Acvatix^{TM}

Differential pressure regulator PN25

VHG519..

- **Spheroidal cast iron GJS-400-15**
- **DN 15...50**
- **k_{vs} 2.5...32 m³/h**
- **Differential pressure adjustable**
- **Suitable for mounting in flow or return pipe**
- **For differential pressure regulators with additional volumetric flow limitation, see data sheet Q4393 (VSG519..)**

Use

For use as a differential pressure regulator in district heating systems and heating, ventilation and air conditioning systems with media temperatures up to 150 °C.
For closed hydraulic circuits.

Type summary

VHG519K..
Versions with adjustable Δp_w settings (red, small spring)

Product no. Stock no.	DN	G [Inch]	k_{vs} [m³/h]	Δp_w [kPa]	Δp_{min} [kPa]
VHG519K15-2.5	15	G 1	2.5	15...60	
VHG519K15-5			5		
VHG519K20-8	20	G 1¼	8		
VHG519K25-10	25	G 1½	10		$\Delta p_{w,set} + 100 \cdot \left(\dfrac{\dot{V}_{100}}{k_{vs}} \right)^2$
VHG519K32-15	32	G 2	15	25...70	
VHG519K40-21	40	G 2¼	21		
VHG519K50-32	50	G 2 ¾	32		

VHG519L..
Versions with adjustable Δp_w settings (yellow spring)

Product no. Stock no.	DN	G [Inch]	k_{vs} [m³/h]	Δp_w [kPa]	$\Delta p_{min,total}$ [kPa]
VHG519L15-2.5	15	G 1	2.5	30...210	
VHG519L15-5			5		
VHG519L20-8	20	G 1¼	8		
VHG519L25-10	25	G 1½	10		$\Delta p_{w,set} + 100 \cdot \left(\dfrac{\dot{V}_{100}}{k_{vs}} \right)^2$
VHG519L32-15	32	G 2	15	40...220	
VHG519L40-21	40	G 2¼	21		
VHG519L50-32	50	G 2 ¾	32		

DN	=	Nominal size
k_{vs}	=	Nominal flow rate of cold water (5…30 °C) through the fully open valve (H_{100}) at a differential pressure of 100 kPa (1 bar)
Δp_w	=	Effective differential pressure, adjustable at VHG519K.., VHG519L..
$\Delta p_{w,set}$	=	Effective differential pressure setting at VHG519K.., VHG519L..
$\Delta p_{min,total}$	=	Minimum differential pressure required across the system including the differential pressure regulator, to ensure that the differential pressure regulator responds reliably
$\dot{V}_{100}$	=	Volumetric flow through the fully open differential pressure regulator (H_{100})

Accessories

Product no.	Stock no.	Description
ALS..2	**ALS..2**	ALS..2 are set of 2 fittings with weldable connections for 2-port valves, consisting of 2 union nuts, 2 discs and 2 flat seals. For ALS..9 order two sets, as it is a set of 1 fitting.
ALS..9	**ALS..9**	
ALG..2	**ALG..2**	Set of 2 fittings with threaded connections for 2-port valves, consisting of 2 union nuts, 2 discs and 2 flat seals.
ALG..2B	**S55846-Z1..**	ALG..2B are brass fittings, for media temperatures up to 100 °C.
ALP..	**ALP..**	Pressure tubes to connect the differential pressure regulator with flow and return pipes of the HVAC plant.

Ordering

Example

Product no.	Stock no.	Description	Quantity
VHG519L32-15	VHG519L32-15	Differential pressure regulator. Two ALP16 pressure tubes are delivered with the pressure regulator as standard.	1
ALS329	ALS329	Fitting with weldable connections.	2

Delivery

The differential pressure regulator and fittings are packed separately.

Hint

Fittings ALS.. and ALG.. must be ordered separately. For ALS..9 order two sets.

Technical / mechanical design

Principle of operation

The self-acting VHG519.. differential pressure regulator is designed to maintain a constant effective differential pressure Δp_w across a given system. This is achieved by exposing a diaphragm to the effects of the inlet and outlet pressure of the system.

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Deflections of the diaphragm are transferred to the plug, which closes respectively opens the differential pressure regulator as the total differential pressure Δp_{total} increases, respectively decreases and maintains therefore the effective differential pressure Δp_w constant. The plug is pressure-balanced, so that the effective differential pressure Δp_w is neither affected by the pressure ratio Δp_{VHG} inside the regulator and the total differential pressure Δp_{total}.

A minimum total differential pressure $\Delta p_{min,total}$ is required across the system including the differential pressure regulator, to ensure that the differential pressure regulator responds reliably.

WZ = heat meter
Δp_{total} = total differential pressure
Δp_{VHG} = differential pressure across differential pressure regulator
Δp_w = adjustable effective differential pressure of differential pressure regulator
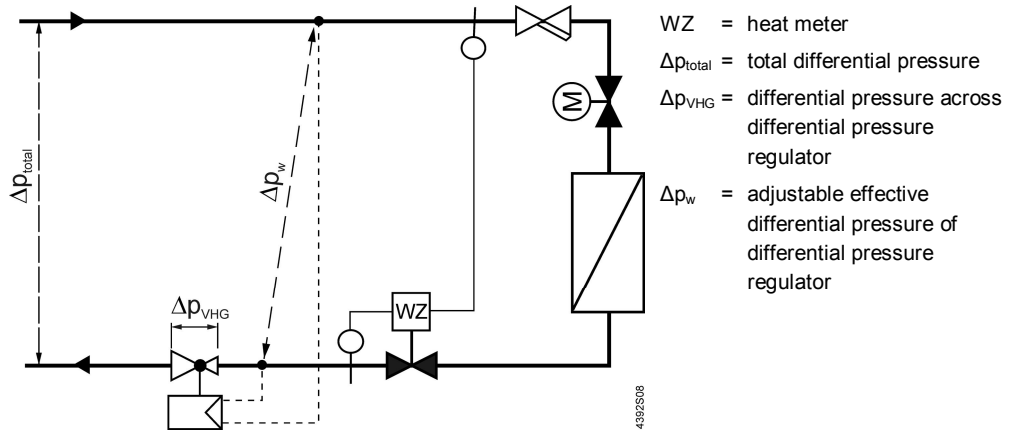
In cases where the required differential pressure value is between two spring ranges (red, yellow), it is advisable to choose the range with lower effective differential pressure Δp_w values to ensure the sensitivity of the differential pressure regulator.

The ALP16 pressure tubes used to tap the pressure in the flow and return pipework are delivered with the differential pressure regulator as standard.

VHG519K.. (only one spring),
VHG519L..
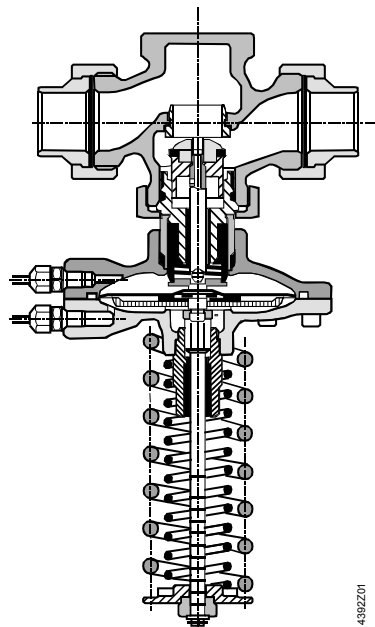
ALG..2
Fittings with threaded connections, malleable cast iron

Product no.	Stock no.	Differential pressure regulator	Connecting thread		Material
			valve side	pipe side	
ALG152	ALG152	VHG519.., DN 15	G 1	Rp ½	Malleable cast iron
ALG202	ALG202	VHG519.., DN 20	G 1¼	Rp ¾	Malleable cast iron
ALG252	ALG252	VHG519.., DN 25	G 1½	Rp 1	Malleable cast iron
ALG322	ALG322	VHG519.., DN 32	G 2	Rp 1¼	Malleable cast iron
ALG402	ALG402	VHG519.., DN 40	G 2¼	Rp 1½	Malleable cast iron
ALG502	ALG502	VHG519.., DN 50	G 2¾	Rp 2	Malleable cast iron

ALG..2B
Fittings with threaded connections, brass

Product no.	Stock no.	Differential pressure regulator	Connecting thread		Material
			valve side	pipe side	
ALG152B	S55846-Z100	VHG519.., DN 15	G 1	Rp ½	Messing
ALG202B	S55846-Z102	VHG519.., DN 20	G 1¼	Rp ¾	Messing
ALG252B	S55846-Z104	VHG519.., DN 25	G 1½	Rp 1	Messing
ALG322B	S55846-Z106	VHG519.., DN 32	G 2	Rp 1¼	Messing
ALG402B	S55846-Z108	VHG519.., DN 40	G 2¼	Rp 1½	Messing
ALG502B	S55846-Z110	VHG519.., DN 50	G 2¾	Rp 2	Messing

- On valve side: cylindrical thread to ISO 228-1
- On pipe side: with cylindrical thread to ISO 7-1
- ALG..B for media temperatures up to 100 °C

ALS..2, ALS..9
Fittings with weldable connections, steel

Product no. [1]	Stock no.	Differential pressure regulator	Connecting thread valve side	Pipe diameter	Material
ALS202	ALS202	VHG519.., DN 15	G 1	∅ 268	Steel
ALS252	ALS252	VHG519.., DN 20	G 1¼	∅ 337	Steel
ALS259	ALS259	VHG519.., DN 25	G 1½	∅ 337	Steel
ALS329	ALS329	VHG519.., DN 32	G 2	∅ 424	Steel
ALS409	ALS409	VHG519.., DN 40	G 2¼	∅ 483	Steel
ALS509	ALS509	VHG519.., DN 50	G 2¾	∅ 603	Steel

[1] ALS..2: Set of 2
ALS..9: Set of 1

- On valve side: cylindrical thread to ISO 228-1

ALP..
Pressure tubes

The pressure tube for the supply of pressure from flow and return pipes of the HVAC plant to the regulator is available in two lengths. Two type ALP16 pressure tubes are delivered with the pressure regulator as standard. If a longer tube is required, this must be ordered separately, under type code ALP25.

Product no.	Stock no.	Differential pressure regulator	Connecting thread		Material
			valve side	pipe side	
ALP16	ALP16	1600 mm	M8 x 1	G ¼B	Copper
ALP25	ALP25	2500 mm	M8 x 1	G ¼B	Copper

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Example:

Δp_{total} = 300 kPa
$\dot{V}_{100}$ = 10 m³/h
Δp_{Valve} = 40 kPa
$\Delta p_{HeatExchanger}$ = 10 kPa
$\Delta p_{Devices}$ = 20 kPa
$\Delta p_{Pipework}$ = 10 kPa
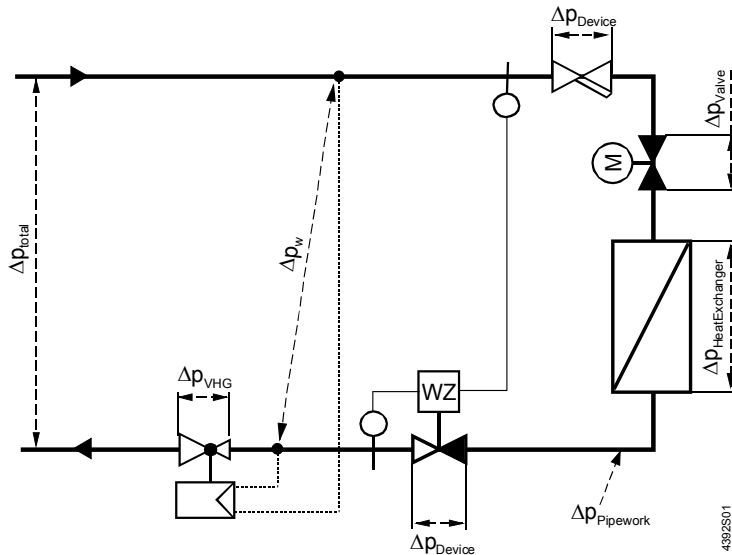
Step 1:   Determine the required effective pressure:

$$\Delta p_w \geq \Delta p_{Devices} + \Delta p_{Valve} + \Delta p_{HeatExchanger} + \Delta p_{Pipework}$$

Example: $\Delta p_w \geq$ 20 kPa + 40 kPa + 10 kPa + 10 kPa = 80 kPa

$\Delta p_{W,set} \geq$ 80 kPa = 90 kPa

A regulator type **VHG519L..** with a yellow spring and an effective differential pressure between 30…220 kPa should be selected.

Step 2:   Calculate the working pressure Δp_{VHG} for the differential pressure regulator:

$$\Delta p_{VHG} = \Delta p_{total} - \Delta p_{w,set}$$

Example: Δp_{VHG} = 300 kPa – 90 kPa = **210 kPa**

Determine required nominal flow value k_v:

$$k_v = \frac{\dot{V}_{100}}{\sqrt{\dfrac{\Delta p_{VHG}}{100}}} = \frac{10 \text{ m}^3/\text{h}}{\sqrt{\dfrac{210 \text{ kPa}}{100}}} = 6.9 \text{ m}^3/\text{h}$$

Step 3:   Select the differential pressure regulator based on the nominal flow and working pressure Δp_{VHG} in the flow diagram.

The required k_v value must be lower than the k_{vs} value of the selected differential pressure regulator:

k_{vs} value = 1.1…1.3 · k_v value

Example: k_{vs} value = 1.1 · 6.9 m³/h = 7.59 m³/h
k_{vs} value = 1.3 · 6.9 m³/h = 8.97 m³/h

Flow diagram
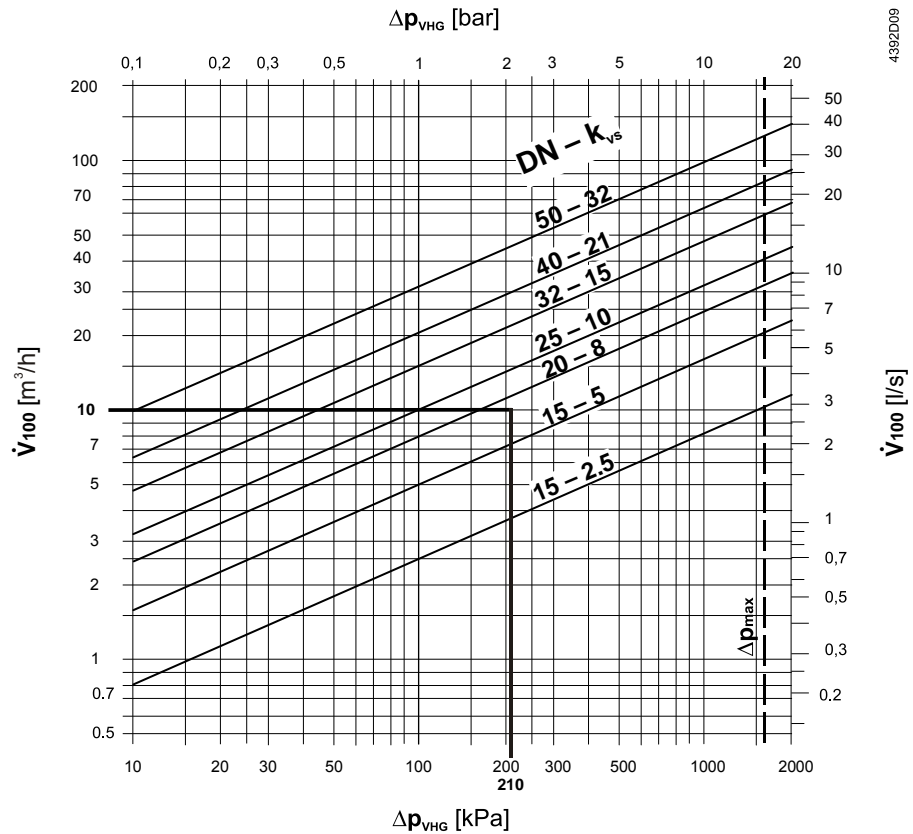
Δp_{VHG} [bar]

$\dot{V}_{100}$ [m³/h]

$\dot{V}_{100}$ [l/s]

Δp_{VHG} [kPa]
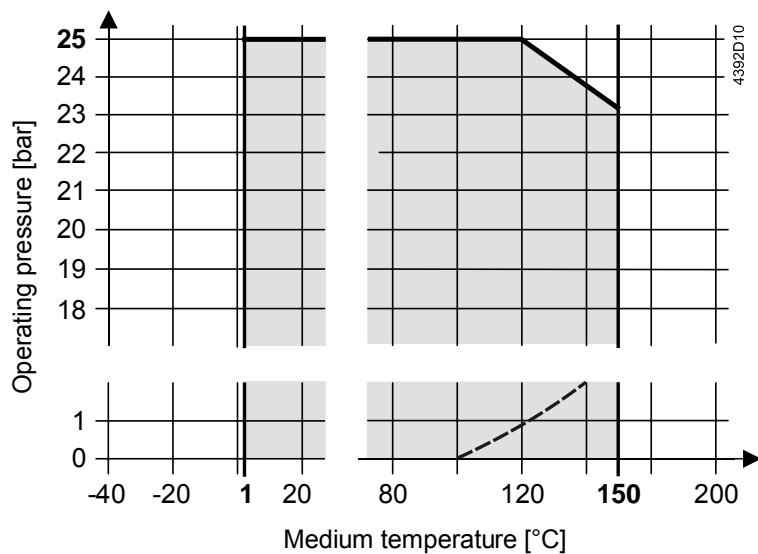
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Δp_{VHG}	=	Differential pressure across the differential pressure regulator
Δp_{max}	=	Maximum permissible differential pressure across the differential pressure regulator at a volumetric flow $\dot{V}_{100}$. For installation in the return pipe Δp_{VHG} should not be above 200 kPa or twice $\Delta p_{w,set,max}$
$\dot{V}_{100}$	=	Volumetric flow through the fully open differential pressure regulator (H_{100})
k_{vs}	=	Nominal flow rate of cold water (5...30 °C) through the fully open differential pressure regulator (H_{100}), at a differential pressure of 100 kPa (1 bar)
100 kPa	=	1 bar ≈ 10 mWC
1 m³/h	=	0.278 l/s water at 20 °C

Example:

Selected:

DN	**= DN 20**
k_{vs}	**= 8 m³/h**

Differential pressure regulator = **VHG519L20-8**

Operating pressure and operating temperature

Fluids

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Operating pressure [bar]

Medium temperature [°C]

--- Curve for saturated steam; steam forms below this line

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Operating pressure and operating temperatures as per ISO 7005 and EN 1092

⚠ All relevant local directives must be observed

Saturated steam
Superheated steam
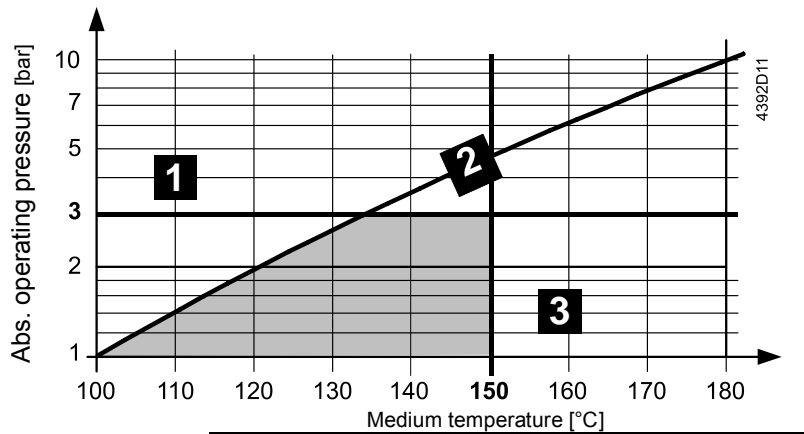
1	Wet steam	To be avoided
2	Saturated steam	Permissible operating range
3	Superheated steam	
A	Subcritical pressure ratio	
B	Supercritical pressure ratio	

Notes

Engineering

- The differential pressure regulator can be installed in either the flow or the return pipe:
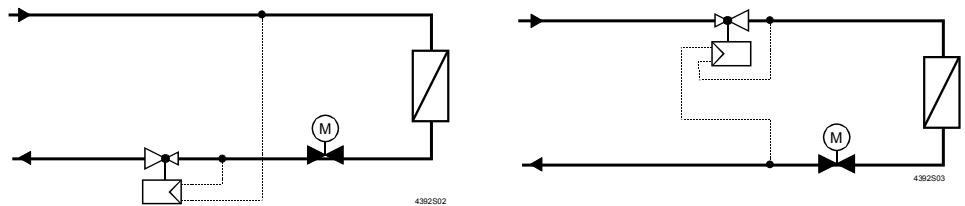
- As long as the total differential pressure Δp_{total} is below twice $\Delta p_{w,set,max}$ or 200 kPa, the regulator should preferably be installed in the return, where in heating systems the seal will be exposed to lower temperatures, so extending its service life. If the total differential pressure is much above 200 kPa, installation in the flow is recommended to protect the installed devices.
- Water should be of the quality recommended in VDI 2035

⚠ - **Recommendation: To increase reliability, a strainer should be installed at the differential pressure regulator inlet.**

- We recommend that the pressure tubes should be connected to the pipework in such a way that they remain horizontal.
  This prevents the ingress of dirt into the control path and possible malfunctioning of the differential pressure regulator.
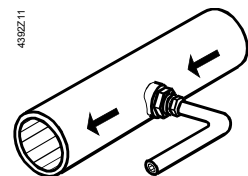
- We recommend that the pressure tube connections should be designed as shown in the picture.
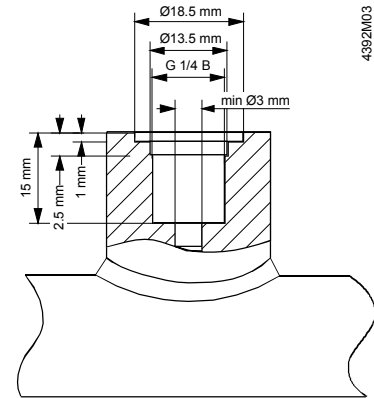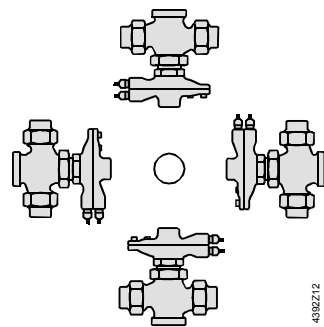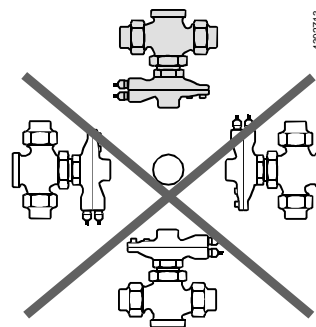

Mounting

The differential pressure regulator, fittings and pressure tubes are easily assembled directly on site. There is no need for special tools or calibration. Mounting instructions are enclosed with the differential pressure regulator.

Orientation

Medium temperature < 90 °C

Medium temperature > 90 °C

Direction of flow

The differential pressure regulator must be installed with the flow in the direction marked: ➡

Commissioning

When carrying out any service work on the regulator and / or pressure tubes:

Warning ⚠

Disable the pump and turn off the power supply, close the shutoff valves, fully reduce the pressure in the piping system and allow pipes to cool down completely. If necessary, disconnect the electrical wires.

Before putting the regulator into operation, ensure that the pressure tubes are correctly fitted.

Disposal

Before disposal, the 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.
All local and currently valid legislation must be observed.

Technical data

Function data	PN class	PN 25
	Operating pressure	Within the range of the permissible medium temperature according to the charts on pages 6ff
	Leakage rate	< 0.05 %
	Permissible operating pressure	2500 kPa (25 bar) to ISO 7268 / EN 1333
	Media Fluids	Cold water
		Low and high-temperature hot water
		Water with antifreeze
		Water with oxygen inhibitors
		Water with additives as specified in VDI 2035
	Steam	Low pressure steam up to 0,4 MPa
Material	Valve body	Spheroidal cast iron GJS-400-15
	Plug, seat and stem	Stainless steel
	Diaphragm and sealing	EPDM
	Diaphragm chamber bonnets	Spheroidal cast iron GJS-400-15
	Fittings ALS..	DN 15…32: 1.0036
		DN 40…50: 1.0308
	ALG..2	Malleable cast iron, phosphated
	ALG..2B	Brass [1]
Dimensions / Weight	Plug type	Contoured, pressure balanced, with soft sealing
	Dimensions	See «Dimensions»
	Threaded connections valve side	G.. in accordance with ISO 228-1
	Threaded connections pressure tubes	G ¼B
	Weight	See «Dimensions»
Standards, directives and approvals	Pressure Equipment Directive	PED 2014/68/EU
	Pressure-carrying accessories	Scope: Article 1, section 1
		Definitions: Article 2, section 5
	Fluid group 2	PN 25
	DN 15…40	Without CE certification as per article 4, section 3 (sound engineering practice) [2]
	DN 50	Category I, Modul A, with CE-marking as per article 14, section 2
	EU conformity (CE) DN 50	A5W00023883
Environmental compatibility	The product environmental declaration contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).	

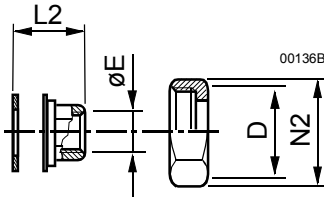[1] ALG..B fittings up to 100 °C media temperature
[2] Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.

Dimensions

Dimensions in mm
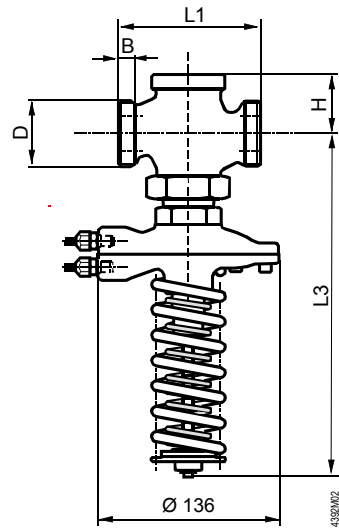
DN	D	B	L1	L3	H	W
	[Inches]	[mm]	[mm]	[mm]	[mm]	[kg]
15	G 1	9	100	254	44.5	4.1
20	G 1¼	10	100	254	44.5	4.4
25	G 1½	11	105	254	44.5	4.7
32	G 2	12	130	274	63	6.1
40	G 2¼	14	140	274	63	7.0
50	G 2¾	16	160	274	63	9.1

Product no. Stock no.	Product no.	Stock no.	Connecting thread valve side D [Inch]	Connecting thread pipe side Ø E [Inch]	L2 [mm]	N2 [mm]
ALG152	ALG152B	S55846-Z100	G 1	Rp ½	24	41
ALG202	ALG202B	S55846-Z102	G 1¼	Rp ¾	25	50
ALG252	ALG252B	S55846-Z104	G 1½	Rp 1	28	55
ALG322	ALG322B	S55846-Z106	G 2	Rp 1¼	32	70
ALG402	ALG402B	S55846-Z108	G 2¼	Rp 1½	34	75
ALG502	ALG502B	S55846-Z110	G 2¾	Rp 2	36	90

- On valve side: cylindrical thread to ISO 228-1
- On pipe side: with cylindrical thread to ISO 7-1
- ALG..B for media temperatures up to 100 °C
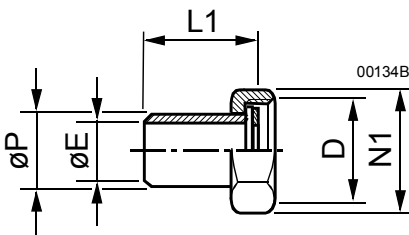
Product no.	Stock no.	Connecting thread valve side Ø D [mm]	Connection pipe side Ø P [mm]	Ø E [mm]	L1 [mm]	N1 [mm]
ALS202	ALS202	G 1	⌀ 26,8	20	41,5	41
ALS252	ALS252	G 1¼	⌀ 33,7	25	41,5	50
ALS259	ALS259	G 1½	⌀ 33,7	29,5	27,5	56
ALS329	ALS329	G 2	⌀ 42,4	37,2	31,5	71
ALS409	ALS409	G 2¼	⌀ 48,3	43,1	33,5	76
ALS509	ALS509	G 2¾	⌀ 60,3	54,5	36,5	91

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