



Acvatix™

## 2-port seat valves with externally threaded connection, PN16

## VVG41..

- Bronze CuSn5Zn5Pb2 valve body
- DN 15...DN 50
- $k_{vs}$  0.63...40 m<sup>3</sup>/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 SAX.. electromotoric or SKD.. and SKB.. electrohydraulic actuators

### Use

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

## Type summary

Product number	DN	$k_{vs}$ [m <sup>3</sup> /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

Product no.	Stock no.	Description
ALG..2	ALG..2	Set of 2 fittings with threaded connections for 2-port valves, consisting of 2 union nuts, 2 discs and 2 flat seals ALG..2B are brass fittings, for media temperatures up to 100 °C.
ALG..2B	S55846-Z1..	
ASZ6.6	S55845-Z108	Electric stem heating element, AC 24 V / 30 W, required for media below 0 °C

## Ordering

Example:

Product number	Stock no.	Description	Quantity
VVG41.25	VVG41.25	2-port valve PN16 externally threaded	2
ALG252B	S55846-Z104	Set of threaded fittings	2

Delivery

Valves, actuators and accessories are packed and supplied separately.

Spare parts, Rev. no.

See overview, page 11.

## Equipment combinations

Valves	H <sub>100</sub> [mm]	Actuators						Fitting sets					
		SAX.. <sup>3)</sup>		SKD.. <sup>1)</sup>		SKB..		Malleable cast iron	Brass <sup>2)</sup>				
		Δp <sub>max</sub>	Δp <sub>s</sub>	Δp <sub>max</sub>	Δp <sub>s</sub>	Δp <sub>max</sub>	Δp <sub>s</sub>	Type / stock no.	Type	Stock no.			
[kPa]													
VVG41.11	20	800	1600	800	1600	800	1600	ALG152	ALG152B	S55846-Z100			
VVG41.12													
VVG41.13													
VVG41.14													
VVG41.15													
VVG41.20											ALG202	ALG202B	S55846-Z102
VVG41.25											ALG252	ALG252B	S55846-Z104
VVG41.32											ALG322	ALG322B	S55846-Z106
VVG41.40											ALG402	ALG402B	S55846-Z108
VVG41.50	300	300	450	450	1225	ALG502	ALG502B	S55846-Z110					

<sup>1)</sup> Usable up to maximum medium temperature of 150 °C

<sup>2)</sup> Usable up to maximum medium temperature of 100 °C

<sup>3)</sup> Serie G / H: Usable up to maximum medium temperature of 130 °C

H<sub>100</sub> = Nominal stroke

Δp<sub>max</sub> = Maximum permissible differential pressure across valve's control path, valid for the entire actuating range of the motorized valve

Δp<sub>s</sub> = Maximum permissible differential pressure at which the motorized valve will close securely against the pressure (close off pressure)

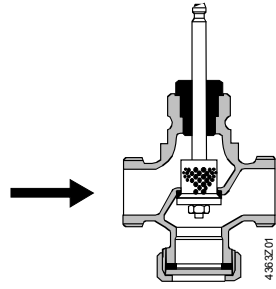
## Actuator overview

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	No	120 s	800 N	N4501		
SAX31.03					30 s				
SAX81.00		AC/DC 24 V			120 s				
SAX81.03					DC 0...10 V <sup>1)</sup>			30 s	
SAX61.03									
SKD32.50	Electro-hydraulic	AC 230 V	3-position	No	120 s	1000 N	N4561		
SKD32.21				Yes	30 s				
SKD32.51				No	120 s				
SKD82.50		AC 24 V		Yes	DC 0...10 V <sup>1)</sup>			No	30 s
SKD82.51				Yes					
SKD60				No					
SKD62				Yes					
SKB32.50	Electro-hydraulic	AC 230 V	3-position	No	120 s	2800 N	N4564		
SKB32.51				Yes					
SKB82.50				No					
SKB82.51		AC 24 V		Yes				DC 0...10 V <sup>1)</sup>	No
SKB60				No					
SKB62				Yes					

Actuators SAX81.. and SAX61.. are UL listed

<sup>1)</sup> or DC 4...20 mA or 0...1000 Ω

Valve cross section



Guided perforated plug which is integrated in the valve stem.

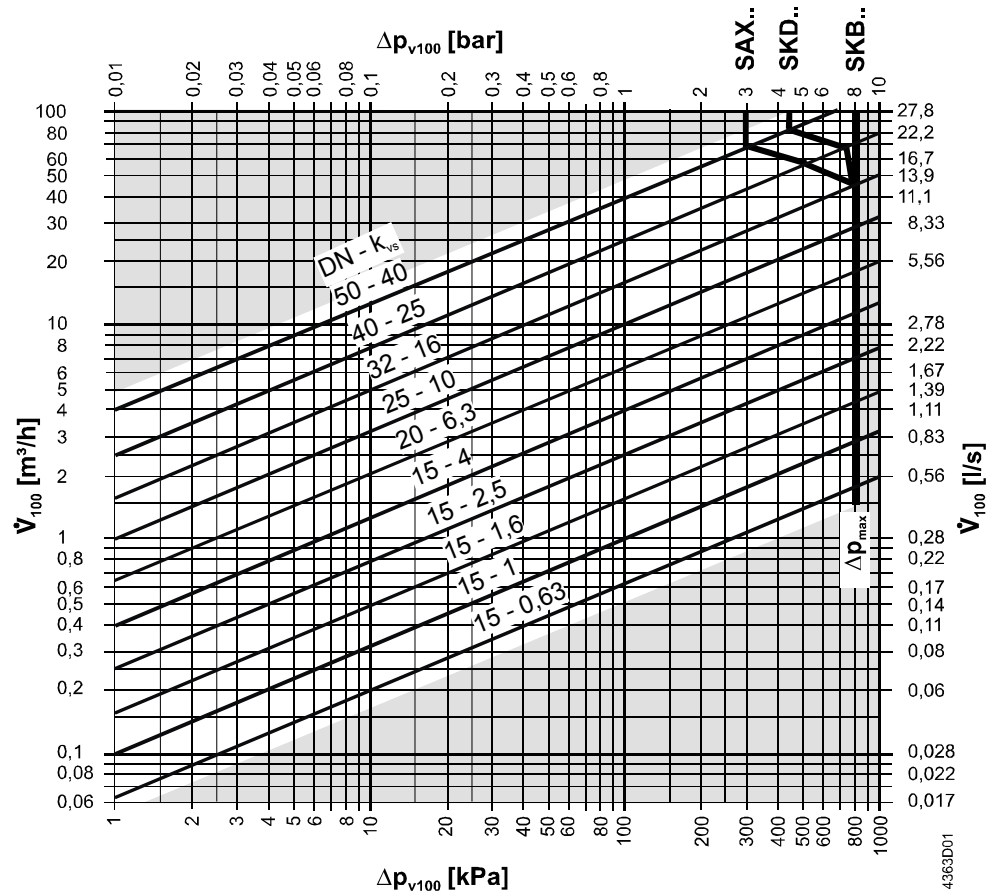
A pressed-in stainless steel seat ring is used as seat.



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

Sizing

Flow diagram



$\Delta p_{max}$  = Maximum permissible differential pressure across the valve, valid for the entire actuating range of the motorized valve

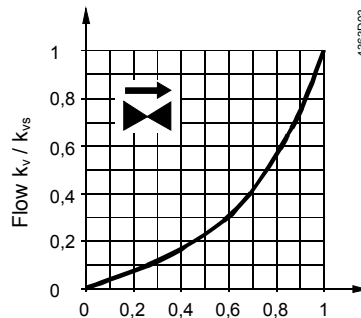
$\Delta p_{v100}$  = Differential pressure across the fully open valve and the valve's control path by a volume flow  $V_{100}$

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

100 kPa = 1 bar  $\approx$  10 mWC

1 m<sup>3</sup>/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

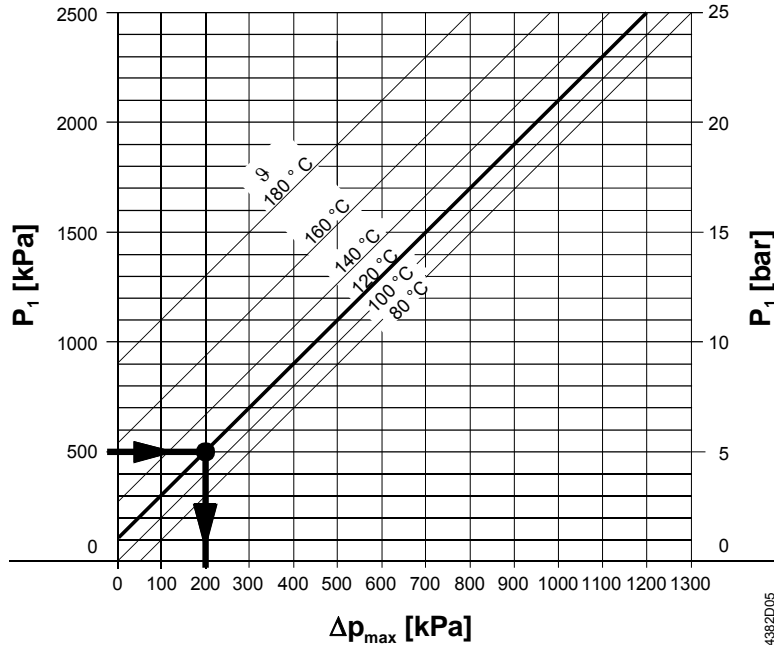
Stroke H / H100

**Cavitation**

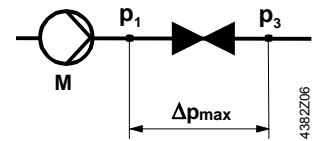
Cavitation accelerates wear on the valve plug and seat, and also results in undesirable noise. Cavitation can be avoided by not exceeding the differential pressure shown in the "Flow diagram" on page 4, and by adhering to the static pressures shown below.

**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.



- $\Delta p_{max}$  = 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
- $\vartheta$  = Water temperature



High temperature hot water example:

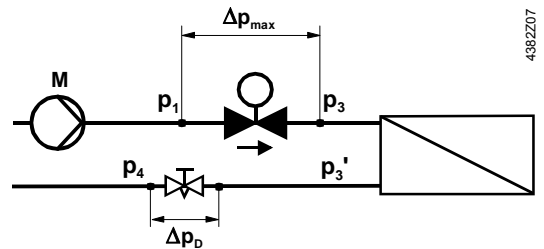
Pressure  $p_1$  at valve inlet: 500 kPa (5 bar)  
 Water temperature: 120 °C

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

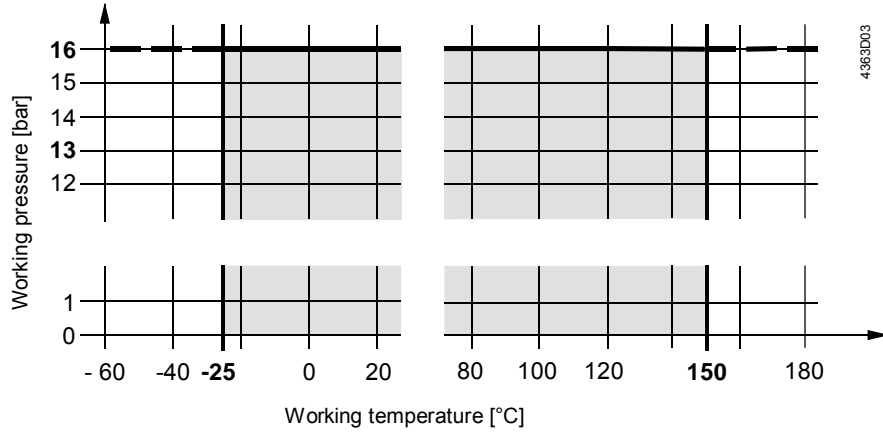
Chilled water example:

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)
- $\Delta p_{max}$  = 300 kPa (3 bar)
- $\Delta p_{3-3'}$  = 20 kPa (0.2 bar)
- $\Delta p_D$  (throttle) = 80 kPa (0.8 bar)
- $p_3'$  = pressure after consumer in kPa



**Working pressure and medium temperature**  
Fluids



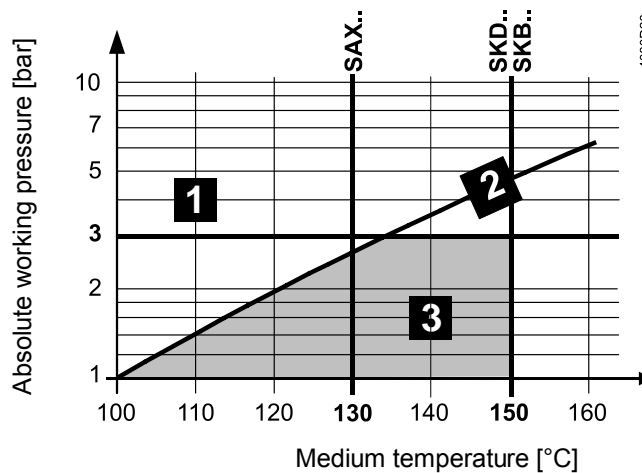
4363D03

**Working pressure and medium temperature staged as per ISO 7005**



**Current local legislation must be observed.**

Saturated steam  
Superheated steam



4030D20

<b>1</b>	water	-
<b>2</b>	wet steam	avoid
<b>3</b>	saturated steam superheated steam	permissible range of use

**Recommendation**

For saturated steam and superheated steam the differential pressure  $\Delta p_{max}$  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  $\geq$  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)

$\Delta T$  = temperature differential in K between saturated steam and superheated steam

### Example

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

### 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 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.

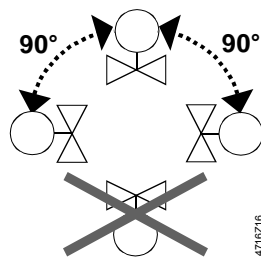
The use of these valves for steam is subject to specific parameters:  
Observe diagram for steam on page 6 and "Technical data" on page 9!

#### 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

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**Warning** 

Valves are equipped with maintenance-free, continuously lubricated stem sealing glands. See page 11 for replacement stem sealing glands.

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" , page 11.

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

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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

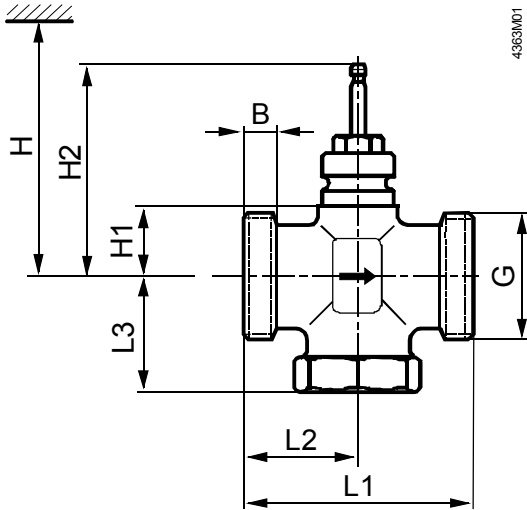
Functional data	PN class	PN 16 to ISO 7268	
	Working pressure	to ISO 7005 within the permissible "medium temperature" range according to the diagram on page 6	
	Flow characteristic 0...30 % 30...100 %	linear equal percentage; $\eta_{gl} = 3$ to VDI / VDE 2173	
	Leakage rate	0...0.02 % of $k_{vs}$ value 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 <sup>1)</sup> steam	max. 150 °C -25...150 °C ≤ 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	
	Standards, directives and approvals	Pressure Equipment Directive Pressure Accessories	PED 2014/68/EU Scope: Article 1, section 1 Definitions: Article 2, section 5
		Fluid group 2	without CE-marking as per article 4, section 3 (sound engineering practice) <sup>2)</sup>
EAC Conformity		Eurasia Conformity	
Environmental compatibility	The product environmental declaration CE1E4363en <sup>3)</sup> contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).		
Materials	Valve body	bronze CuSn5Zn5Pb2	
	Seat, plug, stem	stainless steel	
	Stem sealing gland	dezincification-free brass  EPDM O rings, silicon-free	
Dimensions / Weight	Refer to «Dimensions»		
	External thread connections	G...B to ISO 228-1	

<sup>1)</sup> Media below 0 °C:  
Stem heating element required to prevent freezing of the valve stem in the stem sealing gland.

<sup>2)</sup> Valves where  $PS \times DN < 1000$ , do not require special testing and cannot carry the CE label.

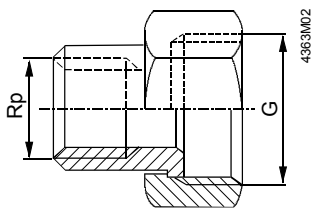
<sup>3)</sup> The documents can be downloaded from <http://siemens.com/bt/download>.

**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

Product number	DN	B [mm]	G [inch]	L1 [mm]	L2 [mm]	L3 [mm]	H1 [mm]	H2 [mm]	H			[kg]
									SAX..	SKD..	SKB..	
VVG41.11 VVG41.12 VVG41.13 VVG41.14 VVG41.15	15	10	G1B	100	50	57	26	122.5	> 468	> 526	> 601	1.25
VVG41.20	20		G1½B									
VVG41.25	25	14	G1½B	105	52.5	59	34	130.5	> 476	> 534	> 609	1.60
VVG41.32	32		G2B			60						2.20
VVG41.40	40	15	G2¼B	130	65	73	46	142.5	> 488	> 546	> 621	2.70
VVG41.50	50	16	G2¾B	150	75	83						3.90

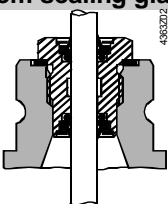


Malleable cast iron fittings	Brass fittings		for valve type	G [Inch]	Rp [Inch]
Product no. Stock no.	Product number	Stock no.			
ALG152	ALG152B	S55846-Z100	VVG41.11...15	G 1	Rp ½
ALG202	ALG202B	S55846-Z102	VVG41.20	G 1¼	Rp ¾
ALG252	ALG252B	S55846-Z104	VVG41.25	G 1½	Rp 1
ALG322	ALG322B	S55846-Z106	VVG41.32	G 2	Rp 1¼
ALG402	ALG402B	S55846-Z108	VVG41.40	G 2¼	Rp 1½
ALG502	ALG502B	S55846-Z110	VVG41.50	G 2¾	Rp 2

- On valve side: cylindrical thread to ISO 228-1
- On pipe side: with cylindrical thread to ISO 7-1
- ALG..B for media temperatures up to 100 °C

## Spare parts

### Order numbers for spare parts

Product number	DN	Stem sealing gland
		
VVG41.11	15	4 284 8874 0
VVG41.12	15	4 284 8874 0
VVG41.13	15	4 284 8874 0
VVG41.14	15	4 284 8874 0
VVG41.15	15	4 284 8874 0
VVG41.20	20	4 284 8874 0
VVG41.25	25	4 284 8874 0
VVG41.32	32	4 284 8874 0
VVG41.40	40	4 284 8874 0
VVG41.50	50	4 284 8874 0

### Revision numbers

Product number	Valid from rev. no.	Product number	Valid from rev. no.	Product number	Valid from rev. no.
VVG41.11	..A	VVG41.15	..A	VVG41.40	..A
VVG41.12	..A	VVG41.20	..A	VVG41.50	..A
VVG41.13	..A	VVG41.25	..A		
VVG41.14	..A	VVG41.32	..A		

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Technical specifications and availability subject to change without notice.

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