# Self-operated Regulators Series 45

## Differential Pressure Regulators with closing actuator
## Type 45-1 · Type 45-2 · For installation in flow pipes
## Type 45-3 · Type 45-4 · For installation in return flow pipes

**Application**

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

Differential pressure set points (Δp) from **0.1** to **10 bar** · 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 pressures increases.

The differential pressure regulators consist of a valve and an 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
- 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 DN 15 to DN 50 made of red casting brass with welding ends (special versions with threaded ends or flanges) · Balanced plug Nominal sizes DN 32, 40 and 50 also available with flanged valve body made of spheroidal graphite iron

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

**Type 45-1** · Set point fixed at 0.1, 0.2, 0.3, 0.4 or 0.5 bar

**Type 45-2** · Set point adjustable within the range of 0.1 to 4 bar · With set point indication (DN 15, 20, 25 and 32 only; set point 0.1 to 0.5 bar and 0.1 to 1 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 0.1, 0.2, 0.3, 0.4 or 0.5 bar · With internal overload protection in the actuator

**Type 45-4** (Fig. 2) · Set point adjustable within the range 0.1 to 4 bar · With set point indication (DN 15, 20, 25 and 32 only; set point 0.1 to 0.5 bar and 0.1 to 1 bar) · 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 $K_{VS}$ with DN 15 version
- With internal parts resistant to mineral oil (with PN 25 only) Other oils on request

**Combinations** with other devices from SAMSON on request

**ANSI** versions available on request

| | | | |
|---|---|---|---|
| **Associated Information Sheet** | **T 3120 EN** | **Edition July 2011** | |
| **Associated Data Sheet for accessories** | **T 3095 EN** | **Data Sheet** | **T 3124 EN** |

**Principle of operation**

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.

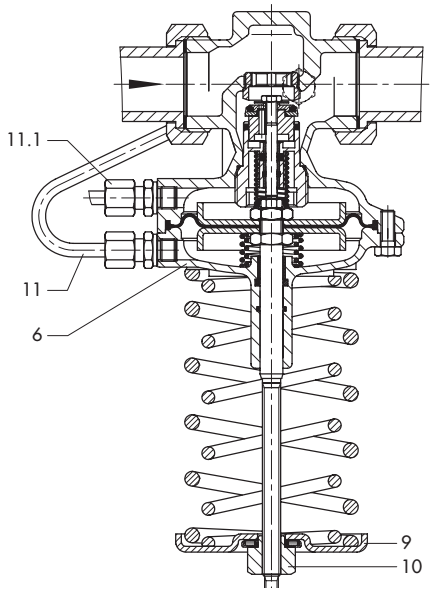
In **Types 45-3** and **45-4**, the pressure in the valve inlet (low pressure) acts on the low-pressure chamber of the operating diaphragm (7) via a hole (12) in the valve body (1). The high pressure (flow pipe) is transferred to the bottom diaphragm chamber over the external control line (11.1). The 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.

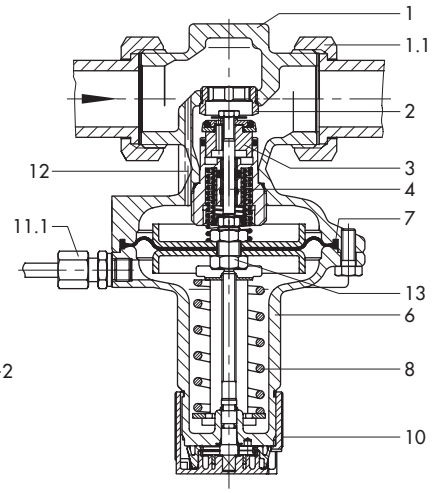
**Regulators for installation in high-pressure pipes**

**Regulators for installation in low-pressure pipes**

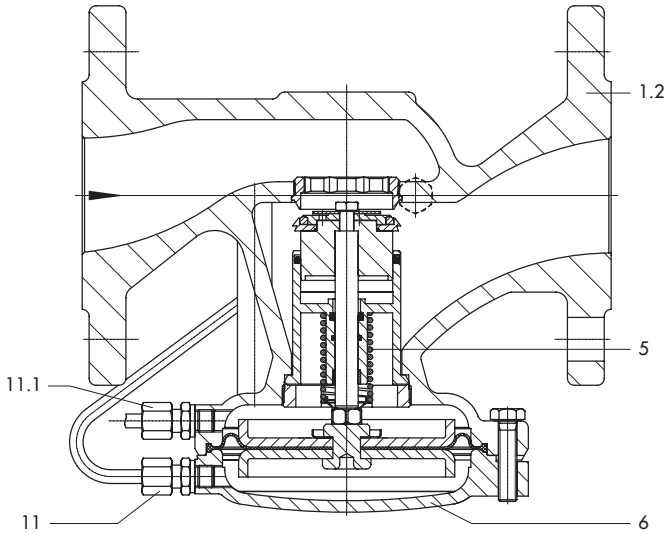



Type 45-2 · Standard version
(0.5 to 2.0 bar/1.0 to 4.0 bar)

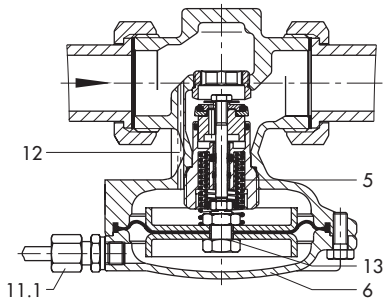
1 Valve body
1.1 Connection nut with seal and welding end
1.2 Flanged body
2 Seat
3 Piston plug
4 Plug stem
5 Set point spring (fixed set point)
6 Actuator
7 Operating diaphragm
8 Set point spring (adjustable set point)
9 Spring plate
10 Set point adjuster
11 Control line for Type 45-1 and Type 45-2
11.1 External control line
12 Hole for low pressure in Type 45-3 and Type 45-4
13 Internal excess pressure limiter (overload protection) Type 45-3, Type 45-4




Type 45-4 · Standard version
(DN 15 to DN 32/
0.1 to 0.5 bar and 0.1 to 1.0 bar) with
set point indication and set point adjuster




Type 45-1 · Version with flanged valve body (DN 32, 40 and 50)




Type 45-3 · Standard version

Fig. 3 · Sectional views of the differential pressure regulators

**Table 1 · Technical data**

| **Nominal size** DN | | **15** | **20** | **25** | **32** [1] | **40** [1] | **50** [1] |
|---|---|---|---|---|---|---|---|
| $K_{VS}$ | | 2.5 | 6.3 | 8 | 12.5 | 16 | 20 |
| Special versions | | 0.4 · 1 · 4 | – | | | | |
| Flanged body | | – | | | 12.5 | 20 | 25 |
| z value | Standard | 0.6 | | 0.55 | 0.55 | | 0.45 |
| | Flanged body | – | | | 0.45 | | 0.4 |
| Nominal pressure Type 45-2 · Type 45-4 | | PN 25 | | | | | |
| Type 45-1 · Type 45-3 | | PN 25/PN 16 | | | PN 25 | | |
| Max. perm. differential pressure Δp at the valve | | 20/10 bar[2] | | | | 16 bar | |
| Max. perm. temperature | | Liquids: 150 °C/130 °C [2] · Non-flammable gases: 80 °C | | | | | |
| Pressure above adjusted set point at which internal excess pressure limiter responds (Types 45-3 and 45-4) | | 0.5 bar | | | | | |
| **Differential pressure set point ranges** | | | | | | | |
| Type 45-1, Type 45-3 fixed | | 0.1 · 0.2 · 0.3 · 0.4 · 0.5 bar | | | | | |
| Type 45-2, Type 45-4 continuously adjustable | | 0.1 to 1 bar · 0.1 to 0.5 bar | | | | 0.2 to 1 bar | |
| | | 0.5 to 2 bar · 1 to 4 bar | | | | | |

[1] Additional version: Valve with flanged body made of spheroidal graphite iron (EN-JS 1049)

[2] For PN 16 version

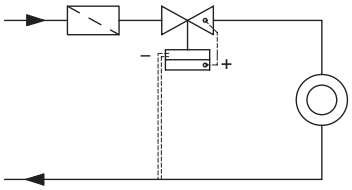
**Table 2 · Materials** · Material number acc. to DIN EN

| **Valve body** | | **Red brass CC491K** (Rg 5) · **Spheroidal graphite iron EN-JS 1049** [1] |
|---|---|---|
| Seat | | Stainless steel 1.4305 |
| Plug | PN 25 | Brass (free of dezincification) with EPDM soft sealing [2] |
| | PN 16 | Brass (free of dezincification) and plastic with EPDM soft sealing [2] |
| Valve springs | | Stainless steel 1.4310 |
| Operating diaphragm | | EPDM with fabric reinforcement [2] |
| Seal rings | | EPDM [2] |

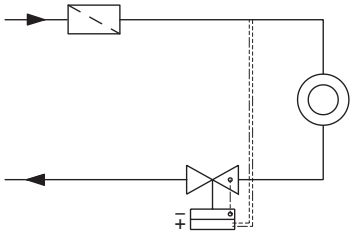
[1] Additional version for DN 32, 40 and 50: Valve with flanged body made of spheroidal graphite iron

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

## Application



Differential pressure control with Types 45-1/45-2, installation in high-pressure pipe



Differential pressure control with Types 45-3/45-4, installation in low-pressure pipe

- - - - Permanent connection to actuator
= = = To be attached on installing the regulator in the pipeline

Fig. 4 · Typical applications

## Installation

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

Regulators in sizes DN 32 or 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.
- If possible, install a strainer (e.g. SAMSON Type 1NI) upstream of the valve.

Further details can be found in EB 3124 EN.

**Pressure-temperature diagram** – acc. to DIN EN 12516-1 –

The range of application, the permissible pressures and temperatures are limited by the specifications in the pressure-temperature diagram and the pressure ratings.

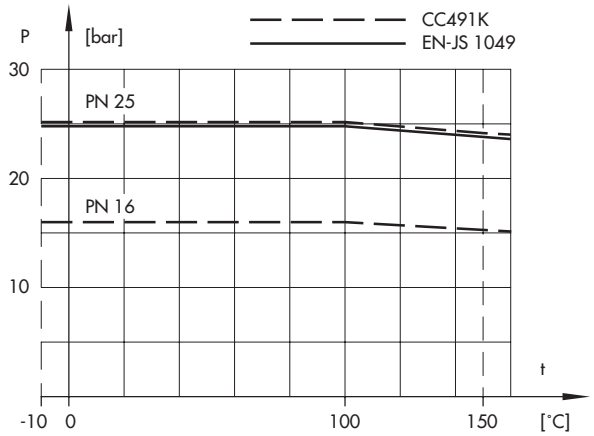



Fig. 5 · Pressure-temperature diagram

**Flow rate diagram for water**

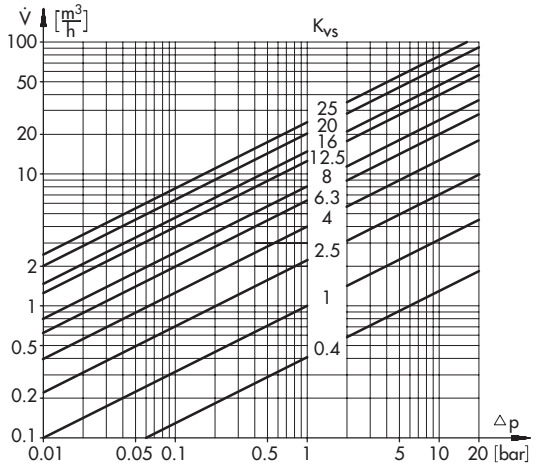
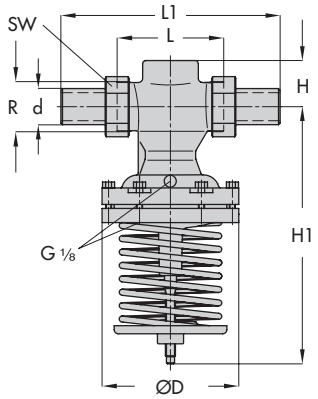
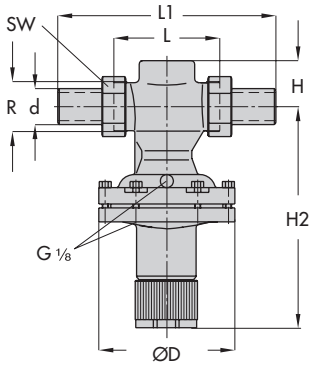



Fig. 6 · Flow rate diagram

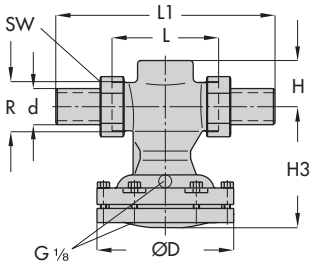
## Dimensions




Types 45-2 and 45-4 [1], DN 15 to 32
0.5 to 2 bar and 1 to 4 bar
DN 40/50, all set point ranges

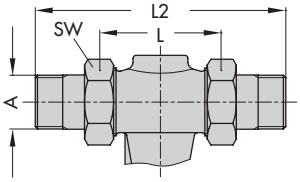



Types 45-2 and 45-4 [1], DN 15 to 32
0.1 to 0.5 bar and 0.1 to 1 bar

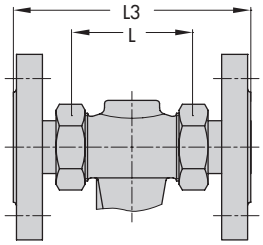



Type 45-1, Type 45-3 [1]

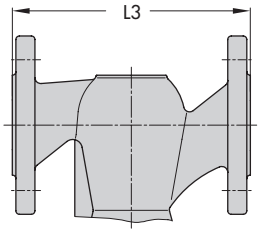
[1] Type 45-4 (45-3) same as Type 45-2 (45-1), except connection G ⅛ on diaphragm case




Connection nuts with threaded ends




Connection nuts with flanges




Flanged body
(DN 32, 40 and 50)

**Dimensions in mm** · Standard version

| Nominal size DN | 15 | 20 | 25 | 32 [1] | 40 [1] | 50 [1] |
|---|---|---|---|---|---|---|
| Pipe Ø d | 21.3 | 26.8 | 32.7 | 42 | 48 | 60 |
| Connection R | G ¾ | G 1 | G 1¼ | G 1¾ | G 2 | G 2½ |
| Width across flats SW | 30 | 36 | 46 | 59 | 65 | 82 |
| Length L | 65 | 70 | 75 | 100 | 110 | 130 |
| Height H | 32 | | | 45 | | |
| Height H1 | 230 | | | 250 | 380 | |
| Height H2 | 160 | | | 180 | – | |
| Height H3 | 85 | | | 105 | 140 | |
| Ø D | 116 | | | | 160 | |

[1] Additional version: Valve with flanged body

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

**Dimensions in mm and weights in kg · Incl. connecting parts**

| Nominal size DN | | 15 | 20 | 25 | 32 | 40 | 50 |
|---|---|---|---|---|---|---|---|
| **With welding ends** | | | | | | | |
| Length L1 | | 210 | 234 | 244 | 268 | 294 | 330 |
| Weight, approx. kg | 45-2/-4 | 2.0 | 2.1 | 2.2 | 8.5 | 9 | 9.5 |
| | 45-1/-3 | 1.5 | 1.6 | 1.8 | 4.8 | 5.3 | 6.0 |
| **With threaded ends** | | | | | | | |
| Length L2 | | 129 | 144 | 159 | 180 | 196 | 228 |
| Male thread A | | G ½ | G ¾ | G 1 | G 1¼ | G 1½ | G 2 |
| Weight, approx. kg | 45-2/-4 | 2.0 | 2.1 | 2.2 | 8.5 | 9.0 | 9.5 |
| | 45-1/-3 | 1.5 | 1.6 | 1.8 | 4.8 | 5.3 | 5.8 |
| **With flanges [1] [2] or with flanged body (DN 32 to DN 50)** | | | | | | | |
| Length L3 | | 130 | 150 | 160 | 180 | 200 | 230 |
| Weight, approx. kg | 45-2/-4 | 3.4 | 4.1 | 4.7 | 11.7 | 13.0 | 14.5 |
| | 45-1/-3 | 2.9 | 3.6 | 4.3 | 8 | 9.3 | 10.8 |

[1] PN 16/25

[2] Valves in DN 40 and 50 already have flanges mounted

Fig. 7 · Dimensions

### Ordering text

**Type 45-1/ 45-2/ 45-3/ 45-4** Differential Pressure Regulator
DN ..., PN …
Permissible temperature ... °C, $K_{VS}$ …
Connection nuts with welding ends/threaded ends/flanges/ flanged valve body in DN 32, 40 and 50
Set point/set point range … bar
On option, special version …

Specifications subject to change without notice.

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