

Self-operated Regulators

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

SAMSON

ANSI version

Application

Flow regulator for district heating systems, extended piping systems and industrial applications.

Differential pressure at the restriction of **3.0** or **4.5 psi** (0.2 or 0.3 bar) · Pressure rating **Class 150** or **Class 250** · Valve size **NPS ½ to 2** (DN 15 to 50) · Suitable for **liquids** up to **300 °F** (150 °C), **air** and **nitrogen** up to **300 °F** ¹⁾ (150 °C)

The valve closes when the flow rate rises

The regulator consists of a globe valve with adjustable restriction and an actuator. It controls the flow rate to the set point adjusted at the restriction (orifice).

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
- Wide adjustable set point range
- Flow rate set point adjustable according to a diagram
- Single-seated valve with balanced plug

Versions

Standard version (Fig. 1) · Flow regulator suitable for installation in flow or return flow pipe of a district heating substation Valve sizes NPS ½ to 2 (DN 15 to 50) made of red brass with connection nuts and welding ends (optionally with threaded ends or flanges) · With integrated restriction (orifice) for adjustment of the flow rate set point and set point spring · Differential pressure at the restriction of 3.0 or 4.5 psi (0.2 or 0.3 bar)

Special version · Flow regulator same as standard version, but including:

- With external scaled cap for adjustment of the flow rate set point
- Internal parts made of FPM (FKM), e.g. for use with mineral oils · Other oils on request (Class 250 only)
- With special C_v (K_{vs}) coefficient for valve size NPS ½ (DN 15)

¹⁾ Diaphragm and seals made of FPM (FKM) · Class 250 (PN 25) version only



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

Principle of operation (see Fig. 2)

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.

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).

The differential pressure $\Delta p_{\text{restriction}}$ created at the restriction is converted into a positioning force at the diaphragm. This force is used to adjust the position of the plug depending on the force of the set point spring (5). The force of the installed set point spring (5) determines the differential pressure at the restriction of either 3 psi (0.2 bar) or 4.5 psi (0.3 bar).

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).

Installation

Install the regulators in horizontal pipelines with the actuator facing down.

The regulator in sizes NPS ½ to 1 (DN 15 to 25) can also be installed in vertical pipes.

- Direction of flow must match the direction indicated by the arrow on the body

- If possible, install a strainer (e.g. SAMSON Type 1 NI) upstream of the valve.

For further details on installation, refer to Mounting and Operating Instructions ► EB 3128 EN.



Type 45-9 with scaled cap

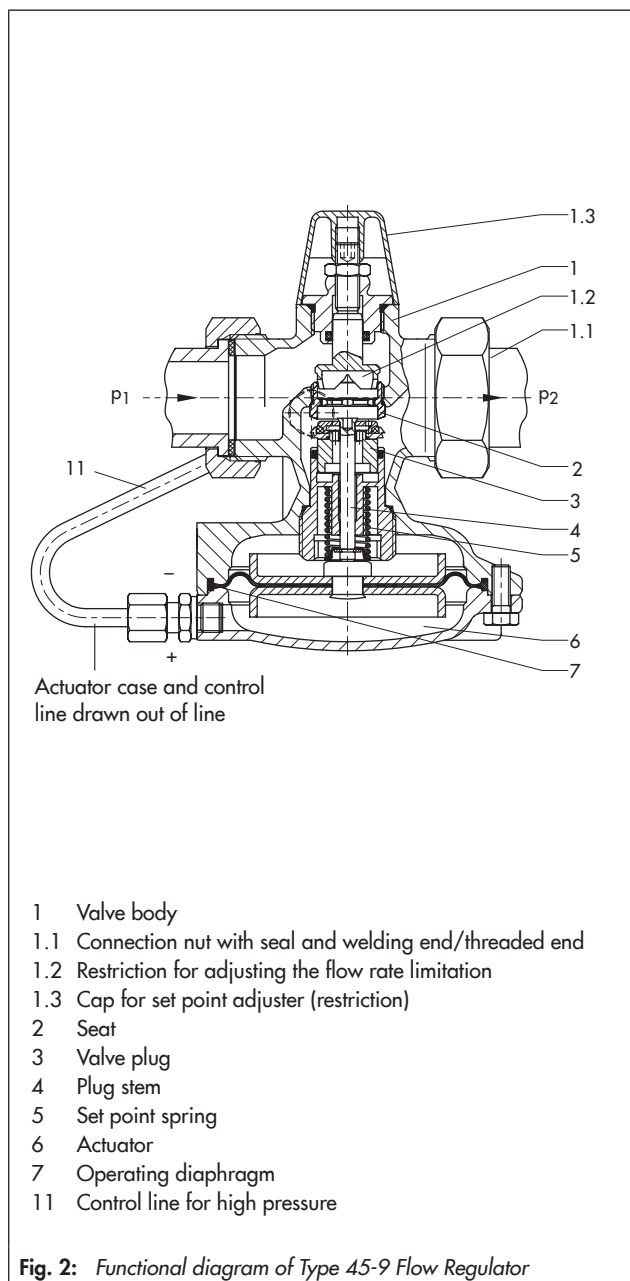


Fig. 2: Functional diagram of Type 45-9 Flow Regulator

Table 1: Technical data · All pressures in bar (gauge)

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. differential pressure Δp	psi	145/300						240		
	bar	10 ²⁾ /20						16		
Max. permissible temperature	°F	Liquids: 265 °F (Class 150)/300 °F (Class 250) · Nitrogen and air: 300 °F ³⁾								
	°C	Liquids: 130 °C (Class 150)/150 °F (Class 250) · Nitrogen and air: 150 °C ³⁾								
Flow rate set point ranges for water in US gal/min (m³/h)										
Differential pressure at the restriction 3 psi/0.2 bar	US gal/min	-	-	-	0.4 to 5.7 ⁴⁾	0.4 to 10.1 ⁴⁾	0.4 to 15.4 ⁴⁾	1.3 to 25.5 ⁴⁾	1.8 to 40 ⁴⁾	1.8 to 62 ⁴⁾
		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 18.5	1.32 to 44	1.8 to 55	1.8 to 66
	m ³ /h	-	-	-	0.1 to 1.3 ⁴⁾	0.1 to 2.3 ⁴⁾	0.1 to 3.5 ⁴⁾	0.3 to 5.8 ⁴⁾	0.4 to 9.1 ⁴⁾	0.4 to 14.1 ⁴⁾
		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 4.2	0.3 to 10	0.4 to 12.5	0.4 to 15
Differential pressure at the restriction 4.5 psi/0.3 bar	US gal/min	-	-	-	0.4 to 13.2	-	0.4 to 22	-	-	-
	m ³ /h	-	-	-	0.1 to 3	-	0.1 to 5	-	-	-

¹⁾ Special versions

²⁾ With Class 150 version

³⁾ Diaphragm and seals made of FPM (FKM) · Class 250 (PN 25) version only

⁴⁾ An increase in noise level can be expected when the specified flow rates are exceeded, even if cavitation does not occur.

The minimum required differential pressure Δp_{min} across the valve is calculated as follows:

ANSI: $\Delta p_{\min} = \Delta p_{\text{restriction}} + (\dot{V}/C_V)^2$

DIN: $\Delta p_{\min} = \Delta p_{\text{restriction}} + (\dot{V}/K_{VS})^2$

Δp_{min} Minimum differential pressure across the valve (psi or bar)

Δp_{restriction} Differential pressure (psi or bar) created at the restriction for measuring the flow rate in the regulator

Ṃ Adjusted flow rate (US gal/min or m³/h)

C_V or K_{VS} Valve flow coefficient in (US gal/min or m³/h)

Table 2: Materials · Material numbers according to ASTM and DIN EN

Body	Red brass CC491K/CC499K (Rg 5) · C83600	
Seat	Stainless steel 1.4305	
Plug	Class 250	Brass, resistant to dezincification, with EPDM soft seal ¹⁾
	Class 150	Brass, resistant to dezincification, and plastic with EPDM soft seal
Cover	Class 250	Red brass CC491K/CC499K · C83600
	Class 150	Stainless steel 1.4301
Valve spring	Stainless steel 1.4310	
Restriction	Brass, free of dezincification	
Operating diaphragm ¹⁾	EPDM with fabric reinforcement ¹⁾	
Seals ¹⁾	EPDM ¹⁾	

¹⁾ Special version, e.g. for mineral oils: FPM (FKM)

Dimensions

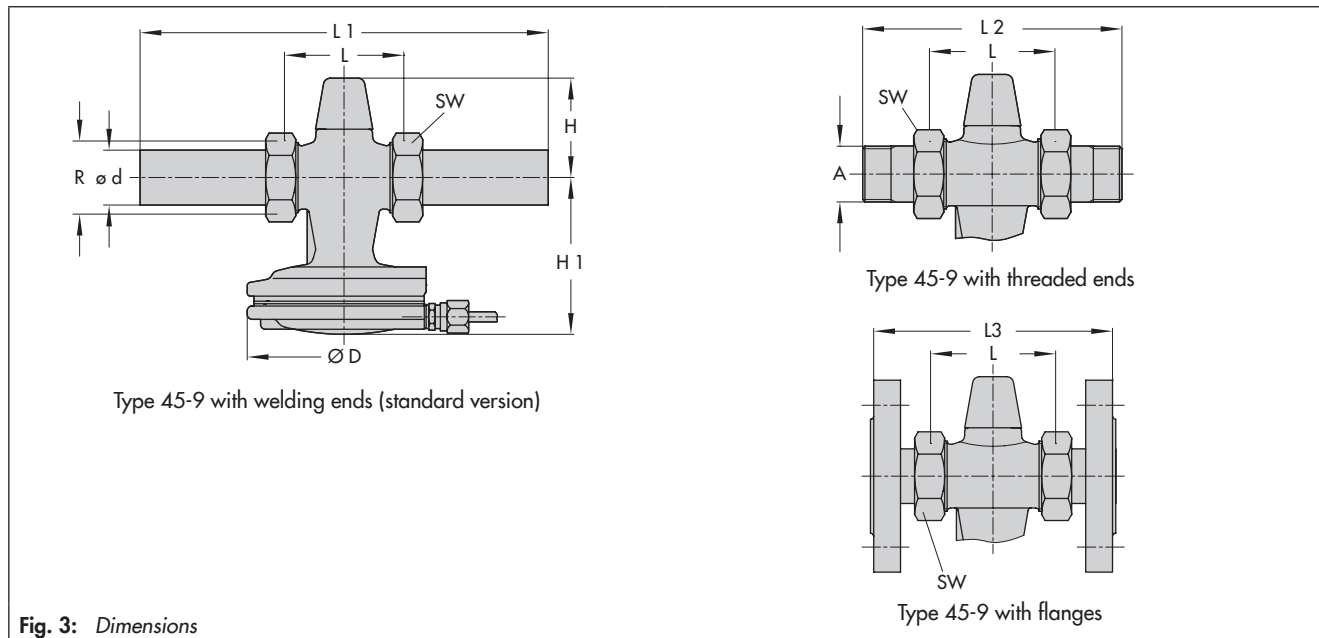


Fig. 3: Dimensions

Dimension tables

Table 3: Dimensions without connecting parts

Valve size	NPS	1/2	3/4	1	1 1/4	1 1/2	2
	DN	15	20	25	32	40	50
Threaded connection R		G 3/4	G 1	G 1 1/4	G 1 3/4	G 2	G 2 1/2
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
AF	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		

Ordering text

Type 45-9 Flow Regulator

NPS ..., (DN ...), Class ..., perm. temperature ...°F (°C),

C_v (K_{vs}) coefficient ...

With welding ends/threaded ends/flanges

Differential pressure at the restriction 3 or 4.5 psi (0.2 or 0.3 bar)

Optionally, special version ...

Optionally, combination

Specifications subject to change without notice

Table 4: Dimensions and weights with connecting parts

Valve size	NPS	1/2	3/4	1	1 1/4	1 1/2	2
	DN	15	20	25	32	40	50
With welding ends (standard version)							
Length 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							
Length L2	inch	5.1	5.7	6.3	7.1	7.7	9
	mm	129	144	159	180	196	228
Male thread A		1/2 NPT	3/4 NPT	1 NPT	1 1/4 NPT	1 1/2 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
With flanges ¹⁾							
Length L3	inch	5.1	5.9	6.3	7.1	7.9	9.1
	mm	130	150	160	180	200	230
Weight, approx.	lbs	6.6	8.2	9.5	13.7	20.9	24.3
	kg	3	3.7	4.3	6.2	9.5	11

¹⁾ Flanges are already mounted on valves in NPS 1 1/2 and 2

