 150 °C = 40 °C.

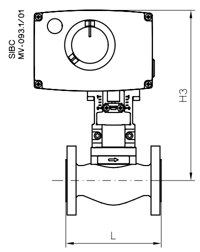
The superheated steam flow is found on the upper right hand scale, point H, and the diagonal line is followed down from here until it meets a vertical line from the steam temperature elevation (40 °C) at point J.

As before, the horizontal line through point B is drawn to cut line A-A at point C and the point where the vertical line from this point meets the horizontal line from point J is the operating point (point K). This horizontal line, J-K, is the corrected flow line. The nearest diagonal line above this is for kvs 10 (point K'). A vertical line dropped from the intersection of J-K with the 10 kvs line intersects the 500 kPa inlet pressure line (point K'') at a pressure drop diagonal of about 150 kPa. This is about 30% of the inlet pressure which will give reasonable control quality (compared to recommended ratio of 40%).

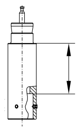
Dimensions



VFS 2 +
AMV(E) 15, 16



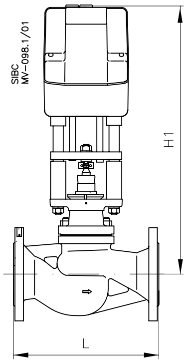
VFS 2 +
AMV(E) 25, 35



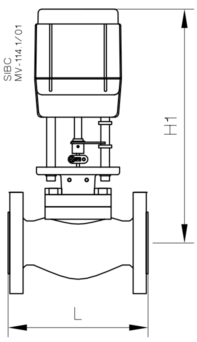
Adapter for media temperatures over 150 °C

VFS 2 / AMV(E) 15, 16, 25, 35

Type	DN	Connection	L mm	H_1 mm	H_3 mm	DC mm	d mm	n number	Weight kg
VFS 2	15	flange PN 25	130	249	237	65	14	4	3.6
VFS 2	20	flange PN 25	150	249	237	75	14	4	4.3
VFS 2	25	flange PN 25	160	249	237	85	14	4	5.0
VFS 2	32	flange PN 25	180	271	259	100	18	4	8.7
VFS 2	40	flange PN 25	200	271	259	110	18	4	9.5
VFS 2	50	flange PN 25	230	271	259	125	18	4	11.7



VFS 2 +
AMV(E) 85,86



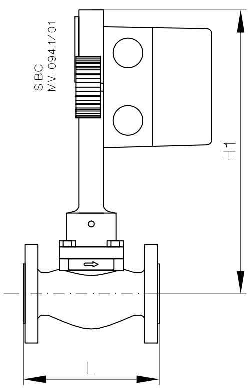
VFS 2 +
AMV(E) 55,56

VFS 2 / AMV(E) 55, 56, 85, 86

Type	DN	Connection	L mm	H_1 mm	DC mm	d mm	n number	Weight kg
VFS 2	65	flange PN 25	290	586	145	18	8	23.0
VFS 2	80	flange PN 25	310	587	160	18	8	28.1
VFS 2	100	flange PN 25	350	614	190	22	8	40.7

VFS 2 / AMV 323, 423, 523

Type	DN	Connection	L mm	H_1 mm	DC mm	d mm	n number	Weight kg
VFS 2	15	flange PN 25	130	301	65	14	4	3.6
VFS 2	20	flange PN 25	150	301	75	14	4	4.3
VFS 2	25	flange PN 25	160	301	85	14	4	5.0
VFS 2	32	flange PN 25	180	323	100	18	4	8.7
VFS 2	40	flange PN 25	200	323	110	18	4	9.5
VFS 2	50	flange PN 25	230	323	125	18	4	11.7
VFS 2	65	flange PN 25	290	405	145	18	4	23.0
VFS 2	80	flange PN 25	310	424	160	18	8	28.1
VFS 2	100	flange PN 25	350	451	190	22	8	40.7



VFS 2 +
AMV 323, 423, 523