SIEMENS

4373

Acvatix™

2-port seat valves PN25 with flanged connection VVF52..

- **Nodular cast iron EN-GJS-400-18-LT valve body**
- **DN 15...40**
- **k_{vs} 0.16...25 m^3/h**
- **Can be equipped with SAX..-electromotoric or SKD..- or SKB..-electrohydraulic actuators**

Use

For use in district heating, heating, ventilating, and air conditioning systems as a control or safety shutoff valve. Control devices MK..5.. (water) or MK..5..G (steam) are TÜV approved per DIN EN 14597 and can therefore be used as control devices with safety shut-off function for temperature and pressure limitation.

For open and closed circuits (mind "Cavitation", refer to page 6).
Silicon-free valve versions with type suffix ..M available.

Type summary

Product number	DN	k_{vs} [m^3 / h]	S_v
VVF52.15-0.16	15	0.16	50…100
VVF52.15-0.2		0.2	
VVF52.15-0.25		0.25	
VVF52.15-0.32		0.32	
VVF52.15-0.4		0.4	
VVF52.15-0.5		0.5	
VVF52.15-0.63		0.63	
VVF52.15-0.8		0.8	
VVF52.15-1		1	
VVF52.15-1.25		1.25	
VVF52.15-1.6		1.6	
VVF52.15-2		2	
VVF52.15-2.5		2.5	
VVF52.15-3.2		3.2	
VVF52.15-4		4	
VVF52.25-5	25	5	100…200
VVF52.25-6.3		6.3	
VVF52.25-8		8	
VVF52.25-10		10	
VVF52.40-12.5	40	12.5	
VVF52.40-16		16	
VVF52.40-20		20	
VVF52.40-25		25	

DN = Nominal size
k_{vs} = Nominal flow rate of cold water (5…30 °C) through the fully open valve (H_{100}) by a differential pressure of 100 kPa (1 bar)
S_v = Rangeability k_{vs} / k_{vr}
k_{vr} = Smallest k_v value, at which the flow characteristic tolerances can still be maintained, by a differential pressure of 100 kPa (1 bar)

High performance versions

Product number	Type suffix	Description	Examples
VVF52..A	A	Sealing gland with PTFE sleeve for temperatures up to 180 °C	VVF52.15-2.5A
VVF52..G	G	Sealing gland with PTFE sleeve for steam up to 180 °C, available for $k_{vs} \geq 1.25$ m^3/h	VVF52.15-3.2G
VVF52..M	M	Sealing gland with PTFE sleeve, silicon-free version, for temperatures up to 180 °C	VVF52.25-6.3M

TÜV tested per DIN EN 14597

Product number	Stock No.	Description	Data sheet
MK..5..	S55329-M1..	Control device PN 25 for safety function per DIN EN 14597, for water	N4387
MK..5..G	S55329-M1..	Control device PN 25 for safety function per DIN EN 14597, for steam	N4389

Accessories

Product number	Stock No.	Description
ASZ6.5	**ASZ6.5**	Electric stem heating element, AC 24 V / 30 W, required for media below 0 °C. For electrohydraulic actuators SKD.., SKB.., SKC..
ASZ6.6	**S55845-Z108**	Electric stem heating element, AC 24 V 30 W, required for media below 0 °C

Ordering

Example:

Product number	*Stock number*	*Designation*	*Quantity*
VVF52.15-0.25	VVF52.15-0.25	2-port seat valve PN25 with flanged connection	1

Delivery

Valves, actuators and accessories are packed and supplied separately.
The valves are supplied without counter-flanges and without flange gaskets.

Spare parts, Rev no.

See overview, page 12.

Equipment combinations

Valves		**Actuators**					
		SAX.. [1)]		**SKD.. [1) 2) 3)]**		**SKB.. [2) 3)]**	
	H_{100}	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s
	[mm]	[kPa]					
VVF52.15..	20	1600	2500	1600	2500	1600	2500
VVF52.25..		1200	1500		2250		
VVF52.40..		400	500	700	750		2000

[1)] Usable up to maximum medium temperature of 150 °C
[2)] Usable also in combination with special version G for saturated steam / super-heated steam
[3)] Together with actuators SKD.. or SKB.., 2-port valves VVF52.. are TÜV approved to DIN EN 14597 and can be used as safety shutoff valves for steam or high-temperature hot water should permissible temperature or pressure limits not be exceeded.

H_{100} = Nominal stroke
Δp_{max} = Maximum permissible differential pressure across the valve, valid for the entire actuating range of the motorized valve
Δp_s = Maximum permissible differential pressure at which the motorized valve will close securely against the pressure (close off pressure).

Actuator overview

Product number	**Actuator type**	**Operating voltage**	**Positioning signal**	**Spring return**	**Positioning time**	**Positioning force**	**Data sheet**
SAX31.00	Electro-motoric	AC 230 V	3-position	-	120 s	800 N	N4501
SAX31.03					30 s		
SAX81.00		AC/DC 24 V			120 s		
SAX81.03					30 s		
SAX61.03			DC 0…10 V [1)]				
SKD32.50	Electro-hydraulic	AC 230 V	3-position	-	120 s	1000 N	N4561
SKD32.21				Yes	30 s		
SKD32.51					120 s		
SKD82.50		AC 24 V		-			
SKD82.51				Yes			
SKD60			DC 0…10 V [1)]	-	30 s		
SKD62..				Yes			
SKB32.50	Electro-hydraulic	AC 230 V	3-position	-	120 s	2800 N	N4566
SKB32.51				Yes			
SKB82.50		AC 24 V		-			
SKB82.51				Yes			
SKB60			DC 0…10 V [1)]	-			
SKB62..				Yes			

Actuators SAX81.. and SAX61.. are UL listed

[1)] or DC 4…20 mA or 0…1000 Ω

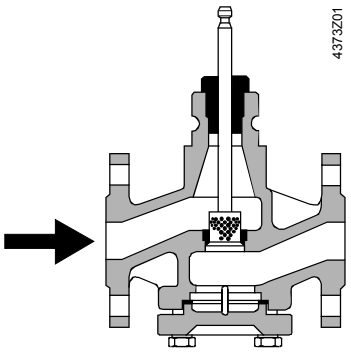
Pneumatic actuators

Contact your local office or branch for more information.

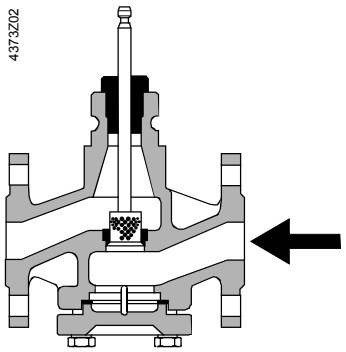
⚠ **The VVF52..G valves (for saturated steam / super-heated steam) cannot be used with pneumatic actuators.**

Technical design / mechanical design

Valve cross section



Standard version VVF52..
for chilled water, cooling water, low-temperature hot water, high-temperature hot water, water with anti-freeze
−20…150 °C



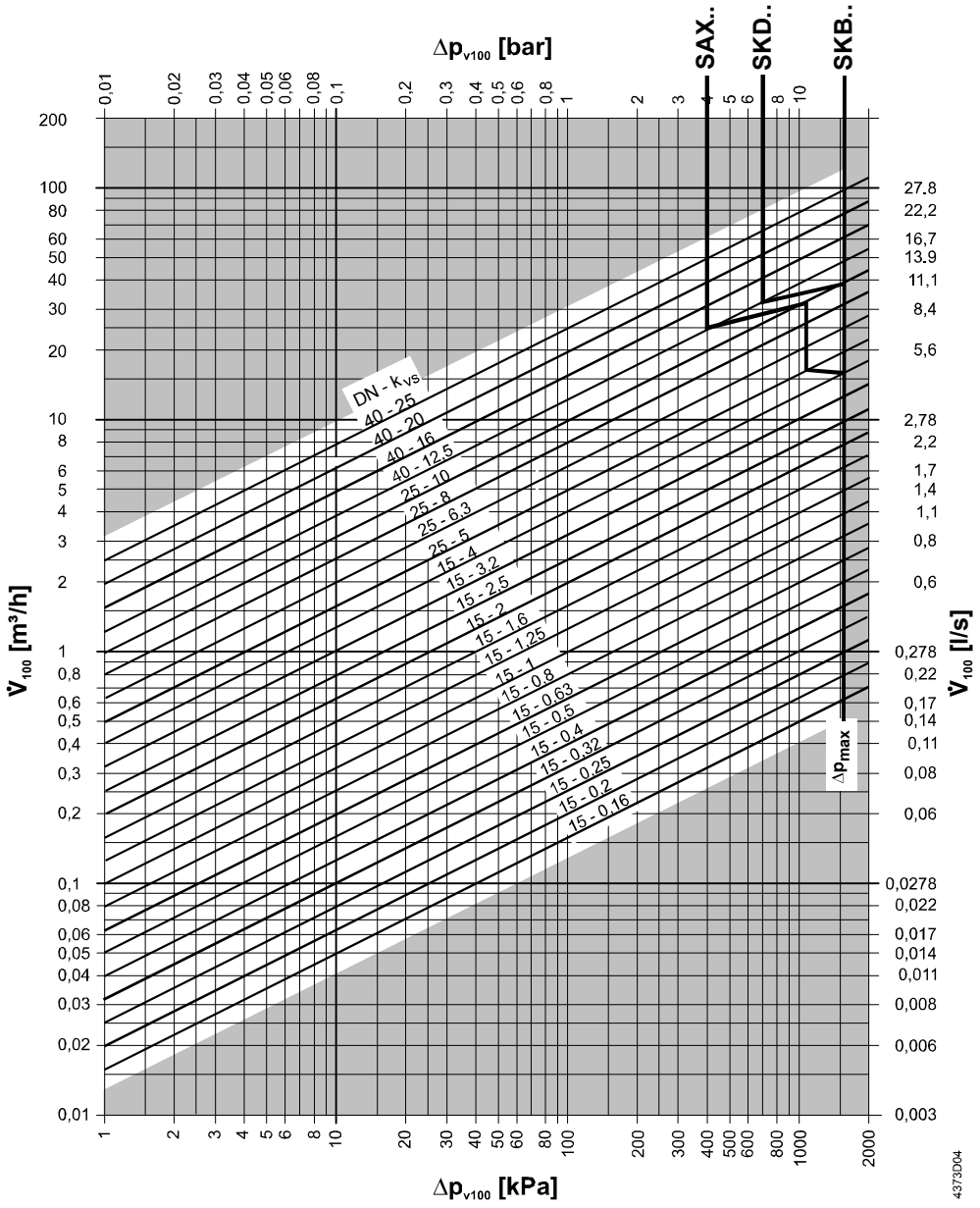
Special version VVF52..G
for saturated steam, super-heated steam up to max. 600 kPa (6 bar) abs

≤ 180 °C

Depending on the nominal size, a guided parabolic, perforated or slot plug is used that is directly connected to the valve stem.
The seat is screwed to the valve body with the aid of special gland material.
Schematic representation, design variations are possible.

⚠ **The two-port seat valve does not become a three-port valve by removing the blank flange!**

Flow diagram



Δp_{max} = Maximum permissible differential pressure across the valve, valid for the entire actuating range of the motorized valve

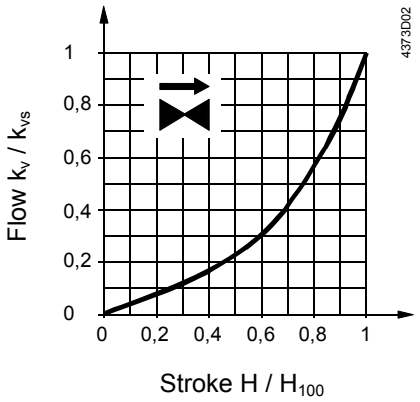
Δp_{v100} = Differential pressure across the fully open valve and the valve's control path by a volume flow V_{100}

$\dot{V}_{100}$ = Volume flow through the fully open valve (H_{100})

100 kPa = 1 bar ≈ 10 mWC

1 m³/h = 0.278 l/s water at 20 °C

Valve flow characteristic



0…30 % → linear

30…100 % → equal percentage

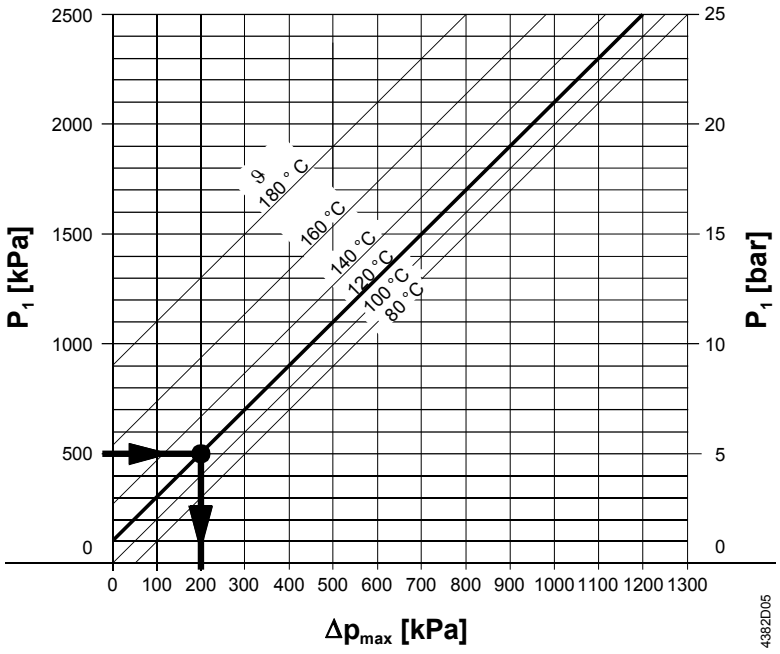
n_{gl} = 3 as per VDI / VDE 2173

Cavitation

Cavitation accelerates wear on the valve plug and seat, and also results in undesirable noise. Cavitation can be avoided by not exceeding the differential pressure shown in the flow diagram on page 5 and by adhering to the static pressures shown below.

Note on chilled water

To avoid cavitation in chilled water circuits ensure sufficient counter pressure at valve outlet, e.g. by a throttling valve after the heat exchanger. Select the pressure drop across the valve at maximum according to the 80 °C curve in the flow diagram below.



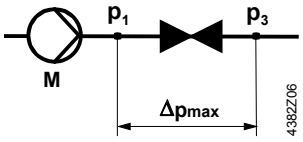
Δp_{max} = Differential pressure with valve almost closed, at which cavitation can largely be avoided

p_1 = Static pressure at inlet

p_3 = Static pressure at outlet

M = Pump

ϑ = Water temperature



High temperature hot water example:

Pressure p_1 at valve inlet: 500 kPa (5 bar)
Water temperature: 120 °C

From the diagram above, it will be seen that with the valve almost closed, the maximum permissible differential pressure Δp_{max} is 200 kPa (2 bar).

Chilled water example:

Spring water cooling as an example of avoiding cavitation:

Chilled water = 12 °C

p_1 = 500 kPa (5 bar)

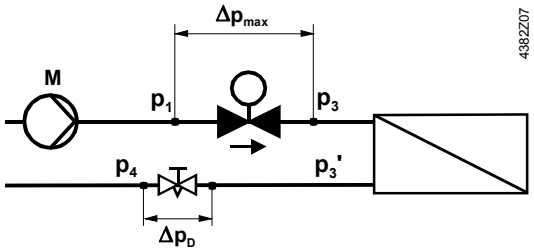
p_4 = 100 kPa (1 bar) (atmospheric pressure)

Δp_{max} = 300 kPa (3 bar)

$\Delta p_{3\text{-}3'}$ = 20 kPa (0,2 bar)

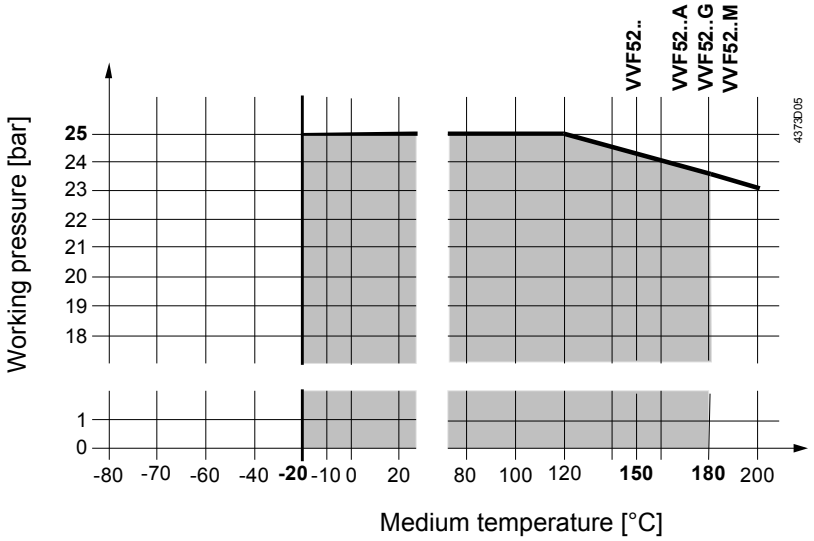
Δp_D (throttle) = 80 kPa (0,8 bar)

p_3' = pressure after consumer in kPa



Working pressure and medium temperature

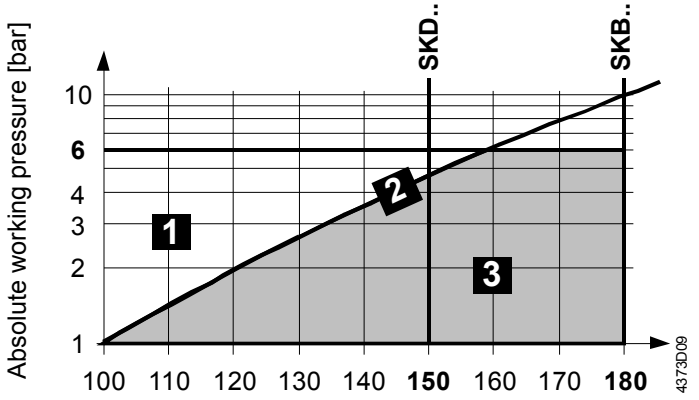
Fluids



Working pressure and medium temperature staged as per ISO 7005

Current local legislation must be observed.

Saturated steam
Superheated steam



≤ 180 °C VVF52..G

1	wet steam	avoid
2	saturated steam	permissible range of use
3	superheated steam	

Recommendation

For saturated steam and superheated steam the differential pressure Δp_{max} across the valve should be close to the critical pressure ratio.

$$\text{Pressure ratio} = \frac{p_1 - p_3}{p_1} \cdot 100\%$$

p_1 = absolute pressure before valve in kPa
p_3 = absolute pressure after valve in kPa

Calculation of the k_{vs} value for steam

Subcritical range

$$\frac{p_1 - p_3}{p_1} \cdot 100\% < 42\%$$

Pressure ratio < 42% subcritical

$$k_{vs} = 4.4 \cdot \frac{\dot{m}}{\sqrt{p_3 \cdot (p_1 - p_3)}} \cdot k$$

Supercritical range

$$\frac{p_1 - p_3}{P_1} \cdot 100\% \geq 42\%$$

Pressure ratio ≥ 42% supercritical (not recommended)

$$k_{vs} = 8.8 \cdot \frac{\dot{m}}{p_1} \cdot k$$

$\dot{m}$ = steam quantity in kg/h
k = factor for superheating of steam = 1 + 0.0012 · ΔT (k = 1 for saturated steam)
ΔT = temperature differential in K between saturated steam and superheated steam

Example

given	saturated steam 151.8 °C p_1 = 500 kPa (5 bar) $\dot{m}$ = 460 kg/h pressure ratio = 30 %	saturated steam 151.8 °C p_1 = 500 kPa (5 bar) $\dot{m}$ = 460 kg/h pressure ratio = 42 % (supercritical permitted)
required	k_{vs}, valve type	k_{vs}, valve type
procedure	$p_3 = p_1 - \frac{30 \cdot p_1}{100}$ $p_3 = 500 - \frac{30 \cdot 500}{100} = 350 \text{ kPa (3.5bar)}$ $k_{vs} = 4.4 \cdot \frac{460}{\sqrt{350 \cdot (500 - 350)}} \cdot 1 = 8.83 \text{ m}^3/\text{h}$	$k_{vs} = 8.8 \cdot \frac{460}{500} \cdot 1 = 8.09 \text{ m}^3/\text{h}$
selected	k_{vs} = 10 m^3/h ⇨ VVF52.25-10G	k_{vs} = 8 m^3/h ⇨ VVF52.25-8G

Notes

Engineering

We recommend installation in the return pipe, as the temperatures in this pipe are lower for applications in heating systems, which in turn, extends the stem sealing gland's life.

⚠ In open circuits the valve plug may seize as the result of scale deposits. In these applications, only the most powerful SKD.. or SKB.. actuators should be used. Further the valve should be exercised at regular intervals (two to three times per week). A strainer MUST be fitted at the valve inlet

Ensure cavitation free flow (refer to page 6).

⚠ To ensure the reliability of the valve, we recommend the fitting of a strainer at the valve inlet even in closed circuits.

⚠ For media below 0 °C, use the electric stem heating element to prevent the valve stem from freezing in the sealing gland. For safety reasons, the stem heating element has been designed for AC 24 V / 30 W operating voltage.

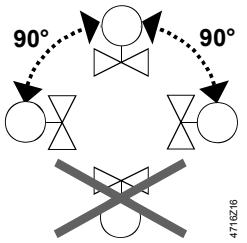
The use of these valves for steam is subject to specific parameters:
Observe diagram for steam on page 7 and "Technical data" on page 10!

Mounting

Both valve and actuator can easily be assembled at the mounting location. Neither special tools nor adjustments are required.

The valve is supplied with Mounting Instructions 74 319 0509 0.

Orientation



Direction of flow

When mounting, pay attention to the valve's flow direction symbol →.

VVF52.. → Standard
Direction of action: closes against pressure

VVF52..G ← Steam
Direction of action: closes on pressure

Commissioning ⚠ **Commission the valve only if the actuator has been mounted correctly.**

Valve stem retracts: valve opens = increasing flow
Valve stem extends: valve closes = decreasing flow

Maintenance

VVF52.. valves require no maintenance.

Warning ⚠ When doing service work on the valve / actuator:

- Deactivate the pump and turn off the power supply
- Close the shutoff valves
- Fully reduce the pressure in the piping system and allow pipes to completely cool down

If necessary, disconnect the electrical wires.

Before putting the valve into operation again, make certain the actuator is correctly fitted.

Stem sealing gland

The glands can be exchanged without removing the valve, provided the pipes are depressurized and cooled off and the stem surface is unharmed.
If the stem is damaged in the gland range, replace the entire stem-plug-unit.
Contact your local office or branch.

Disposal

Before disposal the valve must be dismantled and separated into its various constituent materials.
Legislation may demand special handling of certain components, or it may be sensible from an ecological point of view.
Current local legislation must be observed.

Warranty

The technical data given for these applications is valid only in conjunction with the Siemens actuators as detailed under "Equipment combinations", page 3.
All terms of the warranty will be invalidated by the use of actuators from other manufacturers.

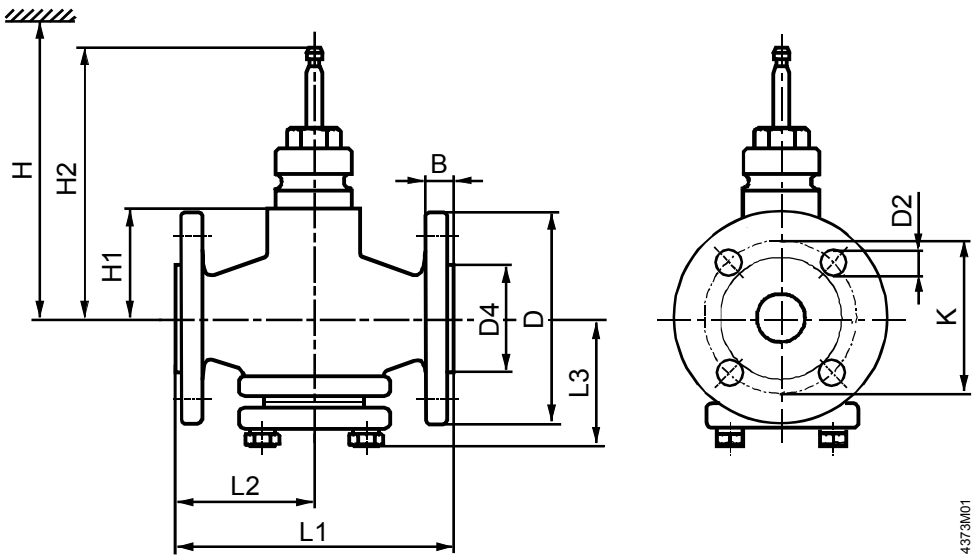
Technical data

Functional data	PN class		PN 25 to ISO 7268
	Working pressure		to ISO 7005 within the permissible "medium temperature" range according to the diagram on page 7
	Flow characteristic	• 0…30 %	• linear
		• 30…100 %	• equal percentage; n_{gl} = 3 to VDI / VDE 2173
	Leakage rate		0…0.02 % of k_{vs} value to DIN EN 1349
	Permissible media:	water	cooling water, chilled water, low temperature hot water, high temperature hot water, water with anti-freeze; recommendation: water treatment to VDI 2035
		brine	
		steam	saturated steam, super-heated steam; dryness at inlet minimum 0.98 (use only valves with suffix G)
		heat transfer oils	(use only valves with suffix A or M)
	Medium temperature [1]		
	water, brine [2]	VVF52..	-20…150 °C
		VVF52..A, VVF52..G, VVF52..M	≤ 180 °C
	saturated steam	VVF52..G	≤ 180 °C ≤ 600 kPa (6 bar)
	super-heated steam	VVF52..G	≤ 180 °C ≤ 600 kPa (6 bar) permissible temperature and pressure range according to the diagram on page 7
	heat transfer oils		
		VVF52..A, VVF52..M	≤ 180 °C
	Rangeability S_v		DN 15: 50…100 DN 25…40: 100…200
	Nominal stroke		20 mm
Industry standards	Pressure Equipment Directive		PED 97/23/EC
	Pressure Accessories		as per article 1, section 2.1.4
	Fluid group 2		without CE-marking as per article 3, section 3 (sound engineering practice)
	Environmental compatibility		ISO 14001 (Environment) ISO 9001 (Quality) SN 36350 (Environmentally compatible products) RL 2002/95/EG (RoHS)
Materials	Valve body		nodular cast iron EN-GJS-400-18-LT
	Stem		stainless steel
	Plug, seat		stainless steel
	Sealing gland [3]		standard version: brass, silicon-free special version: stainless steel
	Gland materials [3]		standard version: EPDM O-ring, silicon-free special version: VVF52..A: PTFE sleeve VVF52..G: PTFE sleeve VVF52..M: PTFE sleeve, silicon-free
Dimensions / Weight	Refer to "Dimensions", page 11		
	Flange connections		to ISO 7005

[1] For 150…180 °C use electrohydraulic SKB.. actuators.
[2] Electric stem heating element required for media below 0 °C.
[3] Silicon-free version to 180 °C with type suffix M.

Dimensions

Dimensions in mm



DN	B	D	D2	D4	K	L1	L2	L3	H1	H2	H			kg
		Ø	Ø	Ø							SAX..	SKD..	SKB..	[kg]
15	16	95	14 (4x)	46	65	130	65	69	64	160.5	> 506	> 564	> 639	4.3
25	18	115		65	85	160	80	73						5.8
40	20	150	19 (4x)	84	110	200	100	97.5	57	153.5	> 499	> 557		8.9

DN = Nominal size

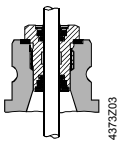
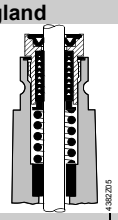
H = Total actuator height plus minimum distance to the wall or the ceiling for mounting, connection, operation, maintenance etc.

H1 = Dimension from the pipe centre to install the actuator (upper edge)

H2 = Valve in the «Closed» position means that the valve stem is fully extended

Spare parts

Order numbers for spare parts

	Sealing gland			Set
				Plug with stem, circlip, sealing
Product number	**VVF52..**	**VVF52..A, VVF52..G**	**VVF52..M**	**VVF52.., VVF52..G, VVF52..M, VVF52..A**
VVF52.15-0.16	4 284 8806 0	4 284 8829 0	4 284 9538 0	For these valves a plug replacement is not possible
VVF52.15-0.2	4 284 8806 0	4 284 8829 0	4 284 9538 0	
VVF52.15-0.25	4 284 8806 0	4 284 8829 0	4 284 9538 0	
VVF52.15-0.32	4 284 8806 0	4 284 8829 0	4 284 9538 0	
VVF52.15-0.4	4 284 8806 0	4 284 8829 0	4 284 9538 0	
VVF52.15-0.5	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0142 0
VVF52.15-0.63	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0143 0
VVF52.15-0.8	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0144 0
VVF52.15-1	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0145 0
VVF52.15-1.25	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0146 0
VVF52.15-1.6	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0147 0
VVF52.15-2	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0148 0
VVF52.15-2.5	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0149 0
VVF52.15-3.2	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0150 0
VVF52.15-4	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0151 0
VVF52.25-5	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0133 0
VVF52.25-6.3	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0138 0
VVF52.25-8	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0134 0
VVF52.25-10	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0139 0
VVF52.40-12.5	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0117 0
VVF52.40-16	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0131 0
VVF52.40-20	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0118 0
VVF52.40-25	4 284 8806 0	4 284 8829 0	4 284 9538 0	74 676 0132 0

Revision numbers

Product number	Valid from rev. no.	Product number	Valid from rev. no.	Product number	Valid from rev. no.	Product number	Valid from rev. no.
VVF52.15-0.16	..04	VVF52.15-0.16A	..03			VVF52.15-0.16M	..03
VVF52.15-0.2	..04	VVF52.15-0.2A	..03			VVF52.15-0.2M	..03
VVF52.15-0.25	..04	VVF52.15-0.25A	..03			VVF52.15-0.25M	..03
VVF52.15-0.32	..04	VVF52.15-0.32A	..03			VVF52.15-0.32M	..03
VVF52.15-0.4	..04	VVF52.15-0.4A	..03			VVF52.15-0.4M	..03
VVF52.15-0.5	..04	VVF52.15-0.5A	..03			VVF52.15-0.5M	..03
VVF52.15-0.63	..04	VVF52.15-0.63A	..03			VVF52.15-0.63M	..03
VVF52.15-0.8	..04	VVF52.15-0.8A	..03			VVF52.15-0.8M	..03
VVF52.15-1	..04	VVF52.15-1A	..03			VVF52.15-1M	..03
VVF52.15-1.25	..04	VVF52.15-1.25A	..03	VVF52.15-1.25G	..03	VVF52.15-1.25M	..03
VVF52.15-1.6	..04	VVF52.15-1.6A	..03	VVF52.15-1.6G	..03	VVF52.15-1.6M	..03
VVF52.15-2	..04	VVF52.15-2A	..03	VVF52.15-2G	..03	VVF52.15-2M	..03
VVF52.15-2.5	..04	VVF52.15-2.5A	..03	VVF52.15-2.5G	..03	VVF52.15-2.5M	..03
VVF52.15-3.2	..04	VVF52.15-3.2A	..03	VVF52.15-3.2G	..03	VVF52.15-3.2M	..03
VVF52.15-4	..04	VVF52.15-4A	..03	VVF52.15-4G	..03	VVF52.15-4M	..03
VVF52.25-5	..04	VVF52.25-5A	..03	VVF52.25-5G	..03	VVF52.25-5M	..03
VVF52.25-6.3	..04	VVF52.25-6.3A	..03	VVF52.25-6.3G	..03	VVF52.25-6.3M	..03
VVF52.25-8	..04	VVF52.25-8A	..03	VVF52.25-8G	..03	VVF52.25-8M	..03
VVF52.25-10	..04	VVF52.25-10A	..03	VVF52.25-10G	..03	VVF52.25-10M	..03
VVF52.40-12.5	..04	VVF52.40-12.5A	..03	VVF52.40-12.5G	..03	VVF52.40-12.5M	..03
VVF52.40-16	..04	VVF52.40-16A	..03	VVF52.40-16G	..03	VVF52.40-16M	..03
VVF52.40-20	..04	VVF52.40-20A	..03	VVF52.40-20G	..03	VVF52.40-20M	..03
VVF52.40-25	..04	VVF52.40-25A	..03	VVF52.40-25G	..03	VVF52.40-25M	..03