2-Port Seat Valves with Male Thread, PN 16

VVG41...

- Bronze CuSn5Zn5Pb2 valve body
- DN 15...DN 50
- k_{vs} 0.63...40 m^3/h
- Flat sealing connections with external thread G…B to ISO 228-1
- Sets of ALG…2 screwed fittings with threaded connection available from Siemens
- Can be equipped with SQX... electromotoric or SKD... and SKB... electrohydraulic actuators

Use

For use in heating, ventilating and air conditioning systems as a control or safety shutoff valve.
For open and closed circuits (mind cavitation on page 5).

Type summary

Type	DN	k_{vs} [m^3/h]	S_v
VVG41.11	15	0.63	> 50
VVG41.12		1.0	
VVG41.13		1.6	
VVG41.14		2.5	
VVG41.15		4.0	
VVG41.20	20	6.3	> 100
VVG41.25	25	10	
VVG41.32	32	16	
VVG41.40	40	25	
VVG41.50	50	40	

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)

Accessories

Type	Description
ALG…2	Set of 2 screwed fittings for 2-port valves, consisting of - 2 union nut - 2 discs and - 2 flat seals
ASZ6.5	Electric stem heating element, AC 24 V 30 W, required for media below 0 °C

Order

When ordering please give quantity, product name and type reference.

Example:
2 valves VVG41.25
2 sets of screwed fittings ALG252

Delivery

Valves, actuators and accessories are packed and supplied separately.

Spare parts

See overview, section „Spare parts“, page 11

Equipment combinations

Valves		Actuators						Fitting sets
		SQX... [1]		SKD... [1]		SKB...		
	H_{100}	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s	
	[mm]	[kPa]						Type
VVG41.11	20	800	1600	800	1600	800	1600	ALG152
VVG41.12								
VVG41.13								
VVG41.14								
VVG41.15								
VVG41.20								ALG202
VVG41.25			1550					ALG252
VVG41.32			875		1275			ALG322
VVG41.40		525	525	775	775			ALG402
VVG41.50		300	300	450	450		1225	ALG502

[1] Usable up to maximum medium temperature of 150 °C

H_{100} = Nominal stroke

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

Δp_s = Maximum permissible differential pressure at which the motorised valve will close securely against the pressure (close off pressure)

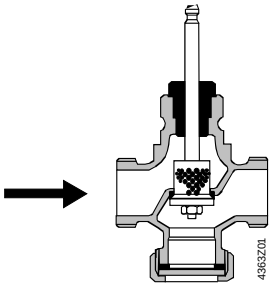
Actuator overview

Type	Actuator type	Operating voltage	Positioning signal	Spring return	Positioning time	Positioning force	Data sheet
SQX32.00	Electro-motoric	AC 230 V	3-position	No	150 s	700 N	N4554
SQX32.03					35 s		
SQX82.00		AC 24 V			150 s		
SQX82.03					35 s		
SQX62			DC 0…10 V [1]				
SKD32.50	Electro-hydraulic	AC 230 V	3- position	No	120 s	1000 N	N4561
SKD32.21				Yes	30 s		
SKD32.51					120 s		
SKD82.50		AC 24 V		No			
SKD82.51				Yes			
SKD60			DC 0…10 V [1]	No	30 s		N4563
SKD62				Yes			
SKB32.50	Electro-hydraulic	AC 230 V	3- position	No	120 s	2800 N	N4564
SKB32.51				Yes			
SKB82.50		AC 24 V		No			
SKB82.51				Yes			
SKB60			DC 0…10 V [1]	No			N4566
SKB62				Yes			

[1] or DC 4…20 mA

Technical design / mechanical design

Valve cross section



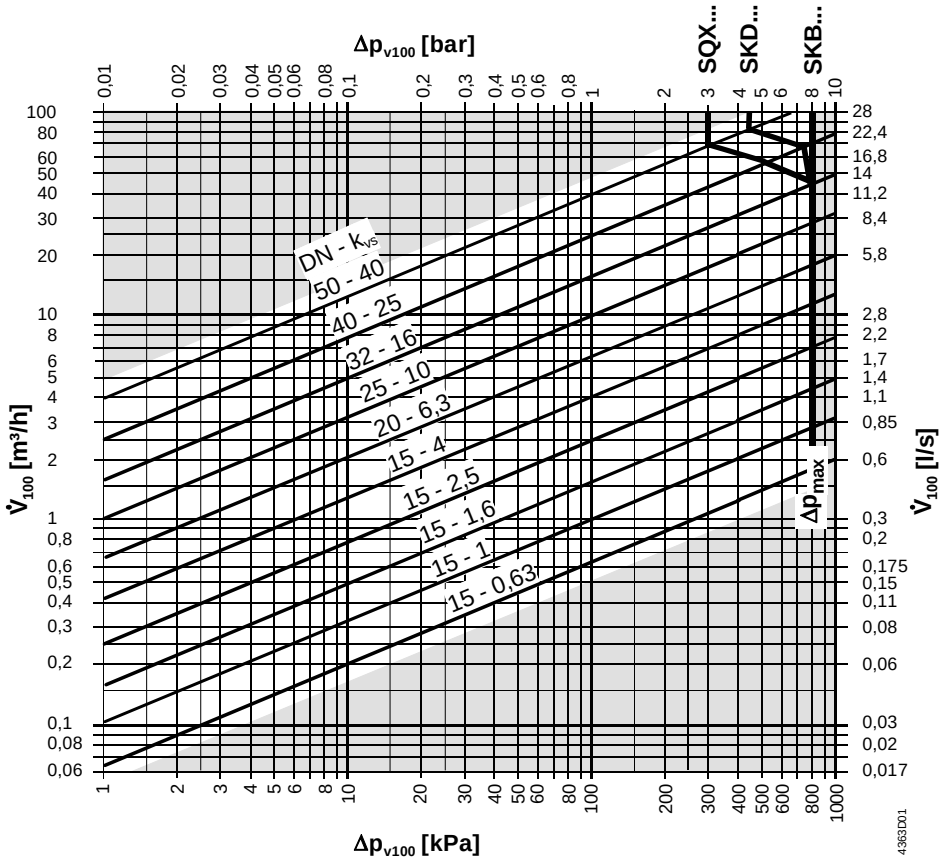
Guided perforated plug which is integrated in the valve stem.

A pressed-in stainless steel seat ring is used as seat.

⚠ **The 2-port seat valve does not become a 3-port valve by removing the seal cover!**

Sizing

Flow diagram



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

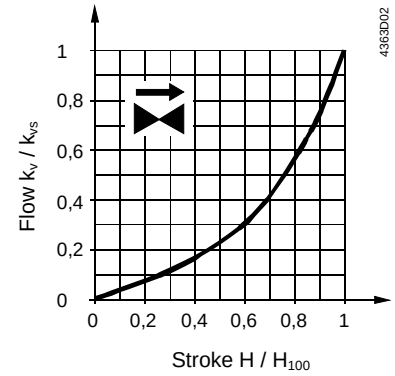
Δp_{v100} = Differential pressure across the fully open valve and the valve's control path by a volume flow V_{100}

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

100 kPa = 1 bar ≈ 10 mWC

1 m^3/h = 0.278 l/s water at 20 °C

Valve flow characteristic



0…30 % → linear

30…100 % → equal percentage

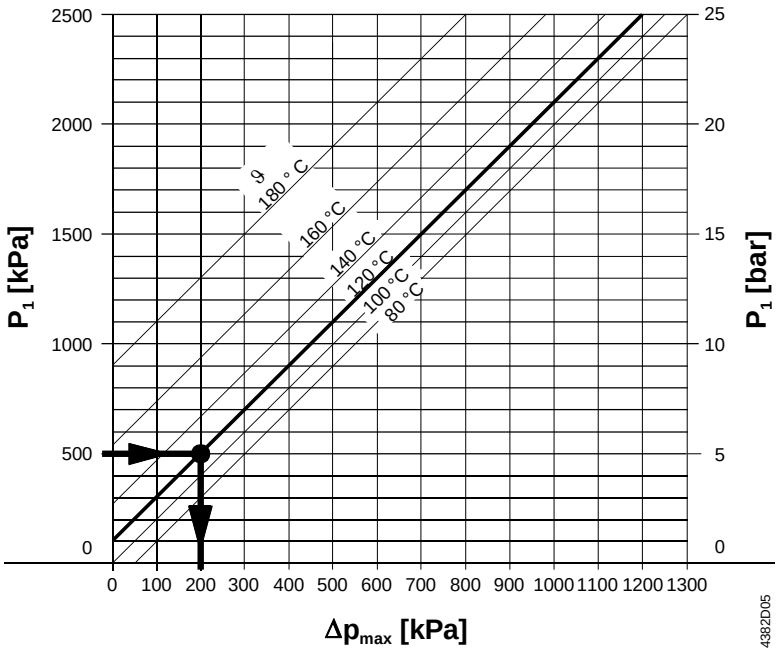
n_{gl} = 3 as per VDI / VDE 2173

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 4, 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.



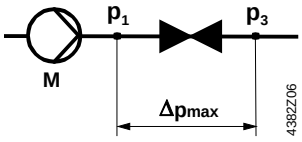
Δp_{max} = Differential pressure with valve almost closed, at which cavitation can largely be avoided

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)

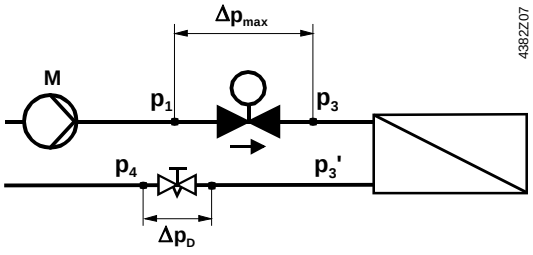
p_4 = 100 kPa (1 bar) (atmospheric pressure)

Δp_{max} = 300 kPa (3 bar)

$\Delta p_{3\text{-}3'}$ = 20 kPa (0.2 bar)

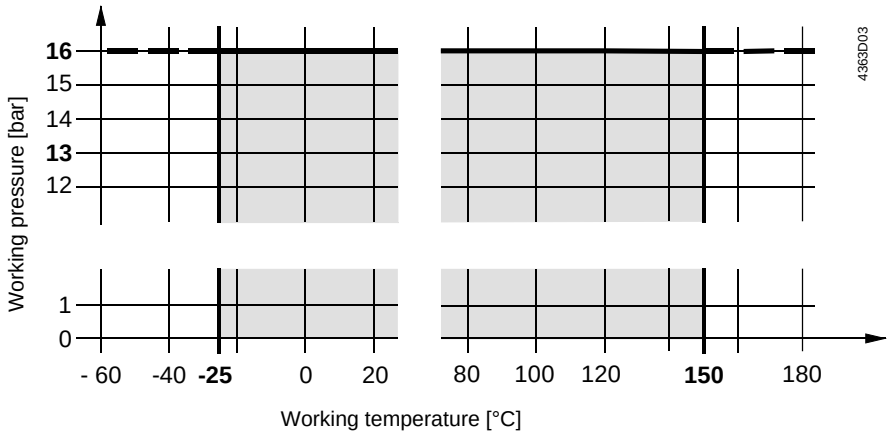
Δp_D (throttle) = 80 kPa (0.8 bar)

p_3' = pressure after consumer in kPa



Working pressure and temperature

Fluids

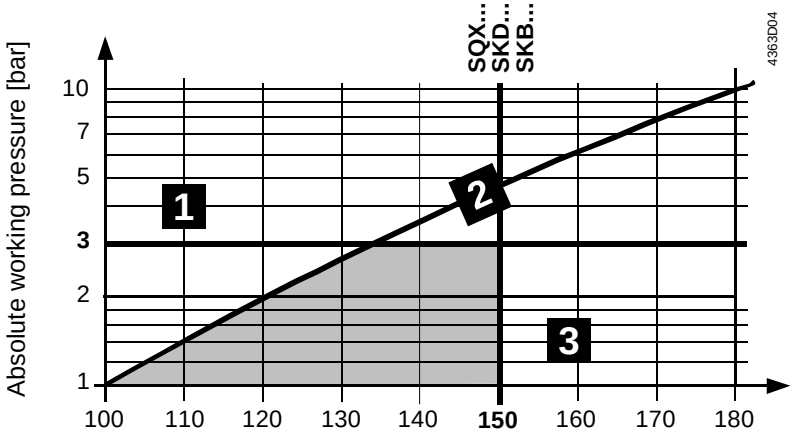


Working pressure and medium temperature staged as per ISO 7005

Current local legislation must be observed.

Saturated steam

Superheated steam



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 133.5 °C p_1 = 300 kPa (3 bar) $\dot{m}$ = 85 kg/h pressure ratio = 30 %	saturated steam 133.5 °C p_1 = 300 kPa (3 bar) $\dot{m}$ = 85 kg/h pressure ratio = 42 % (supercritical permitted)
required	k_{vs}, valve type	k_{vs}, valve type
procedure	$p_3 = p_1 - \frac{30 \cdot p_1}{100}$ $p_3 = 300 - \frac{30 \cdot 300}{100} = 210\ \text{kPa}\ (2.1\ \text{bar})$ $k_{vs} = 4.4 \cdot \frac{85}{\sqrt{210 \cdot (300 - 210)}} \cdot 1 = 2.72\ \text{m}^3/\text{h}$	$k_{vs} = 8.8 \cdot \frac{85}{300} \cdot 1 = 2.49\ \text{m}^3/\text{h}$
selected	k_{vs} = 4 m^3/h ⇨ VVG41.15	k_{vs} = 2.5 m^3/h⇨ VVF41.14

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, there is a risk of valve plug seizing caused by scale deposits. Thus, use only the most powerful actuator SKB... for these applications. Additionally, periodic actuation (twice or three times per week) must be planned.

Ensure cavitation free flow (refer to page 5).

With closed and open circuits always use a strainer upstream of the valve to increase the valve's functional safety.

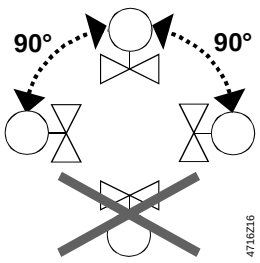
⚠ For media below 0 °C, use the electric ASZ6.5 stem heating element to prevent the valve stem from freezing in the sealing gland. For safety reasons, the stem heating element has been designed for AC 24 V / 30 W operating voltage.

The use of these valves for steam is subject to specific parameters:
Observe diagram for steam on page 6 and «Technical Data» on page 9!

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 4 319 9563 0.

Orientation



Direction of flow

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

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

VVG41... 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, refer to «Spare parts».
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 a ecological point of view.
Current local legislation must be observed.

Warranty

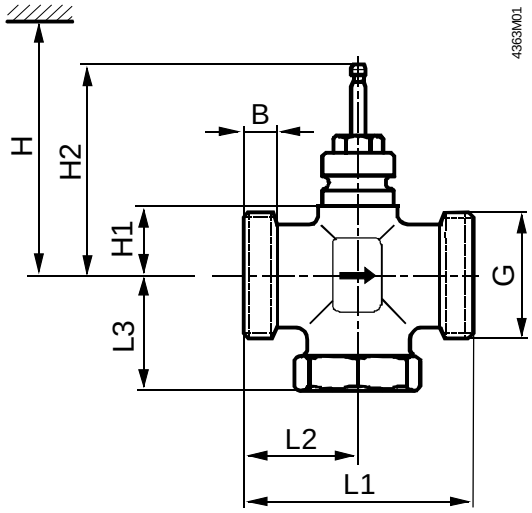
The technical data given for these applications is valid only in conjunction with the Siemens actuators as detailed under «Equipment combinations».
All terms of the warranty will be invalidated by the use of actuators from other manufacturers.

Technical data

Functional data	PN class		PN 16 to ISO 7268
	Working pressure		to ISO 7005 within the permissible medium temperature range according to the diagram on page 6
	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
	Medium temperature		max. 150 °C
		water, brine [1)]	-25…150 °C
		steam	≤ 150 °C ≤ 300 kPa (3 bar) abs permissible temperature and pressure range according to the diagram on page 6
	Rangeability S_v		DN 15: > 50 DN ≥ 20: > 100
	Nominal stroke		20 mm
	Pressure Equipment Directive		PED 97/23/EC
Industry standards	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)
Materials	Valve body		bronze CuSn5Zn5Pb2
	Seat, plug, stem		stainless steel
	Sealing gland		dezincification-free brass, silicon-free
	Gland materials		EPDM O rings, silicon-free
Dimensions / Weight	Refer to «Dimensions»		
	External thread connections		G…B to ISO 228-1

[1)] Media below 0 °C:
ASZ6.5 stem heating element required to prevent freezing of the valve stem in the sealing gland.

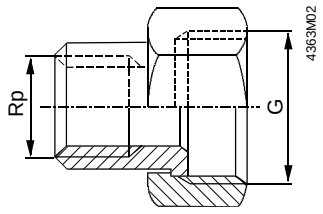
Dimensions



DN = Nominal size
H = Total actuator height plus minimum distance to the wall or the ceiling for mounting, connection, operation, service, etc.
H1 = Dimension from the pipe centre to install the actuator (upper edge)
H2 = Valve in the «Closed» position means that the stem is fully extended

Type	DN	B	G	L1	L2	L3	H1	H2	H			kg
		[mm]	[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	SQX...	SKD...	SKB...	[kg]
VVG41.11 **VVG41.12** **VVG41.13** **VVG41.14** **VVG41.15**	15	10	G1B	100	50	57	26	122.5	> 451	> 526	> 601	1.25
VVG41.20	20		G1¼B									1.30
VVG41.25	25	14	G1½B	105	52.5	59	34	130.5	> 459	> 534	> 609	1.60
VVG41.32	32		G2B			60						2.20
VVG41.40	40	15	G2¼B	130	65	73	46	142.5	> 471	> 546	> 621	2.70
VVG41.50	50	16	G2¾B	150	75	83						3.90

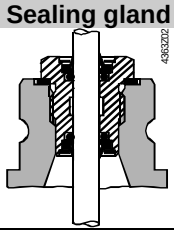
Screwed fittings



Type	for valve type	G [inch]	Rp [inch]
ALG15…	VVG41.11…15	G1	Rp½
ALG20…	VVG41.20	G1¼	Rp¾
ALG25…	VVG41.25	G1½	Rp1
ALG32…	VVG41.32	G2	Rp1¼
ALG40…	VVG41.40	G2¼	Rp1½
ALG50…	VVG41.50	G2¾	Rp2

- On valve side: cylindrical thread to ISO 228-1
- On pipe side: with cylindrical thread to ISO 7-1

Order numbers for spare parts

		Sealing gland	Set
			**Plug with stem, circlip, sealing**
Type	**DN**		
VVG41.11	15	4 284 8874 0	74 676 0161 0
VVG41.12	15	4 284 8874 0	74 676 0162 0
VVG41.13	15	4 284 8874 0	74 676 0163 0
VVG41.14	15	4 284 8874 0	74 676 0164 0
VVG41.15	15	4 284 8874 0	74 676 0165 0
VVG41.20	20	4 284 8874 0	74 676 0119 0
VVG41.25	25	4 284 8874 0	74 676 0120 0
VVG41.32	32	4 284 8874 0	74 676 0115 0
VVG41.40	40	4 284 8874 0	74 676 0116 0
VVG41.50	50	4 284 8874 0	74 676 0170 0