

ACVATIX™

## 6-port compact control ball valve

VWG42.10..



### 6-port compact control ball valve, PN 16, with externally threaded connection

- Compact control ball valve body made of hot-pressed brass CW617N
- DN 10
- $K_{vs}$  0.25...1.95 m<sup>3</sup>/h
- Flat sealing, externally threaded connections G..B per ISO 228-1
- Fittings sets ALG13.156B with internal threading per ISO 7-1 and ALG13G156B with internal threading per ISO 228-1
- Fittings set ALN13.156B with external threading per ISO 228-1
- Insulation shell made of cross-linked polyethylene, low-halogen
- Rotational angle 90°
- VWG42.10.. can be combined with:
  - Electromotoric rotary actuators GDB..9../.6 without spring return, including Modbus variants
  - Electromotoric rotary actuators GSD141.9A and GSD341.9A without spring return

## Use

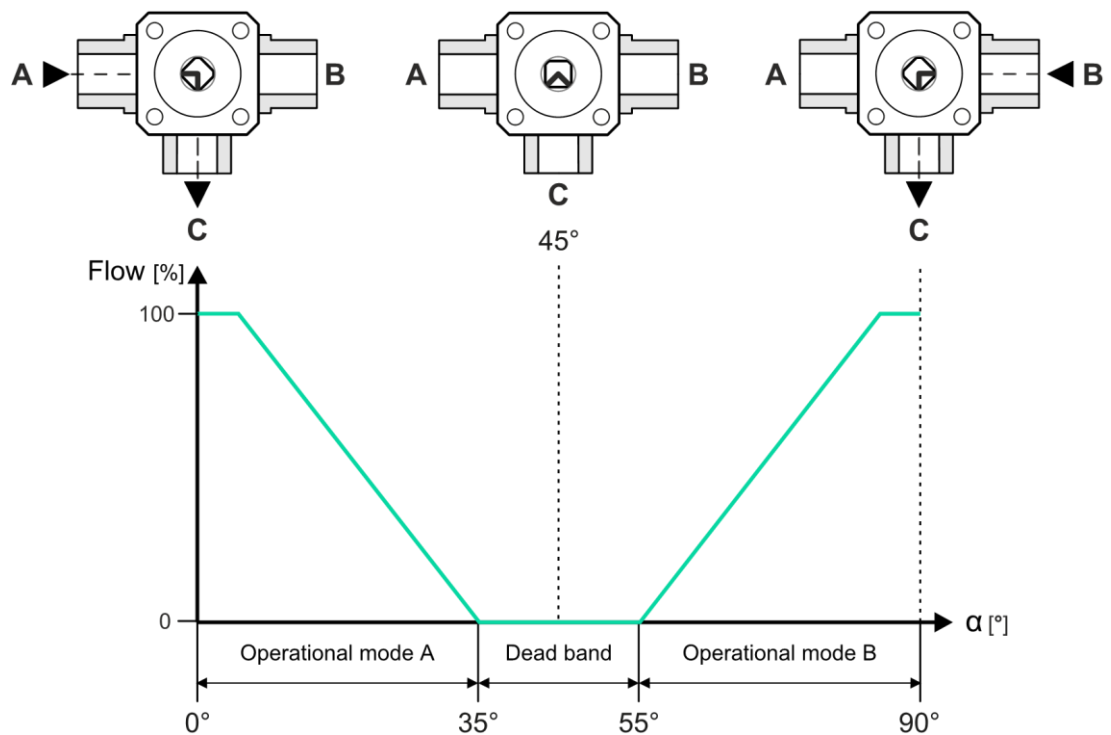
- Used in heated/chilled ceilings and fan coils as control ball valve.
- For closed circuits.
- Cost efficient: only one valve with actuator is needed to control a heated/chilled ceiling and fan coil.
- Flexible: various connections can be implemented thanks to external threading.
- Simple: pre-mounted ball valve linkage on the actuators - no extra tools needed to mount the actuator onto the valve.

## Technical design

### Sizing

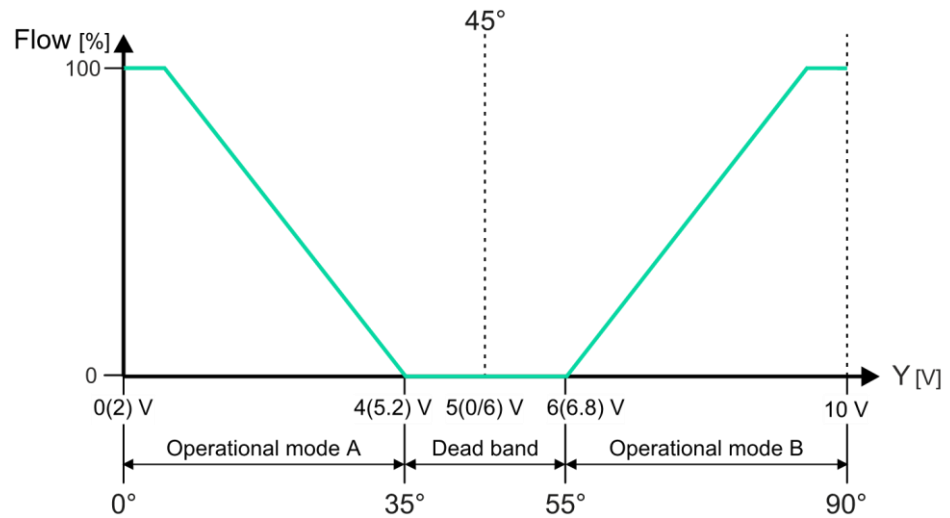
The 6-port control ball valve enables control between two sources through positions  $0^\circ$  and  $90^\circ$ . The 6-port control valve is closed at  $45^\circ$ .

**Ball valve characteristic curve DN10**



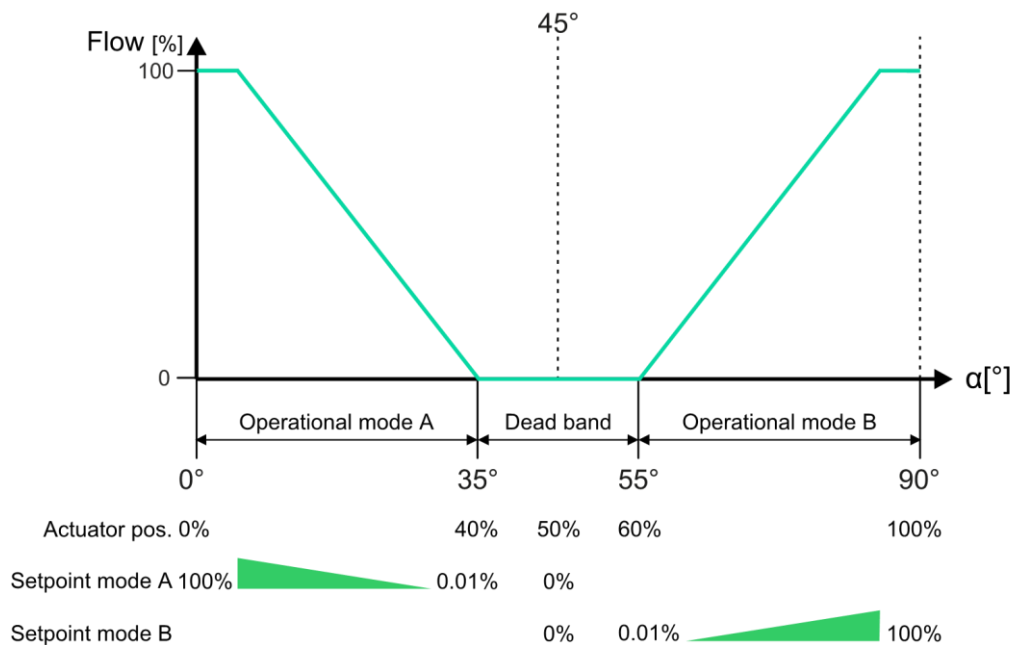
Note that the valve angle  $\alpha$  [°] moves counter-clockwise (CCW). The GDB161.9../.6.. actuators' default rotation direction is CCW, therefore:

- GDB161.9../6W** — a valve angle of 90° is achieved by a 10 V actuator control signal, while a valve angle of 0° is achieved by a 0(2) V actuator control signal. The dead band zone is fixed. The closed position is always achieved by a 5(0/6) V actuator control signal.



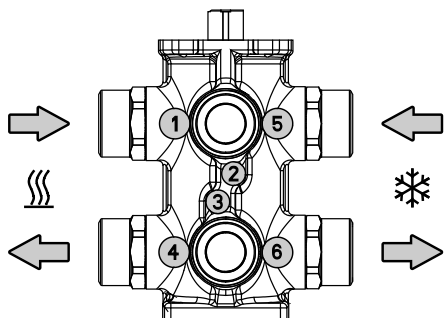
**Notes:** Values in brackets refer to a 2...10 V control signal, e.g. 0(2).  
 (0/6) - with a 2...10 V control signal, the actuator drives the valve to the closed position (45°) for open Y signal input (0 V).

- GDB161.9E/MO6P** — a valve angle of 90° is achieved by an actuator position of 100 %, while a valve angle of 0° is achieved by an actuator position of 0 %.



Siemens suggests the allocation of heating on the left side of the valve and of cooling on the right side of the valve for all valves during installation for safety reasons, as shown below:

- Operational mode A (ports 1-4) = heating
- Operational mode B (ports 5-6) = cooling



Where:

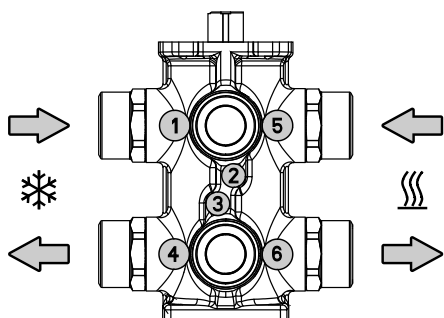
- Fully open position cooling corresponds to 100 % actuator position (GDB161.9E/MO6P)
- Fully open position cooling corresponds to 10 V (GDB161.9../6W)

In case heating has been allocated on the right side of the valve and cooling on the left side, the rotation direction of the actuator can be changed to meet the conditions above.

CCW is considered the default rotation direction for the GDB161.9../.6.. series of actuators.

By changing the rotation direction to CW, the heating and cooling sides are swapped and the conditions below come into play:

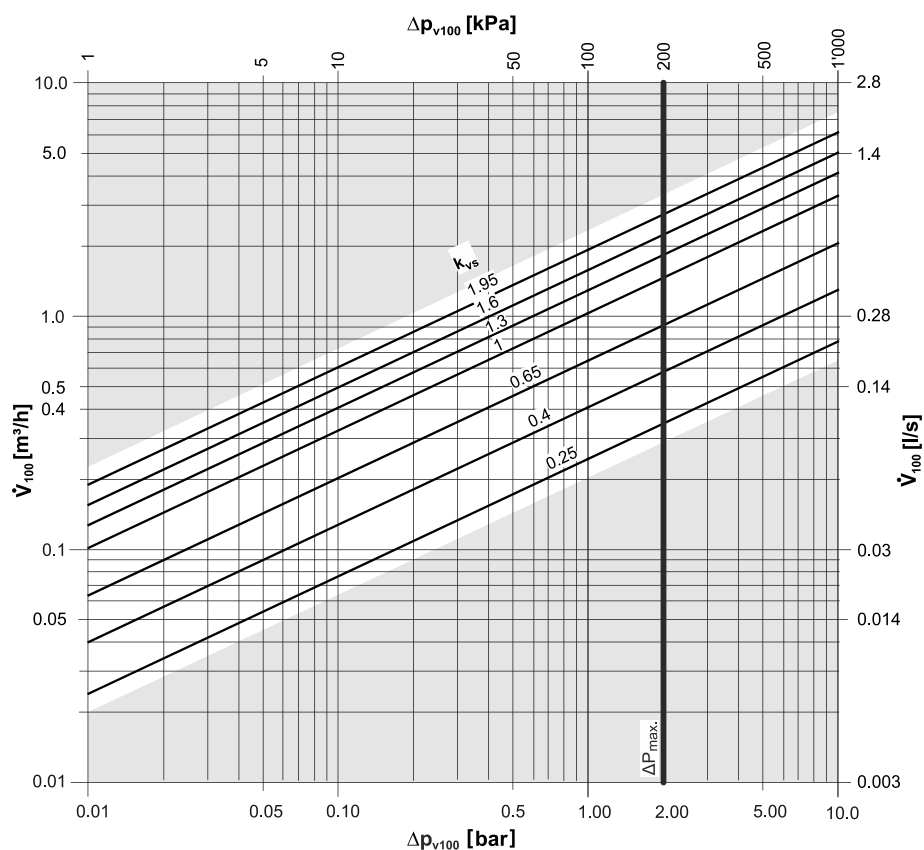
- Operational mode A (ports 1-4) = cooling
- Operational mode B (ports 5-6) = heating



Where:

- Fully open position cooling corresponds to 100 % actuator position (GDB161.9E/MO6P)
- Fully open position cooling corresponds to 10 V (GDB161.9../6W)

## Flow diagram DN10



$\Delta p_{\max}$  = Maximum permissible differential pressure over the ball valve (flow and return), valid for the entire positioning range of the ball valve rotary actuator unit

$\Delta p_{V_{100}}$  = Differential pressure over the fully opened ball valve (flow and return) 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<sup>3</sup>/h = 0.278 l/s water at 20 °C

## Sizing example

### Design

$$Q_H = 2.8 \text{ kW}$$

$$\Delta T_H = 6 \text{ K}$$

$$Q_K = 1.9 \text{ kW}$$

$$\Delta T_K = 2 \text{ K}$$

$$\Delta p_{V_{100}} = 20 \text{ kPa}$$

$$Q_{\text{Water}} = 1000 \text{ kg/m}^3$$

### Determining volumetric flow

$$V_H = \frac{Q_H}{\Delta T_H \cdot c \cdot \rho} = \frac{2800 \text{ W} \cdot \text{kg} \cdot \text{K} \cdot \text{m}^3}{6 \text{ K} \cdot 1.163 \text{ Wh} \cdot 1000 \text{ kg}} = 0.4 \frac{\text{m}^3}{\text{h}}$$

$$V_K = \frac{Q_K}{\Delta T_K \cdot c \cdot \rho} = \frac{1900 \text{ W} \cdot \text{kg} \cdot \text{K} \cdot \text{m}^3}{2 \text{ K} \cdot 1.163 \text{ Wh} \cdot 1000 \text{ kg}} = 0.8 \frac{\text{m}^3}{\text{h}}$$

$$k_{vS} = V \cdot \sqrt{\frac{\rho}{\Delta p}}$$

### Orifice selection

Heating: 1.0

Cooling: 1.95

## Overpressure protection

The Siemens 6-port compact control ball valve is equipped with an internal pressure equalization functionality. It ensures the secure operation of heated/chilled ceilings and fan coils with the valve in a closed state (45° position). Fluctuating media temperatures in the heated/chilled ceilings and fan coils can result in over- or under-pressure in the valve in a closed state, and potentially damage parts of the heated/chilled ceiling or fan coil.

This safety feature acts even when the valve is in the closed position (45°). The heating and cooling circuits are securely separated while operating.

## Type summary

Type	Stock number	DN	k <sub>vs</sub> left	k <sub>vs</sub> right
			[m³/h]	[m³/h]
VWG42.10-0.25-0.25	S55230-V240	10	0.25	0.25
VWG42.10-0.25-0.4	S55230-V241			0.4
VWG42.10-0.25-0.65	S55230-V242			0.65
VWG42.10-0.25-1.0	S55230-V243			1.0
VWG42.10-0.25-1.3	S55230-V244			1.3
VWG42.10-0.25-1.6	S55230-V245			1.6
VWG42.10-0.25-1.95	S55230-V246			1.95
VWG42.10-0.4-0.4	S55230-V247		0.4	0.4
VWG42.10-0.4-0.65	S55230-V248			0.65
VWG42.10-0.4-1.0	S55230-V249			1.0
VWG42.10-0.4-1.3	S55230-V250			1.3
VWG42.10-0.4-1.6	S55230-V251			1.6
VWG42.10-0.4-1.95	S55230-V252			1.95
VWG42.10-0.65-0.65	S55230-V253		0.65	0.65
VWG42.10-0.65-1.0	S55230-V254			1.0
VWG42.10-0.65-1.3	S55230-V255			1.3
VWG42.10-0.65-1.6	S55230-V256			1.6
VWG42.10-0.65-1.95	S55230-V257			1.95
VWG42.10-1.0-1.0	S55230-V258		1.0	1.0
VWG42.10-1.0-1.3	S55230-V259			1.3
VWG42.10-1.0-1.6	S55230-V260			1.6
VWG42.10-1.0-1.95	S55230-V261			1.95
VWG42.10-1.3-1.3	S55230-V262		1.3	1.3
VWG42.10-1.3-1.6	S55230-V263			1.6
VWG42.10-1.3-1.95	S55230-V264			1.95
VWG42.10-1.6-1.6	S55230-V265		1.6	1.6
VWG42.10-1.6-1.95	S55230-V266			1.95
VWG42.10-1.95-1.95	S55230-V267		1.95	1.95

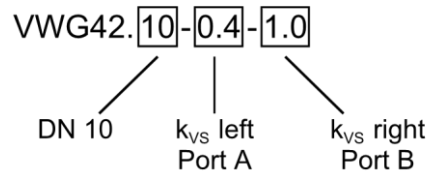
Type	Stock number	DN	k <sub>vs</sub> left	k <sub>vs</sub> right	
			[m³/h]	[m³/h]	
VWG42.10-0.4-0.25	S55230-V268	10	0.4	0.25	
VWG42.10-0.65-0.25	S55230-V269		0.65		
VWG42.10-1.0-0.25	S55230-V270		1.0		
VWG42.10-1.3-0.25	S55230-V271		1.3		
VWG42.10-1.6-0.25	S55230-V272		1.6		
VWG42.10-1.95-0.25	S55230-V273		1.95		
VWG42.10-0.65-0.4	S55230-V274		0.65	0.4	
VWG42.10-1.0-0.4	S55230-V275		1.0		
VWG42.10-1.3-0.4	S55230-V276		1.3		
VWG42.10-1.6-0.4	S55230-V277		1.6		
VWG42.10-1.95-0.4	S55230-V278		1.95		
VWG42.10-1.0-0.65	S55230-V279		1.0		0.65
VWG42.10-1.3-0.65	S55230-V280		1.3		
VWG42.10-1.6-0.65	S55230-V281		1.6		
VWG42.10-1.95-0.65	S55230-V282		1.95		
VWG42.10-1.3-1.0	S55230-V283		1.3	1.0	
VWG42.10-1.6-1.0	S55230-V284		1.6		
VWG42.10-1.95-1.0	S55230-V285		1.95		
VWG42.10-1.6-1.3	S55230-V286		1.6	1.3	
VWG42.10-1.95-1.3	S55230-V287		1.95		
VWG42.10-1.95-1.6	S55230-V288	1.95	1.6		

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)

**ASN key**

Example:



**Fittings**

Type	Stock no.	Description
ALG13.156B	S55846-Z154	Internally threaded fittings set made of brass for media temperatures up to 90 °C, consisting of <ul style="list-style-type: none"> <li>• 6x cap nuts</li> <li>• 6x cap nuts with sleeves and insert per ISO 7-1</li> <li>• 6x flat seals</li> </ul>
ALG13G156B	S55846-Z155	Internally threaded fittings set made of brass for media temperatures up to 90 °C, consisting of: <ul style="list-style-type: none"> <li>• 6x cap nuts</li> <li>• 6x cap nuts with sleeves and insert per ISO 228-1</li> <li>• 6x flat seals</li> </ul>
ALN13.156B	S55846-Z156	Externally threaded fittings set made of brass for media temperatures up to 90 °C, consisting of: <ul style="list-style-type: none"> <li>• 6x cap nuts</li> <li>• 6x cap nuts with sleeves and insert per ISO 228-1</li> <li>• 6x flat seals</li> </ul>

**Insulation shells**

Type	Stock no.	Description
ALI10VWG42	S55846-Z157	Insulation shell for VWG42.10.., for media temperatures up to 90 °C



When using the insulation shells ALI10VWG42 for comfort cooling applications, the shell must be glued properly to the valve body, in order to minimize the risk of condensation between the valve and the insulation shell.

**Equipment combinations**

Type	Rotary actuators			
	Type of use	$\Delta p_{max}$	Type of use	$\Delta p_{max}$
VWG42.10..	GDB161.9../6W		GDB111.9E/KN	
	Control ball valve with analog control	200 kPa	Control ball valve with KNX communication	200 kPa
	GDB..41.9E, GSD..41.9A		GDB161.9E/MO6P	
	Change-over valve	200 kPa	Control ball valve with Modbus communication	200 kPa

$\Delta p_{max}$  = Maximum permissible differential pressure over the valve control path, valid for the entire positioning range of the rotary actuator unit



## Overview of rotary actuators for the 6-port control ball valve

Type	Stock no.	Torque	Operating voltage	Positioning		Cable length [m]	Data sheet <sup>1)</sup>	
				signal	time			
GDB111.9E/KN	S55499-D203	5 Nm	AC 24 V	KNX-TP	150 s	0.9	A6V10301232	
GDB161.9E/6W	S55499-D784		AC/DC 24 V	DC 0/2...10 V		3	0.9	A6V12986395
GDB161.9G/6W	S55499-D829					5		
GDB161.9H/6W	S55499-D830					10		
GDB161.9H/6W100	S55499-D925				Modbus RTU			
GDB161.9E/MO6P	S55499-D802		AC 100...240 V	2-position	30 s	0.9	A6V10636150	
GDB141.9E	S55499-D200							
GDB341.9E	S55499-D201							
GSD141.9A	BPZ:GSD141.9A	AC/DC 24 V						30 s
GSD341.9A	BPZ:GSD341.9A	AC 230 V	30 s					

<sup>1)</sup> Documents can be downloaded at <http://siemens.com/bt/download>.

Application examples for the device combinations: see "Examples for device combinations".

### Ordering

Indicate type, stock number, order text, and quantity when ordering. Example:

Type	Stock no.	Order text	Quantity
VWG42.10-0.4-1.3	S55230-V250	6-port compact control valve	1
ALN13.156B	S55846-Z156	6x fittings with ISO 228-1 external threading	1
GDB161.9E/6W	S55499-D784	Electromotoric rotary actuator for 6-port	1

### Delivery

6-port control valve (in closed position), rotary actuator with mounting kits (unassembled), individually packaged.

### Product documentation

Topic	Title	Document ID
Mounting	Mounting instructions 6-port control ball valves VWG42.10..	A5W00340833
Mounting	Mounting instructions rotary actuator GDB111.9E/KN	M4657
Mounting	Mounting instructions rotary actuators GDB..41.9E	A6V10636144
Mounting	Mounting instructions rotary actuators GSD..9A	M4655
Mounting	Mounting instructions rotary actuators GDB161.9../..6..	A6V12815008

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

**NOTICE****Note the following when servicing a ball valve/actuator:**

- Switch off both pump and operating voltage.
- Close shut-off 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.
- Ensure that there is no cavitation.
- Install filter to increase functional security.

**Safety****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.

**NOTICE****Use of rotary actuator**

Commission the 6-port ball valve only after it is correctly coupled with the rotary actuator.

**Mounting**

Assembling the ball valve and rotary actuator is easy and can be done at the construction site. No special tools or settings are required.

The 6-port compact control ball valve is delivered with the mounting instructions A5W00340833.

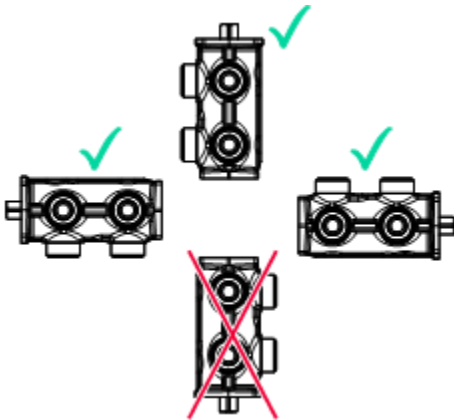
For additional information on applicable documentation, see Product documentation [▶ 9].

**NOTICE****Conduct a function test before installing the device.**

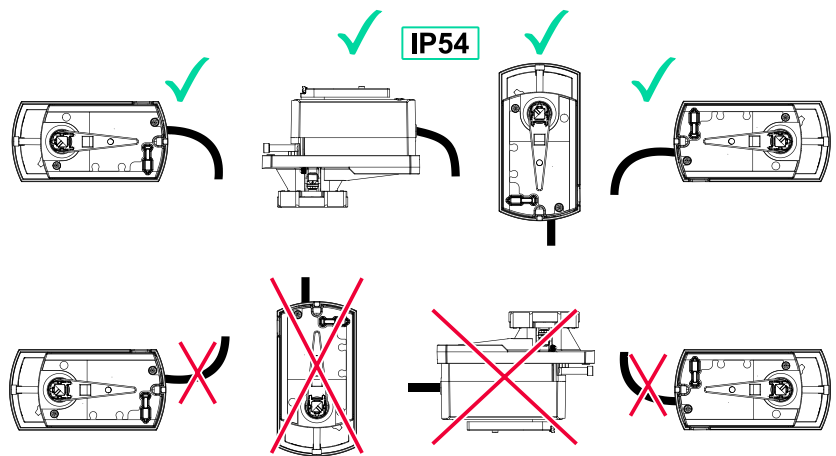
Manually operate the device one time in full.

## Mounting position

Valve

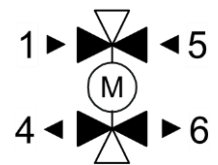


Actuator



## Flow direction

Make sure that the valve is mounted in the proper flow direction. Flow direction is indicated on the ball valve body by the symbol on the type label:



## Commissioning

The rotary actuator must be properly mounted before commissioning the 6-port compact control ball valve. The 6-port compact control ball valve is delivered in a closed state (middle position, 45°).

## Maintenance

The 6-port compact control ball valve VWG42.10.. is maintenance free.

## Disposal



The valve is considered an electronic device for disposal in accordance with the European Guidelines and may not be disposed of as domestic garbage.

- Dispose of the valve through channels provided for this purpose.
- Comply with 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.

Functional data		
PN class	PN 16	
Operating pressure	16 bar	
Maximum differential pressure	2 bar	
Leakage rate	"Air-tight" per EN 12266-1, class A	
Permissible media	Chilled water, hot water, water with anti-freeze (max. 50% glycol)	
	Recommendation	Water treatment per VDI 2035 / ÖNORM 5185
Medium temperature	5...90 °C	
Rotational angle	90°	
	Valve closed	45°

Materials	
Ball valve body	Hot-pressed brass CW617N
Valve cartridge	PPSU
Stem	Hot-pressed brass CW617N
Gaskets	EPDM O-rings
Calibrated flow disk	Stainless steel
Adapter actuator plate	Hot-pressed brass CW617N

Standards and directives	
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 (generally applicable engineering practice) <sup>1)</sup>

Environmental compatibility
the product environmental declaration A5W00341197A <sup>2)</sup> contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

Dimensions / Weight	
W x H x D	See Dimensions [▶ 15]
Connections with external threading	G..B per ISO 228-1

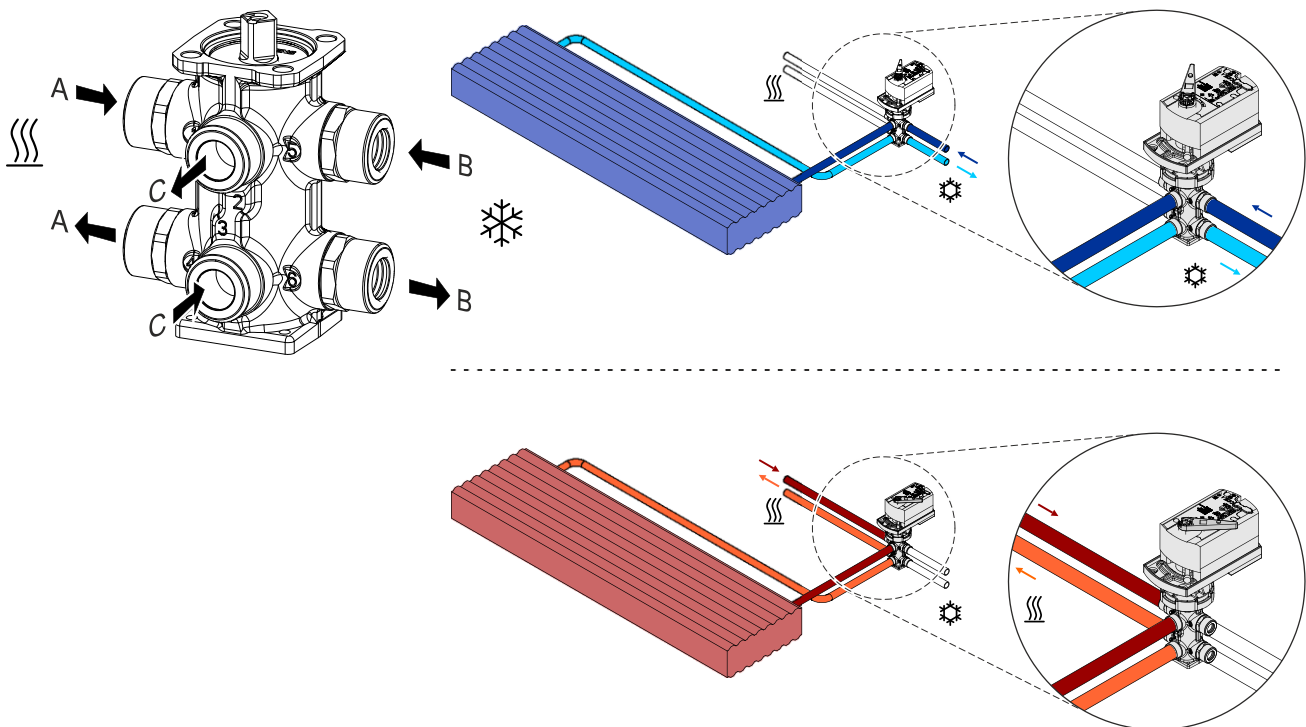
Insulation shells ALI10VWG42		
Material		EPE (crosslinked expanded polyethylene)
Water absorption		< 1 vol% at 20 °C
Temperature range		Up to 90 °C
Insulation property	Lambda	0.041 W/mk
Density		30 g/l
Fire resistance		As per DIN 4102: B2

- 1) Fittings for a product where  $PS \times DN < 1000$ , do not require special testing and cannot have CE labeling.
- 2) Documents can be downloaded at the following Internet address: <http://siemens.com/bt/download>

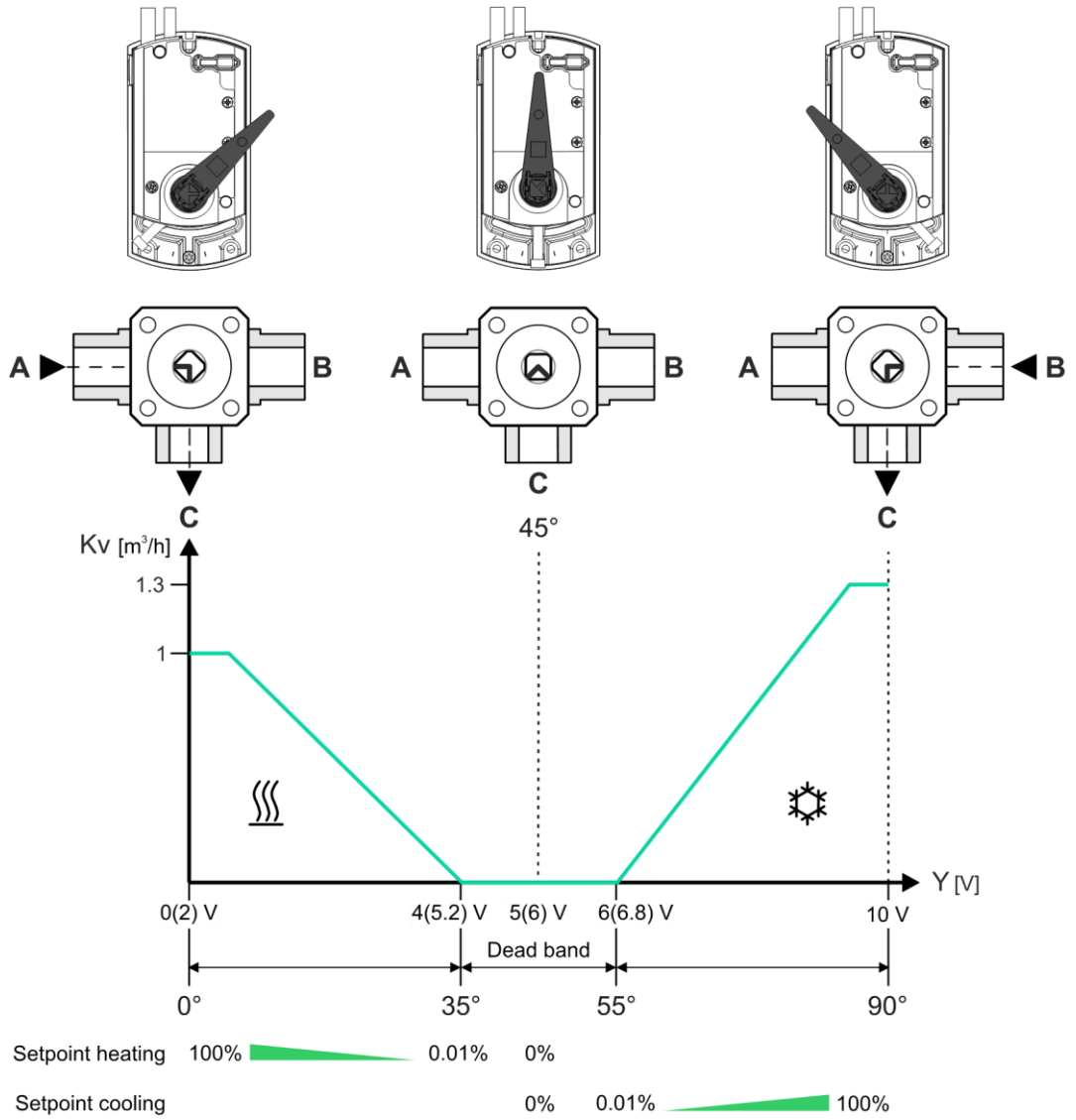
## Application examples

- Stem rotates counter-clockwise (CCW) ▶ Cooling sequence opens
- Stem rotates clockwise (CW) ▶ Heating sequence opens
- GDB161.9../.6.. actuator rotation direction ▶ Counter-clockwise (CCW)

The following application describes the flow direction in a heated/chilled ceiling or fan coil.



**Example: VWG42.10-1.0-1.3**

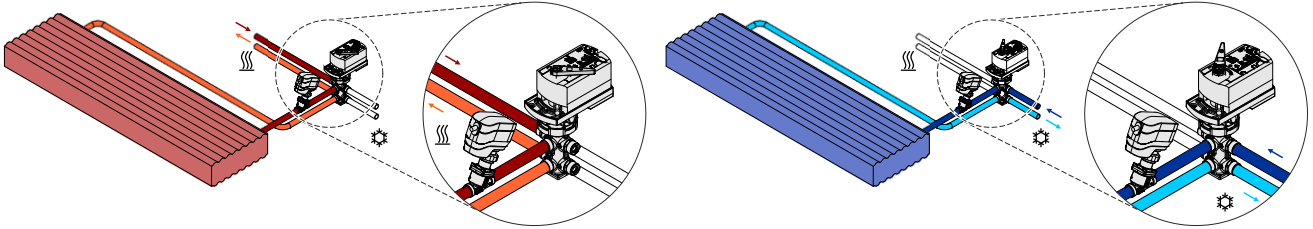


## Examples of device combinations

### Hydraulically balanced solution with 6-port compact control ball valve as change-over and PICV as the control element

In this application, the 6-port compact control ball valve changes over between 100% cooling or 100% heating. The PICV controls the primary flow for the application.

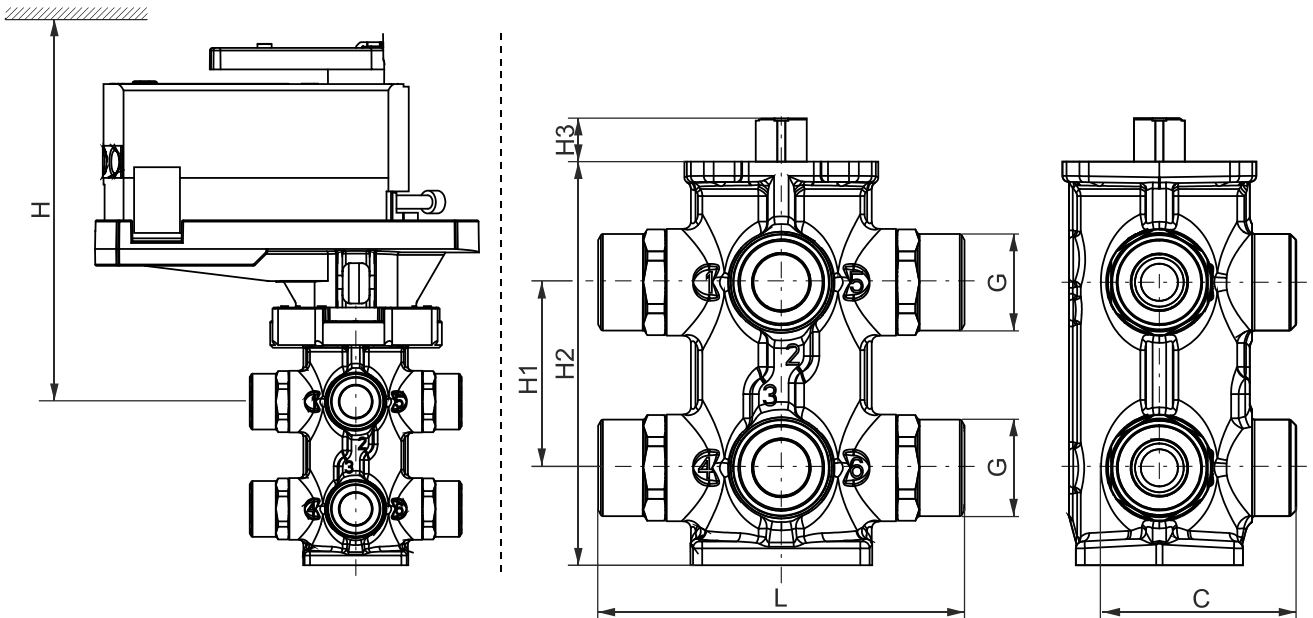
The following combinations are possible:



#### DN10:

1. VWG42.10-1.95-1.95 (1/2" 6-port compact ball valve) + or GDB341.9E (5 Nm) or GSD341.9A (2 Nm) (rotary actuator)
2. VPP46.15 (PICV) + SSA161E.05HF (0...10 V actuator)

## Dimensions

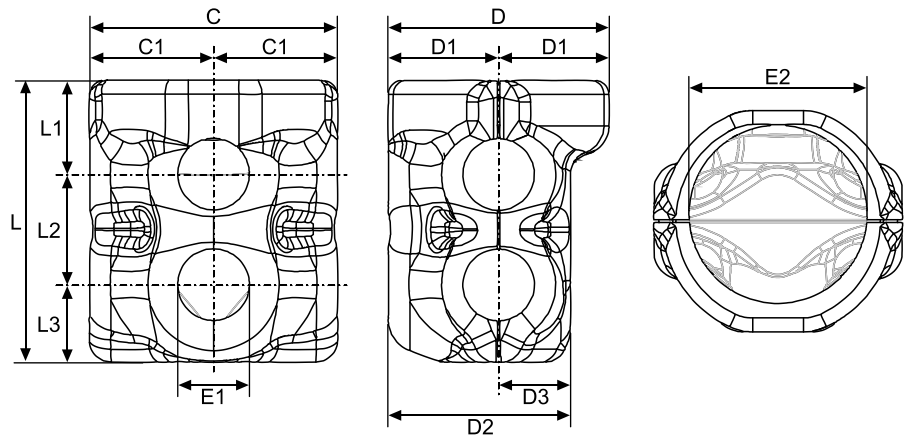


	DN	G	H	H1	H2	H3	L	C	Weight
		[inch]	[mm]						[kg]
VWG42.10..	10	G 1/2 " M	> 169	40	87	10	77	51	0.56

## Fittings

	Type	Stock no.	Valve type	G	G1	Rp	DN	C	C1	Weight
				ISO 228-1		ISO 7-1		[mm]		[kg]
				[inch]						
	ALG13.156B	S55846-Z154	VWG42.10..	-	-	Rp ½	15	35	15	0.406
	ALG13G156B	S55846-Z155		G ½ B	G ½	-	15	33.5	13.5	0.381
	ALN13.156B	S55846-Z156		G ½ B	-	-	15	37.5	18.5	0.387

## Insulation shells



Type	DN	C	C1	D	D1	D2	D3	E1	E2	L	L1	L2	L3	Weight
		[mm]												[kg]
ALI10VWG42	10	90	45	80	40	66	26	26	64	102	34	40	28	0.023



## Revision numbers

Type	Stock no.	Valid from rev. no.	Type	Stock no.	Valid from rev. no.
VWG42.10-0.25-0.25	S55230-V140	..A	VWG42.10-0.4-0.25	S55230-V168	..A
VWG42.10-0.25-0.4	S55230-V141	..A	VWG42.10-0.65-0.25	S55230-V169	..A
VWG42.10-0.25-0.65	S55230-V142	..A	VWG42.10-1.0-0.25	S55230-V170	..A
VWG42.10-0.25-1.0	S55230-V143	..A	VWG42.10-1.3-0.25	S55230-V171	..A
VWG42.10-0.25-1.3	S55230-V144	..A	VWG42.10-1.6-0.25	S55230-V172	..A
VWG42.10-0.25-1.6	S55230-V145	..A	VWG42.10-1.95-0.25	S55230-V173	..A
VWG42.10-0.25-1.95	S55230-V146	..A	VWG42.10-0.65-0.4	S55230-V174	..A
VWG42.10-0.4-0.4	S55230-V147	..A	VWG42.10-1.0-0.4	S55230-V175	..A
VWG42.10-0.4-0.65	S55230-V148	..A	VWG42.10-1.3-0.4	S55230-V176	..A
VWG42.10-0.4-1.0	S55230-V149	..A	VWG42.10-1.6-0.4	S55230-V177	..A
VWG42.10-0.4-1.3	S55230-V150	..A	VWG42.10-1.95-0.4	S55230-V178	..A
VWG42.10-0.4-1.6	S55230-V151	..A	VWG42.10-1.0-0.65	S55230-V179	..A
VWG42.10-0.4-1.95	S55230-V152	..A	VWG42.10-1.3-0.65	S55230-V1780	..A
VWG42.10-0.65-0.65	S55230-V153	..A	VWG42.10-1.6-0.65	S55230-V1781	..A
VWG42.10-0.65-1.0	S55230-V154	..A	VWG42.10-1.95-0.65	S55230-V1782	..A
VWG42.10-0.65-1.3	S55230-V155	..A	VWG42.10-1.3-1.0	S55230-V1783	..A
VWG42.10-0.65-1.6	S55230-V156	..A	VWG42.10-1.6-1.0	S55230-V1784	..A
VWG42.10-0.65-1.95	S55230-V157	..A	VWG42.10-1.95-1.0	S55230-V1785	..A
VWG42.10-1.0-1.0	S55230-V158	..A	VWG42.10-1.6-1.3	S55230-V1786	..A
VWG42.10-1.0-1.3	S55230-V159	..A	VWG42.10-1.95-1.3	S55230-V1787	..A
VWG42.10-1.0-1.6	S55230-V160	..A	VWG42.10-1.95-1.6	S55230-V1788	..A
VWG42.10-1.0-1.95	S55230-V161	..A			
VWG42.10-1.3-1.3	S55230-V162	..A			
VWG42.10-1.3-1.6	S55230-V163	..A			
VWG42.10-1.3-1.95	S55230-V164	..A			
VWG42.10-1.6-1.6	S55230-V165	..A			
VWG42.10-1.6-1.95	S55230-V166	..A			
VWG42.10-1.95-1.95	S55230-V167	..A			

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