SIEMENS

4³⁸²

Acvatix™

2-port seat valves with flanged connection, PN40

VVF61..

- Cast steel GP240GH valve body
- DN 15...150
- k_{vs} 0.19...300 m³/h
- Can be equipped with SKD.., SKB.. or SKC.. electrohydraulic actuators

Use

For use in district heating, heating, ventilating and air conditioning systems as a control or safety shutoff valve. Control devices MK..6.. (water, 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 closed and open circuits (mind "Cavitation", refer to page 6).

Type summary

Product number	DN	k_{vs} [m³ / h]	S_v
VVF61.09		0.19	
VVF61.10		0.3	
VVF61.11		0.45	
VVF61.12	15	0.7	
VVF61.13		1.2	>50
VVF61.14		1.9	
VVF61.15		3	
VVF61.23			
VVF61.24	25	5	
VVF61.25		7.5	>100
VVF61.39	40	12	
VVF61.40		19	>50
VVF61.49	50		
VVF61.50		31	
VVF61.65	65	49	
VVF61.80	80	78	
VVF61.90	100	124	>100
VVF61.91	125	200	
VVF61.92	150	300	

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)

TÜV tested per DIN EN 14597

Product number	Stock number	Description	Data sheet
MK..6.	S55329-M1..	Control device PN 25 for safety function per DIN EN 14597, for water and steam	N4388

Accessories

Product number	Description
ASZ6.6	Electric stem heating element, AC 24 V / 30 W, required for media below 0 °C

Ordering

Example:

Product number	Stock number	Designation	Quantity
VVF61.50	VVF61.50	2-port seat valve PN40 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.

2/14

Siemens
Building Technologies

2-port seat valves PN40 with flanged connection

CM1N4382en
2017-02-03

Equipment combinations

Valves		Actuators					
		SKD.. [1]		SKB..		SKC..	
	H_{100}	Δp_{max}	Δp_s	Δp_{max}	Δp_s	Δp_{max}	Δp_s
	[mm]	[kPa]					
VVF61.09…15	20	1600	4000	1600	4000		
VVF61.23…25			2250				
VVF61.39…40							
VVF61.49…50							
VVF61.65	40					1000	4000
VVF61.80						700	
VVF61.90						450	
VVF61.91						300	
VVF61.92						200	

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

H_{100} = Nominal stroke

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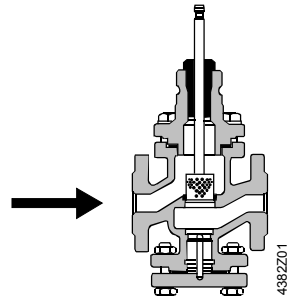
Δp_s = Maximum permissible differential pressure at which the motorized valve will close securely against the pressure (close off pressure)

Actuator overview

Product number	Actuator type	Operating voltage	Positioning signal	Spring return	Positioning time	Positioning force	Data sheet
SKD32.50	Electro-hydraulic	AC 230 V	3- position	-	120 s	1000 N	N4561
SKD32.21				Yes	30 s		
SKD32.51							
SKD82.50		AC 24 V		-	120 s		
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	N4564
SKB32.51				Yes			
SKB82.50		AC 24 V		-			
SKB82.51				Yes			
SKB60			DC 0…10 V [1]	-			
SKB62..				Yes			
SKC32.60	Electro-hydraulic	AC 230 V	3- position	-	120 s	2800 N	N4566
SKC32.61				Yes			
SKC82.60		AC 24 V		-			
SKC82.61				Yes			
SKC60			DC 0…10 V [1]	-			
SKC62..				Yes			

[1] or DC 4…20 mA or 0…1000 Ω

Valve cross section

DN 15 and DN 25
closes against pressure
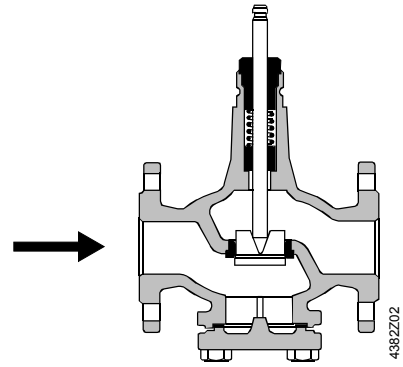
DN 40…150
closes on pressure

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.
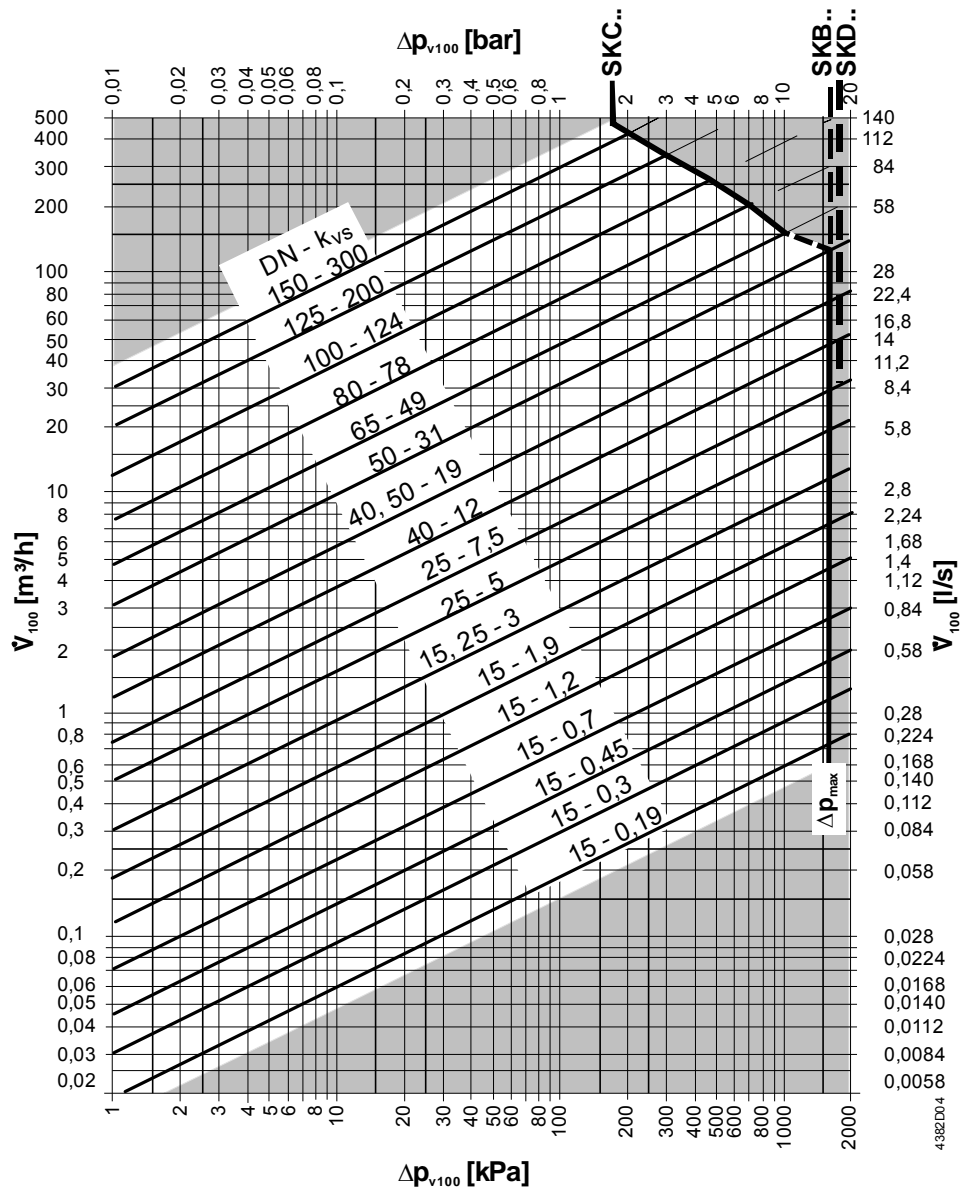Schematic representation, design variations are possible.

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

4/14

Siemens
Building Technologies

2-port seat valves PN40 with flanged connection

CM1N4382en
2017-02-03

Sizing

Flow diagram

Δp_{v100} [bar]

SKC.. SKB.. SKD..

0,01 0,02 0,03 0,04 0,05 0,06 0,08 0,1 0,2 0,3 0,4 0,5 0,6 0,8 1 2 3 4 5 6 8 10 20

$\dot{V}_{100}$ [m³/h]

500 400 300 200 100 80 60 50 40 30 20 10 8 6 5 4 3 2 1 0,8 0,6 0,5 0,4 0,3 0,2 0,1 0,08 0,06 0,05 0,04 0,03 0,02

$\dot{V}_{100}$ [l/s]

140 112 84 58 28 22,4 16,8 14 11,2 8,4 5,8 2,8 2,24 1,68 1,4 1,12 0,84 0,58 0,28 0,224 0,168 0,140 0,112 0,084 0,058 0,028 0,0224 0,0168 0,0140 0,0112 0,0084 0,0058

DN - k_{vs}
150 - 300
125 - 200
100 - 124
80 - 78
65 - 49
50 - 31
40, 50 - 19
40 - 12
25 - 7,5
25 - 5
25 - 3
15, 25 - 3
15 - 1,9
15 - 1,2
15 - 0,7
15 - 0,45
15 - 0,3
15 - 0,19

Δp_{max}

Δp_{v100} [kPa]

1 2 3 4 5 6 8 10 20 30 40 50 60 80 100 200 300 400 500 600 800 1000 2000

4382D04

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 $\approx$ 10 mWC
1 m³/h	=	0.278 l/s water at 20 °C

Valve flow characteristic

4310D02

Flow k_v / k_{vs}

1
0.8
0.6
0.4
0.2
0

0   0.2   0.4   0.6   0.8   1

Stroke H / H_{100}
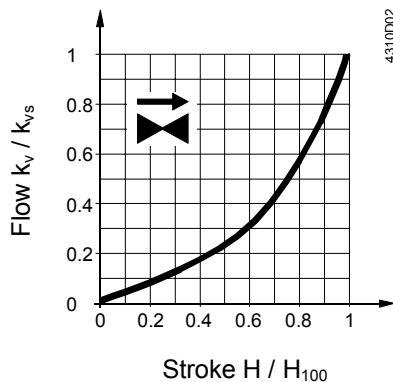
0...30 %   → linear
30...100 %   → equal percentage
n_{gl} = 3 as per VDI / VDE 2173

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.
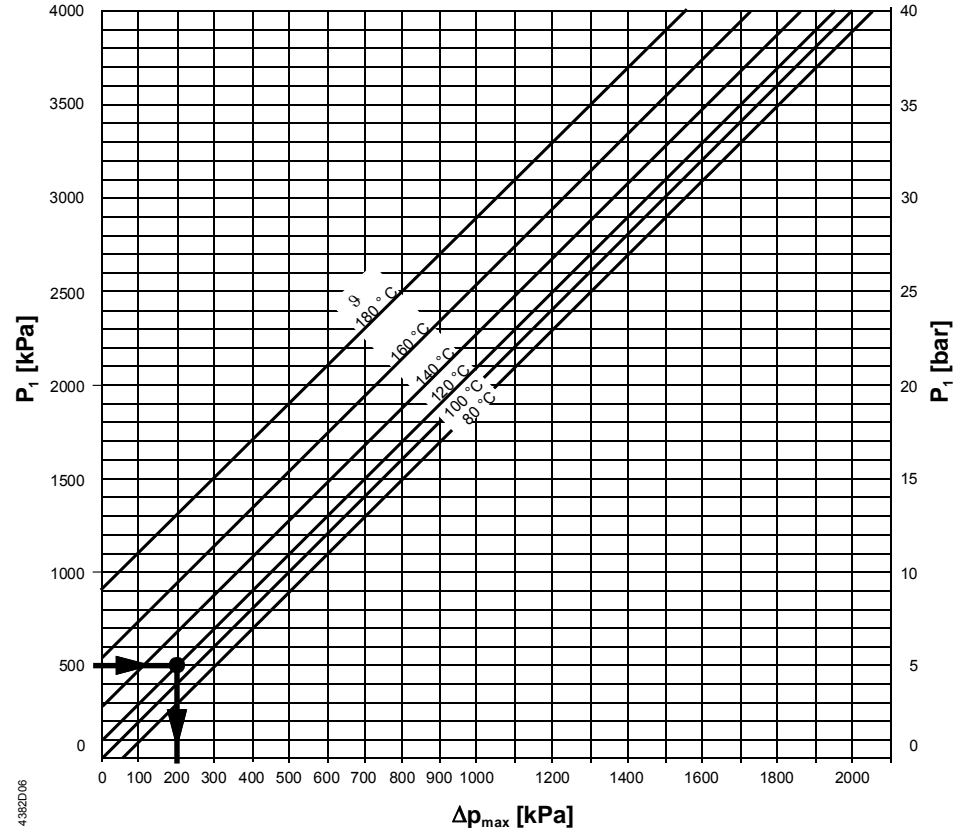
Δp_{max} = Differential pressure with valve almost closed, at which cavitation can largely be avoided
p_1 = Static pressure at inlet
p_3 = Static pressure at outlet
M = Pump
ϑ = Water temperature
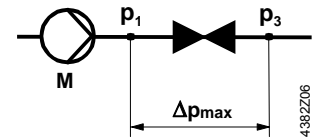

High temperature hot water example:

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).
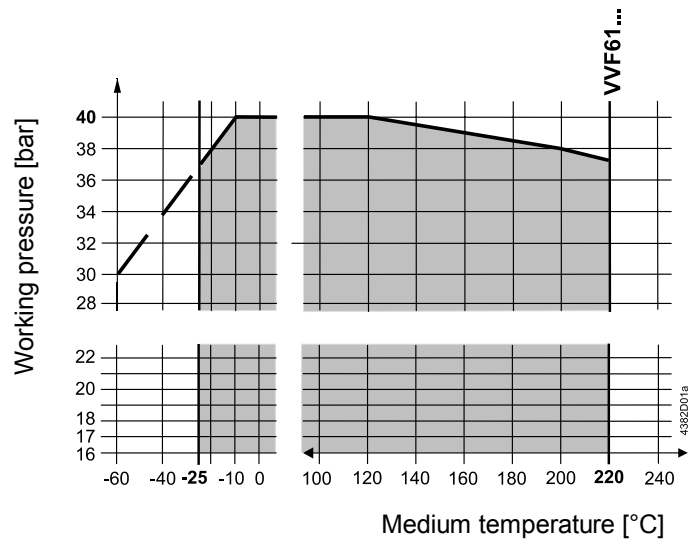
Chilled water example:

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)
$\Delta p_{3-3'}$ = 20 kPa (0.2 bar)
Δp_D (throttle) = 80 kPa (0.8 bar)
p_3' = pressure after consumer in kPa
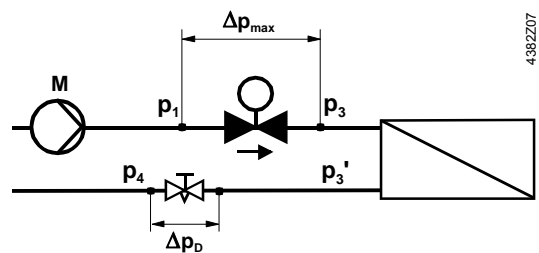
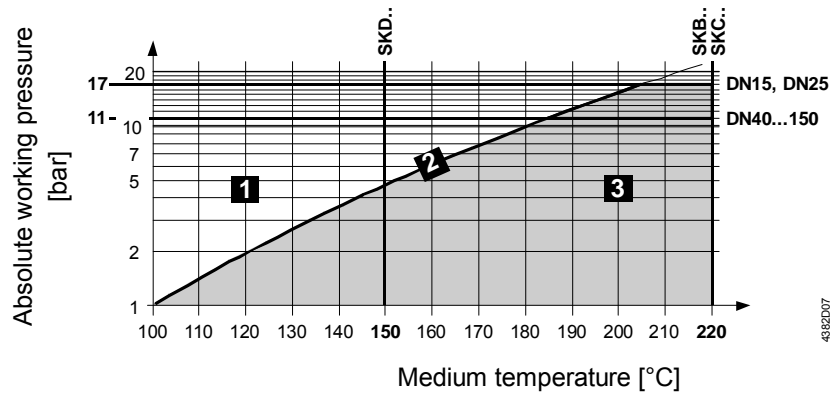**Working pressure and medium temperature**
Fluids

Working pressure and medium temperature staged as per ISO 7005

Current local legislation must be observed.

Saturated steam
Superheated steam

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

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 = $1 + 0.0012 \cdot \Delta T$ (k = 1 for saturated steam)

ΔT = temperature differential in K between saturated steam and superheated steam

Example

given	saturated steam 133.5 °C		saturated steam 133.5 °C	

given   saturated steam 133.5 °C

p_1 = 300 kPa (3 bar)

$\overset{*}{m}$ = 105 kg/h

pressure ratio = 30 %

saturated steam 133.5 °C

p_1 = 300 kPa (3 bar)

$\overset{*}{m}$ = 105 kg/h

pressure ratio = 42 %
(supercritical permitted)

required k_{vs}, valve type

k_{vs}, valve type

procedure

$$p_3 = p_1 - \frac{30 \cdot p_1}{100}$$

$$p_3 = 300 - \frac{30 \cdot 300}{100} = 210 \text{ kPa (2.1 bar)}$$

$$k_{vs} = 4.4 \cdot \frac{105}{\sqrt{210 \cdot (300 - 210)}} \cdot 1 = 3.36 \text{ m}^3/\text{h}$$

$$k_{vs} = 8.8 \cdot \frac{105}{300} \cdot 1 = 3.08 \text{ m}^3/\text{h}$$

selected k_{vs} = 5 m³/h ⇨ VVF61.24

k_{vs} = 3 m³/h ⇨ VVF61.15 (DN15)

or   ⇨ VVF61.23 (DN25)

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 SKB.. or SKC.. 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 ASZ6.6 stem heating element to prevent the valve stem from freezing in the stem sealing gland. For safety reasons, the stem heating element has been designed for AC 24 V / 30 W operating voltage.
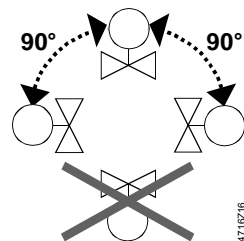
The use of these valves for steam is subject to specific parameters:
Observe diagram for steam on page 7 and "Technical data" on page 10!

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.

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

Valves are equipped with maintenance-free, continuously lubricated stem sealing glands. See page 12 for replacement stem sealing glands.

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 valve.
Contact your local office or branch.

Disposal   Do not dispose of the device as household waste.

- Special handling of individual components may be mandated by law or make ecological sense.
- Observe all local and currently applicable laws and regulations.

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

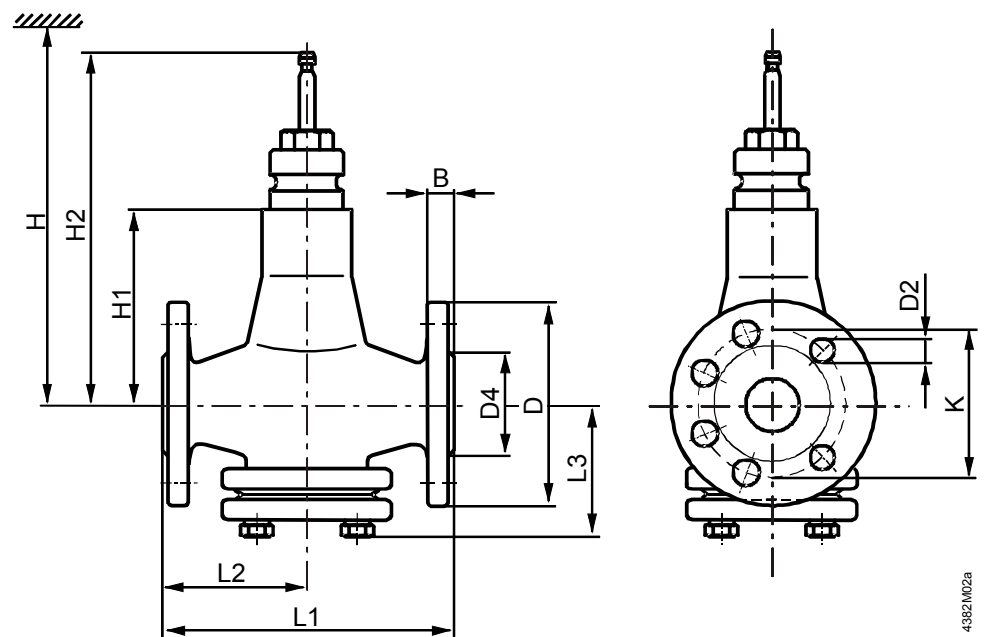| Functional data	PN class		PN 40 to ISO 7268
	Working pressure		to ISO 7005 within the permissible "medium temperature" range according to the diagram on page 7
	Flow characteristic	• 0…30 % • 30…100 %	• linear • equal percentage; n_{gl} = 3 to VDI / VDE 2173
	Leakage rate		0…0.02 % of k_{vs} value 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 water, brine [1] steam	VVF61.. VVF61.. VVF61..	-25…220 °C ≤ 220 °C DN 15…25 ≤ 1700 kPa (17 bar) abs ≤ 220 °C DN 40…150 ≤ 1100 kPa (11 bar) abs permissible temperature and pressure range according to the diagram on page 7
	Rangeability S_v		DN 15…40: > 50 (VVF61.25: > 100) DN 50…150: > 100 (VVF61.49: > 50)
	Nominal stroke		DN 15…50: 20 mm DN 65…150: 40 mm
Standards, directives and approvals	Pressure Equipment Directive Pressure-carrying accessories		PED 2014/68/EU Scope: Article 1, section 1 Definitions: Article 2, section 5
	Fluid group 2:	DN 15…25	Without CE certification as per article 4, section 3 (sound engineering practice) [2]
		DN 40…80	Category I, Modul A, with CE-marking as per article 14, section 2
		DN 100…150	Category II, Modul A2, with CE-marking as per article 14, section 2, notified body number 0036
	EU conformity (CE)	DN 40…150	A5W00006523 [3]
	EAC Conformity		Eurasia Conformity
Environmental compatibility	The product environmental declaration CE1E4382en [3] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).		
Materials	Valve body		cast steel GP240GH
	Stem		stainless steel
	Plug, seat		stainless steel
	Stem sealing gland		stainless steel Standard version: PTFE sleeve Special versions: VVF61..2: PTFE sleeve
Dimensions / Weight	Refer to "Dimensions", page 11		
	Flange connections		to ISO 7005

[1] Electric stem heating element ASZ6.6 required for media below 0 °C.
[2] Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.
[3] The documents can be downloaded from http://siemens.com/bt/download

10/14

Siemens
Building Technologies

2-port seat valves PN40 with flanged connection

CM1N4382en
2017-02-03

Dimensions

Dimensions in mm

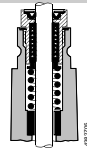| DN	B	D	D2	D4	K	L1	L2	L3	H1	H2	H			kg
		Ø	Ø	Ø							SKD..	SKB..	SKC..	VVF61..
15	16	95	14 (4x)	46	65	130	65	90	96	192.5	>596	>671		7.4
25	18	115		67	85	160	80	107	111	207.5	>611	>686		10
40		150	18 (4x)	84	110	200	100	102	136	232.5		>711		16
50	20	165		99	125	230	115	107						18
65	22	185	18 (8x)	118	145	290	145	138	162	278.5			>737	29
80	24	200		132	160	310	155	150	170	286.5			>745	35
100		235	22 (8x)	156	190	350	175	173	180	296.5			>755	52
125	26	270	26 (8x)	184	220	400	200	195	200	316.5			>775	74.5
150	28	300		211	250	480	240	219	225	341.5			>800	110

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

| | | Stem sealing gland | |
| | | | |
Product number	DN	VVF61..	VVF61..
VVF61.09	15	4 284 8829 0	
VVF61.10	15	4 284 8829 0	
VVF61.11	15	4 284 8829 0	
VVF61.12	15	4 284 8829 0	
VVF61.13	15	4 284 8829 0	
VVF61.14	15	4 284 8829 0	
VVF61.15	15	4 284 8829 0	
VVF61.23	25	4 284 8829 0	
VVF61.24	25	4 284 8829 0	
VVF61.25	25	4 284 8829 0	
VVF61.39	40		4 679 5630 0
VVF61.40	40		4 679 5630 0
VVF61.49	50		4 679 5630 0
VVF61.50	50		4 679 5630 0
VVF61.65	65		4 679 5630 0
VVF61.80	80		4 679 5630 0
VVF61.90	100		4 679 5630 0
VVF61.91	125		4 679 5630 0
VVF61.92	150		4 679 5630 0

Revision numbers

Product number	Valid from rev. no.	Product number	Valid from rev. no.
VVF61.09	..04		
VVF61.10	..04		
VVF61.11	..04		
VVF61.12	..04		
VVF61.13	..04	VVF61.132 [1]	..04
VVF61.14	..04	VVF61.142 [1]	..04
VVF61.15	..04	VVF61.152 [1]	..04
VVF61.23	..04	VVF61.232 [1]	..04
VVF61.24	..04	VVF61.242 [1]	..04
VVF61.25	..04	VVF61.252 [1]	..04
VVF61.39	..02	VVF61.392 [1]	..02
VVF61.40	..02	VVF61.402 [1]	..02
VVF61.49	..02	VVF61.492 [1]	..02
VVF61.50	..02	VVF61.502 [1]	..02
VVF61.65	..02	VVF61.652 [1]	..02
VVF61.80	..02	VVF61.802 [1]	..02
VVF61.90	..02	VVF61.902 [1]	..02
VVF61.91	..02	VVF61.912 [1]	..02
VVF61.92	..02	VVF61.922 [1]	..02

[1] No longer available for sale from Jan 1, 2017

Siemens
Building Technologies

2-port seat valves PN40 with flanged connection

CM1N4382en
2017-02-03