

# Self-operated Regulators Series 46

## Differential Pressure Regulators with Flow Limitation

### Type 46-5 · Type 46-6



#### Application

Differential pressure control and flow limitation in district heating supply networks with indirect connection, large pipelines and industrial plants · Valve sizes **DN 15 to DN 50** Nominal pressure **PN 16/25** · Suitable for liquids up to **150 °C** and gases up to **80 °C**

The valve **closes** when the differential pressure increases. The flow rate is limited.

The regulators consist of a globe valve with an adjustable restriction (orifice) in the valve body and an actuator with operating diaphragm.

#### Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Only one control line needs to be attached on installing the regulator
- Suitable for water and other liquids and gases, provided they do not cause the materials used to corrode
- Single-seated valve with a balanced plug
- Particularly suitable for district heating plants conforming to DIN 4747 (requirements stipulated by AGFW (German District Heating Association) concerning components in house substations)
- With internal overload protection (excess pressure limiter) in the actuator

#### Versions (Figs. 1 and 2)

Series 46 Differential Pressure Regulators with valves in nominal sizes DN 15 to DN 50 with welding ends (special version with threaded ends or flanges) · Nominal sizes DN 32, 40 and 50 also available with flanged valve body made of spheroidal graphite iron · Integrated restriction (orifice) to adjust flow rate limitation · For installation in low pressure pipes, e.g. in the return flow pipe · With internal overload protection in actuator Closing actuator with low pressure connection through a hole in the plug

Refer to the section on the differential pressure across the valve in Table 1 on selecting the regulators

**Type 46-5** (Fig. 1) · Differential pressure regulator with flow limitation · Fixed differential pressure set point adjusted to  $\Delta p = 0.2, 0.3, 0.4$  or  $0.5$  bar

**Type 46-6** (Fig. 2) · Differential pressure regulator with flow limitation · Differential pressure set point  $\Delta p$  0.2 to 2 bar adjustable using a set point screw · DN 15 to 32, set point range 0.2 to 1 bar adjustable at a manual adjuster

#### Special version

ANSI version · Version with internal parts resistant to mineral oil (PN 25 only) · Special  $K_{VS}$  for DN 15



Fig. 1 · Type 46-5 (fixed set point)



Fig. 2 · Type 46-6 (adjustable set point)



**Table 1 · Technical data**

Nominal size	DN	15	20	25	32 <sup>1)</sup>	40 <sup>1)</sup>	50 <sup>1)</sup>
K <sub>VS</sub>		2.5	6.3	8	12.5	16	20
	Special version	0.4/1/4	–	–	–	–	–
	Flanged body version	–	–	–	12.5	20	25
z value (standard)		0.6			0.55		0.5
	Flanged body version	–	–	–	0.45	0.45	0.4
Nominal pressure	PN	16/25			25		
Max. perm. differential pressure $\Delta p$ across the valve		10 <sup>2)</sup> /20 bar				16 bar	
Max. perm. temperature		Liquids: 130 °C <sup>2)</sup> /150 °C · Air and non-flammable gases: 80 °C					
Pressure above adjusted diff. pressure at which int. excess pressure limiter responds		0.5 bar					
<b>Differential pressure set point ranges</b>							
Type 46-6 · Set point continuously adjustable		0.2 to 1 bar · 0.5 to 2 bar					
Type 46-5 · Fixed set point		0.2 · 0.3 · 0.4 · 0.5 bar					

<sup>1)</sup> Additional version: Valve with flanged body made of spheroidal graphite iron (EN-JS 1049) · <sup>2)</sup> For PN 16 version

**Flow rate set points for water in m<sup>3</sup>/h**

$\Delta p_{\text{set point}}$	$\Delta p_{\text{plant}}$	$\Delta p_{\text{rest}}$	DN	15				20	25	32 <sup>1)</sup>	40 <sup>1)</sup>	50 <sup>1)</sup>
			K <sub>VS</sub>	0.4	1	2.5	4	6.3	8	12.5	16/20 <sup>1)</sup>	20/25 <sup>1)</sup>
			$\dot{V}$ min	0.01	0.12	0.2	0.5	0.8	0.8	2	3	4
0.2 bar	0.1 bar	<b>0.1 bar</b>	$\dot{V}$ max	0.14	0.45	0.85	1.8	2.6	3.6	7.1	8.9	10.7
0.5 bar	0.3 bar	<b>0.2 bar</b>	$\dot{V}$ max	0.2	0.65	1.2	2.5	3.6	5	10	12.5	15
				–	–	–	1.3 <sup>2)</sup>	2.3 <sup>2)</sup>	3.5 <sup>2)</sup>	5.8 <sup>2)</sup>	9.1 <sup>2)</sup>	14.1 <sup>2)</sup>

<sup>1)</sup> Additional version: Valve with flanged body made of spheroidal graphite iron (EN-JS1049)

<sup>2)</sup> An increase in noise level can be expected when the specified flow rates are exceeded, even if cavitation does not occur.

**Differential pressure across the valve**

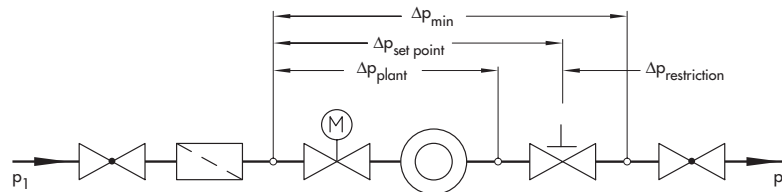
On selecting the differential pressure set point or set point range, note that the differential pressure set point  $\Delta p_{\text{set point}}$  results from the known pressure drop across the fully open plant  $\Delta p_{\text{plant}}$  and the differential pressure created at the restriction  $\Delta p_{\text{restriction}}$

The pressure at the restriction  $\Delta p_{\text{restriction}}$  can be assumed to be 0.2 bar. The flow rates are specified with an upper differential pressure of 0.1 bar and 0.2 bar in the table.

$$\Delta p_{\text{set point}} = \Delta p_{\text{plant}} + \Delta p_{\text{restriction}}$$

The minimum required differential pressure  $\Delta p_{\text{min}}$  between the flow pipe and the return flow pipe is calculated as follows:

$$\Delta p_{\text{min}} = \Delta p_{\text{set point}} + \left( \frac{\dot{V}}{K_{\text{VS}}} \right)^2$$



- $\Delta p_{\text{min}}$  Minimum differential pressure between the flow and return flow pipes in bar
- $\Delta p_{\text{restriction}}$  Differential pressure created at the restriction to measure the flow rate in bar
- $\Delta p_{\text{set point}}$  Differential pressure set point in bar
- $\Delta p_{\text{plant}}$  Differential pressure when the plant is fully opened (pressure drop) in bar
- $\dot{V}$  Adjusted flow rate in m<sup>3</sup>/h
- $K_{\text{VS}}$  Valve flow coefficient in m<sup>3</sup>/h

Fig. 4 · Pressure conditions at the regulator

**Table 2 · Material** · Material number acc. to DIN EN

Valve body	Red brass CC491K/CC499K (Rg 5) · Spheroidal graphite iron EN-JS 1049 <sup>1)</sup>	
Cover	Red brass CC491K/CC499K (Rg 5)	
Seat	Stainless steel 1.4305	
Plug	PN 25	Brass, free of dezincification, with EPDM soft sealing <sup>2)</sup>
	PN 16	Brass, free of dezincification, and plastic with EPDM soft sealing <sup>2)</sup>
Valve springs	Stainless steel 1.4310	
Restriction (orifice)	Brass, free of dezincification	
Operating diaphragm	EPDM with fabric reinforcement <sup>2)</sup>	
Seals	EPDM <sup>2)</sup>	

1) Additional version for DN 32, 40 and 50: Valve with flanged body made of spheroidal graphite iron

2) Special version for mineral oil: FPM (FKM)

**Installation**

The regulator is suitable for installation in horizontal pipes as well as vertically running pipes.

Regulators in sizes DN 32 and larger may only be installed horizontal pipes with the actuator pointing downwards.

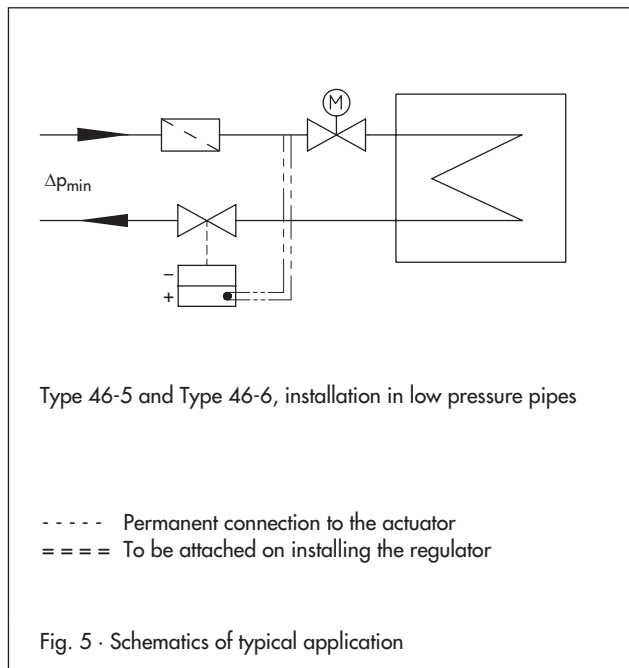
The following points must be observed:

- The medium must flow through the valve in the direction indicated by the arrow on the valve body.
- Connect the external control line at the side or on top to the high pressure pipe.
- If possible, install a strainer (e.g. SAMSON Type 1 NI) upstream of the valve, e.g. upstream of the transfer station.

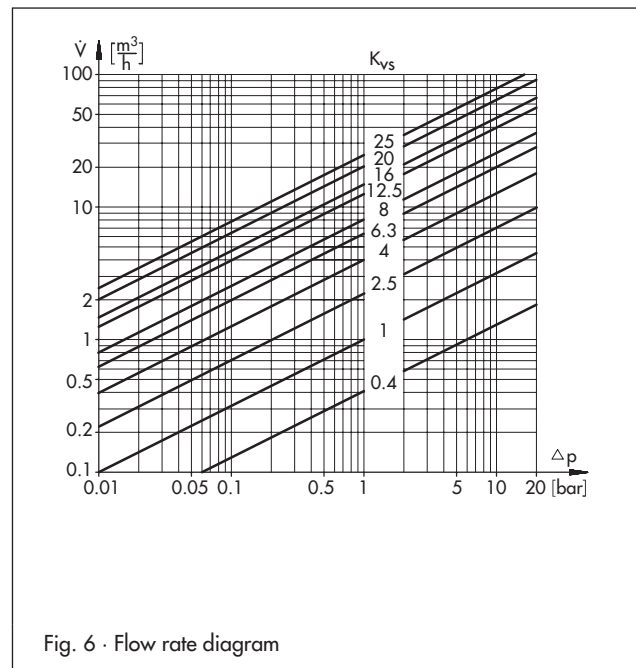


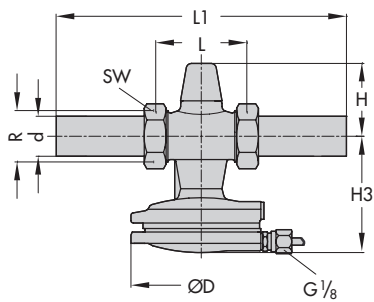
Further details can be found in EB 3130 EN.

**Typical application**

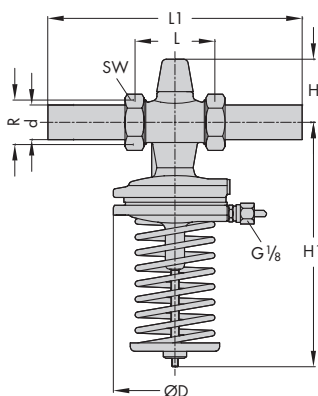


**Flow rate diagram for water**

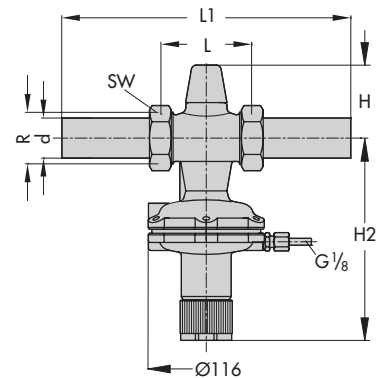




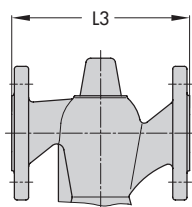
Type 46-5  
Connection nuts and welding ends



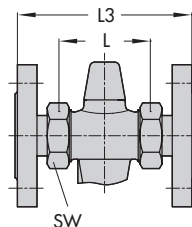
Type 46-6  
Connection nuts and welding ends



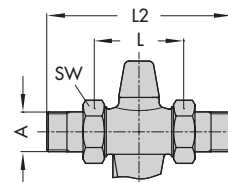
Type 46-6  
Set point adjustment with manual  
adjuster, DN 15 to 32; 0.2 to 1 bar



Flanged body in sizes  
DN 32, 40 and 50



Version with connection  
nuts and flanges



Version with connection  
nuts and threaded ends

#### Dimensions in mm

Nominal sizes DN	15	20	25	32 <sup>1)</sup>	40 <sup>1)</sup>	50 <sup>1)</sup>
Connection R	G 3/4	G 1	G 1 1/4	G 1 3/4	G 2	G 2 1/2
Pipe Ø d	21.3	26.8	32.7	42	48	60
Width across flats SW	30	36	46	59	65	82
Length L	65	70	75	100	110	130
H	65			85		
Height H1	230		250	380		
Height H2	160		180	-		
Height H3	85		105	140		
ØD	116				160	

<sup>1)</sup> Additional version: Valve with flanged body

The dimensions and weights of valves with flanged bodies (DN 32, DN 40 and DN 50) are identical to those valves with screwed-on flanges!

#### Dimensions in mm and weights in kg · Including connections

Nominal sizes DN	15	20	25	32	40	50
<b>With welding ends</b>						
Length L1	210	234	244	268	294	330
Weight, approx. in kg	46-5: 1.6	1.7	1.8	3	5.5	6
	46-6: 2.0	2.1	2.2	3.2	10	10.5
<b>With threaded ends</b>						
Length L2	129	144	159	180	196	228
Male thread A	G 1/2	G 3/4	G 1	G 1 1/4	G 1 1/2	G 2
Weight, approx. in kg	46-5: 1.6	1.7	1.8	3	5.5	6
	46-6: 2.0	2.1	2.2	3.2	10	10.5
<b>With flanges<sup>1) 2)</sup> or with flanged body (DN 32 to 50)</b>						
L3	130	150	160	180	200	230
Weight, approx. in kg	46-5: 3.0	3.7	4.3	6.2	9.5	11
	46-6: 3.4	4.1	4.7	6.4	14	15.5

<sup>1)</sup> PN 16/25

<sup>2)</sup> Valves in DN 40 and DN 50 already have flanges mounted

Fig. 7 · Dimensions

**Ordering text**

Differential Pressure Regulator with Flow Limitation

Type 46-5/46-6

DN ..., PN ...

Permissible temperature ... ° C

$K_{VS}$  ...

With welding ends/threaded ends/flanges/  
flanged body in DN 32, 40 and 50

Differential pressure set point or set point range ... bar

On option, special version ...

Specifications subject to change without notice.



SAMSON AG · MESS- UND REGELTECHNIK  
Weismüllerstraße 3 · 60314 Frankfurt am Main · Germany  
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507  
Internet: <http://www.samson.de>

**T 3130 EN**

2011-09