SIEMENS

4362

VVI41..

VXI41..

ACVATIX™

2-port and 3-port seat salves, PN16

VVI41..
VXI41..

with internally threaded connections

- **Bronze valve body CC491K (Rg5)**
- **DN 15...50**
- **k_{vs} 2.5...40 m^3/h**
- **Internally threaded connections Rp.. as to ISO 7-1**
- **Can be equipped with SAX..- electromotoric or SKD..-electrohydraulic actuators**

Use

For use in heating, in ventilating and air conditioning systems as a control or safety shutoff valve. For open and closed circuits (mind Cavitation, refer to page 4).

Type summary

Product number 2-port	Product number 3-port	DN	k_{vs} [m^3/h]	S_v
VVI41.15-2.5	**VXI41.15-2.5**	15	2.5	> 50
VVI41.15-4	**VXI41.15-4**	15	4.0	
VVI41.20-6.3	**VXI41.20-6.3**	20	6.3	> 100
VVI41.25-10	**VXI41.25-10**	25	10	
VVI41.32-16	**VXI41.32-16**	32	16	
VVI41.40-25	**VXI41.40-25**	40	25	
VVI41.50-40	**VXI41.50-40**	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} as per VDI 2173
k_{vr} = The lowest value for k_v at which the characteristic tolerance is still maintained, at a differential pressure of 100kPa (1 bar)

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*
VVI41.25-10	VVI41.25-10	2-port seat valve PN16 with internally threaded connection	1

Delivery — Valves, actuators and accessories are packed and supplied separately.

Spare parts, Rev. no. — See overview, page 10.

Equipment combinations

Valves		H_{100}	Actuators SAX.. [3] Δp_{max}	SAX.. [3] Δp_{max} [1]	SAX.. [3] Δp_s [2]	SKD.. Δp_{max}	SKD.. Δp_{max} [1]	SKD.. Δp_s [2]
		[mm]	[kPa]	[kPa]	[kPa]	[kPa]	[kPa]	[kPa]
VVI41.15-2.5	**VXI41.15-2.5**	20	400	100	1600	400	100	1600
VVI41.15-4	**VXI41.15-4**							
VVI41.20-6.3	**VXI41.20-6.3**							
VVI41.25-10	**VXI41.25-10**				1550			
VVI41.32-16	**VXI41.32-16**				875			1275
VVI41.40-25	**VXI41.40-25**				525			775
VVI41.50-40	**VXI41.50-40**		300		300			450

[1] For 3-port valves in diverting function, max. 100 kPa is recommended. If noise is permitted, the same values apply as for mixing applications.

[2] Valid for 2-port valves only

[3] Series G: Usable up to maximum medium temperature of 130 °C

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

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 function	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			

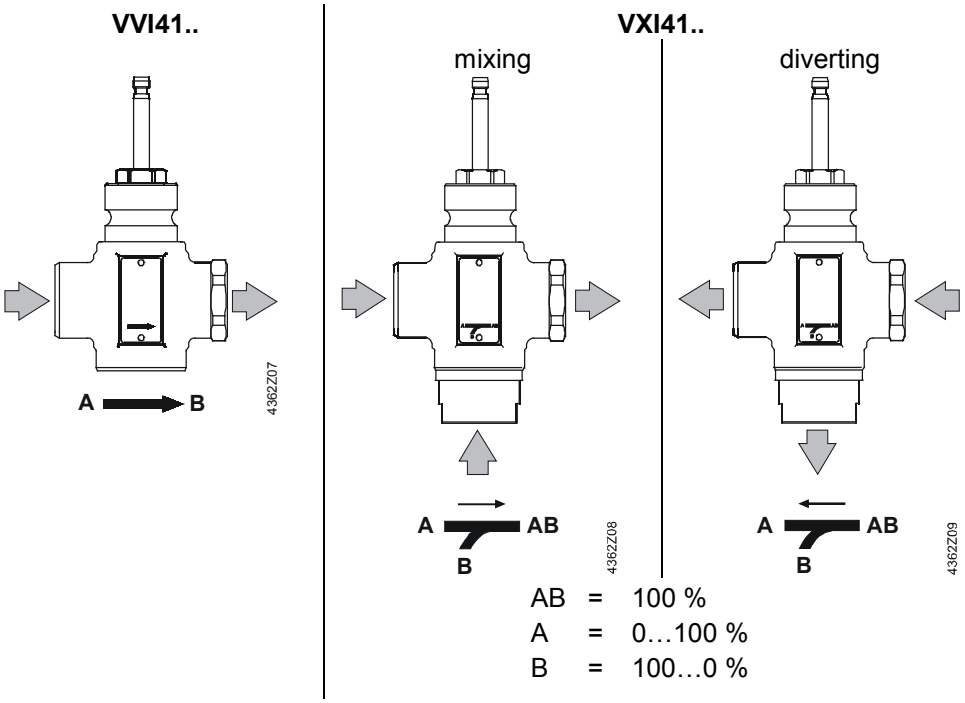
[1] or DC 4…20 mA or 0…1000 Ω

Pneumatic actuators

Contact your local office or branch for more information.

⚠ For VXI41.. the application is only possible if the valve is used as mixing valve.

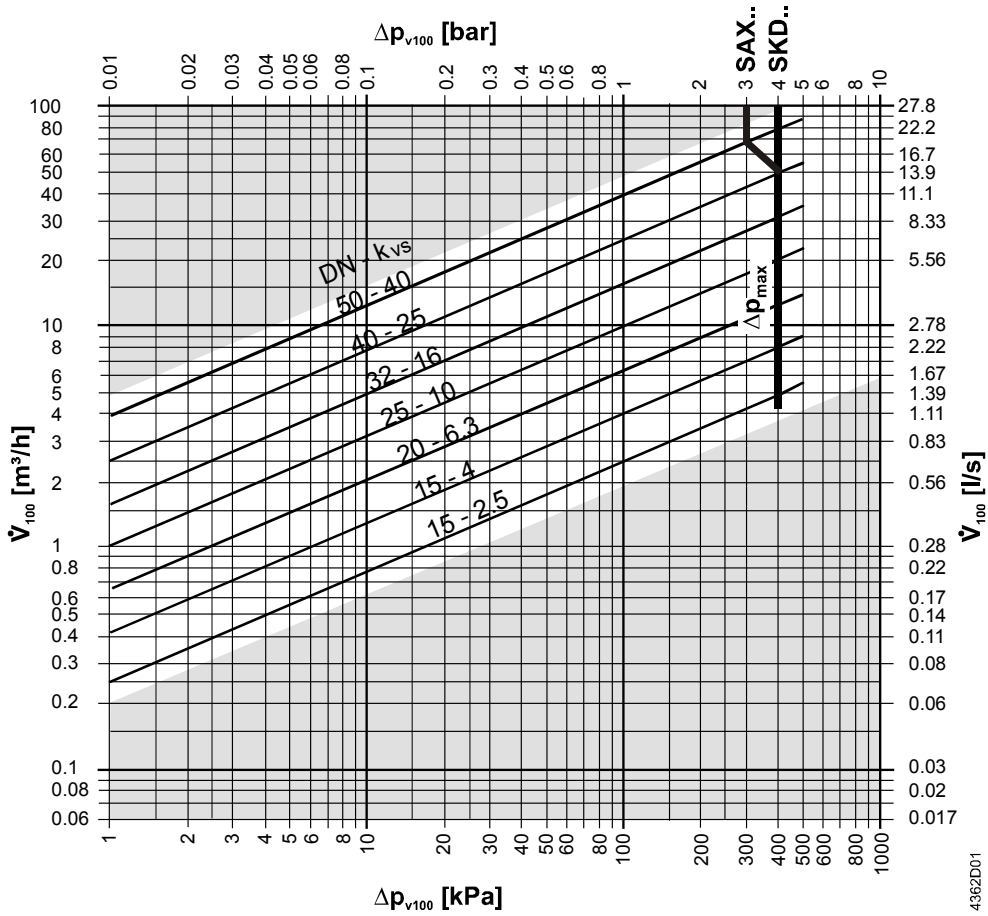
Technical design / Mechanical Design



⚠ **The 2-port seat valve does not become a 3-port valve by removing the blank fitting.**

Sizing

Flow diagram



Δp_{v100} = Differential pressure across the fully open valve and the valve's control path by a Volumetric flow $\dot{V}_{100}$

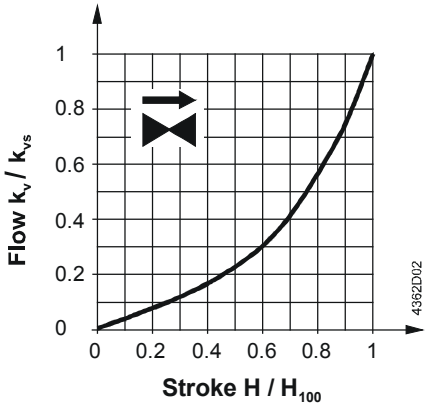
$\dot{V}_{100}$ = Volumetric flow through the fully open valve (H_{100})

100 kPa = 1 bar ≈ 10 mWC

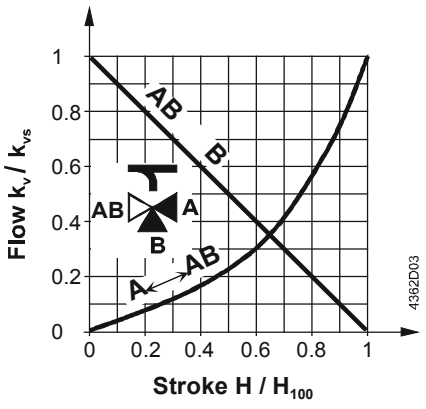
1 m^3/h = 0.278 l/s water at 20 °C

Valve flow characteristics

VVI41..



VXI41..

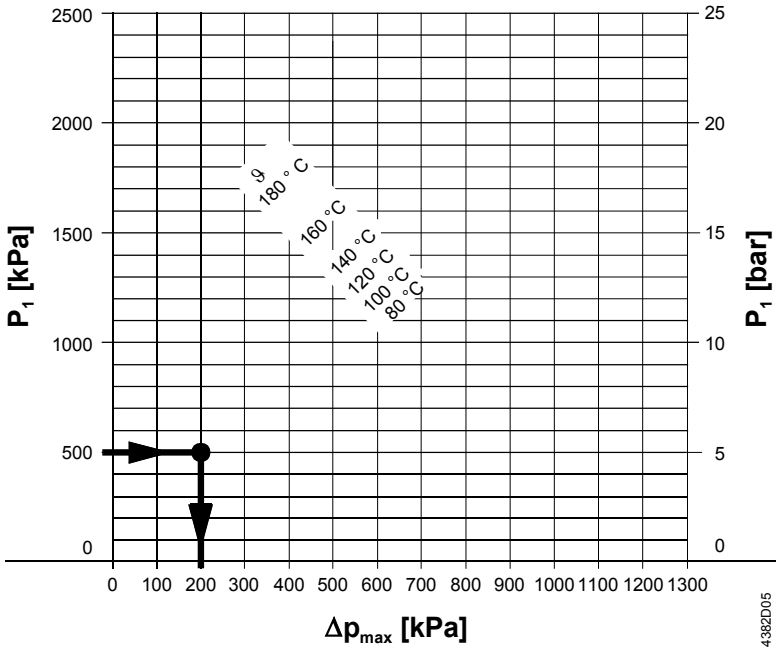


Cavitation

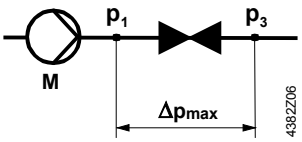
Cavitation accelerates wear on the valve plug and seat, and also results in undesirable noise. Cavitation can be avoided by not exceeding the differential pressure shown in the "Working pressure and medium temperature" on page 5, and by adhering to the static pressures shown below.

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.



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:

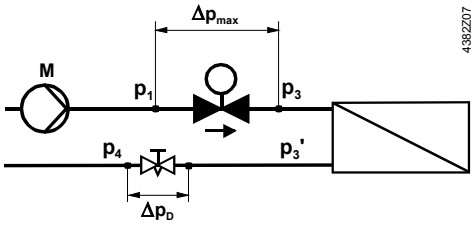
Pressure p_1 at valve inlet: 500 kPa (5 bar)
Water temperature: 120 °C

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).

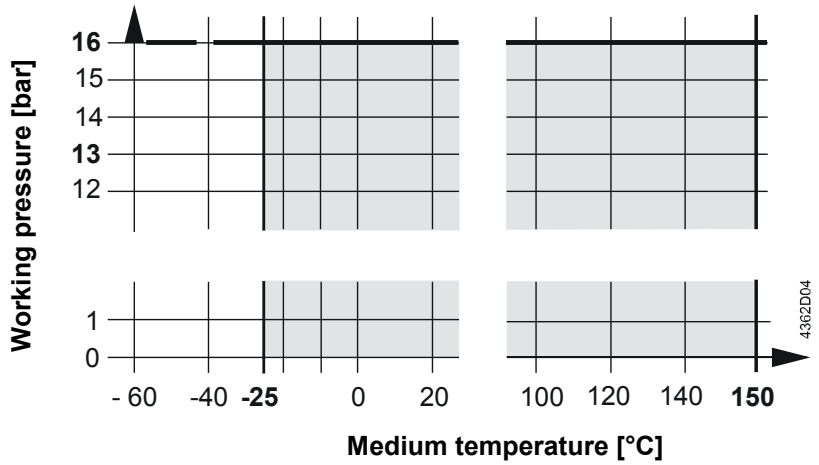
Chilled water example:

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



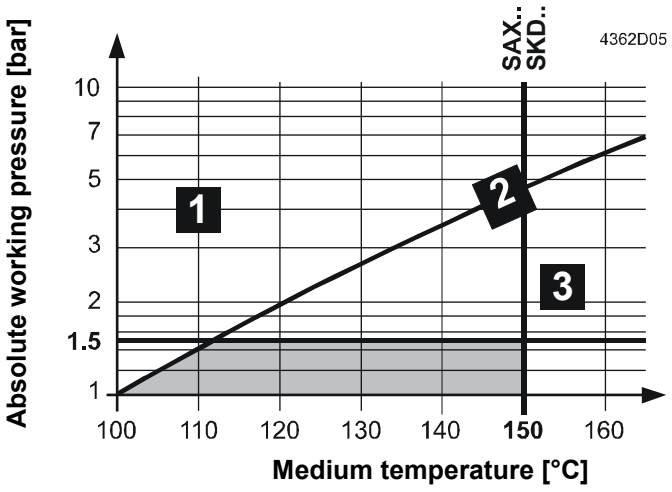
Working pressure and medium temperature
Fluids



Working pressure and medium temperature staged as per ISO 7005

Current local legislation must be observed.

VVI41..
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

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

Example

given: saturated steam 133.5 °C
p_1 = 130 kPa (1.3 bar)
$\dot{m}$ = 85 kg/h
pressure ratio = 20 %

required: k_{vs}, valve type

procedure:

$$p_3 = p_1 - \frac{20 \cdot p_1}{100}$$

$$p_3 = 130 - \frac{20 \cdot 130}{100} = 104 \text{ kPa (1.04 bar)}$$

$$k_{vs} = 4.4 \cdot \frac{85}{\sqrt{104 \cdot (130 - 104)}} \cdot 1 = 7.2 \text{ m}^3/\text{h}$$

selected: k_{vs} = 10 m^3/h ⇨ VVI41.25-10

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.

Water quality requirements as per VDI 2035.

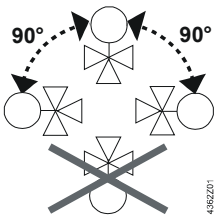
⚠ We generally recommend to install a strainer to increase the valve's functional safety.

⚠ For media below 0 °C, use the electric ASZ6.6 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.
Use the 3-port valve VXI41.. primarily as mixing valve

Mounting

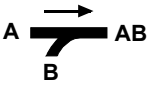
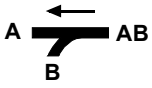
Both valve and actuator can easily be assembled at the mounting location. Neither special tools nor adjustments are required.
The valve is supplied with mounting instructions no. 74 319 0423 0.

Mounting positions



Direction of flow

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

2-port	3-port mixing	3-port diverting
		

Commissioning

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

		
Stem retracts:	Increasing flow	Through-port opens, bypass closes
Stem extends:	Decreasing flow	Through-port closes, bypass opens

Maintenance

⚠ For actuator service work: Turn off the pump and the operating voltage, close the shutoff valves, depressurize the pipes and allow them to cool down. Disconnect the electrical connections, where required, from the terminals. Re-commission the valve only if the actuator has been mounted correctly.

Disposal

The valve must be dismantled and separated into its various constituent materials before disposal.
Observe all local and applicable laws.

Warranty

The technical data supplied for these valves is valid only for valves used in conjunction with the actuators listed under "Equipment combinations".
Use with third-party actuators invalidates any warranty offered by Siemens Building Technologies / HVAC Products.

Technical data

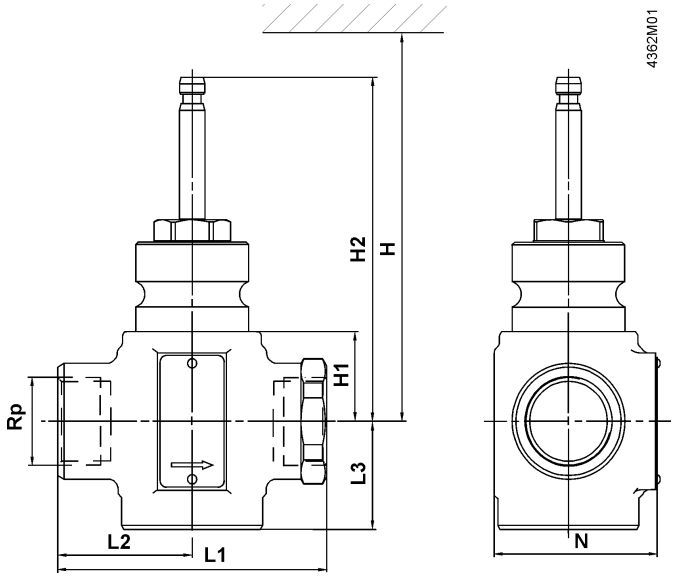
Functional data	PN class	PN 16 to EN 1333
	Working pressure	to ISO 7005 within the permissible "Working

		pressure and medium temperature" range according to the diagram on page 5.
	Flow characteristic Throughport 0…30 % Throughport 30…100 % Bypass (VXI41..) 0…100 %	 linear equal percentage; n_{gl} = 3 to VDI / VDE 2173 linear
	Leakage rate Throughport Bypass (VXI41..)	 0…0.02 % of k_{vs} value to DIN EN 1349 0.5 … 2 % of k_{vs} value to DIN EN 1349
	Permissible media water brine steam	cooling water, chilled water, low temperature hot water, high temperature hot water, water with anti-freeze; recommendation: water treatment to VDI 2035 saturated steam, super-heated steam; dryness at inlet minimum 0.98
	Medium temperature	-25…150 °C
	Medium temperature water, brine [1)] steam	max. 150 °C -25…150 °C ≤ 150 °C ≤ 150 kPa (1.5 bar) abs permissible temperature and pressure range according to the diagram on page 5
	Rangeability S_v	DN 15: > 50 DN ≥ 20: > 100
	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	Bronze CC491K (Rg5)
	Plug	Brass
	Stem	Stainless steel
	Sealing gland	brass
	Gland materials	EPDM O rings, silicon-free
Dimensions / Weight	Dimensions	Refer to "Dimensions"
	Connections	Internally threaded, Rp… to ISO 7-1
	Weight	Refer to "Dimensions"

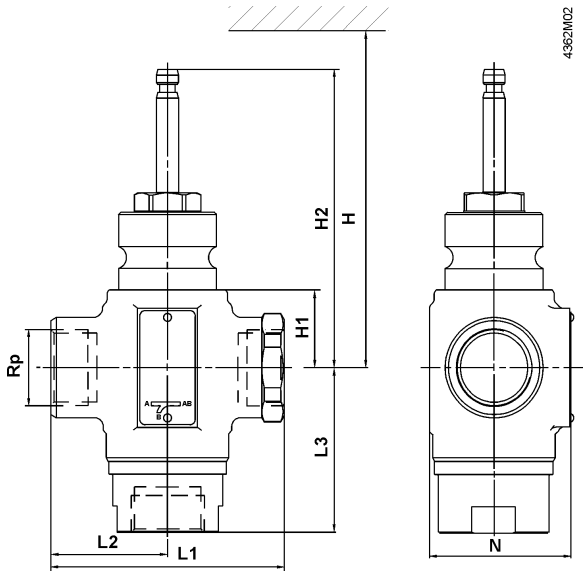
[1)] Media below 0 °C: ASZ6.6 stem heating element required to prevent freezing of the valve stem in the sealing gland.

Dimensions

Dimensions in mm



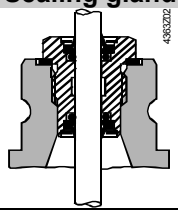
Product number		DN	L1	L2	L3	H1	H2	H SAX..	H SKD..	G [inch]	N	kg [kg]
	VVI41.15-2.5	15	90	45	40	26	122.5	> 468	> 526	Rp ½	60	1.3
	VVI41.15-4	15	90	45	40	26	122.5			Rp ½	60	1.3
	VVI41.20-6.3	20	90	45	40	26	122.5			Rp ¾	60	1.35
	VVI41.25-10	25	105	52.5	41	34	130.5	> 476	> 534	Rp 1	64	1.7
	VVI41.32-16	32	115	57.5	41	34	130.5			Rp 1¼	87	2.1
	VVI41.40-25	40	130	65	46	46	142.5	> 488	> 546	Rp 1½	108	2.75
	VVI41.50-40	50	150	75	56	46	142.5			Rp 2	120	3.7



Product number		DN	L1	L2	L3	H1	H2	H SAX..	H SKD..	G [inch]	N	kg [kg]
	VXI41.15-2.5	15	90	45	68	26	122.5	> 468	> 526	Rp ½	60	1.5
	VXI41.15-4	15	90	45	68	26	122.5			Rp ½	60	1.5
	VXI41.20-6.3	20	90	45	69	26	122.5			Rp ¾	60	1.6
	VXI41.25-10	25	105	52.5	73.5	34	130.5	> 476	> 534	Rp 1	64	2.1
	VXI41.32-16	32	115	57.5	74	34	130.5			Rp 1¼	87	2.3
	VXI41.40-25	40	130	65	84	46	142.5	> 488	> 546	Rp 1½	108	3.1
	VXI41.50-40	50	150	75	98	46	142.5			Rp 2	120	4.1

Spare parts

Order numbers for spare parts

			Sealing gland
			
Product number		**DN**	
VVI41.15-2.5	VXI41.15-2.5	15	4 284 8874 0
VVI41.15-4	VXI41.15-4	15	4 284 8874 0
VVI41.20-6.3	VXI41.20-6.3	20	4 284 8874 0
VVI41.25-10	VXI41.25-10	25	4 284 8874 0
VVI41.32-16	VXI41.32-16	32	4 284 8874 0
VVI41.40-25	VXI41.40-25	40	4 284 8874 0
VVI41.50-40	VXI41.50-40	50	4 284 8874 0

For these valves a plug replacement is not possible

Revision numbers

Product number	Valid from rev. no.	Product number	Valid from rev. no.
VVI41.15-2.5	..A	VXI41.15-2.5	..A
VVI41.15-4	..A	VXI41.15-4	..A
VVI41.20-6.3	..A	VXI41.20-6.3	..A
VVI41.25-10	..A	VXI41.25-10	..A
VVI41.32-16	..A	VXI41.32-16	..A
VVI41.40-25	..A	VXI41.40-25	..A
VVI41.50-40	..A	VXI41.50-40	..A