

Self-operated Regulators Series 45



Flow Regulator

Type 45-9 · Installation in flow or return flow pipe of a district heating substation

ANSI version

Application

Flow regulators for district heating supply networks, extended pipelines and industrial plants · Upper differential pressure of **3.0** or **4.5 psi** (0.2 or 0.3 bar) · Pressure rating **Class 150** or **Class 250** · Valve sizes **NPS ½ to 2** (DN 15 to 50) · Suitable for liquids up to **300 °F** (150 °C), gases up to **175 °F** (80 °C)

The valve closes as the flow rate increases.

The regulators consist of a valve with an integrated actuator and adjustable restriction. They control the flow rate to the set point adjusted at the restriction.

Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Suitable for water and other liquids or gases provided these do not cause the materials used to corrode
- Special version with oil-resistant internal parts
- Wide adjustable set point range
- Flow rate set point adjustable according to a diagram
- Single-seated valve with a balanced plug

Versions (Figs. 1 and 2)

Standard version (Fig. 1) · Flow regulator suitable for the installation in the flow or return flow pipe of a district heating substation

Valve sizes NPS ½ to NPS 2 (DN 15 to DN 50) made of red brass with connection nuts and welding ends (optionally with threaded ends) · With integrated restriction for adjustment of the flow rate set point and positioning spring · Optionally for an upper differential pressure of 3.0 or 4.5 psi (0.2 or 0.3 bar)

Special version · Flow regulator same as standard version, except:

- With external scaled cap for adjustment of the flow rate set point (Fig. 2)
- With oil-resistant internal parts (not with Class 150 version)
- With special C_V (K_{VS}) for valve size NPS ½ (DN 15)



Fig. 1 · Type 45-9 Flow Regulator (standard version)



Fig. 2 · Type 45-9 Flow Regulator, special version with scaled cap

Principle of operation

The medium flows through the valve in the direction indicated by the arrow. The flow rate is determined by the area released between the restriction (1.2) and valve plug (3).

To control the flow rate, the high pressure upstream of the restriction is transmitted to the high pressure side of the operating diaphragm (7) over a control line (11), while the low pressure downstream of the restriction is transmitted to the low pressure side of the diaphragm through a hole in the valve plug (3).

As soon as the flow rate increases in the pipeline, for example, due to a consumer being opened, the pressure on the low-pressure side of the diaphragm drops. If the differential pressure arising from this exceeds the adjusted set point, the plug connected over the plug stem (4) to the diaphragm closes the valve (1).

The setting at the restriction is used to set the flow rate. The force of the installed positioning spring (5) determines the upper differential pressure of either 3 psi (0.2 bar) or 4.5 psi (0.3 bar).

Installation

The regulator in sizes NPS ½ to 1 (DN 15 to 25) is suitable for installation in horizontal pipes as well as vertically running pipes.

Regulators in sizes NPS 1¼ (DN 32) or larger may only be installed horizontal pipes with the actuator pointing downwards.



- The medium must flow through the valve in the direction indicated by the arrow on the valve body.
- Install a strainer (e.g. SAMSON Type 1 NI) upstream of the valve, if possible.

Further details can be found in EB 3128 EN.

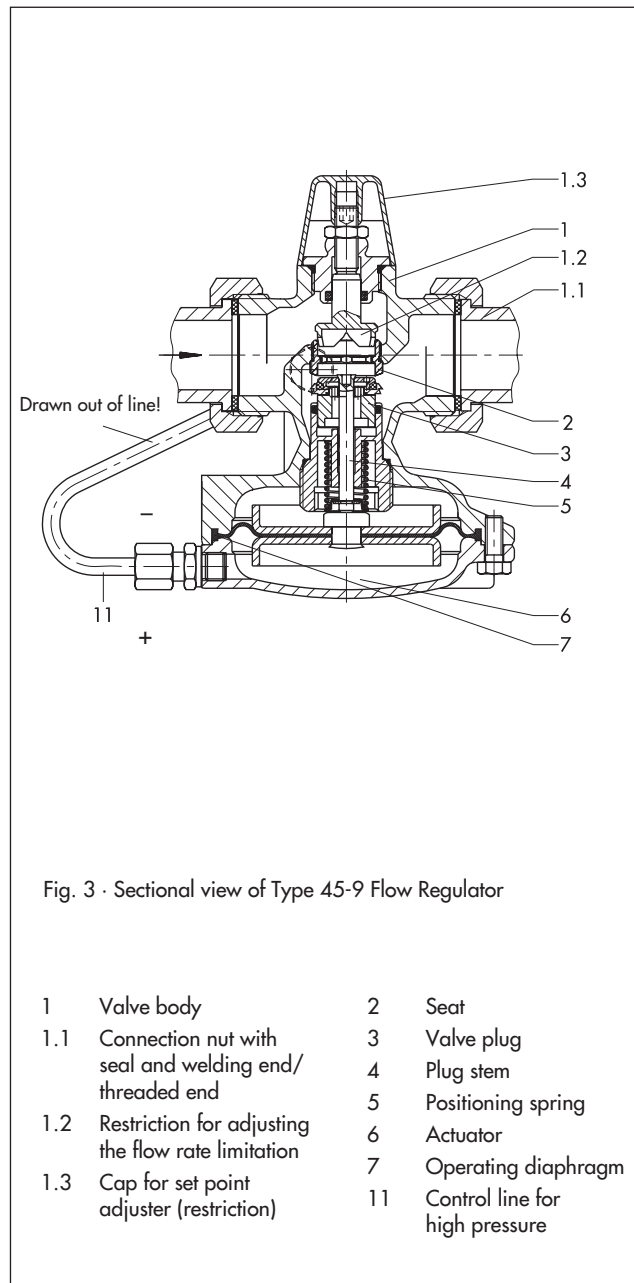


Fig. 3 · Sectional view of Type 45-9 Flow Regulator

Table 1 · Technical data

Valve size	NPS	½				¾	1	1¼	1½	2
	DN	15				20	25	32	40	50
Flow coefficient	C _v	0.5 ¹⁾	1.2 ¹⁾	3	5 ¹⁾	7.5	9.4	15	20	23
	K _{vS}	0.4 ¹⁾	1 ¹⁾	2.5	4 ¹⁾	6.3	8	12.5	16	20
Pressure rating		Class 150/Class 250						Class 250		
Max. perm. diff. press. Δp	psi	145/300						240		
	bar	10 ²⁾ /20						16		
Max. perm. temperature	°F	For liquids: 265 °F (Cl 150)/300 °F (Cl 250) · For air and non-flammable gases: 175 °F								
	°C	For liquids: 130 °C (PN 16)/150 °C (PN 25) · For air and non-flammable gases: 80 °C								
Flow rate set point ranges for water (US gal/min or m³/h)										
With upper differential pressure of 3 psi/0.2 bar	US gal/min	–	–	–	0.4 to 5.7 ³⁾	0.4 to 10.1 ³⁾	0.4 to 15.4 ³⁾	1.3 to 25.5 ³⁾	1.8 to 40	1.8 to 62 ³⁾
		0.04 to 0.9	0.09 to 2.8	0.09 to 5.3	0.4 to 11	0.4 to 15.8	0.4 to 22	1.32 to 44	1.8 to 55	1.8 to 66
	m³/h	–	–	–	0.1 to 1.3 ³⁾	0.1 to 2.3 ³⁾	0.1 to 3.5 ³⁾	0.3 to 5.8 ³⁾	0.4 to 9.1 ³⁾	0.4 to 14.1 ³⁾
		0.01 to 0.2	0.02 to 0.64	0.02 to 1.2	0.1 to 2.5	0.1 to 3.6	0.1 to 5	0.3 to 10	0.4 to 12.5	0.4 to 15
With upper diff. pressure of 4.5 psi/0.3 bar	US gal/min	–	–	–	0.4 to 13.2	–	–	–	–	–
	m³/h	–	–	–	0.1 to 3	–	–	–	–	–

1) Special versions

2) With version Class 150

3) An increase in noise level can be expected when the specified flow rates are exceeded, even if cavitation does not occur.
The minimum differential pressure Δp_{min} across the valve is calculated as follows:

$$\Delta p_{\min} = \Delta p_{\text{restriction}} + \left(\frac{\dot{V}}{C_v(K_{vS})} \right)^2$$

Δp _{min}	Minimum differential pressure (psi/bar) across the valve
Δp _{restriction}	Differential pressure at the restriction (psi/bar), (differential pressure created at the restriction to measure flow rate)
Ṃ	Adjusted flow rate (US gal/min or m³/h)
C _v (K _{vS})	Valve flow coefficient

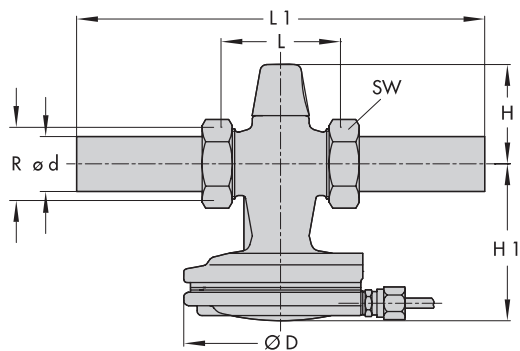
Table 2 · Materials · Material numbers acc. to DIN EN/ASTM

Body	Red brass CC491K (Rg 5)/C83600	
Seat	Stainless steel 1.4305	
Plug	Class 250	Brass, free of dezincification, with EPDM soft sealing ¹⁾
	Class 150	Brass, free of dezincification, and plastic with EPDM soft sealing
Cover	Class 250	Red casting brass CC491K/C83600
	Class 150	Stainless steel 1.4301
Valve spring	Stainless steel 1.4310	
Restriction	Brass, free of dezincification	
Operating diaphragm ¹⁾	EPDM with fabric insert	
Sealing rings ¹⁾	EPDM	

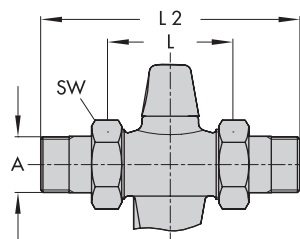
¹⁾ Special version for oils (ASTM I, II, III): FPM (FKM)

Dimensions

Type 45-9 with connections



Type 45-9
with welding ends



Type 45-9
with threaded ends

Dimensions - Without connections

Valve size	NPS	½	¾	1	1¼	1½	2
	DN	15	20	25	32	40	50
Threaded conn. R	G ¾	G 1	G 1¼	G 1¾	G 2	G 2½	
Pipe Ø d	inch	0.8	1.1	1.3	1.7	1.9	2.4
	mm	21.3	26.8	32.7	42	48	60
Width a. flats SW	inch	1.2	1.4	1.8	2.3	2.6	3.2
	mm	30	36	46	59	65	82
Length L	inch	2.6	2.8	3	3.9	4.3	5.1
	mm	65	70	75	100	110	130
H	inch	2.6		3.5			
	mm	65		85			
H1	inch	3.4		4.1	5.5		
	mm	85		105	140		
Ø D	inch	4.6			6.3		
	mm	116			160		

Dimensions and weights - Including connections

Valve size	NPS	½	¾	1	1¼	1½	2
	DN	15	20	25	32	40	50
With welding ends							
L1	inch	8.3	9.2	9.6	10.6	11.6	13
	mm	210	234	244	268	294	330
Weight, approx.	lbs	3.5	3.7	3.9	6.6	12.1	13.2
	kg	1.6	1.7	1.8	3	5.5	6
With threaded ends							
L2	inch	5.1	5.7	6.3	7.1	7.7	9
	mm	129	144	159	180	196	228
Male thread A	½ NPT	¾ NPT	1 NPT	1¼ NPT	1½ NPT	2 NPT	
Weight, approx.	lbs	3.5	3.7	3.9	6.6	12.1	13.2
	kg	1.6	1.7	1.8	3	5.5	6

Fig. 4 · Dimensions

Ordering text

Flow Regulator **Type 45-9**

NPS (DN) ..., Class ..., permissible temperature ...°F (°C),
C_v (K_v) ...

With welding ends/threaded ends

Upper differential pressure of 3.0/4.5 psi (0.2/0.3 bar)

Optionally, special version

Optionally, combination

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 4009-15 07
Internet: <http://www.samson.de>

T 3129 EN