

ACVATIX™

## 2-port shutoff valves and 3-port changeover ball valves, PN 40, with internally threaded connection

VAI60.., VBI60..L, VBI60..T



VAI60..



VBI60..L



VBI60..T

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

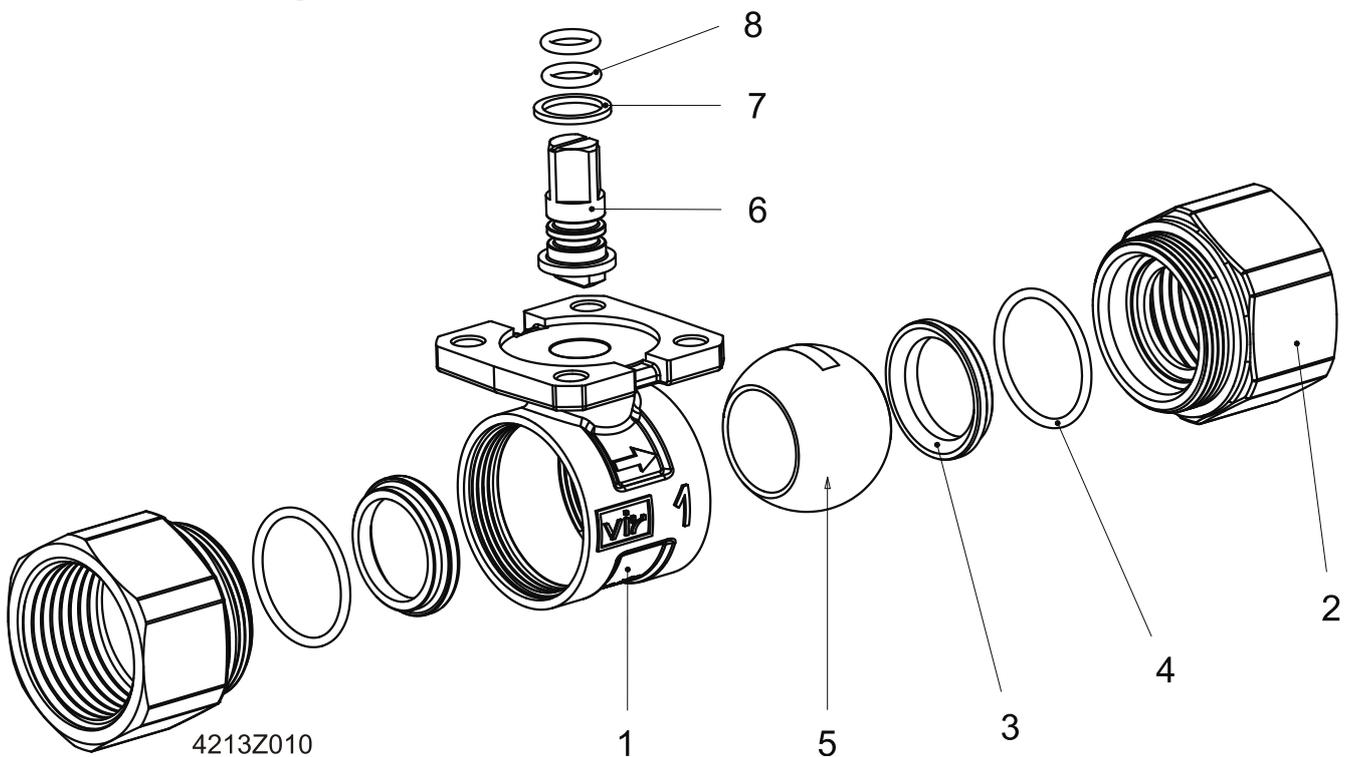
- Ball valve body made of brass, UNS C35330 (DZR)
- DN 15...50
- $k_{vs}$  5...96 m<sup>3</sup>/h
- Connections with internal threading Rp per ISO 7-1
- Rotational angle 90°
- Can be used with electromotorized rotary actuators GQD..9A, GMA..9E with spring return and GSD..9A, GDB..9E, GLB..9E without spring return
- For applications with auxiliary functions (e.g. auxiliary switches, potentiometers, standard rotary actuators from the DAC product range can also be combined)

## 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.
- **Long 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



1 Housing

3 Seat

5 Marble

7 Slide clutch

2 Internally threaded connection

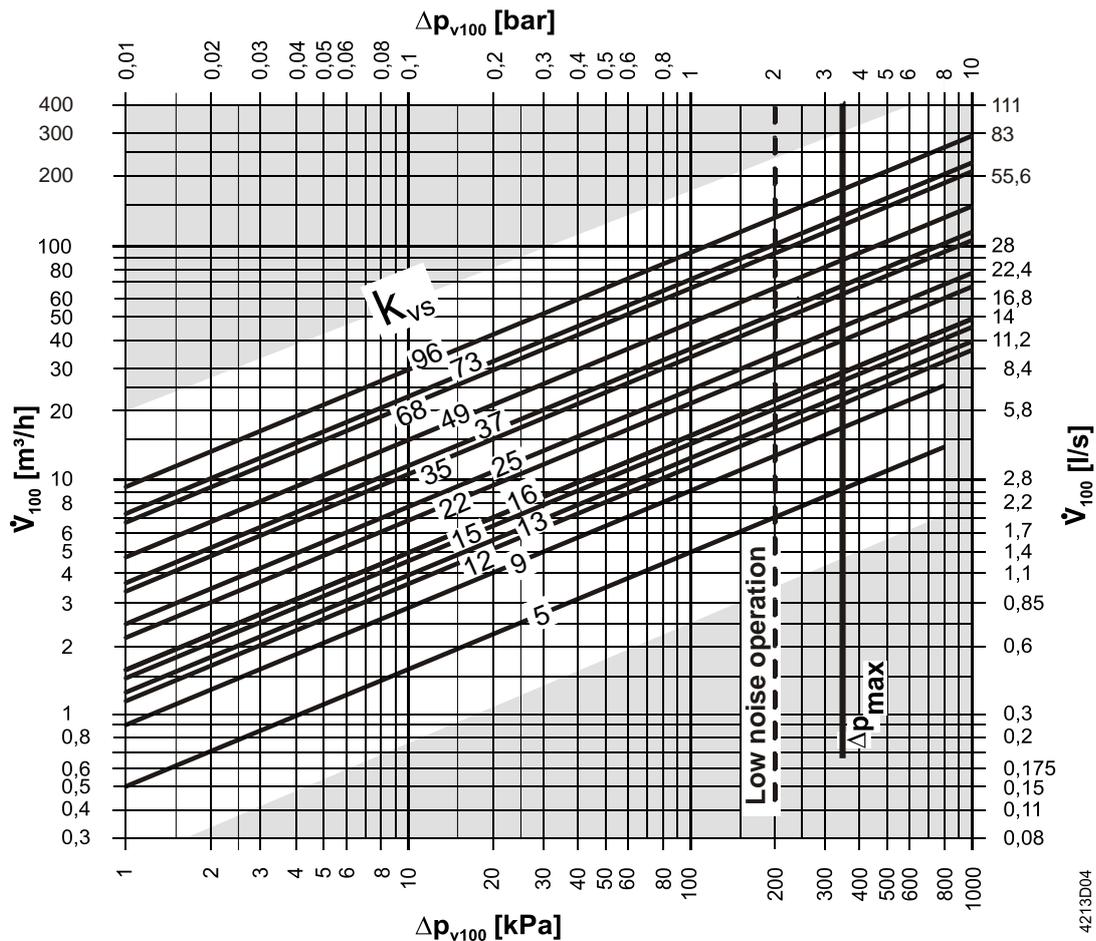
4 O-ring seal

6 Stem, squared

8 O-ring seal

## Sizing

Flow diagram:



---  $\Delta p_{max}$  for VAI60.. and VBI60.., for details, see table on equipment combinations

$\Delta p_{max}$  = Maximum permissible differential pressure over the ball valve, valid for the entire positioning range of the ball valve rotary actuator unit; if low noise operation is desired, we recommend a maximum permissible differential pressure of 200 kPa

$\Delta p_{v100}$  = Differential pressure over the fully opened ball valve and over the control path at a volume flow  $V_{100}$

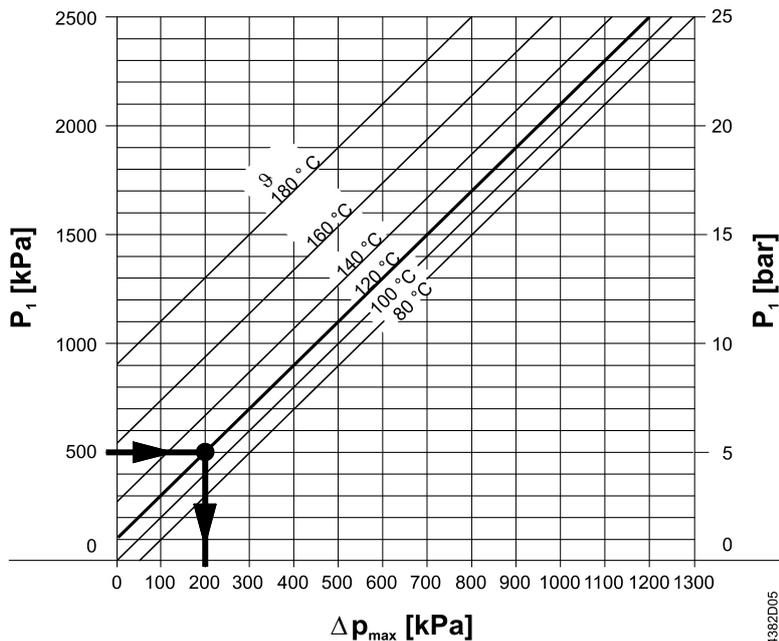
$V_{100}$  = Volume flow through the fully opened ball valve

100 kPa = 1 bar  $\approx$  10 mWS

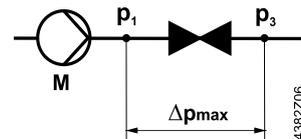
1  $m^3/h$  = 0.278 l/s water at 20 °C

### 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.



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



Example with hot water:

Pressure  $p_1$  at ball valve inlet: 500 kPa (5 bar)

Water temperature: 120 °C

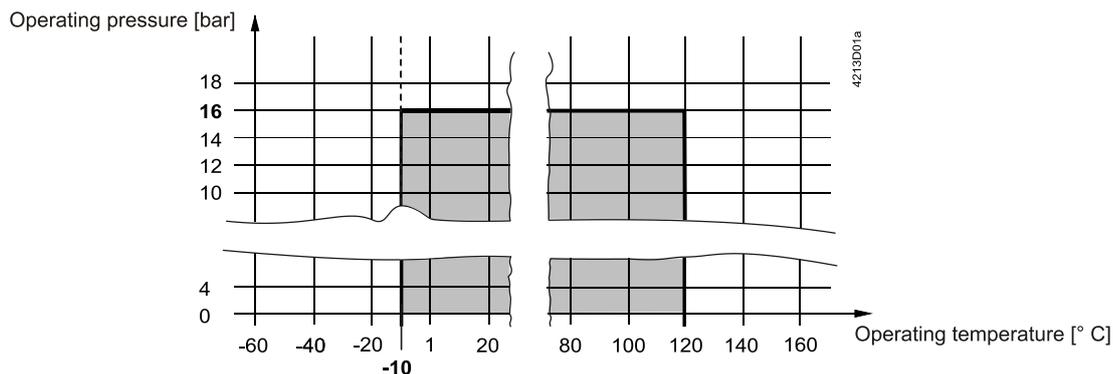
The above diagram clearly indicates that the maximum permissible differential pressure is  $\Delta p_{max} \rightarrow 200$  kPa (2 bar) at a nearly closed ball valve.

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 applicable laws).

### Type summary

Type						DN	k <sub>vs</sub> [m <sup>3</sup> /h]
Shutoff ball valve 2-port		3-port changeover valve (L)		3-port changeover valve (T)			
Product no.	Stock number	Product no.	Stock number	Product no.	Stock number		
–	–	VBI60.15-5L	BPZ:VBI60.15-5L	–	–	15	5
–	–	–	–	VBI60.15-12T	BPZ:VBI60.15-12T		12 <sup>1)</sup>
VAI60.15-15	BPZ:VAI60.15-15	–	–	–	–		15
–	–	VBI60.20-9L	BPZ:VBI60.20-9L	–	–	20	9
–	–	–	–	VBI60.20-16T	BPZ:VBI60.20-16T		16 <sup>1)</sup>
VAI60.20-22	BPZ:VAI60.20-22	–	–	–	–		22
–	–	VBI60.25-9L	BPZ:VBI60.25-9L	–	–	25	9
–	–	–	–	VBI60.25-16T	BPZ:VBI60.25-16T		16 <sup>1)</sup>
VAI60.25-22	BPZ:VAI60.25-22	–	–	–	–		22
–	–	VBI60.32-13L	BPZ:VBI60.32-13L	–	–	32	13
–	–	–	–	VBI60.32-25T	BPZ:VBI60.32-25T		25 <sup>1)</sup>
VAI60.32-35	BPZ:VAI60.32-35	–	–	–	–		35
–	–	VBI60.40-25L	BPZ:VBI60.40-25L	–	–	40	25
–	–	–	–	VBI60.40-49T	BPZ:VBI60.40-49T		49 <sup>1)</sup>
VAI60.40-68	BPZ:VAI60.40-68	–	–	–	–		68
–	–	VBI60.50-37L	BPZ:VBI60.50-37L	–	–	50	37
–	–	–	–	VBI60.50-73T	BPZ:VBI60.50-73T		73 <sup>1)</sup>
VAI60.50-96	BPZ:VAI60.50-96	–	–	–	–		96

<sup>1)</sup> k<sub>vs</sub> Bypass B > 50 % of k<sub>vs</sub> A – AB

DN = Nominal size

k<sub>vs</sub> = Flow nominal value for chilled water (5...30 °C) through a fully opened ball valve at a differential pressure of 100 kPa (1 bar)

Temperature adapter ALJ100

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

Type	Stock number	Description
ALJ100	S55846-Z115	Temperature adapter for ball valves

Equipment combinations

Type	Rotary actuators									
	GSD..9A		GQD..9A		GDB..9E..		GMA..9E..		GLB..9E..	
	$\Delta p_{max}$	$\Delta p_s$								
<b>Ball valve</b>	<b>[kPa]</b>									
VAI60.15-15	350	1400	350	1400	350	1400	350	1400	350	1400
VAI60.20-22										
VAI60.25-22										
VAI60.32-35	-	-	-	-	-	-	-	-	800	800
VAI60.40-68										
VAI60.50-96										
VBI60.15-5L	350	-	350	-	350	-	350	-	350	-
VBI60.20-9L										
VBI60.25-9L										
VBI60.32-13L	-	-	-	-	-	-	350	-	350	-
VBI60.40-25L										
VBI60.50-37L										
VBI60.15-12T	350	-	350	-	350	-	350	-	350	-
VBI60.20-16T										
VBI60.25-16T										
VBI60.32-25T	-	-	-	-	-	-	350	-	350	-
VBI60.40-49T										
VBI60.50-73T										

$\Delta p_{max}$  = Maximum permissible differential pressure over the valve ball control path, valid for the entire positioning range of the ball valve rotary actuator unit; if low noise operation is desired, we recommend a differential pressure of 200 kPa

$\Delta p_s$  = 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 <sup>1)</sup>		Operating voltage	Positioning		Spring return		Data sheet
Product no.	Stock number		Signal	Time	Function	Time	
GSD141.9A <sup>2)</sup>	BPZ:GSD141.9A	AC/DC 24 V	Open-close <sup>3)</sup>	30 s	-	-	N4655
GSD341.9A <sup>2)</sup>	BPZ:GSD341.9A	AC 230 V					
GQD121.9A <sup>2)</sup>	BPZ:GQD121.9A	AC/DC 24 V	2-position	30/15 s <sup>4)</sup>	Yes	15 s	N4659
GQD321.9A <sup>2)</sup>	BPZ:GQD321.9A	AC 230 V					
GMA121.9E	BPZ:GMA121.9E	AC/DC 24 V					
GMA321.9E	BPZ:GMA321.9E	AC 230 V					
GMA131.9E	BPZ:GMA131.9E	AC/DC 24 V	3-position				
GLB141.9E	S55499-D204	AC/DC 24 V	2 or 3 point	150 s	-	-	A6V10636203
GLB341.9E	S55499-D205	AC 100...240 V					
GDB141.9E <sup>2)</sup>	S55499-D200	AC/DC 24 V	2 or 3 point				
GDB341.9E <sup>2)</sup>	S55499-D201	AC 100...240 V					

<sup>1)</sup> Actuator type: Electromotive

<sup>2)</sup> Actuator only approved for medium temperature > 0 °C

<sup>3)</sup> 2-wire SPDT (single pole double throw)

<sup>4)</sup> Open/close

### Ordering

Please indicate material, article type, order text, and quantity; example:

Material	Article type	Order text	Quantity
VAI60.25-22	VAI60.25-22	Open/close ball valve internally threaded, 2-port	2
GLB131.9E	GLB131.9E	Actuator for ball valve, NSR	2

### Delivery

Ball valves, rotary actuators, and mounting kits are not assembled and are delivered in individual packaging.

### 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 this case, mounting kit ASK77.x 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 GMA..1.9E
GLB..1E (without spring return)		ASK77.3 Accessory Kit BV for GLB..1.9E
GDB..1E (without spring return)		ASK77.3 Accessory Kit BV for GDB..1.9E
GQD..1A (with spring return)	Auxiliary switch	ASK77.5 Accessory Kit BV for GQD..1.9A
GSD..1A <sup>1)</sup> (without spring return)		ASK77.5 Accessory Kit BV for GSD..1.9A

<sup>1)</sup> GSDx4x.1A are not compatible with ball valves.

## Product documentation

Title	Content	Document ID
Mounting instructions Ball valve VAI60.. , VBI60..L, VBI60..T	Mounting instructions	M4213 (74 319 0883 0)
Rotary actuators for ball valves GSD..41.9A	Data sheet: product description	N4655
Rotary actuators for ball valves GQD..9A	Data sheet: product description	N4659
Rotary actuators for ball valves GMA..9E..	Data sheet: product description	N4658
Rotary actuators for ball valves GLB..9E..	Data sheet: product description	A6V10636203
Rotary actuators for ball valves GDB..9E..	Data sheet: product description	A6V10636150
Mounting instructions Mounting kit ASK77.2, ASK77.3	Mounting instructions	M4696 (74 319 0648 0)
Mounting instructions Mounting kit ASK77.5	Mounting instructions	A6V11171911 (A5W00032790)

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

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

## Notes

### Safety

	<p><b>⚠ DANGER</b></p> <p><b>There is a risk to operating personnel and device when working on the unit</b> 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.</p> <p><input type="checkbox"/> Note the following when servicing a ball valve/rotary actuator:</p> <ul style="list-style-type: none"><li>• Switch off both pump and operating voltage.</li><li>• Close shutoff valves.</li><li>• Release pressure in the pipes and allow them to cool down completely.</li><li>• Disconnect electrical connections from the terminals as needed.</li><li>• The rotary actuator must be properly installed prior to recommissioning the ball valve.</li></ul>
---	--

	<p><b>⚠ CAUTION</b></p> <p><b>National safety regulations</b> Failure to comply with national safety regulations may result in personal injury and property damage.</p> <ul style="list-style-type: none"><li>• Observe national provisions and comply with the appropriate safety regulations.</li></ul>
---	---

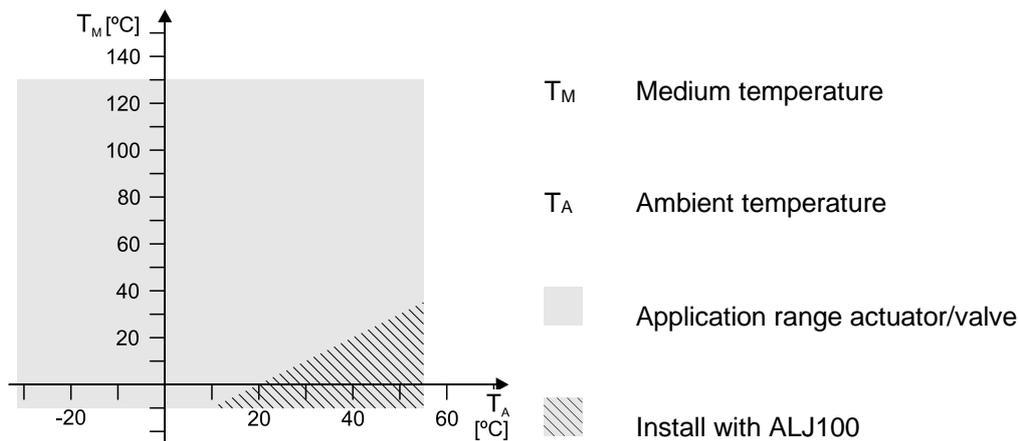
### Engineering

We recommend installing the ball valve with spring return since temperatures are lower on heating plants which increases the lifespan of the sealing gland on the stem.

Ensure there is no cavitation (see Section Technical design [→ 2]).

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 to protect the actuator. Lubricate the adapter axle with silicon grease at medium temperatures  $\leq 0\text{ }^{\circ}\text{C}$ .



Only use GDB.., GDD..,GSD.. and GQD.. actuators at medium temperatures  $> 0\text{ }^{\circ}\text{C}$ .

### Permissible media

Using the ball valve together with potassium formate-based media can result in leakage over the stem to the outside. The reason is the high level of penetration at low surface tension of media based on potassium formate.

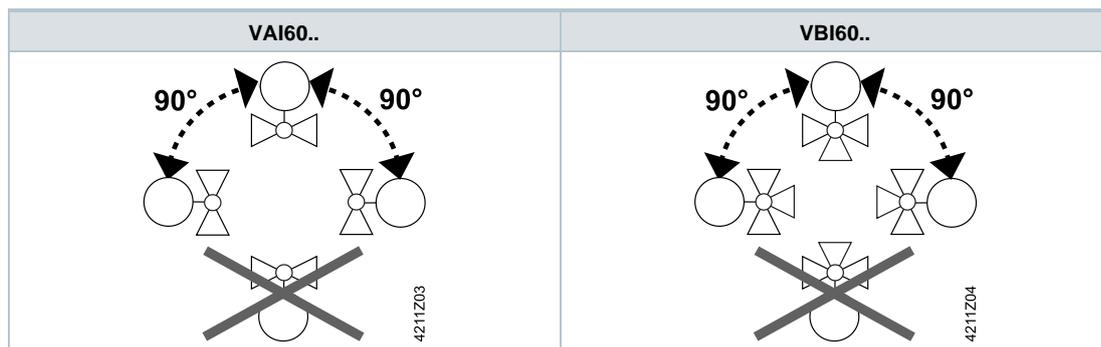
Siemens rejects any and all liability for damages or consequential damages resulting from the use of this media together with our ball valves.

### Mounting

It is easy to assemble the ball valve and rotary actuator; it can be done at the construction site. No special tools or settings required.

Ball valve VAI60.. / VBI60.. is supplied together with mounting instructions M4213 (74°319°0883°0).

#### Mounting position



#### Pipe connection

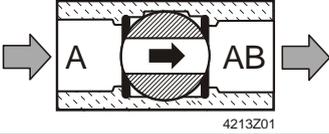
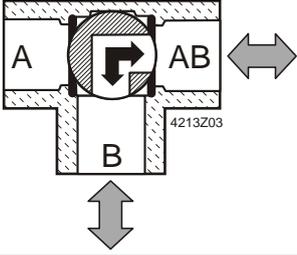
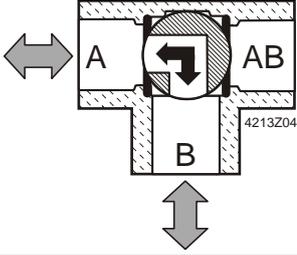
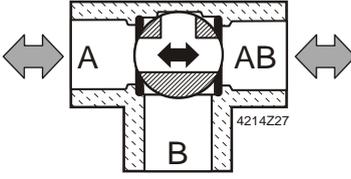
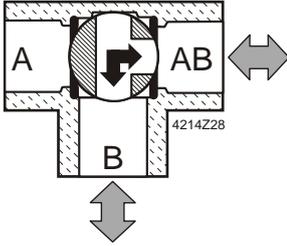
Avoid leakage:

- 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 threading to the very end.
- Place the pliers/wrench on the ball valve union nut that is 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:

VAI60..	VBI60..
	

Ball valve	Laser marking	Position as delivered	90 ° turned (clockwise)
VAI60.. 2-port shutoff ball valve	-	 4213Z01 $A - AB = 100 \%$	 4213Z02 $A - AB = 0 \%$
VBI60..L 3-port changeover ball valve with L shaped	 4213Z03	 4213Z03 $B - AB (AB - B) = 100 \%$	 4213Z04 $A - B (B - A) = 100 \%$
VBI60..T 3-port changeover ball valve with T shaped	 4214Z27	 4214Z27 $A - AB = 100 \%$ $B - AB = 0 \%$	 4214Z28 $A - AB = 0 \%$ $B - AB = 100 \%$

### Maintenance

Ball valves VAI60.. and VBI60.. 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.
- Adhere to all local and currently applicable laws and regulations.

### Warranty

Technical data on specific applications are valid only together with Siemens products listed under "Equipment combinations". Siemens rejects any and all warranties in the event that third-party products are used.

<b>Functional data</b>			
	<b>VAI60..</b>	<b>VBI60..L</b>	<b>VBI60..T</b>
PN class	PN 40 per ISO 7268		
Operating pressure	Per ISO 7005 within the permissible media temperature as per Section Technical design [→ 2]		
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
Leakage A (Flow B-AB) Leakage AB (Flow A-B)	-	Water proof per EN 60534-4 L/1, improved class 4	-
Leakage bypass	-	-	< 1 %
Permissible media	Chilled water, low temperature hot water, hot water, water with antifreeze. Recommendation: Water treatment per VDI 2035 Note: Page 9		
Medium temperature	-10...120 °C <sup>1)</sup>		
Rangeability Sv	> 500		
Rotational angle	90 °		

<b>Materials</b>	
Ball valve body	Dezincification-resistant hot-pressed brass (DZR <sup>2)</sup> ), CW602N
Marble	Dezincification-resistant hot-pressed brass (DZR <sup>2)</sup> ), CW602N, chrome plated
Stem	Dezincification-resistant hot-pressed brass (DZR <sup>2)</sup> ), CW602N
Sealing gland	EPDM-O rings

<b>Dimensions / Weight</b>	
See Dimensions [→ 12]	
Internally threaded connection	Rp per ISO 7-1

<b>Standards, directives and approvals</b>	
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 3, para. 3 (generally applicable engineering practice) <sup>3)</sup>
EAC compliance	Eurasian compliance
Environmental compatibility	Environmental Declaration E1E4213en <sup>4)</sup> contains data on environmental-compatible product design and assessment (RoHS compliance, compositions, packaging, environmental benefits and disposal).

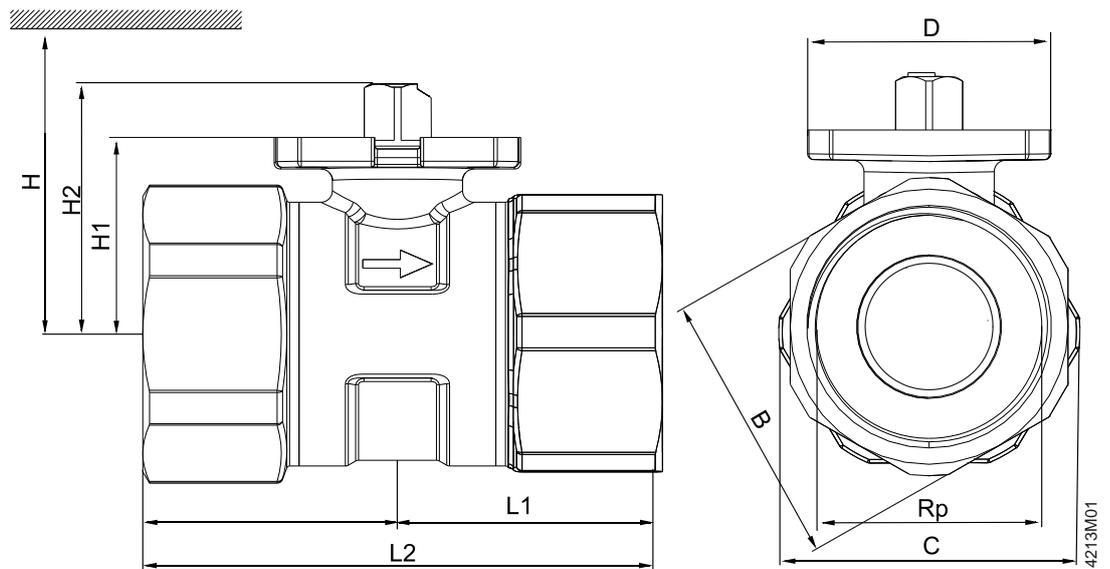
<sup>1)</sup> Only GLB.., GLD.. and GMA.. actuators are approved for medium temperatures ≤ 0 °C.

<sup>2)</sup> Dezincification resistant

<sup>3)</sup> Fittings for a product where PS x DN < 1000, do not require special testing and cannot have CE labeling

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

VAI60..



DN = Nominal size

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

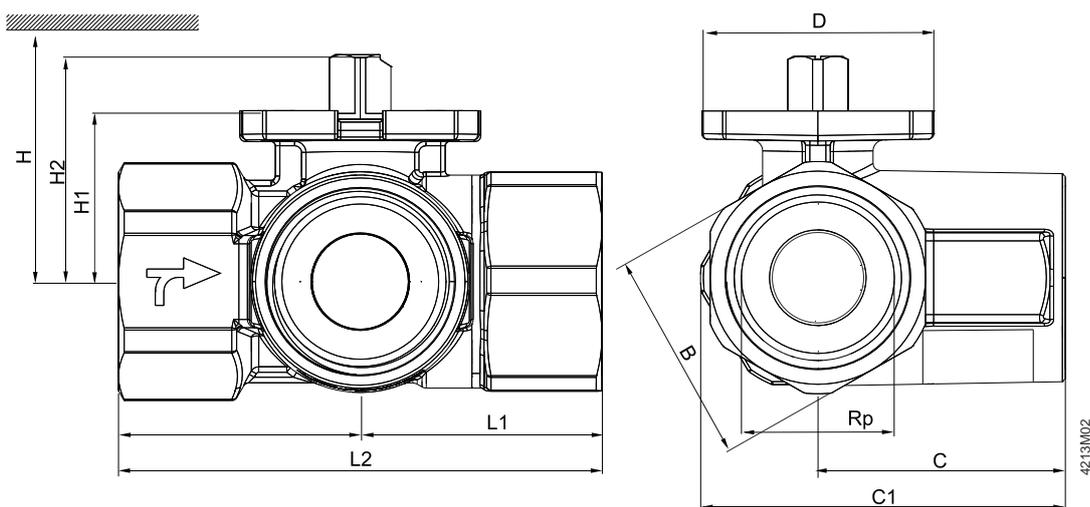
H1 = Dimension from the pipe to the center to install actuator (upper edge)

Type	DN	B	C	D	Rp	L1	L2	H1	H2
VAI60.15-15	15	26	31 <sup>1)</sup>	42	Rp ½	30.8	61.6	27.6	37.6
VAI60.20-22	20	31	38	42	Rp ¾	33,5	67	30.5	40.5
VAI60.25-22	25	39	42.5	42	Rp 1	38.4	76.8	30.5	40.5
VAI60.32-35	32	48	52	42	Rp 1¼	44	88	34.3	44.3
VAI60.40-68	40	55	61	42	Rp 1½	50.9	101.8	39.8	49.8
VAI60.50-96	50	67	74	42	Rp 2	58.1	116.2	52.8	62.8

<sup>1)</sup> Ball valve body extends above threaded connection

Type	H					Weight
	GSD..9A	GQD..9A	GDB..9E..	GMA..9E..	GLB..9E..	
	[mm]					[kg]
VAI60.15-15	> 300	> 300	> 300	> 300	> 300	0.28
VAI60.20-22						0.36
VAI60.25-22	> 320	> 320	> 320	> 320	> 320	0.46
VAI60.32-35	-	-	-			> 320
VAI60.40-68				1.1		
VAI60.50-96				> 335	> 335	

## VBI60..L / VBI60..T



DN = Nominal size

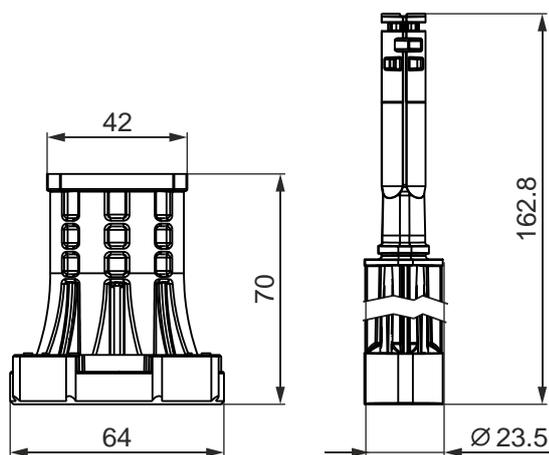
H = Total height of actuator plus minimum mounting distance to wall or ceiling, for mounting, connection, operation, maintenance, etc.

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

Type	DN	B	C	C1	D	Rp	L1	L2	H1	H2
VBI60.15-5L	15	26	34	49.5	42	Rp ½	33.3	66.6	27.6	37.6
VBI60.20-9L	20	39	39.8	61.05	42	Rp ¾	40.2	80.4	30.5	40.5
VBI60.25-9L	25	39	44.8	66.5	42	Rp 1	42.7	85.4	30.5	40.5
VBI60.32-13L	32	48	52.6	78.6	42	Rp 1¼	49.6	99.2	34.3	44.3
VBI60.40-25L	40	55	57.1	87.6	42	Rp 1½	54.8	109.6	39.8	49.8
VBI60.50-37L	50	67	68.9	105.9	42	Rp 2	65.7	131.4	52.8	62.8
VBI60.15-12T	15	26	34	49.5	42	Rp ½	33.3	66.6	27.6	37.6
VBI60.20-16T	20	39	39.8	61.05	42	Rp ¾	40.2	80.4	30.5	40.5
VBI60.25-16T	25	39	44.8	66.5	42	Rp 1	42.7	85.4	30.5	40.5
VBI60.32-25T	32	48	52.6	78.6	42	Rp 1¼	49.6	99.2	34.3	44.3
VBI60.40-49T	40	55	57.1	87.6	42	Rp 1½	54.8	109.6	39.8	49.8
VBI60.50-73T	50	67	68.9	105.9	42	Rp 2	65.7	131.4	52.8	62.8

Type	H					Weight
	GSD..9A	GQD..9A	GDB..9E..	GMA..9E..	GLB..9E..	
	[mm]					[kg]
VBI60.15-5L	> 300	> 300	> 300	> 300	> 300	0.32
VBI60.20-9L						0.73
VBI60.25-9L	> 320	> 320	> 320	> 320	> 320	0.62
VBI60.32-13L						0.97
VBI60.40-25L	-	-	-	> 335	> 335	1.43
VBI60.50-37L						2.36
VBI60.15-12T	> 300	> 300	> 300	> 300	> 300	0.31
VBI60.20-16T						0.74
VBI60.25-16T	> 320	> 320	> 320	> 320	> 320	0.63
VBI60.32-25T						0.69
VBI60.40-49T	-	-	-	> 335	> 335	1.38
VBI60.50-73T						2.26

## Temperature adapter (optional)



## Revision numbers

Type	Valid from rev. no.	Type	Valid from rev. no.	Type	Valid from rev. no.
Shutoff ball valve VAI60..		Changeover ball valve VBI60..L		Changeover ball valve VBI60..T	
2-port		3-port		3-port	
VAI60.15-15	..A	VBI60.15-5L	..A	VBI60.15-12T	..A
VAI60.20-22	..A	VBI60.20-9L	..A	VBI60.20-16T	..A
VAI60.25-22	..A	VBI60.25-9L	..A	VBI60.25-16T	..A
VAI60.32-35	..A	VBI60.32-13L	..A	VBI60.32-25T	..A
VAI60.40-68	..A	VBI60.40-25L	..A	VBI60.40-49T	..A
VAI60.50-96	..A	VBI60.50-37L	..A	VBI60.50-73T	..A

Issued by  
 Siemens Switzerland Ltd  
 Smart Infrastructure  
 Global Headquarters  
 Theilerstrasse 1a  
 CH-6300 Zug  
 Tel. +41 58-724 24 24  
[www.siemens.com/buildingtechnologies](http://www.siemens.com/buildingtechnologies)

© Siemens Switzerland Ltd, 2015  
 Technical specifications and availability subject to change without notice.