



VAI61..

VBI61..

ACVATIX™

2-port and 3-port ball valves PN40

VAI61..
VBI61..

with internally threaded connections

- Brass UNS C35330 (DZR) ball valve body
- DN 15...50
- k_{vs} 1...63 m³/h
- Internally threaded connections Rp as per ISO 7-1
- Angle of rotation 90°
- For use with rotary actuators GQD..9A, GMA..9E with spring-return and GDB..9E, GLB..9E without spring return
- Applications with auxiliary functions (e.g., switch, potentiometer, see p. 3) can also be combined with standard rotary actuators.

Use

For use in heating, ventilating and air conditioning plants as a control or safety shutoff valve.

For closed circuits (avoid cavitation, see page 5).

Type summary

| Type | DN | k_{vs} [m ³ /h] | S_v |
|--------------|----|---------------------------------|-------|
| 2-port | | | |
| 3-port | | | |
| VAI61.15-1 | 15 | 1.0 | > 500 |
| VAI61.15-1.6 | | 1.6 | |
| VAI61.15-2.5 | | 2.5 | |
| VAI61.15-4 | | 4.0 | |
| VAI61.15-6.3 | | 6.3 | |
| VAI61.15-10 | | 10 | |
| VAI61.20-4 | 20 | 4 | |
| VAI61.20-6.3 | | 6.3 | |
| VAI61.20-10 | | 10 | |
| VAI61.25-6.3 | 25 | 6.3 | |
| VAI61.25-10 | | 10 | |
| VAI61.25-16 | | 16 | |
| VAI61.32-10 | 32 | 10 | |
| VAI61.32-16 | | 16 | |
| VAI61.32-25 | | 25 | |
| VAI61.40-16 | 40 | 16 | |
| VAI61.40-25 | | 25 | |
| VAI61.40-40 | | 40 | |
| VAI61.50-25 | 50 | 25 | |
| VAI61.50-40 | | 40 | |
| VAI61.50-63 | | 63 | |

DN = nominal size

k_{vs} = nominal flow rate of cold water (5...30 °C) through the fully open ball valve at 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 at a differential pressure of 100 kPa (1 bar)

Accessories

For thermal insulation, separate insulation covers are available.

| Ball valve | Insulation cover | Ball valve | Insulation cover |
|------------|------------------|------------|------------------|
| VAI61.15.. | AL115VAI60/61 | VBI61.15.. | AL115VBI60/61 |
| VAI61.20.. | AL120VAI60/61 | VBI61.20.. | AL120VBI61 |
| VAI61.25.. | AL125VAI60/61 | VBI61.25.. | AL125VBI60/61 |
| VAI61.32.. | AL132VAI60/61 | VBI61.32.. | AL132VBI60/61 |
| VAI61.40.. | AL140VAI60/61 | VBI61.40.. | AL140VBI60/61 |
| VAI61.50.. | AL150VAI60/61 | VBI61.50.. | AL150VBI60/61 |

Equipment combinations

| Type | Rotary actuators | | | | | | | |
|-------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|
| | GQD..9A | | GDB..9E | | GMA..9E | | GLB..9E | |
| | Δp_{max} | Δp_s | Δp_{max} | Δp_s | Δp_{max} | Δp_s | Δp_{max} | Δp_s |
| Ball valve | [kPa] | | | | | | | |
| VAI61.15.. | 350 | 1'400 | 350 | 1'400 | 350 | 1'400 | 350 | 1'400 |
| VAI61.20.. | | | | | | | | |
| VAI61.25.. | | | | | 350 | 1'000 | 350 | 1'000 |
| VAI61.32-10 | | | | | 240 | 800 | 240 | 800 |
| VAI61.32-16 | | | | | 350 | 800 | 350 | 800 |
| VAI61.32-25 | | | | | 240 | 600 | 240 | 600 |
| VAI61.40-16 | | | | | 350 | 600 | 350 | 600 |
| VAI61.40-25 | | | | | 240 | 600 | 240 | 600 |
| VAI61.40-40 | | | | | 350 | 600 | 350 | 600 |
| VAI61.50-25 | | | | | 240 | 600 | 240 | 600 |
| VAI61.50-40 | | | | | 350 | 600 | 350 | 600 |
| VAI61.50-63 | | | | | 240 | 600 | 240 | 600 |

| | | | | | | | | |
|-------------|-----|--|-----|--|-----|--|-----|--|
| VBI61.15.. | 350 | | 350 | | 350 | | 350 | |
| VBI61.20.. | | | | | | | | |
| VBI61.25-10 | | | | | 240 | | 240 | |
| VBI61.32-16 | | | | | | | | |
| VBI61.40-25 | | | | | | | | |
| VBI61.50-40 | | | | | | | | |
| VBI61.50-63 | | | | | | | | |

Δp_{max} = maximum permissible differential pressure across ball valve's control path, valid for the entire actuating range of the motorized ball valve; for low noise operation, we recommend a maximum permissible differential pressure of 200 kPa

Δp_s = maximum permissible differential pressure at which the motorized ball valve will close securely against the pressure (close off pressure)

Rotary actuators for ball valves (overview)

| Type / Stock no. | Actuator type | Operating voltage | Positioning | | Spring return | | Data Sheet |
|------------------|-----------------|-------------------|-------------|-----------------------|---------------|------|------------|
| | | | signal | time | function | time | |
| GQD131.9A | Electro-motoric | AC/DC 24 V | 3-position | 30/15 s ¹⁾ | Yes | 15 s | N4659 |
| GQD161.9A | | | DC 0...10 V | | | | |
| GDB331.9E | Electro-motoric | AC 230 V | 3-position | 150 s | | | N4657 |
| GDB131.9E | | AC 24 V | | | | | |
| GDB161.9E | | | | | | | |
| GMA131.9E | Electro-motoric | AC / DC 24 V | 3- position | 90/15 s ¹⁾ | Yes | 15 s | N4658 |
| GMA161.9E | | | DC 0...10 V | | | | |
| GLB331.9E | Electro-motoric | AC 230 V | 3-position | 150 s | | | N4657 |
| GLB131.9E | | AC 24 V | | | | | |
| GLB161.9E | | | | | | | |

¹⁾ open/close

Ordering

When ordering please give material, article type, purchase order text and quantity.

Example:

| Material | Article Type | Purchase Order (PO) text | Quantity |
|-------------|--------------|------------------------------------|----------|
| VAI61.25-16 | VAI61.25-16 | Ball valve inside threaded, 2-Port | 2 |
| GLB161.9E | GLB161.9E | Actuator for Ball valve, NSR | 2 |

Spare parts, Rev. no.

See overview, page 10.

Delivery

Ball valves, rotary actuators and mounting sets are supplied in separate packaging and not assembled prior to delivery.

Applications with auxiliary functions

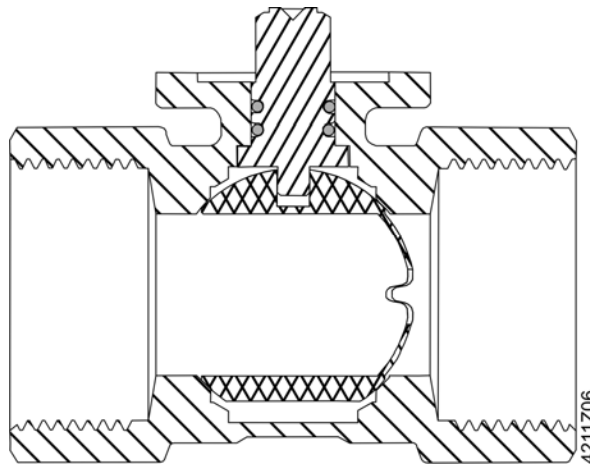
If a ball valve application requires a rotary actuator with auxiliary functions (for example switch or potentiometer), a standard actuator with a corresponding function can be used. In this case, a mounting set ASK77.. is required **in addition** to the rotary actuator.

For assembly please consult mounting instructions accordingly.

| Rotary actuators | Option | Mounting set (order text) |
|---|-------------------------|---|
| GMA..1E (with spring-return) | Potentiometer, switches | ASK77.2 Accessory Kit BV for GMAxx1.9E |
| GDB..1E / GLB..1E (without spring-return) | Potentiometer, switches | ASK77.3 Accessory Kit BV for GDBxx1.9E |
| GQD..1A (with spring-return) | Switches | ASK77.4 Accessory Kit for BV GQDxx1.9A |

Note: GAP19../GNP19.. are not compatible with mounting set ASK77.2.

Ball valve cross-section

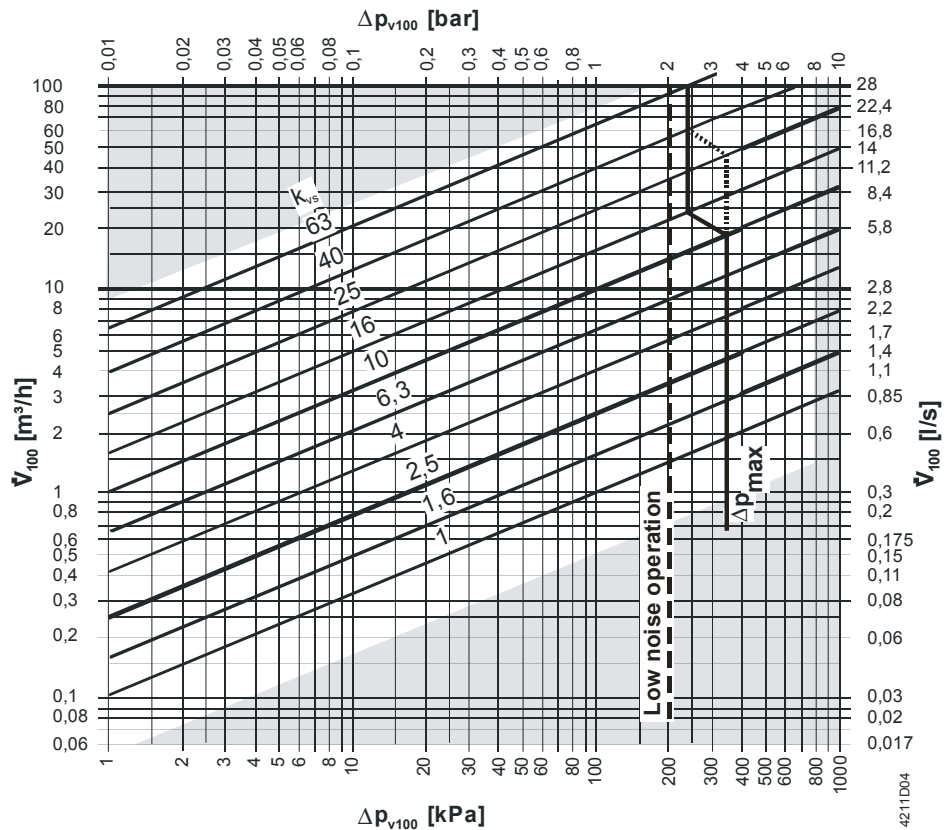


Ball with integrated control characteristic

Special PTFE seat ring design for low torque operation

Sizing

Flow diagram



----- Δp_{max} for VAI61.. and VBI61.. see table equipment combinations for details

Δp_{max} = maximum permissible differential pressure across the ball valve, valid for the entire actuating range of the motorized ball valve; for low noise operation, we recommend a maximum permissible differential pressure of 200 kPa

Δp_{v100} = differential pressure across the fully open ball valve and the ball valve's control path at a volumetric flow V_{100}

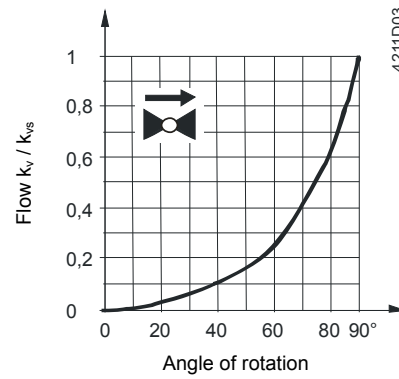
\dot{V}_{100} = volumetric flow through the fully open ball valve

100 kPa = 1 bar \approx 10 mWC

1 m³/h = 0.278 l/s water at 20 °C

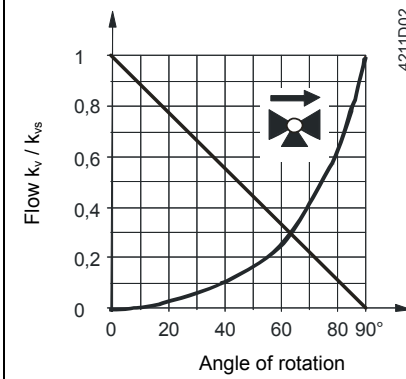
Ball valve flow characteristic

2-port



0...100 %: → equal-percentage, $n_{gr} = 3.9$
as per VDI / VDE 2173

3-port

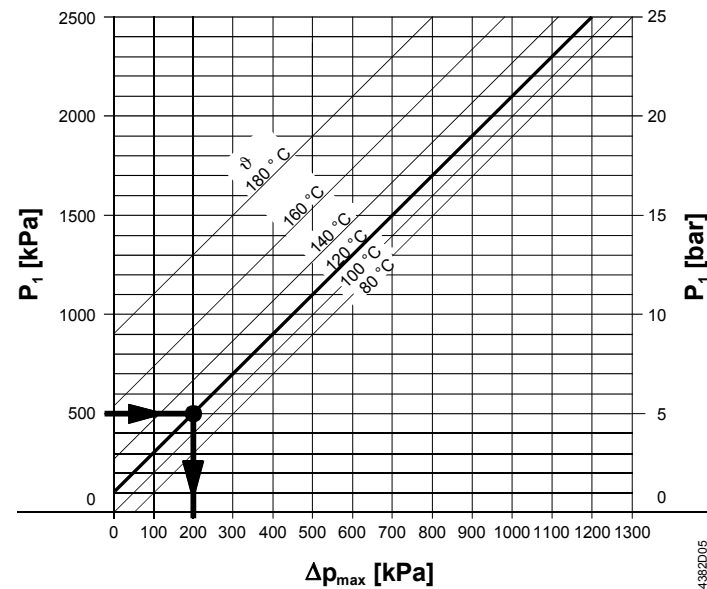


Through-port 0...100 %: → equal-percentage,
 $n_{gr} = 3.9$ as per
VDI / VDE 2173

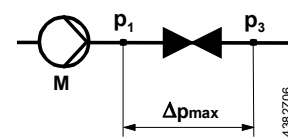
Bypass 0...100 %: → linear
VBI61.50-63 bypass approx. 62 %

Cavitation

Cavitation accelerates wear on the ball 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.



Δp_{max} = differential pressure with ball valve almost closed at which cavitation can largely be avoided
 p_1 = static pressure at ball valve inlet
 p_3 = static pressure at ball valve outlet
 M = pump
 ϑ = water temperature



High temperature
hot water example:

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

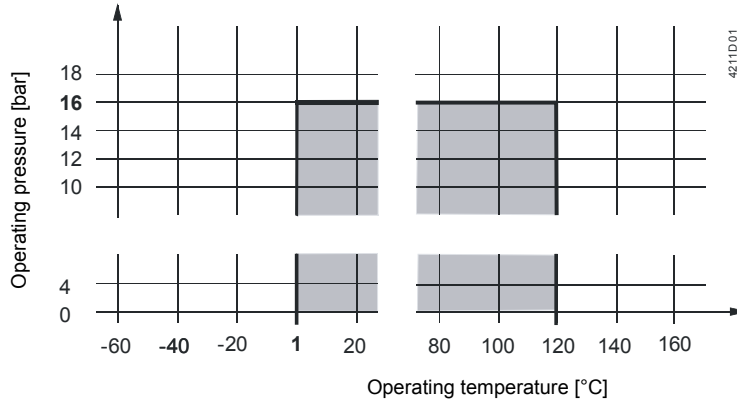
From the diagram above, it will be seen that with the ball valve almost closed, the maximum permissible differential pressure Δp_{max} is 200 kPa (2 bar).

Note on chilled water

To avoid cavitation in chilled water circuits, ensure sufficient counter-pressure at the ball valve's outlet, e.g. with an additional throttling ball valve downstream from

the ball valve. Select the maximum differential pressure across the ball valve according to the 80 °C curve in the flow diagram above.

Operating pressure and temperature
Fluids



Operating pressure and medium temperature as per ISO 7005

Current local legislation must be observed.

Notes

Engineering

We recommend installation in the return pipe, as the temperatures in this pipe are lower for applications in heating systems, which extends the stem sealing gland's life.

Ensure cavitation-free flow (refer to page 5).

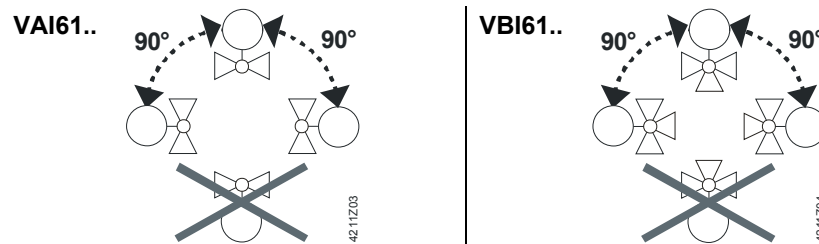
Always use a strainer upstream of the ball valve to increase the ball valve's functional safety.

Mounting

Ball valve and rotary actuator can easily be assembled on site. Neither special tools nor adjustments are required.

The ball valve is supplied with Mounting Instructions (VAI61.., VBI61..: 74 319 0647 0.

Orientation



Direction of flow

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



Commissioning

Commission the ball valve only if the rotary actuator has been mounted correctly.

Ball valve stem moves counterclockwise: Ball valve opens = increasing flow
Ball valve stem moves clockwise: Ball valve closes = decreasing flow

Maintenance

VAI61.. and VBI61.. ball valves are maintenance-free.

Warning

When doing service work on the ball valve / rotary actuator:

- Deactivate the pump and turn off the power supply
- Close the shutoff ball 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 ball valve into operation again, make sure the rotary actuator is correctly fitted.

Disposal



Before disposal, the ball 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 an ecological point of view.

Current local legislation must be observed.

Warranty

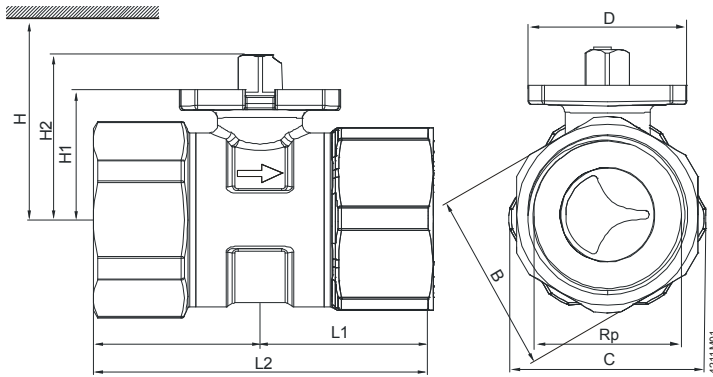
The technical data given for applications is valid only in conjunction with the Siemens rotary actuators listed under "Equipment combinations", page 2.

All terms of the warranty will be invalidated if rotary actuators of other manufacture are used.

Technical data

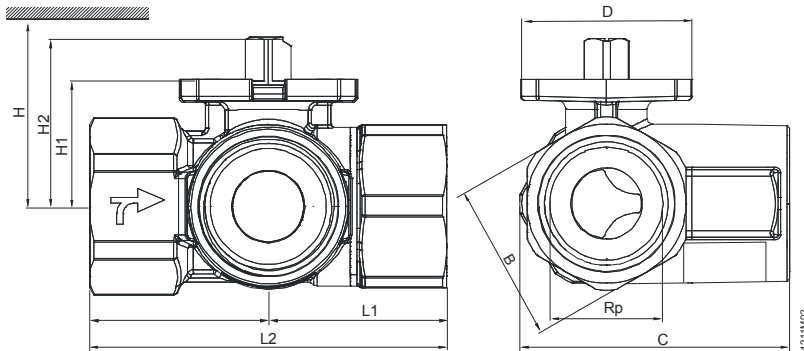
| | VAI61.. | VBI61.. | | |
|----------------------------|---------------------------------|--|---|--|
| Functional data | PN class | PN 40 as per ISO 7268 | | |
| | Operating pressure | To ISO 7005 within the permissible medium temperature range according to diagram on page 6 | | |
| | Ball valve characteristic | | | |
| | Through-port 0...100 % | equal-percentage; $n_{gl} = 3.9$ as per VDI / VDE 2173 | equal-percentage; $n_{gl} = 3.9$ as per VDI / VDE 2173 | |
| | Bypass 0...100 % | | linear | |
| | Leakage rate | | | |
| | Through-port | 0...0.0001 of k_{vs} value | 0...0.0001 of k_{vs} value | |
| | Bypass | | < 0.01 of k_{vs} value | |
| | Permissible media | Cold water, chilled water, low temperature hot water, high temperature hot water, water with anti-freeze. Recommendation: water treatment to VDI 2035 | | |
| | Medium temperature | 1...120 °C | | |
| | Rangeability S_v | > 500 | | |
| | Angle of rotation | 90 ° | | |
| | Materials | Ball valve body | Brass UNS C35330 (DZR) | |
| | | Ball | Brass UNS C35330 (DZR), chromium-plated | |
| Stem | | Brass UNS C35330 (DZR) | | |
| Gland | | EPDM O-rings | | |
| Dimensions / weight | Refer to "Dimensions" below | | | |
| | Internally threaded connections | Rp as per ISO 7-1 | | |
| 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/EC (RoHS) | | |

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)

| Type | DN | B [mm] | C [mm] | D [mm] | Rp [Inch] | L1 [mm] | L2 [mm] | H1 [mm] | H2 [mm] | H | | | | [kg] |
|------------|----|-----------|------------------|-----------|--------------|------------|------------|------------|------------|-----------------|-----------------|-----------------|-----------------|------|
| | | | | | | | | | | GQD..9A [mm] | GDB..9E [mm] | GMA..9E [mm] | GLB..9E [mm] | |
| VAI61.15.. | 15 | 26 | 31 ¹⁾ | 42 | Rp ½ | 31 | 62 | 27.6 | 37.6 | > 300 | > 310 | >300 | >300 | 0.3 |
| VAI61.20.. | 20 | 31 | 34 | 42 | Rp ¾ | 33 | 68 | 27.6 | 37.6 | | | | | 0.35 |
| VAI61.25.. | 25 | 39 | 42.5 | 42 | Rp 1 | 38.5 | 77 | 30.5 | 40.5 | | | >310 | >310 | 0.5 |
| VAI61.32.. | 32 | 48 | 52 | 42 | Rp 1¼ | 44 | 88 | 34.3 | 44.3 | | | | | 0.7 |
| VAI61.40.. | 40 | 55 | 61 | 42 | Rp 1½ | 48.5 | 102 | 39.8 | 49.8 | | | >320 | >320 | 1.1 |
| VAI61.50.. | 50 | 67 | 74 | 42 | Rp 2 | 56.5 | 119 | 52.8 | 62.8 | | | >335 | >335 | 1.8 |



- 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)

| Type | DN | B [mm] | C [mm] | D [mm] | Rp [Inch] | L1 [mm] | L2 [mm] | H1 [mm] | H2 [mm] | H | | | | [kg] |
|--------------|----|-----------|--------------------|-----------|--------------|------------|------------|------------|------------|-----------------|-----------------|-----------------|-----------------|-------|
| | | | | | | | | | | GQD..9A [mm] | GDB..9E [mm] | GMA..9E [mm] | GLB..9E [mm] | |
| VBI61.15.. | 15 | 26 | 48.5 ¹⁾ | 42 | Rp ½ | 33.5 | 67 | 24.2 | 33.7 | > 300 | > 310 | >300 | >300 | 0.29 |
| VBI61.15-6.3 | | | 49.5 ¹⁾ | 42 | | | | 27.6 | 37.6 | | | | | 0.305 |
| VBI61.20.. | 20 | 31 | 52 | 42 | Rp ¾ | 36 | 72 | 27.6 | 37.6 | | | >310 | >310 | 0.375 |
| VBI61.25.. | 25 | 39 | 64.5 | 42 | Rp 1 | 42.5 | 85 | 30.5 | 40.5 | | | >310 | >310 | 0.605 |
| VBI61.32.. | 32 | 48 | 76.5 | 42 | Rp 1¼ | 49.5 | 99 | 34.3 | 44.3 | | | | | 0.95 |
| VBI61.40.. | 40 | 55 | 84.5 | 42 | Rp 1½ | 55 | 110 | 39.8 | 49.8 | | | >320 | >320 | 1.365 |
| VBI61.50.. | 50 | 67 | 102.5 | 42 | Rp 2 | 65.5 | 131 | 52.8 | 62.8 | | | >335 | >335 | 2.215 |

¹⁾ Body larger than union nut

Revision numbers

| Product number | Valid from rev. no. | Product number | Valid from rev. no. |
|----------------|---------------------|----------------|---------------------|
| VAI61.15-1 | ..A | | |
| VAI61.15-1.6 | ..A | VBI61.15-1.6 | ..A |
| VAI61.15-2.5 | ..A | VBI61.15-2.5 | ..A |
| VAI61.15-4 | ..A | VBI61.15-4 | ..A |
| VAI61.15-6.3 | ..A | VBI61.15-6.3 | ..A |
| VAI61.15-10 | ..A | | |
| VAI61.20-4 | ..A | VBI61.20-4 | ..A |
| VAI61.20-6.3 | ..A | VBI61.20-6.3 | ..A |
| VAI61.20-10 | ..A | VBI61.20-10 | ..A |
| VAI61.25-6.3 | ..A | | |
| VAI61.25-10 | ..A | VBI61.25-10 | ..A |
| VAI61.25-16 | ..A | | |
| VAI61.32-10 | ..A | | |
| VAI61.32-16 | ..A | VBI61.32-16 | ..A |
| VAI61.32-25 | ..A | | |
| VAI61.40-16 | ..A | | |
| VAI61.40-25 | ..A | VBI61.40-25 | ..A |
| VAI61.40-40 | ..A | | |
| VAI61.50-25 | ..A | | |
| VAI61.50-40 | ..A | VBI61.50-40 | ..A |
| VAI61.50-63 | ..A | VBI61.50-63 | ..A |