

## 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<sub>vs</sub> 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

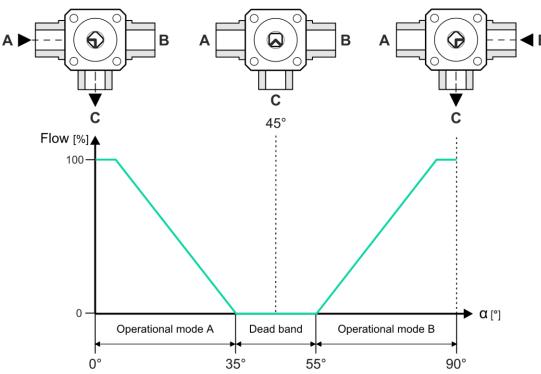
- Used in heated/chilled ceilings and fan coils as control ball valve.
- · For closed circuits.
- Cost efficient: only one valve with actuator is needed to control a heated/chilled ceiling and fan coil.
- Flexible: various connections can be implemented thanks to external threading.
- Simple: pre-mounted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

## Technical design

#### **Sizing**

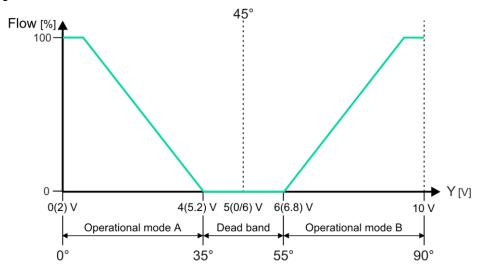
The 6-port control ball valve enables control between two sources through positions 0° and 90°. The 6-port control ball valve is closed at 45°.

#### 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:

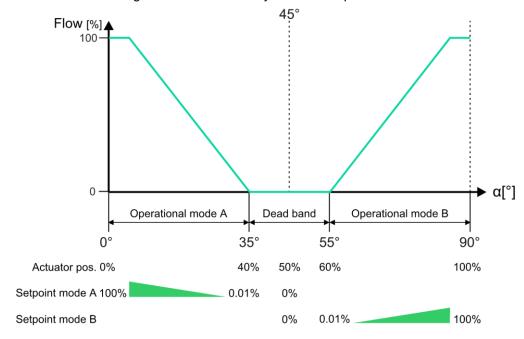
GDB161.9./6W — a valve angle of 90° is achieved by a 10 V actuator control signal, while a valve angle of 0° is achieved by a 0(2) V actuator control signal. The dead band zone is fixed. The closed position is always achieved by a 5(0/6) V actuator control signal.



Notes: Values in brackets refer to a 2...10 V control signal, e.g. 0(2).

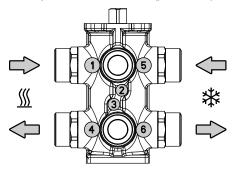
(0/6) - with a 2...10 V control signal, the actuator drives the valve to the closed position (45°) for open Y signal input (0 V).

• **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



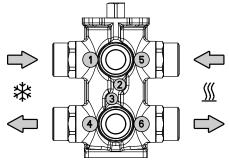
#### Where:

- 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:

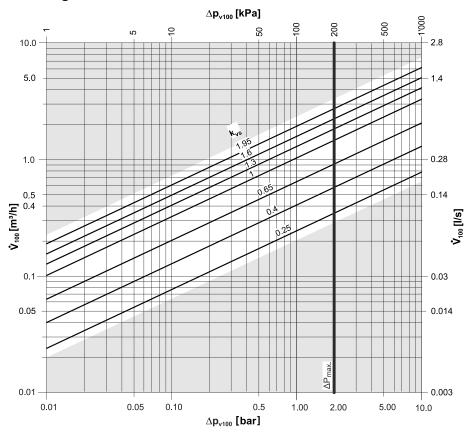
- Operational mode A (ports 1-4) = cooling
- Operational mode B (ports 5-6) = heating



#### 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



- Δp<sub>max</sub> = Maximum permissible differential pressure over the ball valve (flow and return), valid for the entire positioning range of the ball valve/rotary actuator unit
- $\Delta p_{V100}$  = 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≈ 10 mWS
- 1 m $^3$ /h = 0.278 l/s water at 20 °C

## Sizing example

#### Design

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

 $\Delta T_H = 6 K$ 

 $Q_K = 1.9 \text{ kW}$ 

 $\Delta T_K = 2 K$ 

 $\Delta p_{V100} = 20 \text{ kPa}$ 

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

#### **Determining volumetric flow**

$$V_{H} = \frac{Q_{H}}{\Delta T_{H} \cdot c \cdot \varrho} = \frac{2800 \ W \cdot kg \cdot K \cdot m^{3}}{6 \ K \cdot 1.163 \ Wh \cdot 1000 \ kg} = 0.4 \ \frac{m^{3}}{h}$$

$$V_{K} = \frac{Q_{K}}{\Delta T_{K} \cdot c \cdot \varrho} = \frac{1900 \text{ W} \cdot \text{kg} \cdot \text{K} \cdot \text{m}^{3}}{2 \text{ K} \cdot 1.163 \text{ Wh} \cdot 1000 \text{ kg}} = 0.8 \frac{\text{m}^{3}}{\text{h}}$$

$$k_{VS} = V \cdot \sqrt{\frac{\varrho}{\Delta p}}$$

#### Orifice selection

Heating: 1.0

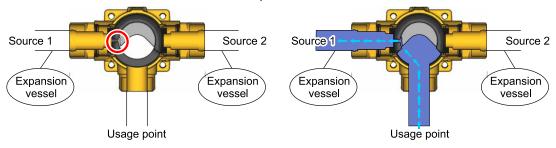
Cooling: 1.95

#### 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 or 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.

The pressure equalization function only acts in the closed valve position (45°). The system pressure in the heating and cooling circuits must have the same value.

It is recommended to use expansion vessel solutions in both circuits as a preventive measure to address the effects of mass displacement.



#### Type summary

Туре	ype Stock number		k <sub>vs</sub> left	k <sub>vs</sub> right
			[m³/h]	[m³/h]
VWG42.10-0.25-0.25	S55230-V240			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		0.25	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
VWG42.10-0.4-0.65	S55230-V248	40		0.65
VWG42.10-0.4-1.0	S55230-V249	10	0.4	1.0
VWG42.10-0.4-1.3	S55230-V250		0.4	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
VWG42.10-0.65-1.0	S55230-V254		0.65	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

6

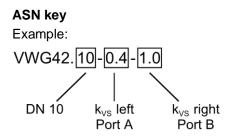
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Туре	Stock number	DN	k <sub>vs</sub> left	k <sub>vs</sub> right
			[m³/h]	[m³/h]
VWG42.10-1.0-1.0	S55230-V258			1.0
VWG42.10-1.0-1.3	S55230-V259		4.0	1.3
VWG42.10-1.0-1.6	S55230-V260		1.0	1.6
VWG42.10-1.0-1.95	S55230-V261			1.95
VWG42.10-1.3-1.3	S55230-V262			1.3
VWG42.10-1.3-1.6	S55230-V263		1.3	1.6
VWG42.10-1.3-1.95	S55230-V264			1.95
VWG42.10-1.6-1.6	S55230-V265		4.0	1.6
VWG42.10-1.6-1.95	S55230-V266		1.6	1.95
VWG42.10-1.95-1.95	S55230-V267		1.95	1.95
VWG42.10-0.4-0.25	S55230-V268		0.4	
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	0.25
VWG42.10-1.6-0.25	S55230-V272		1.6	
VWG42.10-1.95-0.25	S55230-V273	S55230-V273 10		
VWG42.10-0.65-0.4	S55230-V274		0.65	
VWG42.10-1.0-0.4	S55230-V275		1.0	
VWG42.10-1.3-0.4	S55230-V276		1.3	0.4
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	
VWG42.10-1.3-0.65	S55230-V280		1.3	0.05
VWG42.10-1.6-0.65	S55230-V281		1.6	0.65
VWG42.10-1.95-0.65	S55230-V282		1.95	
VWG42.10-1.3-1.0	S55230-V283		1.3	
VWG42.10-1.6-1.0	S55230-V284		1.6	1.0
VWG42.10-1.95-1.0	S55230-V285		1.95	
VWG42.10-1.6-1.3	S55230-V286		1.6	
VWG42.10-1.95-1.3	S55230-V287		1.95	1.3
VWG42.10-1.95-1.6	S55230-V288		1.95	1.6

DN = Nominal size

Flow nominal value for chilled water (5...30 °C) through a fully opened ball valve at a differential pressure of 100 kPa (1 bar)



## **Fittings**

Туре	Stock no.	Description
ALG13.156B	S55846-Z154	Internally threaded fittings set made of brass for media temperatures up to 90 °C, consisting of:  • 6x cap nuts  • 6x cap nuts with sleeves and insert per ISO 7-1  • 6x flat seals
ALG13G156B	S55846-Z155	Internally threaded fittings set made of brass for media temperatures up to 90 °C, consisting of:  • 6x cap nuts  • 6x cap nuts with sleeves and insert per ISO 228-1  • 6x flat seals
ALN13.156B	S55846-Z156	Externally threaded fittings set made of brass for media temperatures up to 90 °C, consisting of:  • 6x cap nuts  • 6x cap nuts with sleeves and insert per ISO 228-1  • 6x flat seals

#### Insulation shells

Туре	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**

Туре		Rotary	Rotary actuators				
	Type of use	Δp <sub>max</sub>	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			
	GDB41.9E,	GDB41.9E, GSD41.9A		E/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

Туре	Stock no.	Torque	Operating	Position	ing	Cable length	Data sheet 1)
			voltage	signal	time	[m]	
GDB111.9E/KN	S55499-D203		AC 24 V	KNX-TP		0.0	A6V10301232
GDB161.9E/6W	S55499-D784	5 Nm				0.9	
GDB161.9G/6W	S55499-D829			DO 0/0 40 V		3	
GDB161.9H/6W	S55499-D830			DC 0/210 V	150 s	5	A6V12986395
GDB161.9H/6W100	S55499-D925					10	
GDB161.9E/MO6P	S55499-D802				Modbus RTU		
GDB141.9E	S55499-D200						40)//0000450
GDB341.9E	S55499-D201		AC 100240 V	0		0.9	A6V10636150
GSD141.9A	BPZ:GSD141.9A	2 Nm	AC/DC 24 V	2-position			
GSD341.9A	BPZ:GSD341.9A		AC 230 V		30 s		N4655

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

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

## **Ordering**

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

Туре	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 GDB41.9E	A6V10636144
Mounting	Mounting instructions rotary actuators GSD9A	M4655
Mounting	Mounting instructions rotary actuators GDB161.9/6	A6V12815008

Related documents such as the environmental declarations, declarations of conformity, etc., can be downloaded from the following Internet address: <a href="http://siemens.com/bt/download">http://siemens.com/bt/download</a>

## **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





#### 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]".

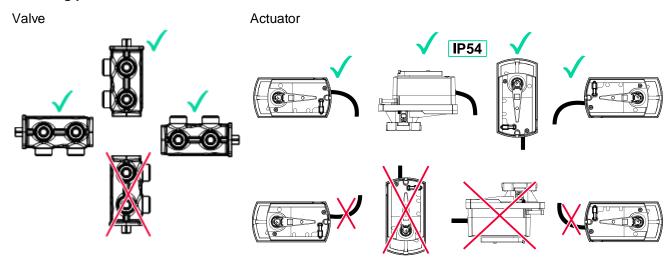
#### NOTICE



Conduct a function test before installing the device.

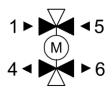
Manually operate the device one time in full.

## **Mounting position**



#### 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.

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Functional data		
PN class		PN 16
Operating pressure		16 bar
Maximum differentia	al 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 temperatur	e	590 °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) 1)	

#### **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		
WxHxD	See Dimensions [▶ 15]	
Connections with external threading	GB per ISO 228-1	

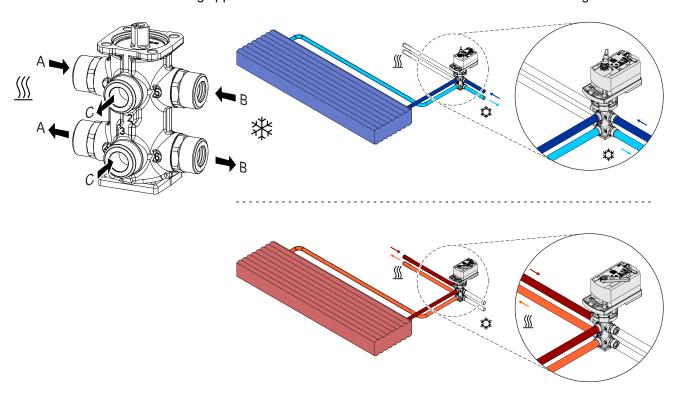
Insulation shells ALI10VWG42							
Material		EPE (crosslinked expanded polyethylene)					
Water absorption		< 1 vol% at 20 °C					
Temperature range		Up to 90 °C					
Insulation property Lambda		0.041 W/mk					
Density		30 g/l					
Fire resistance		As per DIN 4102: B2					

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

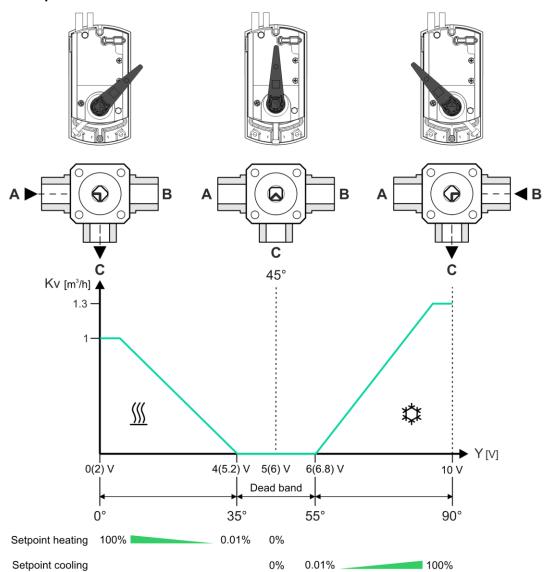
## Application examples

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

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



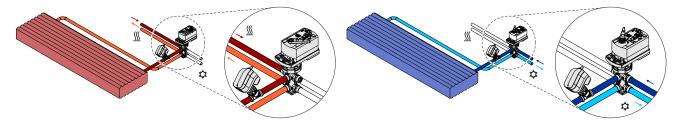
# **Example:** VWG42.10-1.0-1.3



# 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:

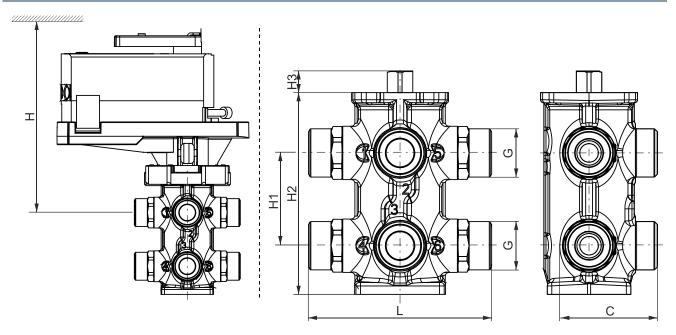


## **DN10**:

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

## **Dimensions**

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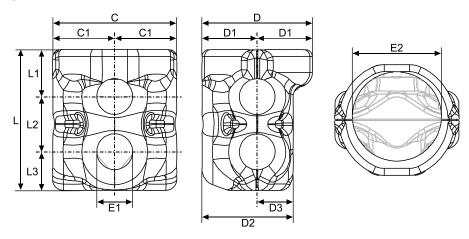
	DN	Н	H1	H2	Н3	L	G	С	Weight
				[mm]	[inch]	[mm]	[kg]		
VWG42.10	10	> 169	40	87	10	77	G ½ " M	51	0.56

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# **Fittings**

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

# Insulation shells



Туре	DN	С	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

Туре	Stock no.	Valid from rev. no.	Туре	Stock no.	Valid from rev. no.
VWG42.10-0.25-0.25	S55230-V240	А	VWG42.10-0.4-0.25	S55230-V268	A
VWG42.10-0.25-0.4	S55230-V241	А	VWG42.10-0.65-0.25	S55230-V269	A
VWG42.10-0.25-0.65	S55230-V242	А	VWG42.10-1.0-0.25	S55230-V270	A
VWG42.10-0.25-1.0	S55230-V243	А	VWG42.10-1.3-0.25	S55230-V271	A
VWG42.10-0.25-1.3	S55230-V244	А	VWG42.10-1.6-0.25	S55230-V272	A
VWG42.10-0.25-1.6	S55230-V245	А	VWG42.10-1.95-0.25	S55230-V273	А
VWG42.10-0.25-1.95	S55230-V246	А	VWG42.10-0.65-0.4	S55230-V274	A
VWG42.10-0.4-0.4	S55230-V247	А	VWG42.10-1.0-0.4	S55230-V275	A
VWG42.10-0.4-0.65	S55230-V248	А	VWG42.10-1.3-0.4	S55230-V276	А
VWG42.10-0.4-1.0	S55230-V249	А	VWG42.10-1.6-0.4	S55230-V277	А
VWG42.10-0.4-1.3	S55230-V250	A	VWG42.10-1.95-0.4	S55230-V278	A
VWG42.10-0.4-1.6	S55230-V251	A	VWG42.10-1.0-0.65	S55230-V279	A
VWG42.10-0.4-1.95	S55230-V252	A	VWG42.10-1.3-0.65	S55230-V280	A
VWG42.10-0.65-0.65	S55230-V253	A	VWG42.10-1.6-0.65	S55230-V281	A
VWG42.10-0.65-1.0	S55230-V254	A	VWG42.10-1.95-0.65	S55230-V282	A
VWG42.10-0.65-1.3	S55230-V255	A	VWG42.10-1.3-1.0	S55230-V283	A
VWG42.10-0.65-1.6	S55230-V256	A	VWG42.10-1.6-1.0	S55230-V284	A
VWG42.10-0.65-1.95	S55230-V257	A	VWG42.10-1.95-1.0	S55230-V285	A
VWG42.10-1.0-1.0	S55230-V258	A	VWG42.10-1.6-1.3	S55230-V286	A
VWG42.10-1.0-1.3	S55230-V259	А	VWG42.10-1.95-1.3	S55230-V287	A
VWG42.10-1.0-1.6	S55230-V260	А	VWG42.10-1.95-1.6	S55230-V288	A
VWG42.10-1.0-1.95	S55230-V261	А			
VWG42.10-1.3-1.3	S55230-V262	А			
VWG42.10-1.3-1.6	S55230-V263	A			
VWG42.10-1.3-1.95	S55230-V264	А			
VWG42.10-1.6-1.6	S55230-V265	А			
VWG42.10-1.6-1.95	S55230-V266	A			
VWG42.10-1.95-1.95	S55230-V267	A			

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