

ACVATIX™

2-port and 3-port control ball valves, PN 40, with internally threaded connection

VAI61.., VBI61..



For use in heating, ventilation, and air conditioning plants as control or shutoff valve. In closed circuits.

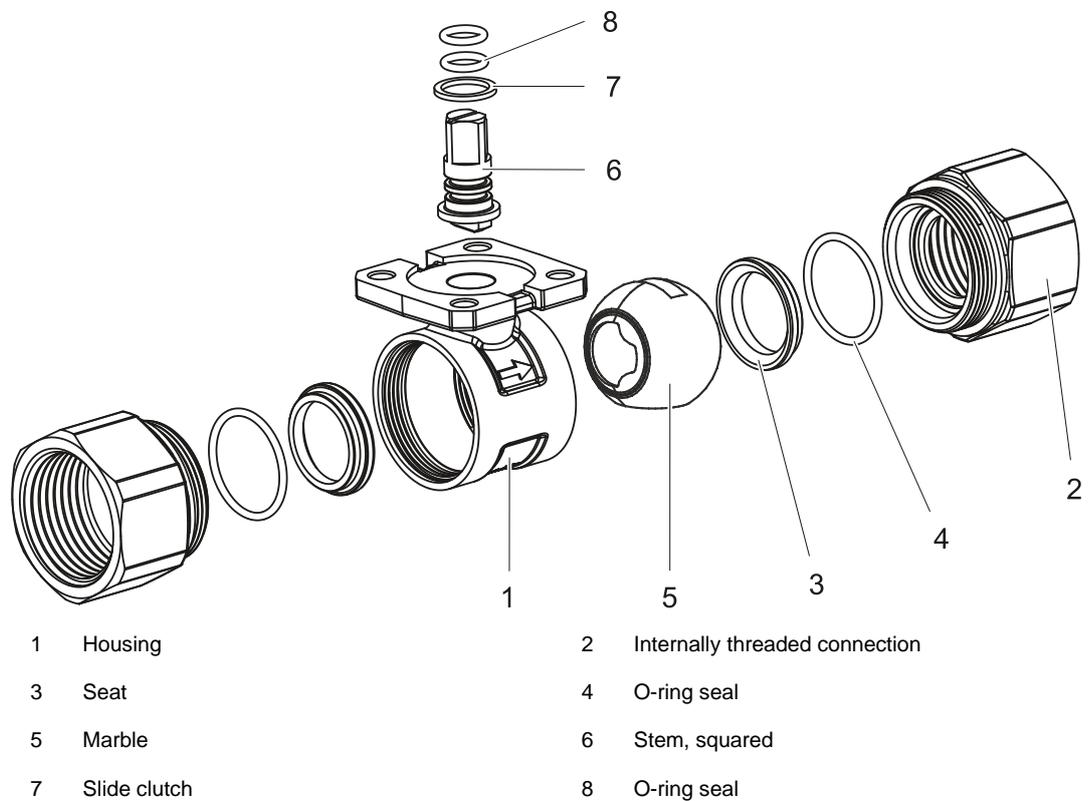
- Ball valve body made of brass UNS C35330 (DZR)
- DN 15...50
- k_{vs} 0.25...63 m³/h
- Connections with internal threading Rp per ISO 7-1
- Rotational angle 90°
- For use with electromotive rotary actuators GQD..9A, GMA..9E.. with spring return, and GSD161.9A, GDB..9E.., GLD161.9E.., GLB..9E.., GDD161.9E without spring return, including Modbus variants
- For applications with auxiliary functions (e.g. auxiliary switch, potentiometer) also combinable with standard rotary actuators

Features

- **Moderately price:**
Optimized flow rates mean smaller ball valves can be selected. Low torque means you can combine them with small, less expensive rotary actuators.
- **High life expectancy:**
Maintenance-free construction, also thanks to low friction stem and polished ball made of chrome-plated DZR brass.
- **Simple mounting:**
The brackets, premounted on the actuators, means you can mount them on the ball valves without tools.

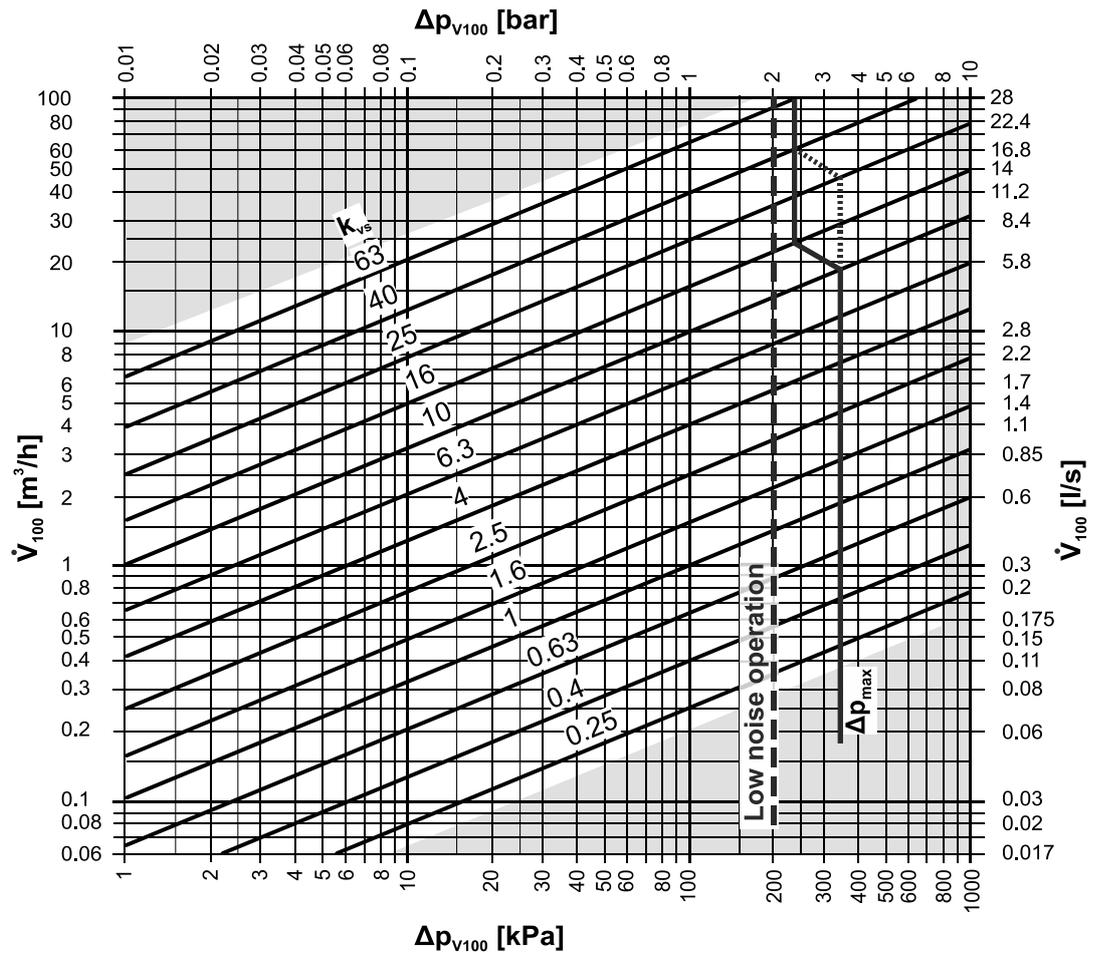
Technical design

Design



Sizing

Flow diagram



--- Δp_{max} for VAI61.. und VBI61.., for details, see "Equipment combinations [► 8]"

Δp_{max} = Maximum permissible differential pressure over the ball valve control path, valid for the entire positioning range of the ball valve/rotary actuator unit.
If low noise operation is desired, we recommend a maximum differential pressure of 200 kPa.

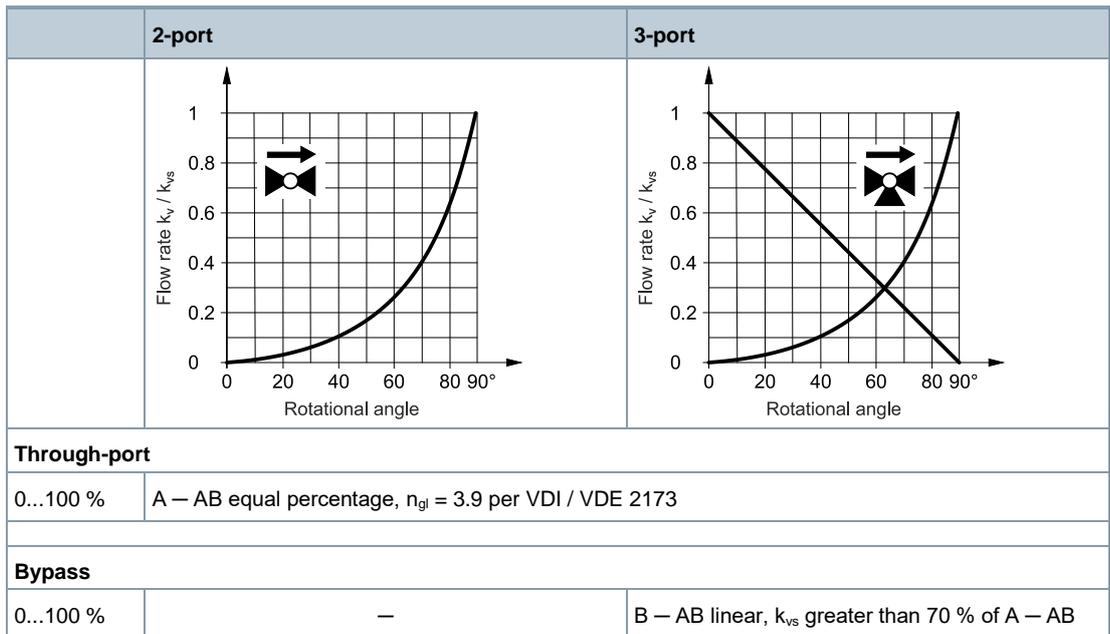
Δp_{V100} = Differential pressure over the fully opened ball valve and over the control path at a volume flow of V_{100}

\dot{V}_{100} = Volume flow through the fully opened ball valve

100 kPa = 1 bar \approx 10 mWS

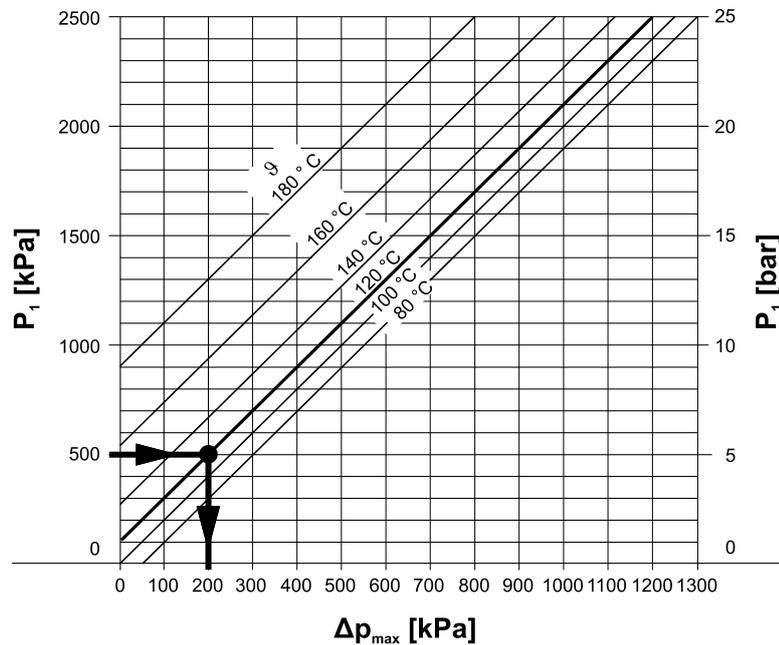
1 m^3/h = 0.278 l/s water at 20 °C

Ball valve characteristic curve

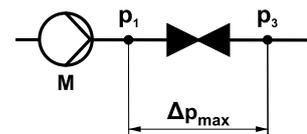


Cavitation

Cavitation increases wear and tear of the ball and seat, and results in unwanted noise. Cavitation can be prevented by not exceeding the differential pressures as per the flow diagram and maintaining the static pressures depicted below.



- Δp_{max} = Differential pressure at a nearly closed ball valve to largely avoid cavitation
- p_1 = Static pressure at the ball valve inlet
- P_3 = Static pressure at the ball valve outlet
- M Pump
- ϑ Water temperature



Example with hot water:

- Pressure p_1 at ball valve inlet: 500 kPa (5 bar)
- Water temperature: 120 °C
- The above diagram clearly indicates that the maximum permissible differential pressure is $\Delta p_{max} \rightarrow 200$ kPa (2 bar) at a nearly closed ball valve.

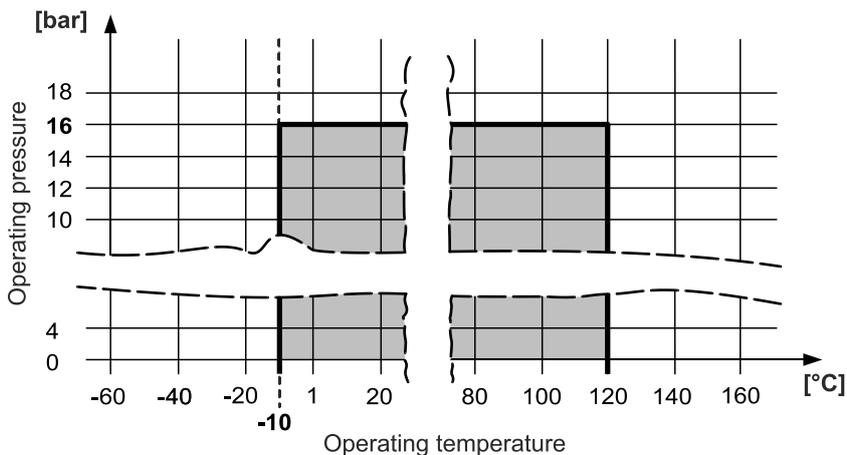


Note on chilled water applications

To prevent cavitation in chilled water circuits, sufficient counter pressure must be supplied to the ball valve outlet, e.g. using an additional butterfly valve downstream of the ball valve. Maximum permissible differential pressure over the ball valve: see 80 °C curve in the above diagram.

Operating pressure and operating temperature

Liquids



Operating pressure and medium temperature per ISO 7005.
(Observe all local and currently applicable laws.)

Type				DN	k _{vs} [m ³ /h]	S _v
Control ball valve 2-port		Control ball valve 3-port				
Product no.	Stock no.	Product no.	Stock no.			
VAI61.15-0.25	S55230-V220	-	-	15	0.25	> 500
VAI61.15-0.4	S55230-V221	-	-		0.4	
VAI61.15-0.63	S55230-V222	-	-		0.63	
VAI61.15-1	BPZ:VAI61.15-1	-	-		1.0	
VAI61.15-1.6	BPZ:VAI61.15-1.6	VBI61.15-1.6	BPZ:VBI61.15-1.6		1.6	
VAI61.15-2.5	BPZ:VAI61.15-2.5	VBI61.15-2.5	BPZ:VBI61.15-2.5		2.5	
VAI61.15-4	BPZ:VAI61.15-4	VBI61.15-4	BPZ:VBI61.15-4		4.0	
VAI61.15-6.3	BPZ:VAI61.15-6.3	VBI61.15-6.3	BPZ:VBI61.15-6.3		6.3	
VAI61.15-10	BPZ:VAI61.15-10	-	-		10	
VAI61.20-4	BPZ:VAI61.20-4	VBI61.20-4	BPZ:VBI61.20-4	20	4	
VAI61.20-6.3	BPZ:VAI61.20-6.3	VBI61.20-6.3	BPZ:VBI61.20-6.3		6.3	
VAI61.20-10	BPZ:VAI61.20-10	-	-		10	
VAI61.25-6.3	BPZ:VAI61.25-6.3	-	-	25	6.3	
VAI61.25-10	BPZ:VAI61.25-10	VBI61.25-10	BPZ:VBI61.25-10		10	
VAI61.25-16	BPZ:VAI61.25-16	-	-		16	
VAI61.32-10	BPZ:VAI61.32-10	-	-	32	10	
VAI61.32-16	BPZ:VAI61.32-16	VBI61.32-16	BPZ:VBI61.32-16		16	
VAI61.32-25	BPZ:VAI61.32-25	-	-		25	
VAI61.40-16	BPZ:VAI61.40-16	-	-	40	16	
VAI61.40-25	BPZ:VAI61.40-25	VBI61.40-25	BPZ:VBI61.40-25		25	
VAI61.40-40	BPZ:VAI61.40-40	-	-		40	
VAI61.50-25	BPZ:VAI61.50-25	-	-	50	25	
VAI61.50-40	BPZ:VAI61.50-40	VBI61.50-40	BPZ:VBI61.50-40		40	
VAI61.50-63	BPZ:VAI61.50-63	VBI61.50-63	BPZ:VBI61.50-63		63	

DN = Nominal size

k_{vs} = Flow nominal value for chilled water (5...30 °C) through a fully opened 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 characteristic curve tolerances can be maintained at a differential pressure of 100 kPa (1 bar)

Ordering (example)

Product no.	Stock no.	Order text	Quantity
VAI61.25-16	BPZ:VAI61.25-16	2-port ball valve, internally threaded	2
GLB161.9E	S55499-D277	Electromotive rotary actuator for ball valve, NSR	2

Delivery

Ball valves, rotary actuators, and mounting kits are delivered unassembled an in individual packaging.

Accessories

Temperature adapter ALJ100

⚠ DANGER	
	<p>Hazard to life when combining ALJ100 with GMA.. and ASK77.2!</p> <p>Combining the temperature adapter ALJ100 with the ASK77.2 mounting kit and a GMA.. rotary actuator operated at AC 230 V ~ or a GMA.. rotary actuator with auxiliary switch voltage AC 230 V ~ can result in life-threatening electric shocks if used improperly.</p> <ul style="list-style-type: none">• Never combine rotary actuator GMA.. <i>operated at voltage of AC 230 V ~</i> with temperature adapter ALJ100.• Never combine rotary actuator GMA.. <i>with auxiliary switch voltage AC 230 V ~</i> with temperature adapter ALJ100.

Product no.	Stock no.	Description
ALJ100	S55846-Z115	Temperature adapter for ball valves

Equipment combinations

Type	Rotary actuators													
	GQD..9A		GSD161.9A		GDB..9E..		GMA..9E..		GLD161.9E..		GLB..9E..		GDD161.9E	
	Δp_{max}	Δp_s												
Ball valve	[kPa]													
VAI61.15..	350	1400	350	1400	350	1400	350	1400	350	1400	350	1400	350	1400
VAI61.20..														
VAI61.25..														
VAI61.32..	-	-	-	-	-	-	-	-	350	1000	350	1000	350	1000
VAI61.40..														
VAI61.50..														
VAI61.50..														
VBI61.15..	350	-	350	-	350	-	350	-	350	-	350	-	350	-
VBI61.20..														
VBI61.25-10														
VBI61.32-16	-	-	-	-	-	-	350	-	350	-	350	-	-	-
VBI61.40-25														
VBI61.50..														
VBI61.50..														

Δp_{max} = Maximum permissible differential pressure over the ball valve control path, valid for the entire positioning range of the ball valve/rotary actuator unit.

If low noise operation is desired, we recommend a maximum differential pressure of 200 kPa.

Δp_s = Maximum permissible differential pressure (closing pressure) at which the ball valve/rotary actuator unit securely closes against the pressure.

Overview of rotary actuators for ball valves

Type ¹⁾		Operating voltage	Positioning		Spring return		Data sheet
Product no.	Stock no.		Signal	Time	Function	Time	
GQD131.9A ²⁾	BPZ:GQD131.9A	AC 24 V / DC 24...48 V	3-position	30/15 s ³⁾	Yes	15 s	N4659
GQD161.9A ²⁾	BPZ:GQD161.9A		DC 0...10 V				
GSD161.9A ²⁾	S55499-D232		AC 100...240 V	Open-close or 3-position	150 s	—	A6V10636150
GDB141.9E ²⁾	S55499-D200			DC 0/2...10 V			
GDB341.9E ²⁾	S55499-D201	Modbus RTU					
GDB161.9E ²⁾	S55499-D275	AC 24 V / DC 24...48 V	DC 0/2...10 V	90/15 s ³⁾	Yes	15 s	N4658
GDB161.9E/MO ²⁾	S55499-D682	AC/DC 24 V	Modbus RTU				
GMA131.9E	BPZ:GMA131.9E	AC 24 V / DC 24...48 V	3-position	30 s	—	A6V11171770	
GMA161.9E	BPZ:GMA161.9E		DC 0...10 V				
GMA161.9E/MO	S55499-D683	AC/DC 24 V	Modbus RTU				
GLD161.9E	S55499-D278	AC 24 V / DC 24...48 V	DC 0/2...10 V	150 s	—	A6V10636203	
GLD161.9E/MO	S55499-D695	AC/DC 24 V	Modbus RTU				
GLB141.9E	S55499-D204	AC 24 V / DC 24...48 V	Open-close or 3-position	150/120 s	—	A6V10725318	
GLB341.9E	S55499-D205	AC 100...240 V	0/2...10 V				
GLB161.9E	S55499-D277	AC 24 V / DC 24...48 V	Modbus RTU				
GLB161.9E/MO	S55499-D681	AC/DC 24 V	Modbus RTU				
GDB111.9E/KN ²⁾	S55499-D203	AC 24 V	KNX-TP	150/120 s	—	A6V10881143	
GLB111.9E/KN	S55499-D207		Modbus RTU				
GDB111.9E/MO ²⁾	S55499-D202		AC 24 V / DC 24...48 V	DC 0/2...10 V	30 s	—	A6V12725064
GLB111.9E/MO	S55499-D206			DC 0/2...10 V			
GDD161.9E ²⁾	S55499-D736	AC 24 V / DC 24...48 V	DC 0/2...10 V	30 s	—	A6V12725064	

¹⁾ Actuator type: electromotive

²⁾ Actuator only approved for medium temperatures > 0 °C

³⁾ Open/close

Applications with auxiliary functions

A standard actuator with corresponding functionality can be used if a ball valve application requires a rotary actuator with auxiliary functions (e.g. auxiliary switch or potentiometer). In such a case, an ASK77.. mounting kit is required **in addition** to the rotary actuator.

Follow the mounting instructions when mounting.

Rotary actuator	Options	Order text: Mounting kit
GMA..1E (with spring return)	Potentiometer, auxiliary switch	ASK77.2 Accessory Kit BV for GMAxx1.9E
GDB..1E / GLB..1E (without spring return)		ASK77.3 Accessory Kit BV for GxBxx1.9E
GQD..1A (with spring return)	Auxiliary switch	ASK77.5 Accessory Kit BV for GxDxx1.9A
GSD..1A ¹⁾ (without spring return)		



¹⁾ GSD141.1A (S55499-D281) and GSD341.1A (S55499-D282) are not compatible with ball valves.

Product documentation

Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address:

<http://siemens.com/bt/download>

Notes

Safety

DANGER



There is a risk to operating personnel and device when working on the unit

Failure to comply with these safety notes can result in personal injury and damage to property from pipe pressure, electrical voltage, or device in operation.

▷ Note the following when servicing a ball valve/rotary actuator:

- Switch off both pump and operating voltage.
- Close shutoff valves.
- Release pressure in the pipes and allow them to cool down completely.
- Disconnect electrical connections from the terminals as needed.
- The rotary actuator must be properly installed prior to recommissioning the ball valve.

CAUTION



National safety regulations

Failure to comply with national safety regulations may result in personal injury and property damage.

- Observe national provisions and comply with the appropriate safety regulations.

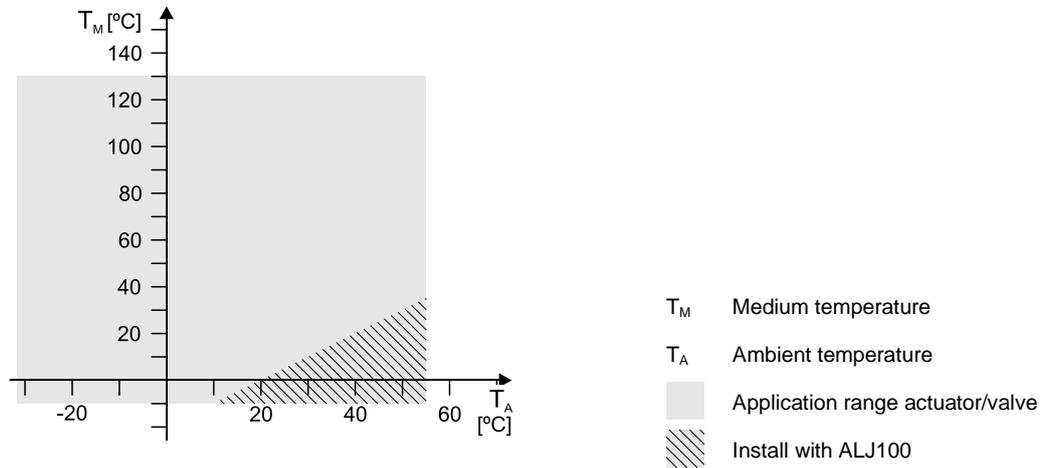
Engineering

We recommend installing the ball valve in the return flow, since temperatures are lower there in heating plants, which increases the lifespan of the sealing gland on the stem.

Ensure there is no cavitation (see "Cavitation [▶ 4]").

A filter must be installed upstream of the ball valve to increase functional safety.

We recommend using temperature adapter ALJ100 in locations exposed to condensation in order to protect the actuator. At medium temperatures $\leq 0\text{ °C}$, lubricate the adapter shaft with silicon grease.



Use GDB.., GSD.., GQD.. and GDD.. actuators only at medium temperatures $> 0\text{ °C}$.

Permissible media

Using the ball valve in combination with potassium formate-based media, such as HyCool or Temper, can result in leakage over the stem to the outside. The reason is the high creep capability at low surface tension of media based on potassium formate.

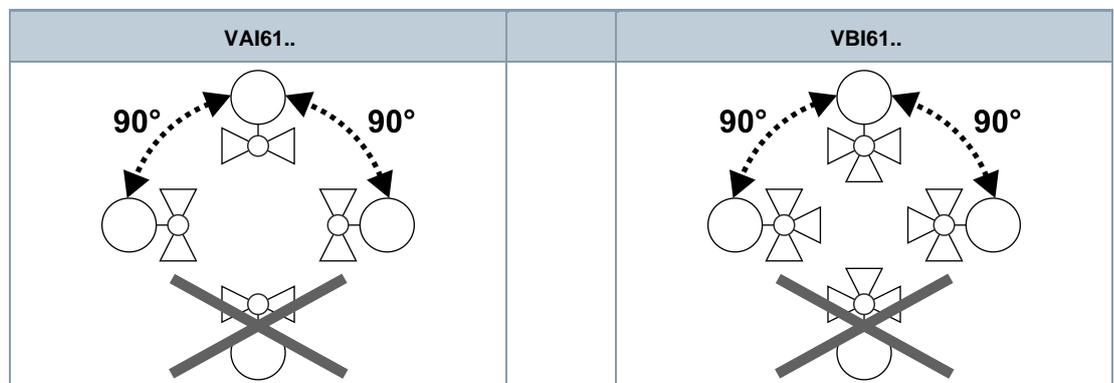
Siemens rejects any and all liability for damages or consequential damages resulting from the use of this media in combination with our ball valves.

Mounting

The ball valve and rotary actuator are easy to assemble; it can be done on site, no special tools or settings are required.

The ball valves VAI61.. / VBI61.. are supplied with the mounting instructions M4211 (7431906470).

Mounting position



Pipe connection

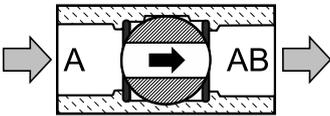
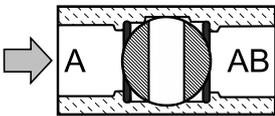
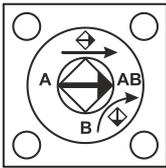
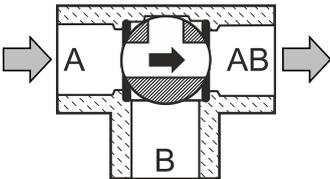
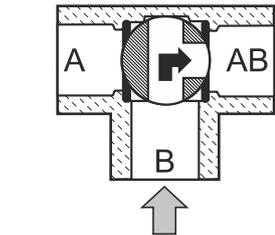
Avoid leakage:

- Install fittings as per ISO 7-1.
 - Ball valves (internal threading) = "Rp"
 - Piping (external threading) = "R"
- Do not use too much hemp or PTFE tape.
- Do not tighten pipe thread to the very end into the ball valve thread.
- Place pliers/wrench on the ball valve union nut closer to the pipe to be tightened or loosened.

Flow direction

Make sure that the valve is mounted in the proper flow direction. A symbol is applied to the ball valve body:

- VAI61...: 
- VBI61...: 

Ball valve	Laser marking	Position on delivery	90° turned (clockwise)
VAI61.. Control ball valve 2-port	-		
		A – AB = 100 %	A – AB = 0 %
VBI61.. Control ball valve 3-port			
		A – AB = 100 % B – AB = 0 %	A – AB = 0 % B – AB = 100 %

Maintenance

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

Disposal

Do not dispose of the device as part of domestic waste.

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

Warranty

The application-specific technical data is guaranteed only in combination with the Siemens products listed in the 'Device combinations' section. If third-party products are used, any guarantee provided by Siemens will be invalidated.

Technical data

Functional data		VAI61..	VBI61..
PN class		PN 40 per ISO 7268	
Operating pressure		Per ISO 7005 within the permissible media temperature range as per "Operating pressure and operating temperature [► 5]"	
Ball valve characteristic curve 0...100 %	Through-port	Equal percentage: $n_{gl} = 3.9$ per VDI / VDE 2173	
	Bypass	—	linear
Leakage	Through-port	"Water proof" per EN 60534-4 L/1, improved class 5	"Water proof" per EN 60534-4 L/1, improved class 4
	Bypass	—	< 1 %
Permissible media		Chilled water, cooling water, low temperature hot water, hot water, water with antifreeze.	
	Recomm.	Water treatment per VDI 2035	
		Note: Cf. "Permissible media [► 11]"	
Medium temperature		-10...120 °C ¹⁾	
Rangeability S_V		> 500	
Rotational angle		90°	

Materials

Ball valve body	Dezincification resistant hot-pressed brass (DZR ²⁾), UNS C35330
Marble	Dezincification resistant hot-pressed brass (DZR ²⁾), UNS C35330, chrome plated
Stem	Dezincification resistant hot-pressed brass (DZR ²⁾), UNS C35330
Sealing gland	EPDM O-rings

Dimensions / Weight

Dimensions	See "Dimensions [► 14]"
Weight	
Internally threaded connections	Rp per ISO 7-1

Standards, directives and approvals

Pressure Equipment Directive		DGR 2014/68/EU
Pressure accessories	Range	Article 1, para. 1
	Definition	Article 2, para. 5
	Fluid group 2	Without CE certification as per article 4, para. 3 (good engineering practice) ³⁾
EAC compliance		Eurasian compliance

Environmental compatibility

The product environmental declaration CE14211en ⁴⁾ contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

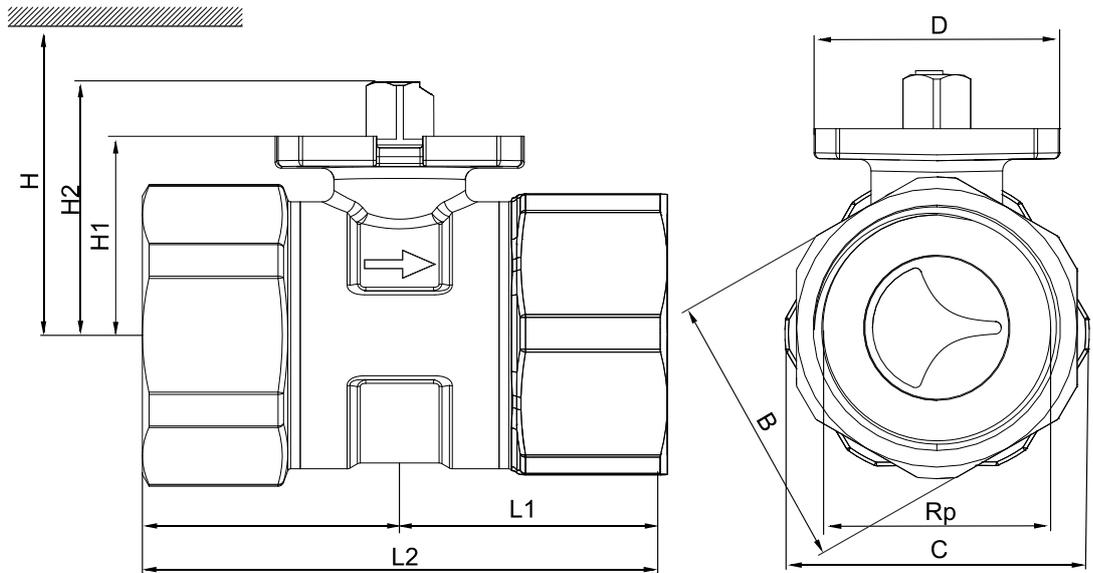
¹⁾ Only GLB.., GLD.. and GMA.. actuators are approved for use with medium temperatures ≤ 0 °C.

²⁾ Dezincification resistant

³⁾ Fittings where the product of PS x DN equals < 1000, do not require special testing and cannot have CE labeling.

⁴⁾ Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address: <http://siemens.com/bt/download>.

VAI61..



DN = Nominal size

H = Total height of actuator plus minimum mounting distance to wall or ceiling, for mounting, connection, operation, maintenance, etc.

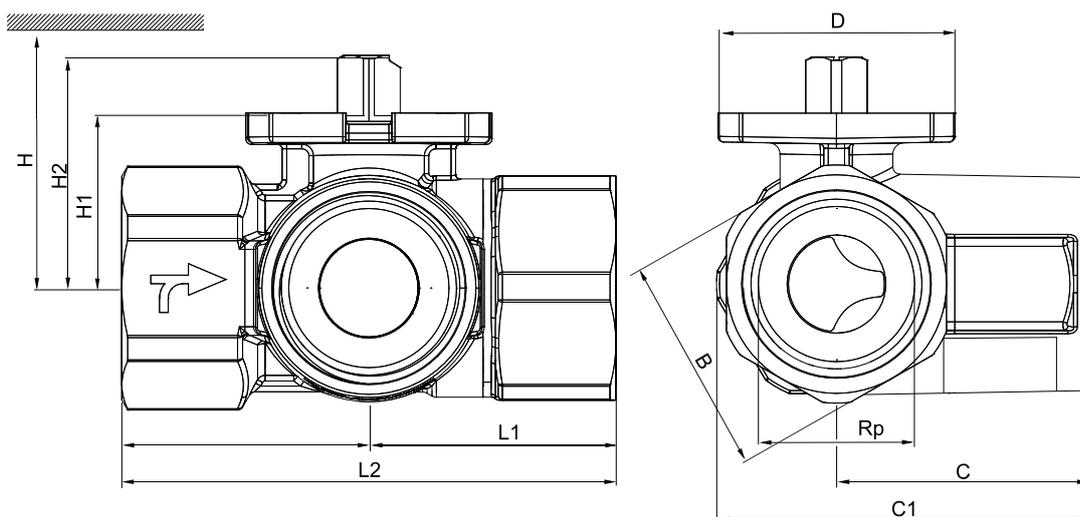
H1 = Dimension from the pipe to the center to install actuator (upper edge)

Type	DN	B	C	D	Rp	L1	L2	H1	H2					
		[mm]			[inch]	[mm]								
VAI61.15-0.25 / VAI61.15-0.4 / VAI61.15-0.63	15	26	31 ¹⁾	42	Rp ½	30.8	61.6	24.2	33.7					
VAI61.15-1 / VAI61.15-1.6 VAI61.15-2.5 VAI61.15-4 VAI61.15-6.3 VAI61.15-10								27.6	37.6					
VAI61.20..								31	34	Rp ¾	33.7	67.4	30.5	40.5
VAI61.25..								39	42.5	Rp 1	38.4	76.8	34.3	44.3
VAI61.32..								48	52	Rp 1¼	44	88	39.8	49.8
VAI61.40..								55	61	Rp 1½	50.9	101.8	52.8	62.8
VAI61.50..								67	74	Rp 2	58.1	116.2		

¹⁾ Ball valve body protrudes above threaded connection

Type	H		Weight
	GQD..9A, GSD161.9A, GDB..9E.., GDD161.9E	GMA..9E.., GLD161.9E.., GLB..9E..	
	[mm]		[kg]
VAI61.15..	> 300	> 300	0.3
VAI61.20..			0.35
VAI61.25..	> 320		0.5
VAI61.32..		> 320	0.7
VAI61.40..	—		1.1
VAI61.50..		> 335	1.8

VBI61..



DN = Nominal size

H = Total height of actuator plus minimum mounting distance to wall or ceiling, for mounting, connection, operation, maintenance, etc.

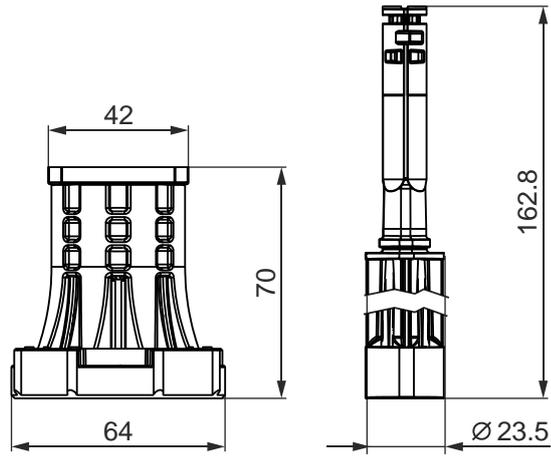
H1 = Dimension from the pipe to the center to install actuator (upper edge)

Type	DN	B	C	C1	D	Rp	L1	L2	H1	H2
		[mm]				[inch]	[mm]			
VBI61.15..	15	26	34	48.5 ¹⁾	42	Rp ½	33.5	67	24.2	33.7
VBI61.15-6.3				49.5 ¹⁾						
VBI61.20..	20	31	36.7	52		Rp ¾	36	72	30.5	40.5
VBI61.25..	25	39	44.8	64.5		Rp 1	42.5	85	34.3	44.3
VBI61.32..	32	48	52.6	76.5		Rp 1¼	49.5	99	39.8	49.8
VBI61.40..	40	55	57.1	84.5		Rp 1½	55	110	52.8	62.8
VBI61.50..	50	67	68.9	102.5		Rp 2	65.5	131		

¹⁾ Ball valve body protrudes above threaded connection

Type	H		Weight
	GQD..9A, GSD161.9A, GDB..9E.., GDD161.9E	GMA..9E.., GLD161.9E.., GLB..9E..	
	[mm]		[kg]
VBI61.15..	> 300	> 300	0.29
VBI61.15-6.3			0.305
VBI61.20..			0.375
VBI61.25..	> 320	> 320	0.605
VBI61.32..			0.95
VBI61.40..	—	> 335	1.365
VBI61.50..			2.215

Temperature adapter (optional)



Dimensions in mm

Revision numbers

Type		Valid from rev. no.	Type		Valid from rev. no.
Control ball valve 2-port			Control ball valve 3-port		
Product no.	Stock no.		Product no.	Stock no.	
VAI61.15-0.25	S55230-V220	..A	-	-	-
VAI61.15-0.4	S55230-V221	..A	-	-	-
VAI61.15-0.63	S55230-V222	..A	-	-	-
VAI61.15-1	BPZ:VAI61.15-1	..A	-	-	-
VAI61.15-1.6	BPZ:VAI61.15-1.6	..A	VBI61.15-1.6	BPZ:VBI61.15-1.6	..A
VAI61.15-2.5	BPZ:VAI61.15-2.5	..A	VBI61.15-2.5	BPZ:VBI61.15-2.5	..A
VAI61.15-4	BPZ:VAI61.15-4	..A	VBI61.15-4	BPZ:VBI61.15-4	..A
VAI61.15-6.3	BPZ:VAI61.15-6.3	..A	VBI61.15-6.3	BPZ:VBI61.15-6.3	..A
VAI61.15-10	BPZ:VAI61.15-10	..A	-	-	-
VAI61.20-4	BPZ:VAI61.20-4	..A	VBI61.20-4	BPZ:VBI61.20-4	..A
VAI61.20-6.3	BPZ:VAI61.20-6.3	..A	VBI61.20-6.3	BPZ:VBI61.20-6.3	..A
VAI61.20-10	BPZ:VAI61.20-10	..A	-	-	-
VAI61.25-6.3	BPZ:VAI61.25-6.3	..A	-	-	-
VAI61.25-10	BPZ:VAI61.25-10	..A	VBI61.25-10	BPZ:VBI61.25-10	..A
VAI61.25-16	BPZ:VAI61.25-16	..A	-	-	-
VAI61.32-10	BPZ:VAI61.32-10	..A	-	-	-
VAI61.32-16	BPZ:VAI61.32-16	..A	VBI61.32-16	BPZ:VBI61.32-16	..A
VAI61.32-25	BPZ:VAI61.32-25	..A	-	-	-
VAI61.40-16	BPZ:VAI61.40-16	..A	-	-	-
VAI61.40-25	BPZ:VAI61.40-25	..A	VBI61.40-25-	BPZ:VBI61.40-25	..A
VAI61.40-40	BPZ:VAI61.40-40	..A	-	-	-
VAI61.50-25	BPZ:VAI61.50-25	..A	-	-	-
VAI61.50-40	BPZ:VAI61.50-40	..A	VBI61.50-40	BPZ:VBI61.50-40	..A
VAI61.50-63	BPZ:VAI61.50-63	..A	VBI61.50-63	BPZ:VBI61.50-63	..A