DATA SHEET

T 3130 EN

Type 2465 (Type 46-5) Differential Pressure Regulators with Flow Limitation
Type 2466 (Type 46-6) Differential Pressure Regulators with Flow Limitation

Series 46 Self-operated Regulators

CE

Application

Differential pressure and flow limitation for district heating systems with indirect connection, extended piping systems and industrial applications
Valves **DN 15 to 50** · **PN 16 and 25** · Suitable for liquids up to **150 °C** and gases up to **80 °C**

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

The regulator consists of a globe valve with adjustable restriction on 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 installed on mounting the regulator.
- Suitable for water and other liquids or gases, provided these do not cause corrosion.
- Single-seated valve with balanced plug
- Particularly suitable for district heating plants according to DIN 4747-1 (AGFW requirements for components in house substations)
- With internal overload protection (excess pressure limiter) in the actuator

Versions

Series 46 Differential Pressure Regulators with Flow Limitation

Valves DN 15 to 50 with connection nuts and welding ends. Valves in DN 32, 40 and 50 also with flanged body made of spheroidal graphite iron.

– Integrated restriction for adjusting the flow rate limitation
– For installation in the low-pressure line, e.g. return pipe
– Closing actuator with integrated low-pressure connection through a hole in the plug

Type 46-5 (Fig. 1) · Differential pressure regulator with flow limitation consisting of Type 2465 Valve/Actuator combination · Fixed differential pressure set point, adjusted to Δp = 0.2, 0.3, 0.4 or 0.5 bar

Fig. 1: *Type 46-5 with fixed set point*

Fig. 2: *Type 46-6 with adjustable set point*

Type 46-6 (Fig. 2) · Differential pressure regulator with flow limitation consisting of the Type 2466 Valve/Actuator combination · Differential pressure set point Δp from 0.2 to 4 bar adjustable at an adjusting screw · DN 15 to 32, set point range 0.2 to 1 bar with set point adjustment at a manual adjuster

Further versions

– DN 15 to 50 with threaded ends or screw-on flanges
– PN 25 version: with internal parts made of FKM, e.g. for use with mineral oils
– Special K_{VS} coefficient in DN 15

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Edition February 2025

Principle of operation

The medium flows through the valve in the direction indicated by the arrow. The areas released by the restriction (1.2) and the valve plug (3) determine the flow rate and the differential pressure Δp. The high pressure of the plant is transmitted to the bottom diaphragm chamber of the actuator (6). The pressure downstream of the restriction (1.2) (not the low pressure of the plant) acts from the top on the operating diaphragm (6.1) through a hole in the plug (3). The resulting differential pressure is converted into a positioning force. This force moves the plug according to the force of the valve spring (5) or set point spring (8).

In Type 46-5, the springs (5) in the valve determines the set point. In Type 46-6, the set point can be adjusted at the set point adjuster (10).

The maximum flow rate (flow limitation) is adjusted at the restriction (1.2). The cross-section of the valve is changed in such a way that the differential pressure and the differential pressure created at the restriction are identical when the required maximum flow rate exists.

An overload protection (excess pressure limiter; 16) in the actuator protects the seat and plug from overload during exceptional operating conditions that could lead to valve or plant damage.

Table 1: *Technical data*

Nominal size	**DN**	**15**	**20**	**25**	**32** [1]	**40** [1]	**50** [1]
K_{VS} coefficient	Standard	2.5	6.3	8	12.5	16	20
	Special version	0.4 · 1 · 4	–				
	Flanged body	–			12.5	20	25
x_{FZ} value	Standard	0.6		0.55		0.5	0.45
	Flanged body	–			0.45	0.45	0.4
Pressure rating		PN 16/25			PN 25		
Max. permissible differential pressure Δp across the valve		10 [2]/20 bar				16 bar	
Max. permissible temperature		For liquids 130 °C [2]/150 °C · For air and non-flammable gases 80 °C					
Pressure above adjusted differential pressure at which internal excess pressure limiter responds		0.5 bar					
Conformity		CE · EAC					
Differential pressure set point ranges							
Type 46-6 · Continuously adjustable set point		0.2 to 1 bar · 0.5 to 2 bar · 1 to 4 bar					
Type 46-5 · Fixed set point		0.2 bar · 0.3 bar · 0.4 bar · 0.5 bar					

[1] Additional version: Valve with flanged body made of spheroidal graphite iron
[2] PN 16 version

Table 2: *Materials · Material numbers according to DIN EN*

Valve body		**Red brass CC491K/CC499K (Rg 5) · Spheroidal graphite iron EN-GJS-400-18-LT** [1]
Diaphragm case		Red brass CC491K/CC499K (Rg 5)
Seat		Stainless steel 1.4305
Plug	PN 25	Brass, resistant to dezincification, with EPDM soft seal
	PN 16	Brass, resistant to dezincification and plastic with EPDM soft seal
Valve springs		Stainless steel 1.4310
Restriction		Brass, free of dezincification
Operating diaphragm		EPDM with fabric reinforcement
Seals		EPDM

[1] Additional version in DN 32, 40 and 50: valve with flanged body made of spheroidal graphite iron

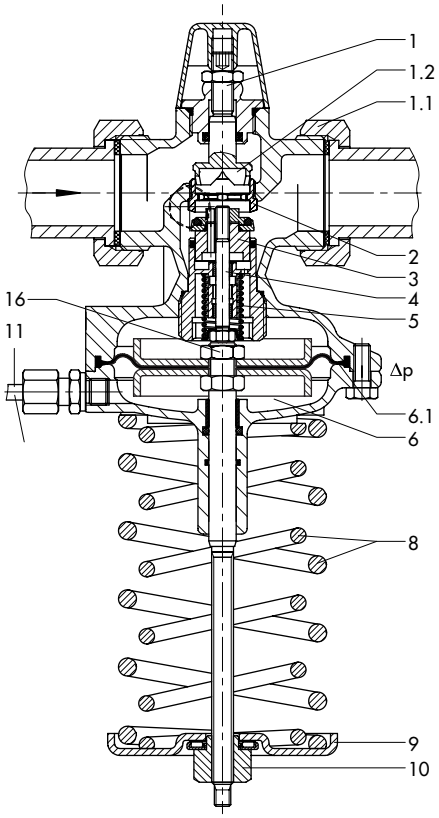


Fig. 4: *Type 46-6 · Differential pressure set point adjustable from 0.2 to 4 bar*

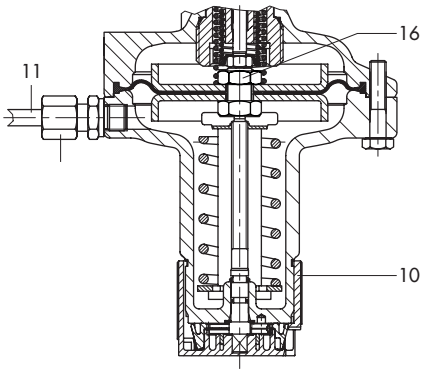


Fig. 5: *Type 46-6 · Differential pressure set point adjustment with manual adjuster, DN 15 to 32, set point range 0.2 to 1 bar*

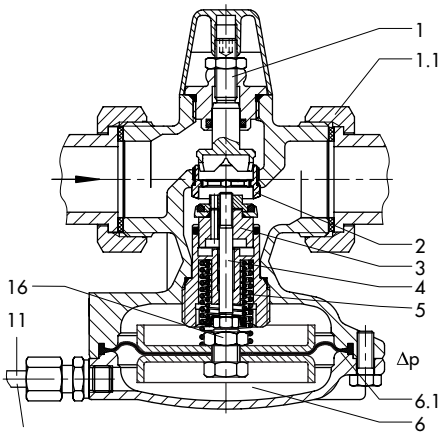


Fig. 3: *Type 46-5 · Fixed differential pressure set point*

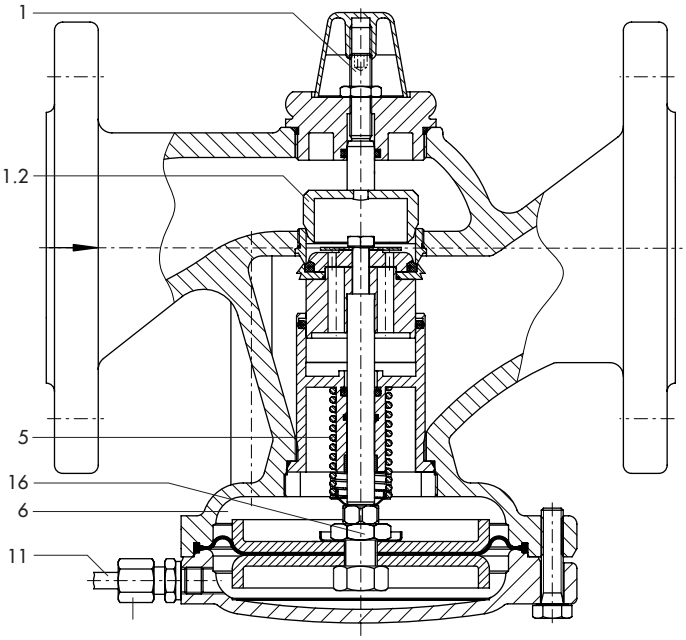


Fig. 6: *Type 46-5 · With flanged valve body, DN 32 to 50*

1	Adjustment of the flow rate limitation with cover cap
1.1	Connection nut with seal and welding end
1.2	Restriction for adjusting the flow rate limitation
2	Seat
3	Plug (balanced)
4	Plug stem
5	Valve spring
6	Actuator
6.1	Operating diaphragm
8	Set point spring
9	Spring plate
10	Set point adjustment for differential pressure
11	Control line for high pressure
16	Internal excess pressure limiter (overload protection)

Note on Fig. 3 to Fig. 6: the control line is turned into the plane of projection.

Table 3: *Flow rate set points for water in m³/h*

$\Delta p_{set\ point}$	Δp_{plant}	$\Delta p_{restriction}$	DN		15				20	25	32 [1]	40 [1]	50 [1]
			K_{VS}		0.4	1	2.5	4	6.3	8	12.5	16/20 [1]	20/25 [1]
			$\dot{V}$	Min.	0.01	0.12	0.2	0.5	0.8	0.8	2	3	4
0.2 bar	0.1 bar	0.1 bar	$\dot{V}$	Max.	0.14	0.45	0.85	1.8	2.6	3.0	7.1	8.9	10.7
0.5 bar	0.3 bar	0.2 bar	$\dot{V}$	Max.	0.2	0.65	1.2	2.5	3.6	4.2	10	12.5	15
					–	–	–	1.3 [2]	2.3 [2]	3.5 [2]	5.8 [2]	9.1 [2]	14.1 [2]

1) Additional version: Valve with flanged body made of spheroidal graphite iron

2) An increase in noise level can be expected when the specified flow rates are exceeded, even if cavitation does not occur (see AGFW (German District Heating Association) document FW 514).

Differential pressure across the valve

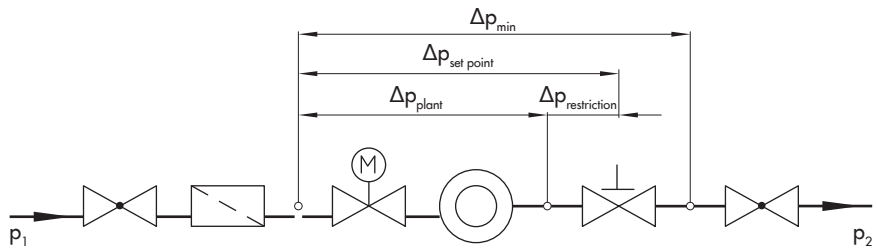
When selecting the differential pressure set point or set point range, make sure that the differential pressure $\Delta p_{set\ point}$ is the sum of the pressure drop in the fully open plant Δp_{plant} and the pressure drop across the restriction $\Delta p_{restriction}$.

From experience, the differential pressure at the restriction $\Delta p_{restriction}$ is assumed to be 0.2 bar. The flow rates at a differential pressure across the restriction of 0.1 bar and 0.2 bar are specified in Table 3.

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

The minimum required differential pressure Δp_{min} between the flow and return pipe is calculated as follows:

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



Δp_{min}	Minimum differential pressure between the flow and return pipes in bar
$\Delta p_{restriction}$	Pressure drop in bar across the restriction
$\Delta p_{set\ point}$	Differential pressure set point in bar
Δp_{plant}	Differential pressure (pressure loss) when the plant is completely open in bar
$\dot{V}$	Adjusted flow rate in m³/h
K_{VS}	Valve flow coefficient in m³/h

Fig. 7: *Pressure conditions at the regulator*

Installation

The regulator is suitable for installation into horizontal pipes as well as vertical pipes.

Regulators in DN 32 or larger must only be installed horizontal pipes (with the actuator facing down). The actuator faces downward.

Installation conditions:

- The direction of flow must match the direction indicated by the arrow on the body.
- Connect the external control line at the side or on top at 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.

Application

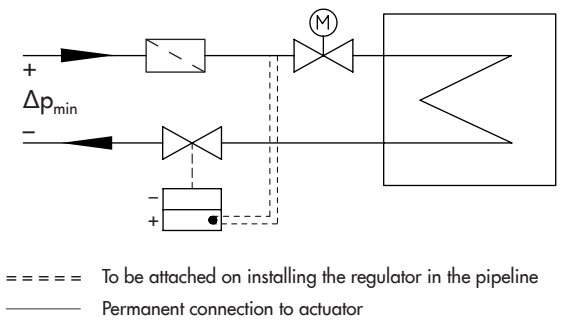


Fig. 8: *Sample application*

Flow rate diagram for water

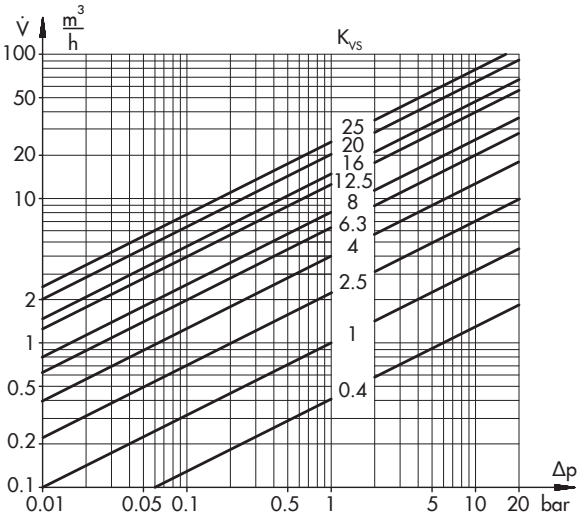


Fig. 9: *Flow rate diagram*

Ordering text

Type 46-5 or Type 46-6 Differential Pressure Regulator with Flow Limitation

DN …

PN …

Permissible temperature …°C

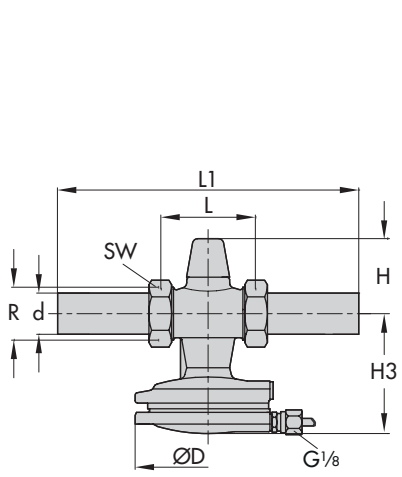
K_{VS} coefficient …

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

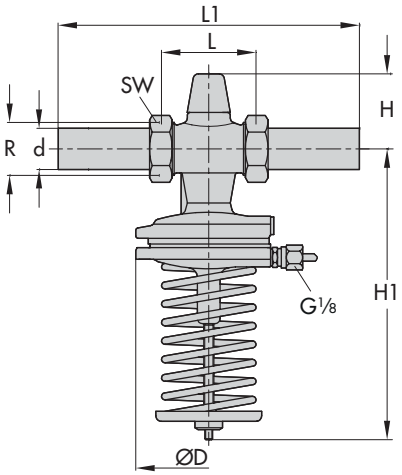
Differential pressure set point or set point range ... bar

Optionally, special version

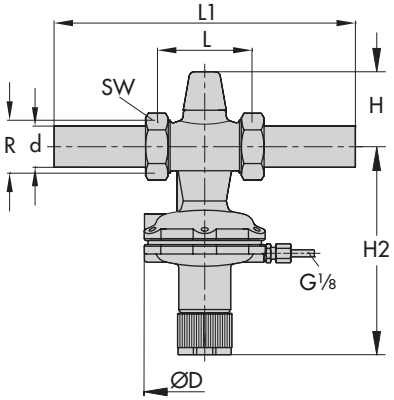
Dimensional drawings



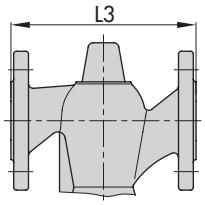
Type 46-5
Connection nuts with welding ends



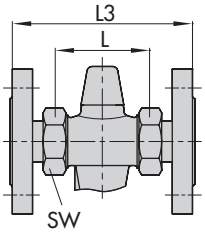
Type 46-6
Connection nuts with welding ends



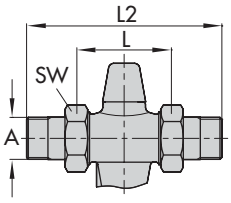
Type 46-6
With manual adjuster for set point adjustment
DN 15 to 32; 0.2 to 1 bar



Flanged body
DN 32, 40 and 50



Connection nuts with flanges



Connection nuts with threaded ends

Table 4: *Dimensions in mm · Regulators without connecting parts*

Nominal size DN	15	20	25	32 [1]	40 [1]	50 [1]
Connection R	G ¾	G 1	G 1¼	G 1¾	G 2	G 2½
Pipe Ød	21.3	26.8	32.7	42	48	60
Width across flats (A/F)	30	36	46	59	65	82
L	65	70	75	100	110	130
H	65			85		
H1	230			250	380	
H2	160			180	–	
H3	85			105	140	
ØD	116				160	

[1] Additional version: valve with flanged body

The dimensions and weights of valves with flanged bodies (DN 32, 40 and 50) are the same as valves with screwed-on flanges.

Table 5: *Dimensions in mm and weights in kg · Including connecting parts*

Nominal size DN		15	20	25	32	40	50
With welding ends							
L1		210	234	244	268	294	330
Weight	Type 46-5	1.6	1.7	1.8	3	5.5	6
	Type 46-6	2.0	2.1	2.2	3.2	10	10.5
With threaded ends							
L2		129	144	159	180	196	228
Male thread A		G ½	G ¾	G 1	G 1¼	G 1½	G 2
Weight	Type 46-5	1.6	1.7	1.8	3	5.5	6
	Type 46-6	2.0	2.1	2.2	3.2	10	10.5
With flanges [1] [2] or with flanged body (DN 32 to 50)							
L3		130	150	160	180	200	230
Weight	Type 46-5	3.0	3.7	4.3	6.2	9.5	11
	Type 46-6	3.4	4.1	4.7	6.4	14	15.5

[1] PN 16/25
[2] Flanges are already mounted on valves in DN 40 and 50.