

Self-operated Regulators Series 45



Differential Pressure Regulators with closing actuator

Type 45-1 · **Type 45-2** · Installation in flow pipes

Type 45-3 · **Type 45-4** · Installation in return flow pipes

ANSI version

Application

Differential pressure set points (Δp) from **1.5 to 145 psi** (0.1 to 10 bar) · Valves in **NPS ½ to 2** (DN 15 to DN 50) · Pressure rating **Class 150/250** · Suitable for liquids up to **300 °F** (150 °C) and gases up to **175 °F** (80 °C).

The valve **closes** when the differential pressures increases.

Differential pressure regulators for use in district heating supply networks, extended pipelines and industrial plants.

The regulators consist of a valve with an integrated actuator. They control the differential pressure to the adjusted set point.

Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Only one control line needs to be installed on mounting the regulator since each regulator has its own permanent connection to the actuator
- 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
- Single-seated valve with a balanced plug
- Especially designed for district heating systems conforming to DIN 4747 (requirements stipulated by the German district heating association (AGFW) for components in house substations)

Versions (Figs. 1 to 3)

Differential pressure regulator with closing actuator · Valves NPS ½ to 2 (DN 15 to DN 50) · With connection nuts and welding ends (special versions with connection nuts and threaded ends) · Plug balanced by a piston

Differential pressure regulators for installation in high-pressure pipes, e.g. in flow pipes

Type 45-1 · Set point fixed at 1.5, 3.0, 4.5, 6.0 or 7.5 psi (0.1, 0.2, 0.3, 0.4 or 0.5 bar)

Type 45-2 · Set point adjustable within the range between 1.5 and 60 psi (0.1 and 4 bar)

Differential pressure regulators for installation in low-pressure pipes, e.g. in return flow pipes

Type 45-3 (Fig. 1) · Set point fixed at 1.5, 3.0, 4.5, 6.0 or 7.5 psi (0.1, 0.2, 0.3, 0.4 or 0.5 bar) · With internal overload protection (excess pressure limiter) in the actuator

Type 45-4 (Fig. 2) · Set point adjustable within the range between 1.5 and 60 psi (0.1 and 4 bar) · With set point indication (NPS ½ to 1¼ only; set point 1.5 to 7.5 psi and 1.5 to 15 psi) · With internal overload protection (excess pressure limiter) in the actuator



Fig. 1 · Type 45-3 Differential Pressure Regulator



Fig. 2 · Type 45-4 Differential Pressure Regulator

Special version

- Special Kvs with NPS ½ (DN 15) version
- With oil-resistant internal parts (Class 250 only)
- **Combinations** with other devices from SAMSON on request

Principle of operation (Fig. 3)

The medium flows through the valve (1) in the direction indicated by the arrow. The position of the valve plug (3) determines the differential pressure Δp over the cross-sectional area released between the plug and seat (2).

The differential pressure to be controlled is transferred to the operating diaphragm (7) where it is transformed into a positioning force.

The valves have a balanced plug (3) to eliminate the forces at the valve plug caused by the differential pressure.

In **Types 45-1** and **45-2**, the pressure in the valve outlet (high pressure) acts on the high-pressure chamber of the operating diaphragm (7) over the attached control line (11). The low pressure (return flow pipe) is transferred to the other side of the operating diaphragm over the external control line (11.1). The regulators are designed for installation in high-pressure pipes.

In **Types 45-3** and **45-4**, the pressure in the valve inlet (low pressure) acts on the low-pressure chamber of the operating diaphragm (7) via a hole (12) in the valve body (1). The high

pressure (flow pipe) is transferred to the bottom diaphragm chamber over the external control line (11.1). The regulators are designed for installation in low-pressure pipes.

The set point springs (5) installed in the valves of **Type 45-1** and **Type 45-3** determine the set point. The set point of **Type 45-2** and **Type 45-4** is adjustable and can be lead-sealed at the set point adjuster (10). The resulting positioning force in all regulators moves the valve plug depending on the fixed or adjustable set point.

Type 45-3 and **Type 45-4** feature an overload protection (excess pressure limiter) (13) in the actuator protects seat and plug from overload during exceptional operating conditions that could lead to valve or plant damage.

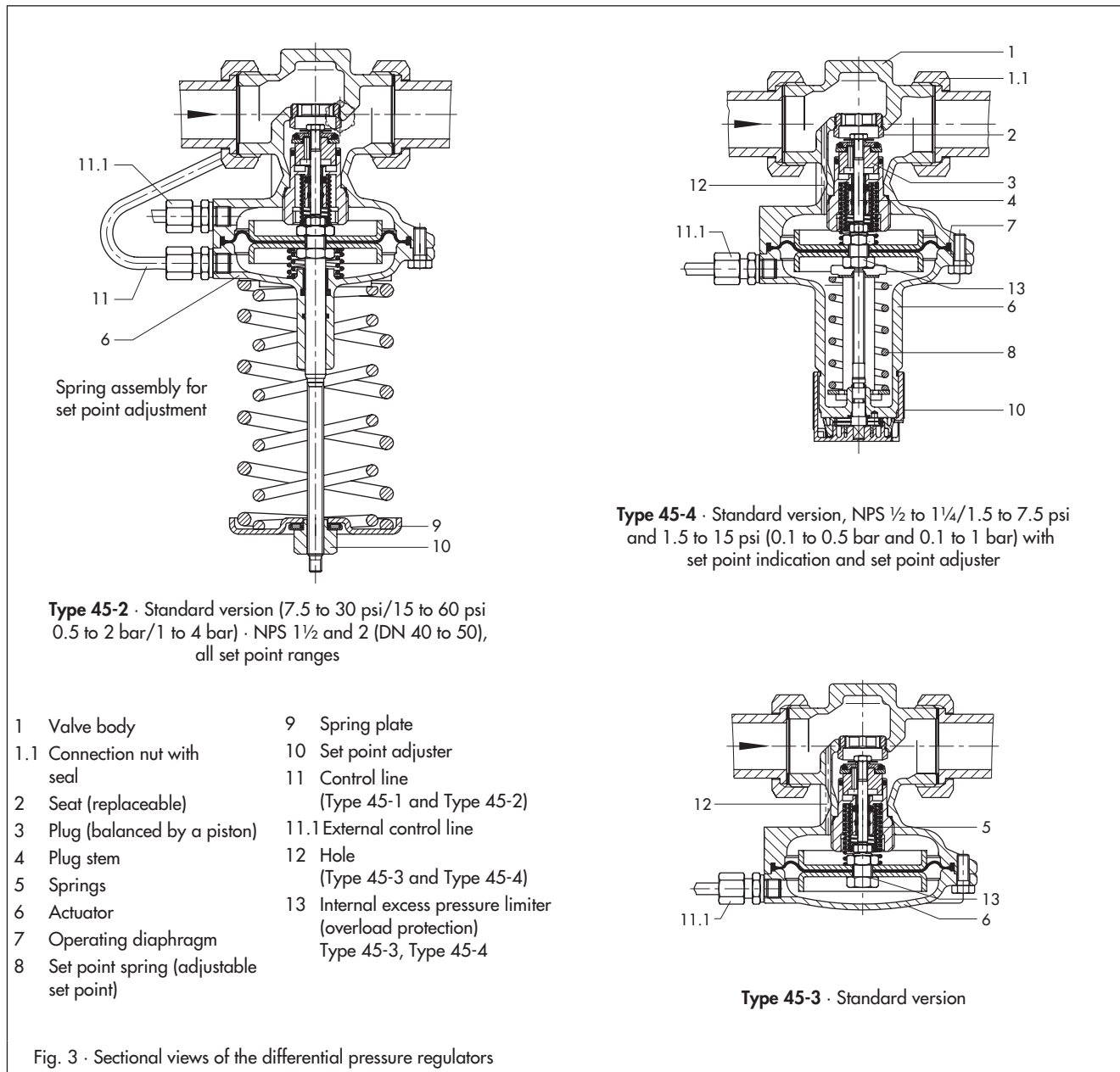


Fig. 3 · Sectional views of the differential pressure regulators

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

Valve size	NPS	½	¾	1	1¼	1½	2
	DN	15	20	25	32	40	50
C _V coefficient	C _V	3	7.5	9.4	15	20	23
K _{VS} coefficient	K _{VS}	2.5	6.3	8	12.5	16	20
Special version	C _V	0.5 · 1.2 · 5.0		-			
	K _{VS}	0.4 · 1.0 · 4.0					
z value		0.6		0.55		0.5	0.45
Pressure rating	Class	250 · 150 ¹⁾				250	
Max. perm. differential pressure Δp at valve	psi	300				240	
	bar	20				16	
Max. permissible temperature of the valve		Liquids: 300 °F (150 °C) Non-flammable gases: 175 °F (80 °C)					
Pressure above adjusted set point at which internal excess pressure limiter responds (Types 45-3 and 45-4)		7.5 psi · 0.5 bar					
Set point ranges							
Types 45-1, 45-3 fixed	psi	1.5 · 3.0 · 4.5 · 6.0 or 7.5					
	bar	0.1 · 0.2 · 0.3 · 0.4 or 0.5					
Types 45-2, 45-4 continuously adjustable	psi	1.5 to 15 · 1.5 to 7.5 · 7.5 to 30 · 15 to 60					3 to 15 · 7.5 to 30 · 15 to 60
	bar	0.1 to 1 · 0.1 to 0.5 · 0.5 to 2 · 1 to 4					0.2 to 1 · 0.5 to 2 · 1 to 4

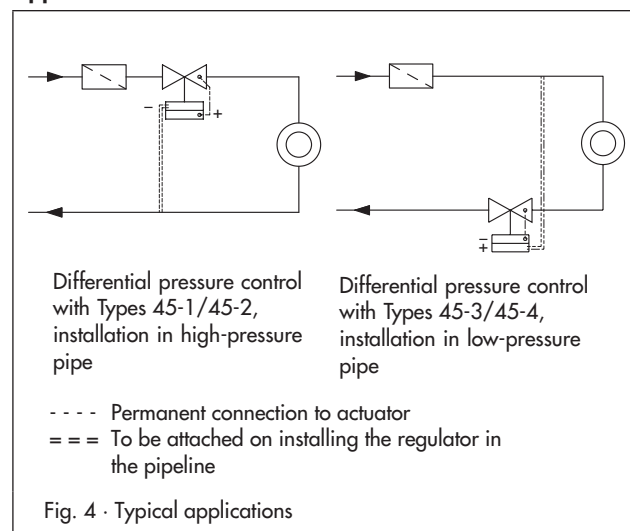
¹⁾ Types 45-1 and 45-3 only

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

Valve		
Body		CC491K (red brass, Rg 5)/C83600
Seat		Stainless steel 1.4305
Plug	Class 250	Brass (free of dezincification) with EPDM soft sealing ^{1) 2)}
	Class 150	Brass (free of dezincification) and plastic with EPDM soft sealing
Cover	Class 250	CC491K (red casting brass, Rg 5)/C83600
	Class 150	DC 01
Valve spring		Stainless steel 1.4310
Operating diaphragm		EPDM with fabric insert ¹⁾
Seal rings		EPDM ¹⁾

¹⁾ Special version for oils (ASTM I, II, III): FPM (FKM) · ²⁾ For C_V = 0.5 and 1.2 (K_{VS} = 0.4 and 1): plug made of 1.4305

Application



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.

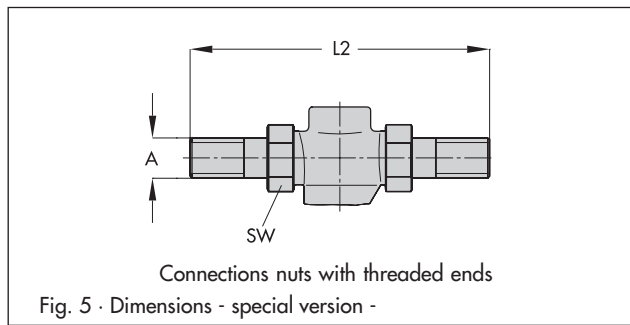
On installing the regulator, observe the following:

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

Further details can be found in EB 3124 EN.

Table 3 · Dimensions and weights

Valve size	NPS	1/2	3/4	1	1 1/4	1 1/2	2
	DN	15	20	25	32	40	50
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
Connection R	G	3/4	1	1 1/4	1 3/4	2	2 1/2
SW (Width across flats)	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	2.9	3.9	4.3	5.1
	mm	65	70	75	100	110	130
H	inch	1.3			1.8		
	mm	32			45		
H1	inch	9.1		9.8	15		
	mm	230		250	380		
H2	inch	6.3		7.1	-		
	mm	160		180	-		
H3	inch	3.4		4.1	5.5		
	mm	85		105	140		
Ø D	inch	4.6			6.3		
	mm	116			160		
Standard version with welding ends							
L1 with welding ends	inch	8.3	9.2	9.6	10.6	11.6	13
	mm	210	234	244	268	294	330
Type 45-2/-4	lb	4.4	4.6	4.9	18.7	19.8	20.9
	kg	2.0	2.1	2.2	8.5	9.0	9.5
Type 45-1/-3	lb	3.3	3.5	3.9	10.5	11.7	13.2
	kg	1.5	1.6	1.8	4.8	5.3	6.0
Special version with threaded ends							
L2 with threaded ends	inch	5.1	5.7	6.3	7.1	7.7	9
	mm	129	144	159	180	196	228
Thread A	NPT	1/2	3/4	1	1 1/4	1 1/2	2
	lb	4.4	4.6	4.9	18.7	19.8	20.9
Type 45-2/-4	kg	2.0	2.1	2.2	8.5	9.0	9.5
	lb	3.3	3.5	3.9	10.5	11.7	13.2
Type 45-1/-3	kg	1.5	1.6	1.8	4.8	5.3	6.0



Ordering text

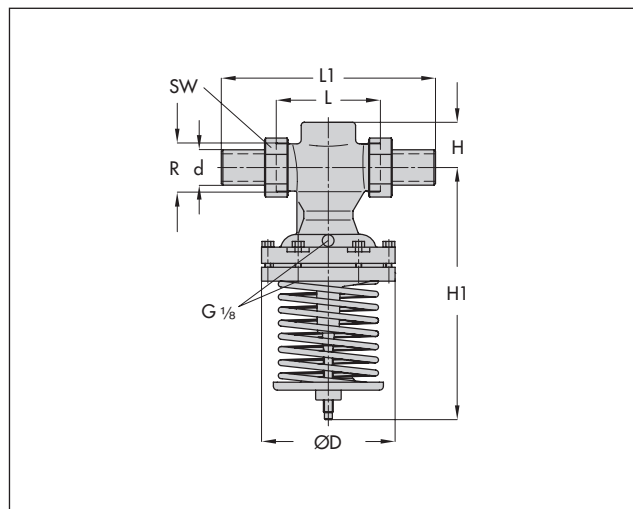
Type 45-1 / 45-2/45-3/45-4 Differential Pressure Regulator in ANSI version

NPS (DN) ..., Class ..., permissible temperature ...° F (° C),
C_v (K_{VS}) ...,
Connection nuts with welding ends/threaded ends
Set point/set point range ... psi (bar)
Optionally, special version ...

Specifications subject to change without notice.



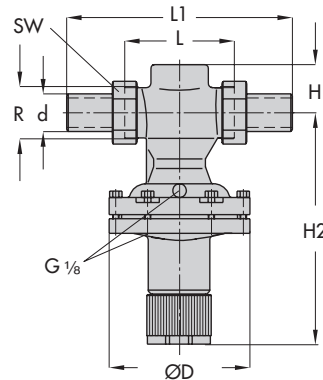
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Type 45-2 · Connection nuts with welding ends

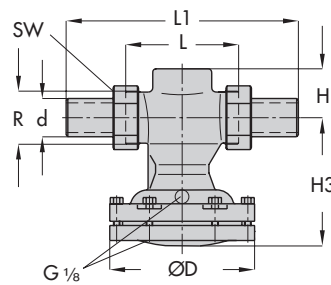
Type 45-4 · Same as Type 45-2, except for connection G 1/8 on diaphragm case

NPS 1/2 to 1 1/4 (DN 15 to 32), set point range 7.5 to 30 psi (0.5 to 2 bar) and 15 to 60 psi (1 to 4 bar),
NPS 1 1/2 and 2 (DN 40 and 50), all set point ranges



Type 45-2 · Connection nuts with welding ends

Type 45-4 · Same as Type 45-2, except connection G 1/8 on diaphragm case · With set point indication and set point adjuster
NPS 1/2 to 1 1/4 (DN 15 to 32), set point ranges 1.5 to 7.5 psi (0.1 to 0.5 bar) and 1.5 to 15 psi (0.1 to 1 bar)



Type 45-1 · Connection nuts with welding ends, Class 250

Type 45-3 · Same as Type 45-1, except connection G 1/8 on diaphragm case

Fig. 6 · Dimensions - standard version -