



Acvatix™

## Differential pressure regulator PN25 with flow limitation

**VSG519..**

- 
- Spheroidal cast iron GJS-400-15
  - DN 15...50
  - $k_{vs}$  2.5...28.5 m<sup>3</sup>/h
  - Differential pressure adjustable
  - Suitable for mounting in flow or return pipes
  - For differential pressure regulators without flow limitation, see data sheet Q4392 (VHG519..)

### Use

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

## Type summary

### VSG519K..

Versions with adjustable  $\Delta p_w$  settings (red, small spring)

Product no. Stock no.	DN	G [Inch]	$k_{vs}$ [m <sup>3</sup> /h]	$\Delta p_w$ [kPa]	$\Delta p_{min,total}$ [kPa]	Coefficient k
VSG519K15-2.5	15	G 1	2.5	15...60	$\Delta p_{w,set} + 100 \cdot \left( \frac{\dot{V}_{100}}{k_{vs}} \right)^2$	1
VSG519K15-5			5			1.12
VSG519K20-8	20	G 1¼	8			1.15
VSG519K25-10	25	G 1½	10			1.1
VSG519K32-15	32	G 2	15			1
VSG519K40-21	40	G 2¼	21			1.05
VSG519K50-28.5	50	G 2¾	28.5	25...70	1.25	

### VSG519L..

Versions with adjustable  $\Delta p_w$  settings (yellow spring)

Product no. Stock no.	DN	G [Inch]	$k_{vs}$ [m <sup>3</sup> /h]	$\Delta p_w$ [kPa]	$\Delta p_{min,total}$ [kPa]	Coefficient k
VSG519L15-2.5	15	G 1	2.5	30...210	$\Delta p_{w,set} + 100 \cdot \left( \frac{\dot{V}_{100}}{k_{vs}} \right)^2$	1
VSG519L15-5			5			1.12
VSG519L20-8	20	G 1¼	8			1.15
VSG519L25-10	25	G 1½	10			1.1
VSG519L32-15	32	G 2	15			1
VSG519L40-21	40	G 2¼	21			40...220
VSG519L50-28.5	50	G 2¾	28.5	1.25		

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)

$\Delta p_w$  = Effective differential pressure, adjustable at VSG519K.., VSG519L..

$\Delta p_{w,set}$  = Effective differential pressure setting at VSG519K.., VSG519L..

$\Delta p_{min,total}$  = 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 ( $H_{100}$ )

k = Correction coefficient for sizing

## Accessories

Product no.	Stock no.	Description
ALS..2	ALS..2	Set of 2 fittings with weldable connections for 2-port valves, consisting of 2 union nuts, 2 discs and 2 flat seals.
ALS..9	ALS..9	For ALS..9 order two sets, as it is a set of 1 fitting.
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.
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
VSG519L25-10	VSG519L25-10	Differential pressure regulator. Two ALP16 pressure tubes are delivered with the pressure regulator as standard.	1
ALG252	ALG252	Fitting with threaded connections.	1

### Delivery

The differential pressure regulator and fittings are packed separately.

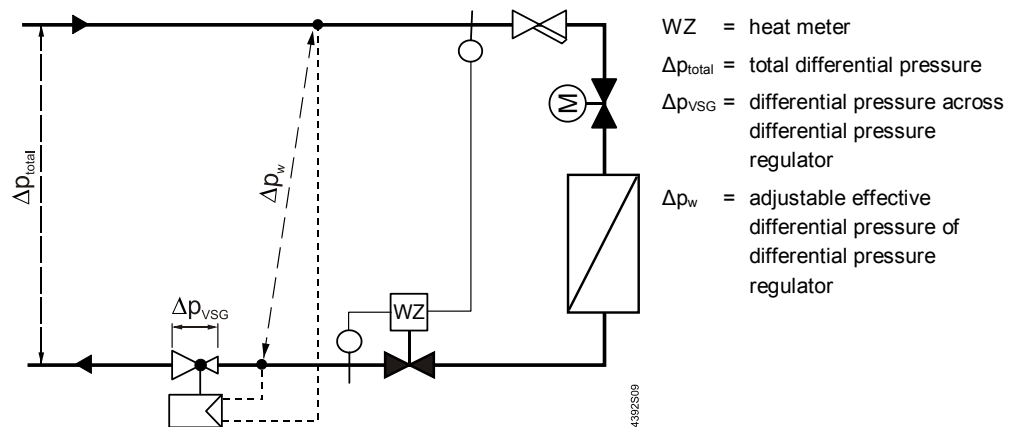
### Hint

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

**Principle of operation**

The self-acting VSG519.. differential pressure regulator is designed to maintain a constant effective differential pressure  $\Delta p_w$  across a given system. This is achieved by exposing a diaphragm to the effects of the inlet and outlet pressure of the system. Deflections of the diaphragm are transferred to the plug, which closes respectively opens the differential pressure regulator as the total differential pressure  $\Delta p_{total}$  increases, respectively decreases and maintains therefore the effective differential pressure  $\Delta p_w$  constant. The plug is pressure-balanced, so that the effective differential pressure  $\Delta p_w$  is neither affected by the pressure ratio  $\Delta p_{VSG}$  inside the regulator and the total differential pressure  $\Delta p_{total}$ .

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.

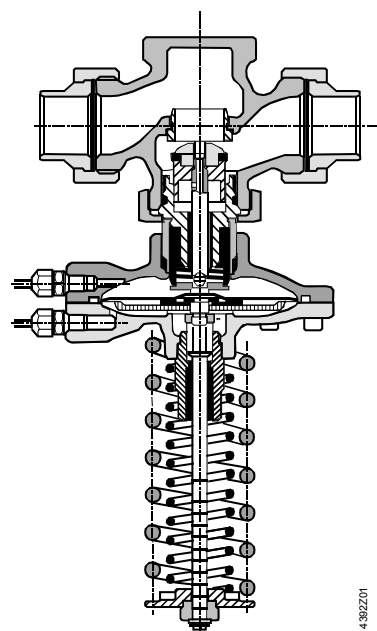


In cases where the required differential pressure value is between two spring ranges (red, yellow), it is advisable to choose the range with lower effective differential pressure  $\Delta p_w$  values to ensure the sensitivity of the differential pressure regulator.

The maximal volumetric flow in the branch can be pre-set with a flow limiter plug in 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.

VSG519K.. (only one spring),  
 VSG519L..



## Accessories

### 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	VSG519..., DN 15	G 1	Rp ½	Malleable cast iron
ALG202	ALG202	VSG519..., DN 20	G 1¼	Rp ¾	Malleable cast iron
ALG252	ALG252	VSG519..., DN 25	G 1½	Rp 1	Malleable cast iron
ALG322	ALG322	VSG519..., DN 32	G 2	Rp 1¼	Malleable cast iron
ALG402	ALG402	VSG519..., DN 40	G 2¼	Rp 1½	Malleable cast iron
ALG502	ALG502	VSG519..., DN 50	G 2¾	Rp 2	Malleable cast iron

### ALS..2, ALS..9

Fittings with weldable connections, steel

Product no. <sup>1)</sup>	Stock no.	Differential pressure regulator	Connecting thread valve side	Pipe diameter	Material
ALS202	ALS202	VSG519..., DN 15	G 1	Ø 268	Steel
ALS252	ALS252	VSG519..., DN 20	G 1¼	Ø 337	Steel
ALS259	ALS259	VSG519..., DN 25	G 1½	Ø 337	Steel
ALS329	ALS329	VSG519..., DN 32	G 2	Ø 424	Steel
ALS409	ALS409	VSG519..., DN 40	G 2¼	Ø 483	Steel
ALS509	ALS509	VSG519..., DN 50	G 2¾	Ø 603	Steel

<sup>1)</sup> ALS..2: Set of 2

ALS..9: Set of 1

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

### ALP..

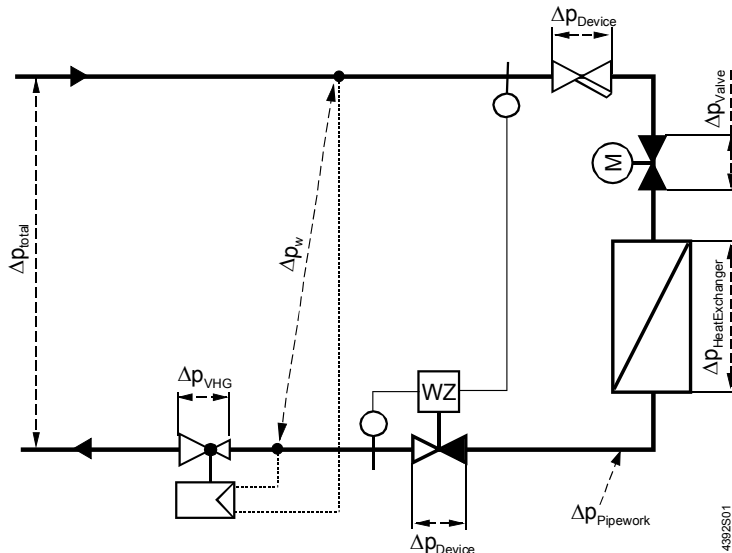
Pressure tubes

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

**Example:**

- $\Delta p_{total} = 300 \text{ kPa}$
- $\dot{V}_{100} = 12 \text{ m}^3/\text{h}$
- $\Delta p_{Valve} = 40 \text{ kPa}$
- $\Delta p_{HeatExchanger} = 10 \text{ kPa}$
- $\Delta p_{Devices} = 20 \text{ kPa}$
- $\Delta p_{Pipeline} = 10 \text{ kPa}$



**Step 1:**

Define the required effective differential pressure:

$$\Delta p_w = \Delta p_{Devices} + \Delta p_{Valve} + \Delta p_{HeatExchanger} + \Delta p_{Pipeline}$$

*Example:*

$$\Delta p_w \geq 40 \text{ kPa} + 10 \text{ kPa} + 20 \text{ kPa} + 10 \text{ kPa} = \mathbf{80 \text{ kPa}}$$

$$\Delta p_{w,set} \geq 80 \text{ kPa} = \mathbf{90 \text{ kPa}}$$

A regulator, type **VSG519L...** with a yellow spring and an effective differential pressure range  $\Delta p_w$  30...220 kPa should be selected.

**Step 2:**

Calculate the working pressure  $\Delta p_{VSG}$  available for the differential pressure regulator:

$$\Delta p_{VSG} = \Delta p_{ges} - \Delta p_{w,set}$$

*Example:*

$$\Delta p_{VSG} = 300 \text{ kPa} - 90 \text{ kPa} = \mathbf{210 \text{ kPa}}$$

Determine required nominal flow value  $k_v$ :

$$k_v = \frac{\dot{V}_{100}}{\sqrt{\frac{\Delta p_{VSG}}{100}}} = \frac{12 \text{ m}^3 / \text{h}}{\sqrt{\frac{210 \text{ kPa}}{100}}} = 8.3 \text{ m}^3 / \text{h}$$

**Step 3:**

Select the differential pressure regulator based on the nominal flow and working pressure  $\Delta p_{VSG}$  in the flow diagram.

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

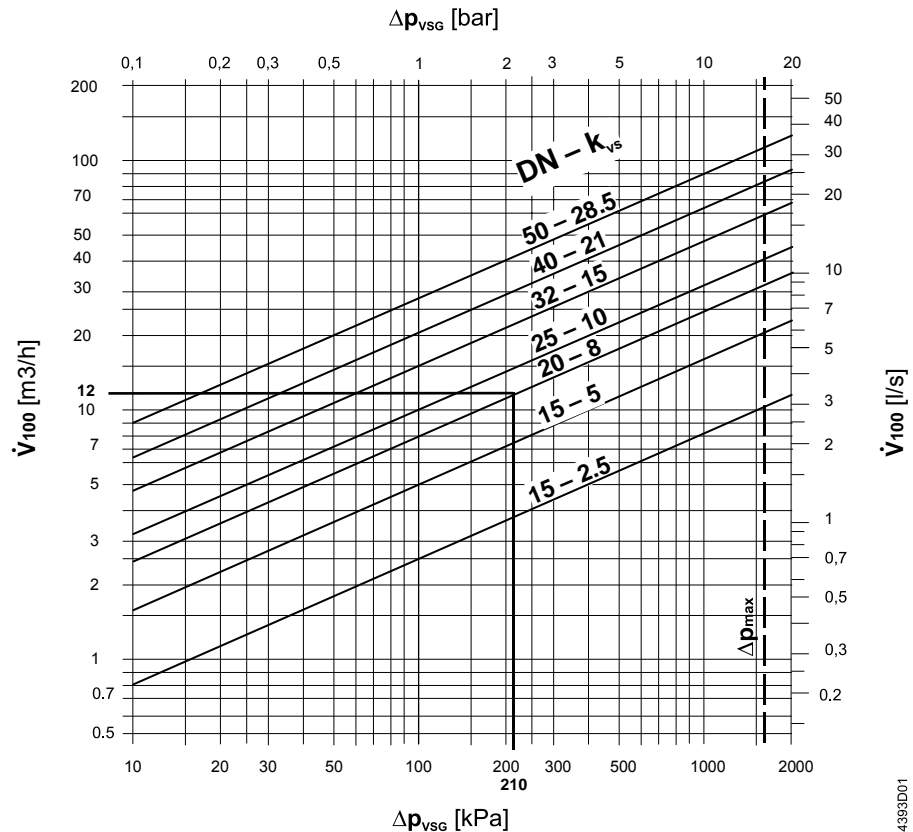
$$k_{vs} \text{ value} = 1.1 \dots 1.3 \cdot k_v \text{ value}$$

*Example:*

$$k_{vs} \text{ value} = 1.1 \cdot 8.3 \text{ m}^3/\text{h} = 9.1 \text{ m}^3/\text{h}$$

$$k_{vs} \text{ value} = 1.3 \cdot 8.3 \text{ m}^3/\text{h} = 10.8 \text{ m}^3/\text{h}$$

Flow rate diagram



$\Delta p_{VSG}$  = Differential pressure across the differential pressure regulator  
 $\Delta p_{max}$  = Maximum permissible differential pressure across the differential pressure regulator at a volumetric flow  $\dot{V}_{100}$ . For installation in the return pipe  $\Delta p_{VSG}$  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  $\approx$  10 mWC  
 1 m<sup>3</sup>/h = 0.278 l/s water at 20 °C

**Example:** Selected:  
 DN = **DN 25**  
 $k_{vs}$  = **12 m<sup>3</sup>/h**  
 Differential pressure regulator = **VSG519L25-10**

**Step 4:** Determination of the flow limiter setting:

**Example:** Calculated  $k_v$  value:

$$k_v = 8.3 \text{ m}^3/\text{h}$$

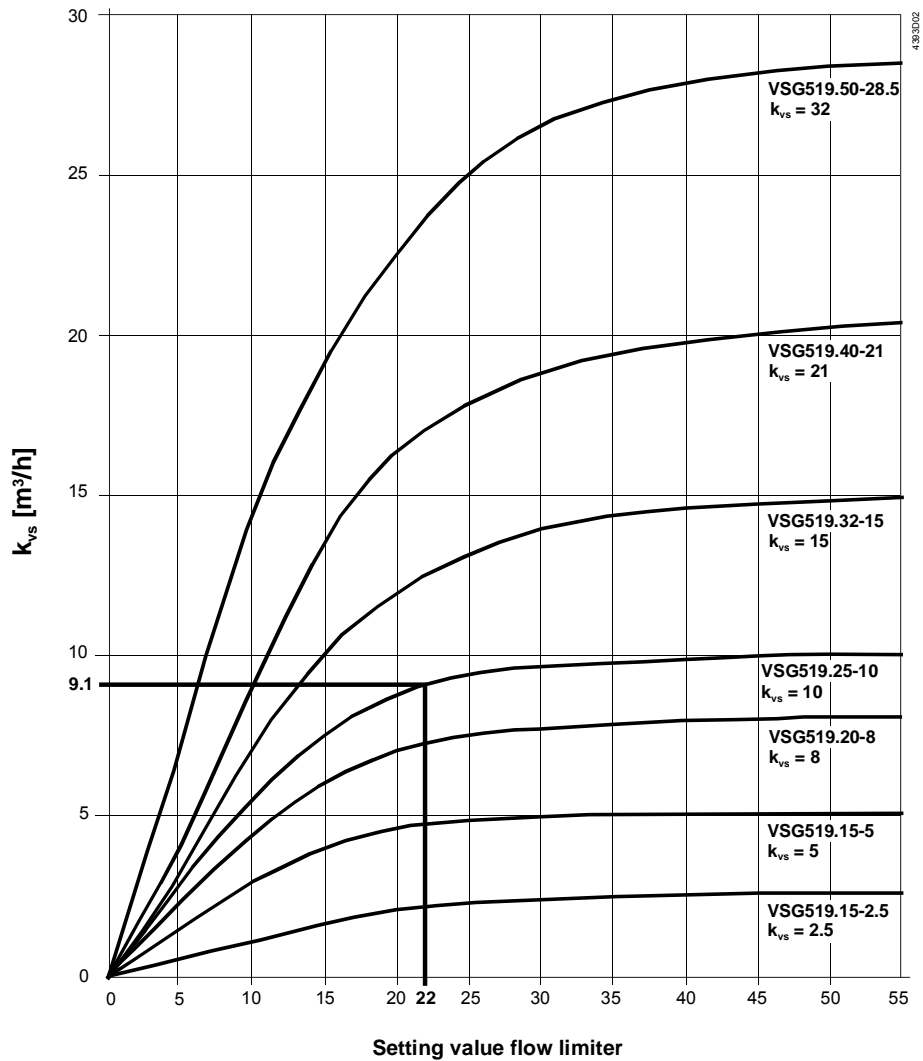
Determining the correction coefficient  $k$  for the  $k_v$  value of the selected differential pressure regulator:

$$k_{v,cor} = k_v \cdot k$$

**Example:** For the regulator VSG519L25-10 the correction coefficient is 1.1 (see type summary on page 2):

$$k_{v,cor} = 8.3 \text{ m}^3/\text{h} \cdot 1.1 = \mathbf{9.1 \text{ m}^3/\text{h}}$$

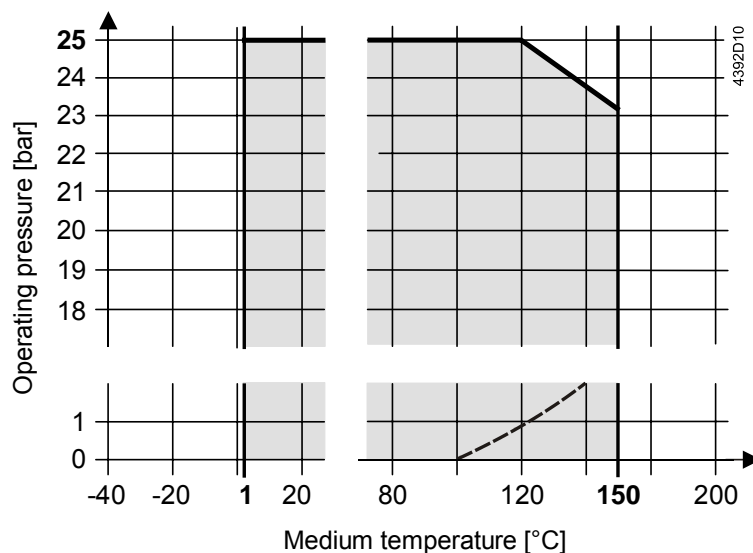
Determining the flow limiter setting based on corrected  $k_v$  value  $k_{v,cor}$  in the following regulator sizing diagram.



Flow limiter setting = 22

Operating pressure and operating temperature

Fluids



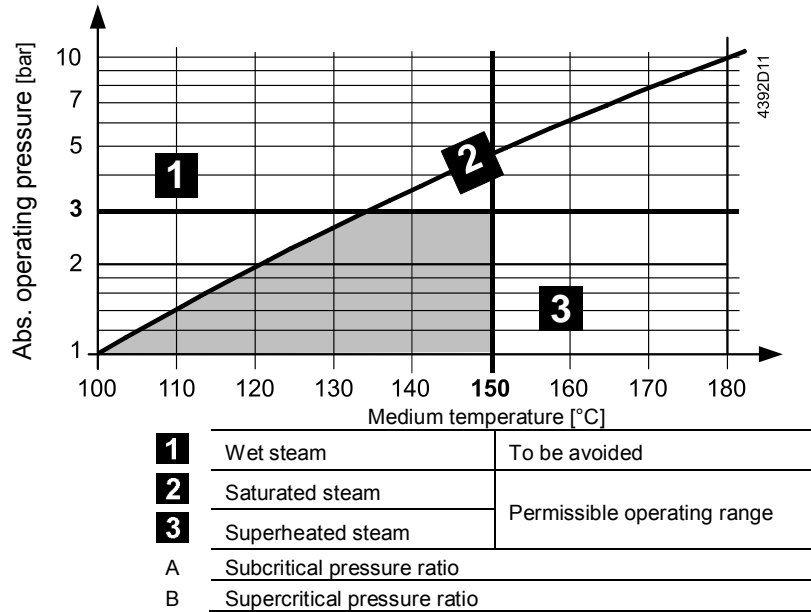
--- Curve for saturated steam; steam forms below this line

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



All relevant local directives must be observed

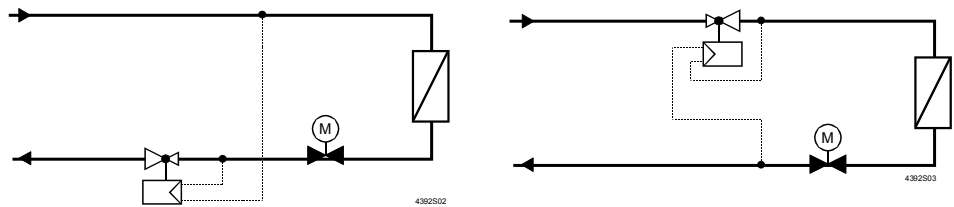
Saturated steam  
Superheated steam



Notes

Engineering

- The differential pressure regulator can be installed in either the flow or the return pipe:



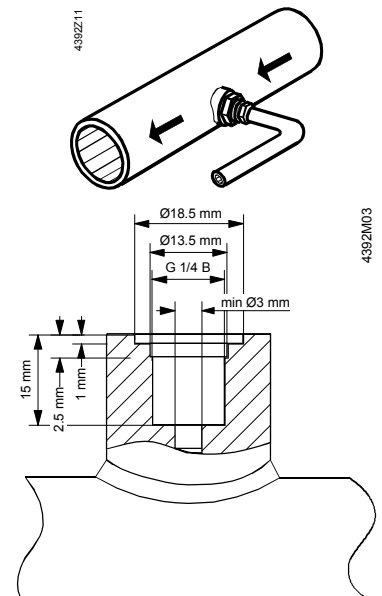
- As long as the total differential pressure  $\Delta p_{total}$  is below twice maximal  $\Delta p_{w,set}$  or 200 kPa, the differential pressure regulator should preferably be installed in the return pipe, where in heating systems the seal will be exposed to lower temperatures, so extending its service life. If the total differential pressure is much above 200 kPa, installation in the flow pipe 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 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.



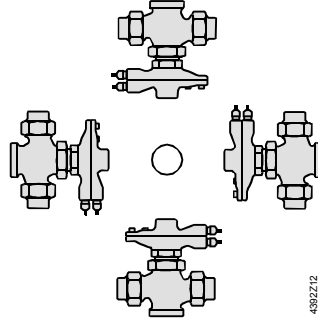


## Mounting

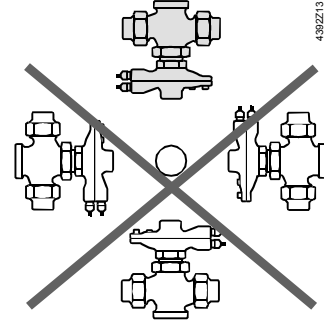
The regulator, fittings and pressure tubes are easily assembled directly on site. There is no need for special tools or calibration. Mounting instructions are enclosed with the differential pressure regulator.

## Orientation

Medium temperature < 90 °C



Medium temperature > 90 °C



## Important

Direction of flow → :

The regulator must be installed so that the direction of flow is as marked on the device.

## Commissioning

**Warning !** ⚠

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

**Deactivate 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, make certain 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.**

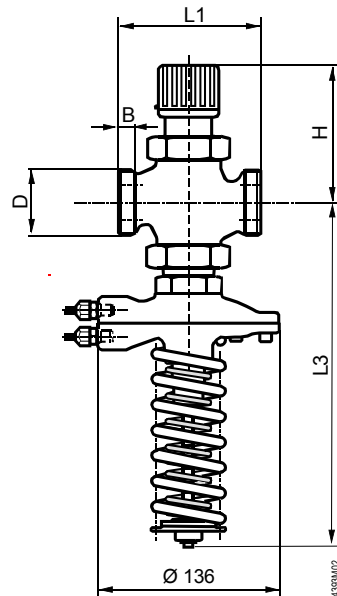
## Technical data

Function data	PN class	PN 25			
	Operating pressure	Within the range of the permissible medium temperature according to the charts on pages 7ff			
	Leakage rate	< 0.05 %			
	Permissible operating pressure	2500 kPa (25 bar) to ISO 7268 / EN 1333			
	Media	<table border="0"> <tr> <td>Fluids</td> <td>           Cold water            Low and high-temperature hot water            Water with antifreeze            Water with oxygen inhibitors            Water with additives as specified in VDI 2035         </td> </tr> <tr> <td>Steam</td> <td>Low pressure steam up to 0,4 MPa</td> </tr> </table>	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
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	<table border="0"> <tr> <td>ALS..</td> <td>DN 15...32: 1.0036 DN 40...50: 1.0308</td> </tr> <tr> <td>ALG..2</td> <td>Malleable cast iron, phosphated</td> </tr> </table>	ALS..	DN 15...32: 1.0036 DN 40...50: 1.0308	ALG..2
ALS..	DN 15...32: 1.0036 DN 40...50: 1.0308				
ALG..2	Malleable cast iron, phosphated				
Dimensions/Weight	Plug type	Contoured, pressure balanced, with soft sealing			
	Dimensions	See «Dimensions»			
	Thread connections	G... according ISO228-1			
	Threads for pressure tubes	G ¼ B			
Standards, directives and approvals	Weight	See «Dimensions»			
	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			
		<table border="0"> <tr> <td>DN 15...40</td> <td>Without CE certification as per article 4, section 3 (sound engineering practice) <sup>1)</sup></td> </tr> <tr> <td>DN 50</td> <td>Category I, Modul A, with CE-marking as per article 14, section 2</td> </tr> </table>	DN 15...40	Without CE certification as per article 4, section 3 (sound engineering practice) <sup>1)</sup>	DN 50
DN 15...40	Without CE certification as per article 4, section 3 (sound engineering practice) <sup>1)</sup>				
DN 50	Category I, Modul A, with CE-marking as per article 14, section 2				
Environmental compatibility	EU conformity (CE)	DN 50 A5W00023883			
	The product environmental declaration contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).				

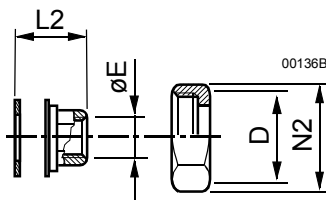
<sup>1)</sup> Valves where PS x DN < 1000, do not require special testing and cannot carry the CE label.

## Dimensions

Dimensions in mm

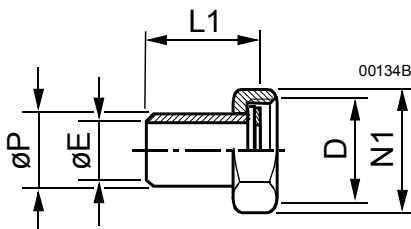


DN	D [Inches]	B [mm]	L1 [mm]	L3 [mm]	H [mm]	W [kg]
15	G 1	9	100	254	100	4.5
20	G 1¼	10	100	254	100	4.8
25	G 1½	11	105	254	100	5.1
32	G 2	12	130	274	119	6.9
40	G 2¼	14	140	274	119	7.9
50	G 2¾	16	160	274	119	10.4



Product no.	Connecting thread valve side D	Connecting thread pipe side Ø E	L2	N2
Stock no.	[Inch]	[Inch]	[mm]	[mm]
ALG152	G 1	Rp ½	24	41
ALG202	G 1¼	Rp ¾	25	50
ALG252	G 1½	Rp 1	28	55
ALG322	G 2	Rp 1¼	32	70
ALG402	G 2¼	Rp 1½	34	75
ALG502	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



Product no.	Stock no.	Connecting thread valve side Ø D	Connection pipe side Ø P	Ø E	L1	N1
		[mm]	[mm]	[mm]	[mm]	[mm]
ALS202	ALS202	G 1	Ø 26,8	20	41,5	41
ALS252	ALS252	G 1¼	Ø 33,7	25	41,5	50
ALS259	ALS259	G 1½	Ø 33,7	29,5	27,5	56
ALS329	ALS329	G 2	Ø 42,4	37,2	31,5	71
ALS409	ALS409	G 2¼	Ø 48,3	43,1	33,5	76
ALS509	ALS509	G 2¾	Ø 60,3	54,5	36,5	91

