Data sheet

2-way control valves
VEFS 2

Description/Application

VEFS 2 valves are a range of 2 port high specification 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:

- Cast iron / Stainless steel construction.
- Flanged connections DN 25 to 50 mm (for DN 15 and 20 use VFS 2 valves).
- Suitable for water or steam (max. Δp = 6 bar) 2 to 200 °C.
- Max. operating pressure: 25 bar at 120 °C (20 bar at 200 °C) according to DIN 4747 and 2401.
- Suitable for use with AMV(E) 25, AMV(E) 25 SU/SD and AMV(E) 35 actuators.
- Suitable for use with glycolic water up to 50 % .
- In compliance with PED directive 97/23/EC.

Ordering

Maximum differential pressure with different actuators
(Max. differential pressure (bar), 2 port single seat)

Type	Size mm	k_{vs}	Max. inlet pressure for steam	Δp steam	Δp water	Recom. Δp	Code No.
				AMV(E) 25, 35, 25/*	AMV(E) 25, 35, 25/*		
VEFS 2/25/10	25	10	8	6	10	5.0	**065Z7517**
VEFS 2/32/16	32	16	8	6	10	5.0	**065Z7518**
VEFS 2/40/20	40	20	8	6	10	5.0	**065Z7519**
VEFS 2/50/25	50	25	8	6	10	5.0	**065Z7520**

AMV(E) 25/*
- AMV(E) 25/SD - spring down (safety function closes port A-AB)
- AMV(E) 25/SU - spring up (safety function opens port A-AB)

Accessories

Type	Description	Code No.
Stuffing box	For valves DN 25 - 50	**065Z7550**
Adapter	For media temperatures over 150 °C	**065Z7549**

Note:
k_{vs} - is the flow in m³/h of water at a temperature between 5 °C and 40 °C which passes through a valve open at the nominal stroke with 100 kPa (1 bar) pressure drop.

Max. Δp is the physical limit of differential pressure the valve will close against.

The recommended Δp is based on the generation of noise, plug erosion etc. It should be checked against the Δp figure calculated from the chart on page 3 or the equation below, with the valve fully opened at the designed flow rate.

$$\Delta P_{valve} = S\left(\frac{Q}{k_{vs}}\right)^2$$

where S = Specific gravity
Q = flow rate in m³/h

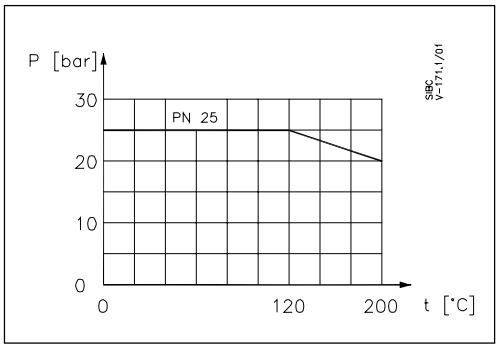
Δp_{valve} = pressure drop across valve in bar (fully open).

Conversion factors
1 bar = 100 kPa = 14.5 psi
1 l/s = 1 kg/s = 3.6 m³/h

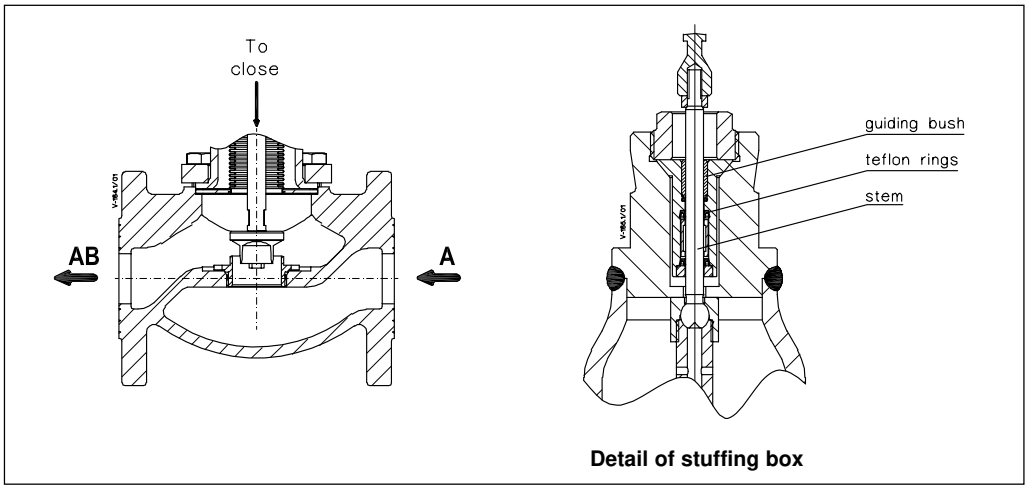
Technical data

Control characteristic	Linear
Control range	min. 50:1
Media	Circulation water / Glycolic water up to 50 % / Steam up to 8 bar max.
Leakage loss	0.05 % of k_{vs}
Medium temperature	2 - 200 °C, for media temperatures over 150 °C use adapter
Pressure stage	PN 25
Max. inlet steam pressure	8 bar
Stroke	7 mm (DN 25), 10 mm (DN 32 - 50)
Material	Body: Ductile iron EN-GJS-400-18-LT (GGG 40.3) Valve seat: Stainless steel Cone: Stainless steel Stem: Stainless steel Stuffing box: PTFE
Connection	Flanged

Pressure temperature diagram



Design



Detail of stuffing box

Disposal

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

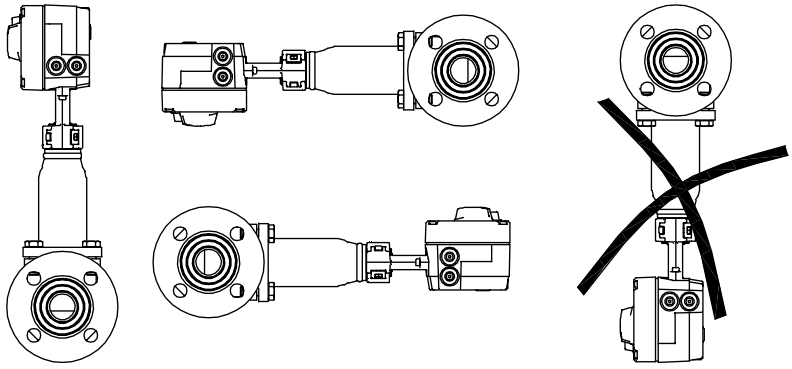
Installation

Hydraulic connections
Mount according to flow direction as indicated on valve body, A is inlet port, AB is outlet port.

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 horizontal or vertical position but not upside down (at high temperatures horizontal position is preferred).



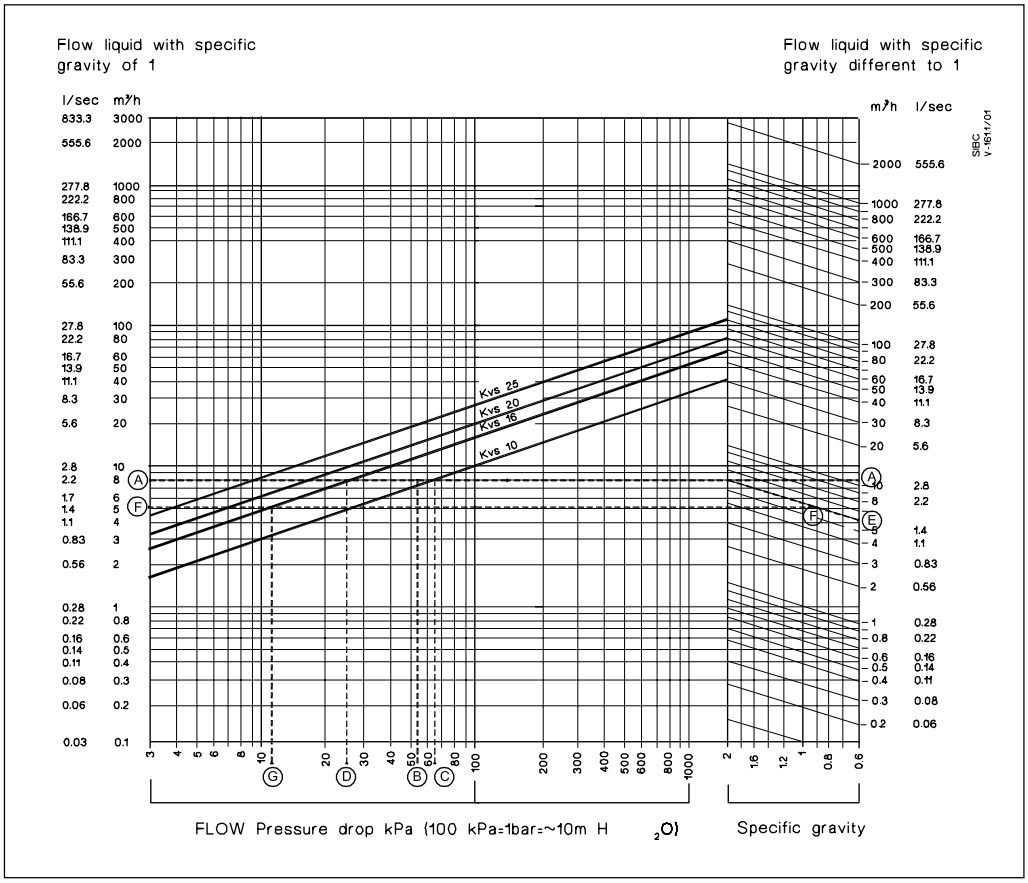
Note that the actuator without adapter should be mounted horizontally at media temperatures over 150 °C.

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 0 °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.

Control valve sizing diagram for fluids



Example:

1 For fluids with specific gravity of 1 (e.g. water)
Design data:
Flow rate: 8 m³/h
System pressure drop: 55 kPa

Locate the horizontal line representing a flow rate of 8 m³/h (line A–A). The valve authority is given by the equation:

$$\text{Valve authority, } a = \frac{P1}{P1 + P2}$$

Where:
P1 = pressure drop across valve with fully open valve,
P2 = pressure drop across the rest of the circuit with a fully open valve

The ideal valve would give a pressure drop equal to the system pressure drop (ie. an authority of 0.5);
If P1 = P2
a = P1/2P1 = 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 10 would give a pressure drop of 63 kPa (point C):

$$\text{hence valve authority} = \frac{63}{63+55} = 0.534$$

The second-largest valve, with kvs 16, would give a pressure drop of 25 kPa (point D):

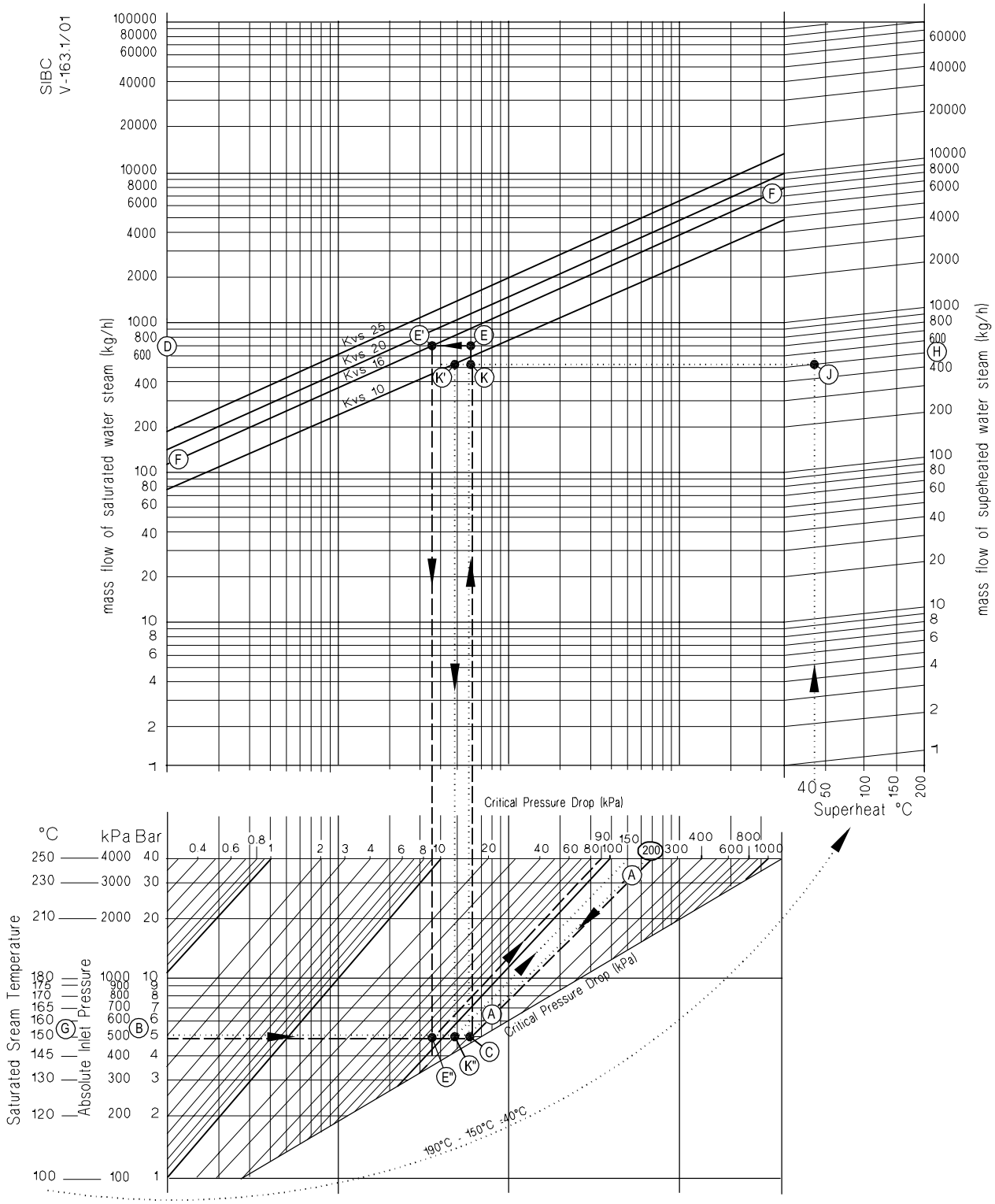
$$\text{hence valve authority} = \frac{25}{25+55} = 0.312$$

Generally, for a 2 port application, 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 head, 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



Control valve sizing diagram for steam

Example

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 16 (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.

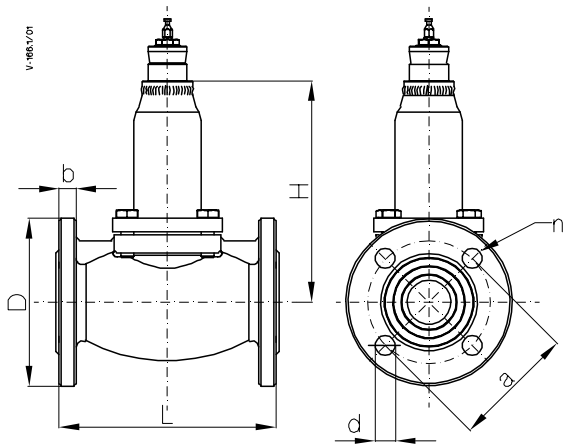
- follow dotted line -

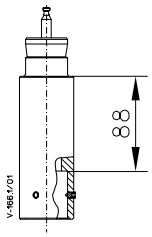
As before, the diagonal pressure drop line A-A is located as before for 40 % of 500 (200 kg/h). The horizontal inlet pressure line through point B is now extended to the left to read off the corresponding saturated steam temperature at point G (150 °C). The difference between the saturated steam temperature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





Adapter for media temperatures over 150 °C

Type	DN	L mm	H mm	D mm	b mm	a mm	d mm	n no.	Stroke mm	Weight kg
VEFS 2	25	160	176	115	16	85	14	4	7	5.5
	32	180	197	140	18	100	18	4	10	9.2
	40	200	197	150	18	110	18	4	10	9.9
	50	230	197	165	20	125	18	4	10	12.5