Data sheet

2- and 3-way control valves VRBZ

Description / Application

VRBZ 3 ext.

VRBZ 3 & VRBZ 2 int.*

VRBZ 2 ext.*

* *Closing plug and closing nut as accessories only.*

VRBZ control valves provide a quality, cost effective solution for most low pressure and hot water applications where threaded connections up to 40 mm are required. The red bronze body and brass plug are suitable for pressures up to 16 bar and the 5.5 mm stroke length gives good rangebility.
Valves comply with PED directive 97/23/EC.

Main data:

- Red bronze construction.
- Thread nipples:
  - Internal Rp $^3/_4$" - 1½"
  - External G $1^1/_4$" - $2^1/_4$"
- Suitable for water temperatures from 2 to 120 °C.
- Nominal operating pressure: 16 bar max.
- Suitable for use with AMV(E) 01/02 and AMV(E) 13-SU and AMV(E) 13 actuators.

Ordering

3-way valves

Type	DN	k_{vs} A-AB	k_{vs} B-AB	$\Delta p_{max.}$ bar	Internal thread	**Code No.** Internal thread	External thread	**Code No.** External thread
VRBZ 20	20	6.3	4.0	1.7	R_p $^3/_4$	**065Z7220**	G $1^1/_4$	**065Z7420**
VRBZ 25	25	10	6.3	1.0	R_p 1	**065Z7225**	G $1^1/_2$	**065Z7425**
VRBZ 32	32	13	10	0.7	R_p $1^1/_4$	**065Z7232**	G 2	**065Z7432**
VRBZ 40	40	16	13	0.5	R_p $1^1/_2$	**065Z7240**	G $2^1/_4$	**065Z7440**

2-way valves (closing plug and closing nut as accessories only)

Type	DN	k_{vs}	$\Delta p_{max.}$ bar	Internal thread		External thread	
				Code No. 3-way valve +	**Code No.** Closing plug	**Code No.** 3-way valve +	**Code No.** Closing nut
VRBZ 20	20	6.3	1.7	**065Z7220**	**065Z7026**	**065Z7420**	**065Z7002**
VRBZ 25	25	10	1.0	**065Z7225**	**065Z7027**	**065Z7425**	**065Z7003**
VRBZ 32	32	13	0.7	**065Z7232**	**065Z7028**	**065Z7432**	**065Z7004**
VRBZ 40	40	16	0.5	**065Z7240**	**065Z7029**	**065Z7440**	**065Z7005**

Accessories

DN	Three nipples for ext. threaded valves	
	R	**Code No.**
20	3/4	**065B4108**
25	1	**065B4109**
32	1 1/4	**065B4110**
40	1 1/2	**065B4111**

Type	**Code No.**
Stuffing box DN 20 - 40	**065Z7050**

Ordering *(continued)*

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. Max. Δp is in this case also recommended maximum Δp which is based on generation of noise, plug erosion, etc. It should be checked against the Δp figure calculated from the chart on page 4 or the equation below, with the valve fully opened at the designed flow rate.

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

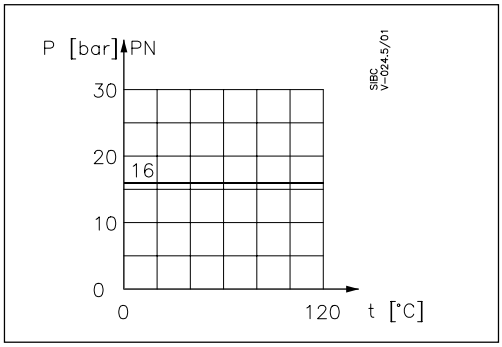
where:
S = specific gravity
Q = flow rate in m³/h
ΔP_{valve} = pressure drop across valve in bar (fully open)

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

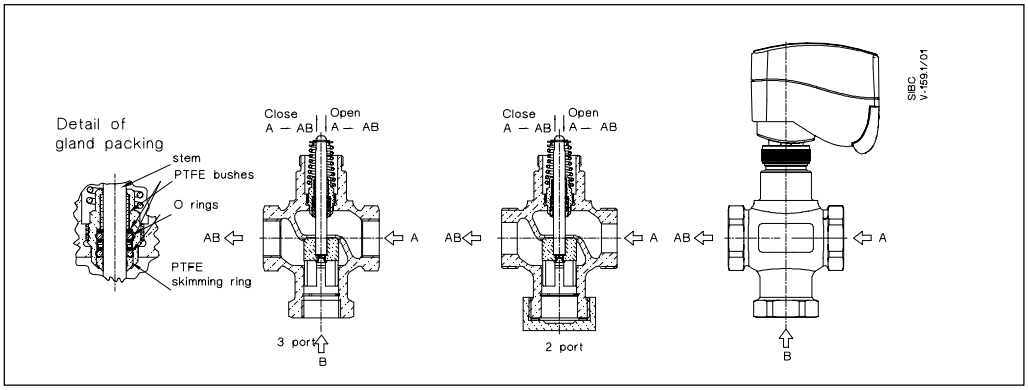
Technical data

Control characteristic	Linear
Control range	min. 50:1
Media	Circulation water / Glycolic water up to 50 %
Leakage loss, closed valve	A - AB ≤ 0.05 % of k_{vs} B - AB ≤ 2 % of k_{vs}
Medium temperature	2 - 120 °C
Pressure stage	PN 16
Stroke	5.5 mm
Material	Body: Red bronze 2.1096.1(Rg5) Valve seat: Red bronze 2.1096.1(Rg5) Cone: Brass Stem: Stainless steel Stuffing box: EPDM
Connection	Valves with internal thread DIN 2999 Valves with external thread DIN ISO 228/1

Pressure temperature diagram



Design



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, AB is *always* the outlet port; inlets are A (two port) or A and B (three port).

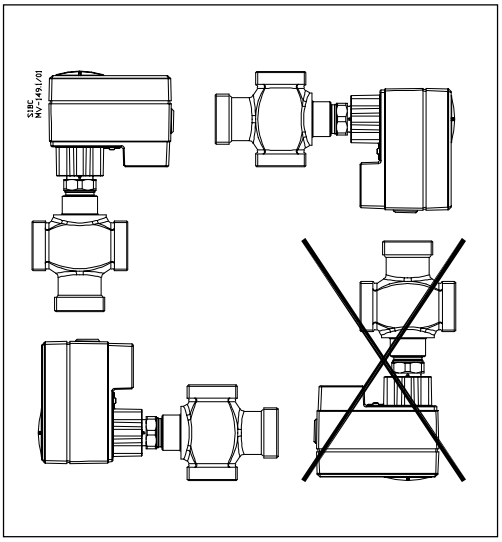
Valve mounting
Before mounting the valve be sure that the pipes are clean and free from swarf. It is essential that the pipes are lined up squarely with the valve at each connection and are free from vibrations.

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.*



Hydraulic diagrams for applications of 3-way mixing valves
Note the valve must only be used as a mixing valve, and is not suitable for diverting (with one inlet and two outlet ports). Where this function is required, the valve should be arranged in the return line, as Fig. 2.

Note *that if the pump is installed before the A port of the valve arrangement (fig.1, fig 2), then excessive valve hammering will occur thus resulting in an overload of the actuator.*

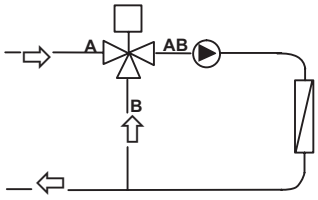


Fig 1 Mixing valve used in mixing application.

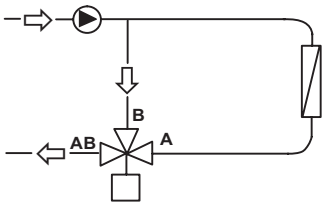
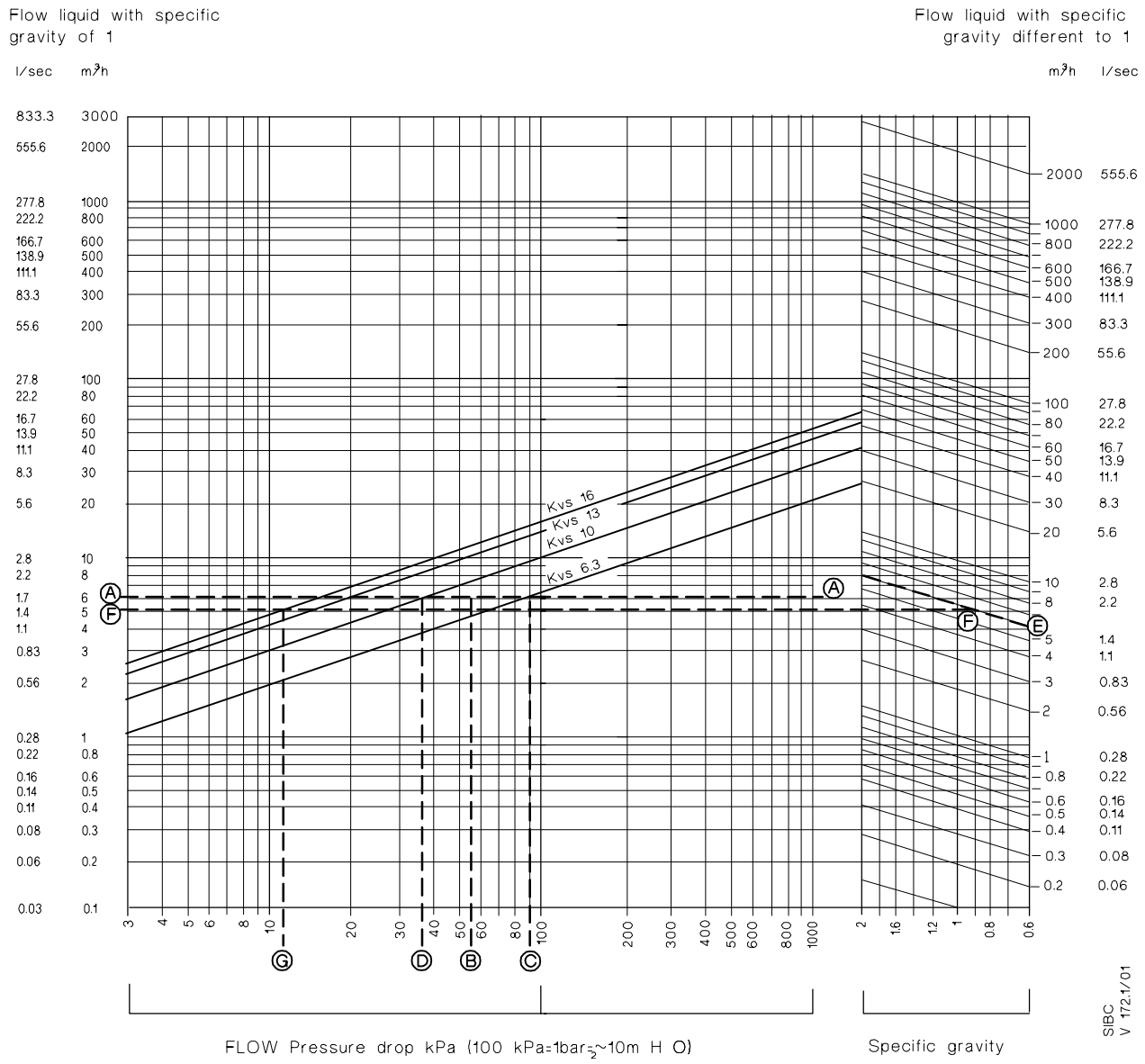


Fig 2 Mixing valve used in diverting application.

Control valves sizing diagram for fluids



Control valves sizing diagram for fluids
(continued)

Example:

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:
$\Delta P1$ = pressure drop across the fully open valve,
$\Delta P2$ = 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 $\Delta P1 = \Delta P2$
$a = \Delta P1/2*\Delta P1 = 0.5$
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 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):

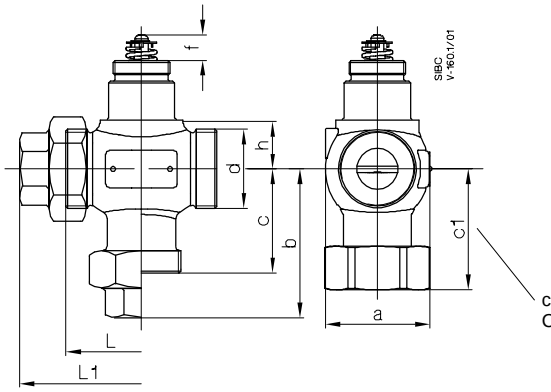
$$\text{hence valve authority} = \frac{36}{36 + 55} = 0.395$$

Generally, for a 3 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.

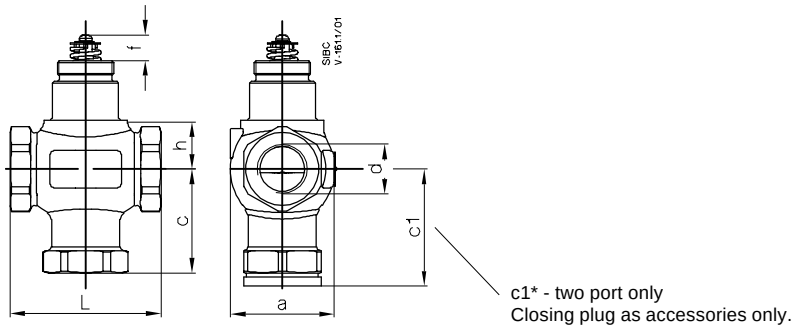
2 For fluids with specific gravity different from 1
Design data:
Flow rate: 6 m³/h of fluid, S.G. 0.9
System pressure drop: 10 kPa

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).

Dimensions



Type	Size	connection (d)	L mm	L1 mm	c mm	c1* mm	b mm	a mm	h mm	Weight kg 2-way	Weight kg 3-way	f stroke mm
VRBZ External	20	ext. G1¼	80	128	55	62	79	55	57	1.4	1.2	5.5
	25	ext. G1½	95	151	60	67	88	60	57	1.7	1.4	5.5
	32	ext. G2	112	178	66	75	99	65	63	2.5	2.1	5.5
	40	ext. G2¼	132	201	75	85	110	71	67	3.3	2.9	5.5



Type	Size	connection (d)	L mm	c mm	c1* mm	a mm	h mm	Weight kg 2-way	Weight kg 3-way	f stroke mm
VRBZ Internal	20	int. R_p¾	80	55	62	55	57	1.2	1.1	5.5
	25	int. R_p1	95	60	67	60	57	1.6	1.4	5.5
	32	int. R_p1¼	112	66	75	65	63	2.3	2.0	5.5
	40	int. R_p1½	132	75	85	71	67	3.3	2.9	5.5