SIEMENS

دقیق صنعت پیشرو

acvatix

# 2-port Seat Valves PN16 with externally threaded connection

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

| Product number | 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

| 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<br>ALG..2B are brass fittings, for media temperatures up to 100 °C. |
| **ALG..2B** | **S55846-Z1..** | |
| **ASZ6.5** | **ASZ6.5** | 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 | Verschraubungs-Sets aus Messing | 2 |

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

**Spare parts, Rev. no.** — See overview, page 11.

## Equipment combinations

| Valves | | Actuators | | | | | | Fitting sets | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | SQX.. [1] | | SKD.. [1] | | SKB.. | | | | |
| | $H_{100}$ | $\Delta p_{max}$ | $\Delta p_s$ | $\Delta p_{max}$ | $\Delta p_s$ | $\Delta p_{max}$ | $\Delta p_s$ | Malleable cast iron | brass [2] | |
| | [mm] | [kPa] | | | | | | Type / stock no. | Type | Stock no. |
| **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** | | | 1550 | | | | | ALG252 | ALG252B | S55846-Z104 |
| **VVG41.32** | | | 875 | | 1275 | | | ALG322 | ALG322B | S55846-Z106 |
| **VVG41.40** | | 525 | 525 | 775 | 775 | | | ALG402 | ALG402B | S55846-Z108 |
| **VVG41.50** | | 300 | 300 | 450 | 450 | | 1225 | ALG502 | ALG502B | S55846-Z110 |

[1] Usable up to maximum medium temperature of 150 °C
[2] Usable up to maximum medium temperature of 100 °C
$H_{100}$ = Nominal stroke
$\Delta p_{max}$ = Maximum permissible differential pressure across valve's control path, valid for the entire actuating range of the motorized valve
$\Delta p_s$ = Maximum permissible differential pressure at which the motorised valve will close securely against the pressure (close off pressure)

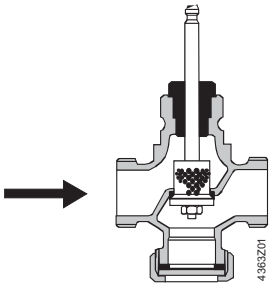
## Actuator overview

| Product number | Actuator type | Operating voltage | Positioning signal | Spring return | Positioning time | Positioning force | Data sheet |
|---|---|---|---|---|---|---|---|
| **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 | | |
| **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 | | | |
| **SKB62** | | | | Yes | | | |

[1] or DC 4…20 mA or 0…1000 Ω

## Technical design / mechanical design

### Valve cross section



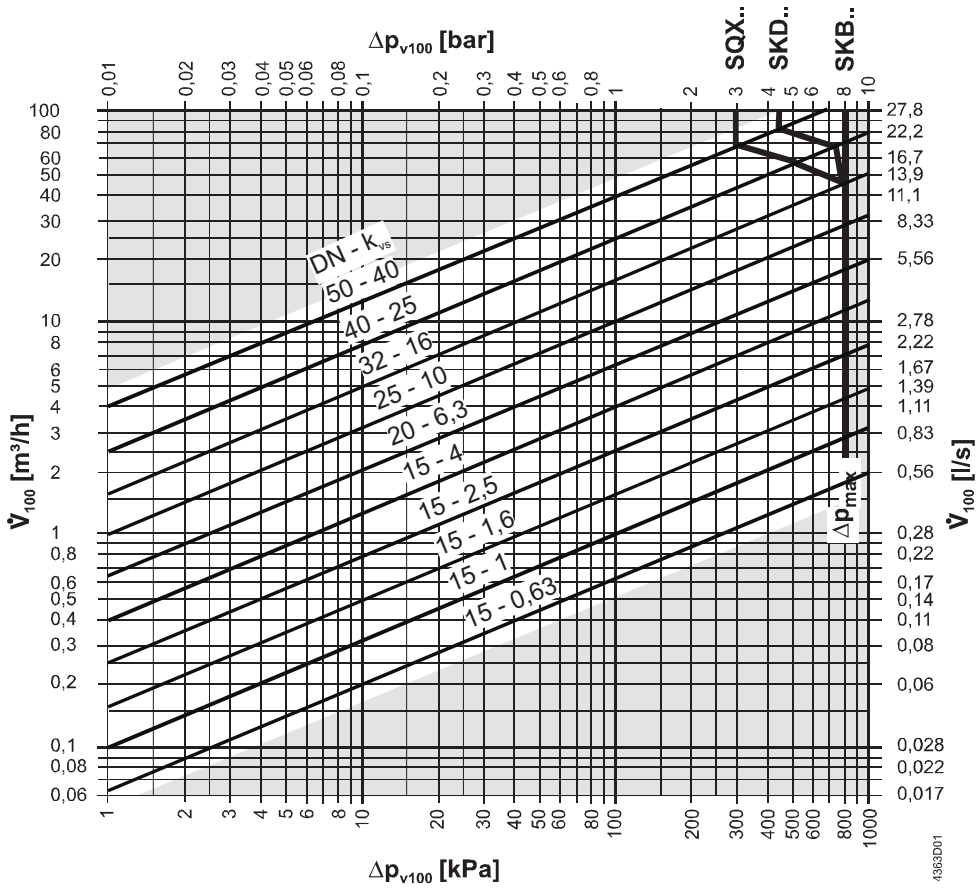

Guided perforated plug which is integrated in the valve stem.

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




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

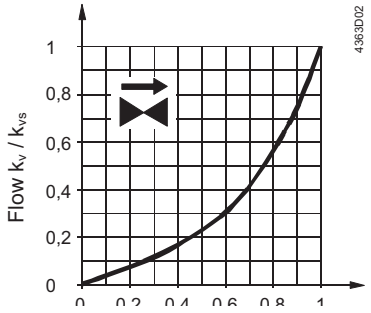
$\Delta p_{v100}$ = Differential pressure across the fully open valve and the valve's control path by a volume flow $V_{100}$

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

100 kPa = 1 bar ≈ 10 mWC

1 $m^3/h$ = 0.278 l/s water at 20 °C

### Valve flow characteristic




0…30 % → linear

30…100 % → equal percentage

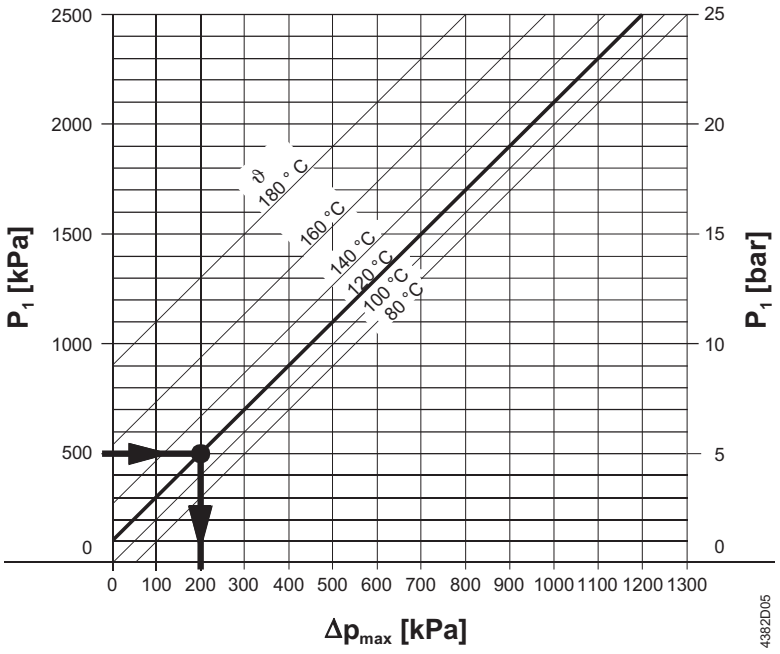
$n_{gl}$ = 3 as per VDI / VDE 2173

**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.



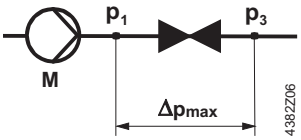

$\Delta p_{max}$ = Differential pressure with valve almost closed, at which cavitation can largely be avoided

$p_1$ = 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)

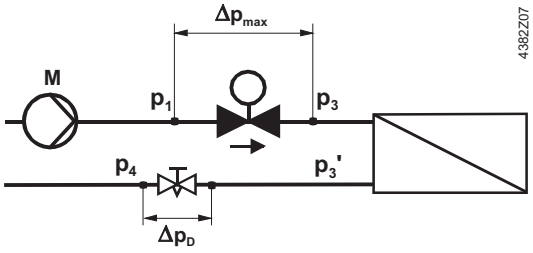
$p_4$ = 100 kPa (1 bar) (atmospheric pressure)

$\Delta p_{max}$ = 300 kPa (3 bar)

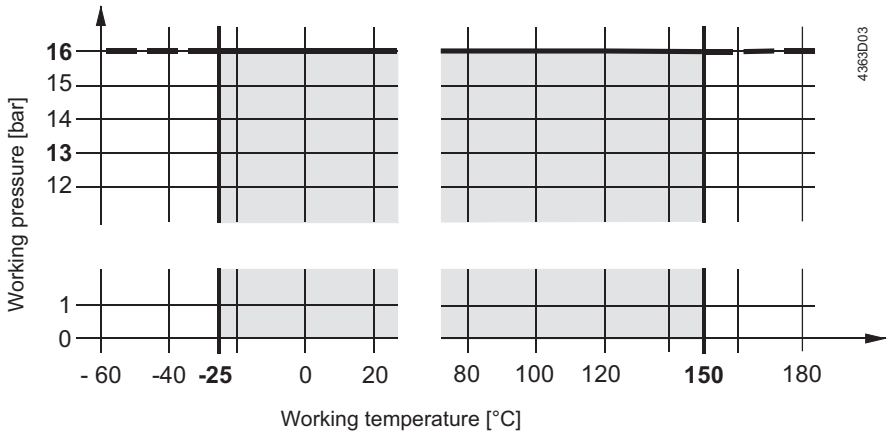
$\Delta p_{3\text{-}3'}$ = 20 kPa (0.2 bar)

$\Delta p_D$ (throttle) = 80 kPa (0.8 bar)

$p_3'$ = pressure after consumer in kPa



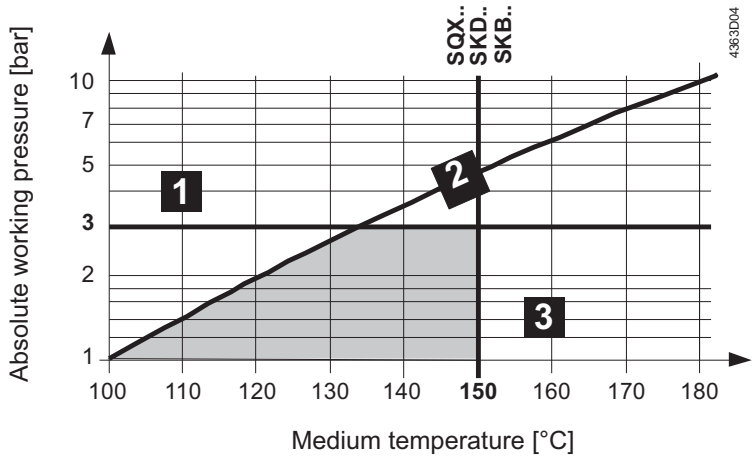
**Working pressure and medium temperature**
Fluids




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

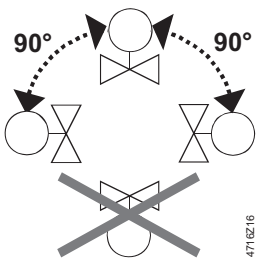
⚠ For media below 0 °C, use the electric ASZ6.5 stem heating element to prevent the valve stem from freezing in the sealing gland. For safety reasons, the stem heating element has been designed for AC 24 V / 30 W operating voltage.

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" , page 11.
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

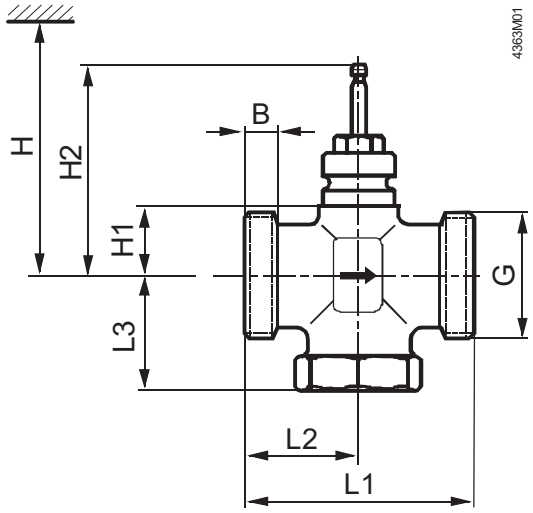
The technical data given for these applications is valid only in conjunction with the Siemens actuators as detailed under "Equipment combinations", page 3.
All terms of the warranty will be invalidated by the use of actuators from other manufacturers.

**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 % | 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;<br>recommendation: water treatment to VDI 2035 |
| | | brine | |
| | | steam | saturated steam, super-heated steam;<br>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<br>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)<br>ISO 9001 (Quality)<br>SN 36350 (Environmentally compatible products)<br>RL 2002/95/EG (RoHS) |
| 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 |

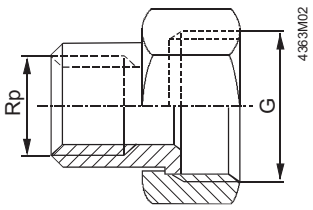
[1)] Media below 0 °C:
ASZ6.5 stem heating element required to prevent freezing of the valve stem in the sealing gland.

## 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

| Product number | DN | B | G | L1 | L2 | L3 | H1 | H2 | H | | | kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | [mm] | [inch] | [mm] | [mm] | [mm] | [mm] | [mm] | SQX.. | SKD.. | SKB.. | [kg] |
| **VVG41.11**<br>**VVG41.12**<br>**VVG41.13**<br>**VVG41.14**<br>**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 |

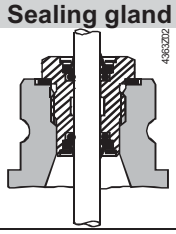



| Product no.<br>Stock no. | Product number | Stock no. | for valve type | G | Rp |
|---|---|---|---|---|---|
| | | | | [Inch] | [Inch] |
| **ALG152** | **ALG152B** | **S55846-Z100** | VVG41.11…15 | G 1 | Rp ½ |
| **ALG202** | **ALG202B** | **S55846-Z102** | VVG41.20 | G 1¼ | Rp ¾ |
| **ALG252** | **ALG252B** | **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 | G2 | Rp 1¼ |

- 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

| | | Sealing gland | Set |
|---|---|---|---|
| | |  | |
| **Product number** | **DN** | | **Plug with stem, circlip, sealing** |
| **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 |

## 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 | | |