# Type 46-7 and Type 47-5 Flow and Differential Pressure Regulators

# Type 47-1 and Type 47-4 Flow and Differential Pressure or Pressure Regulators

Translation of original instructions

Type 46-7

**Type 47-1** with manual adjuster for set point adjustment

Type 47-5

## Mounting and Operating Instructions

## EB 3131 EN

Edition June 2016

CE

**Note on these mounting and operating instructions**

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

➔ For the safe and proper use of these instructions, read them carefully and keep them for later reference.

➔ If you have any questions about these instructions, contact SAMSON's After-sales Service Department (aftersalesservice@samson.de).

The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website (www.samson.de) > Product documentation. You can enter the document number or type number in the [Find:] field to look for a document.

***WARNING!***
*Damage to health relating to REACH Regulation.*
*If a SAMSON device contains a substance which is listed as being a substance of very high concern on the candidate list of the REACH Regulation, this circumstance is indicated on the SAMSON delivery note.*
*Information on safe use of the part affected,*
*see ▶ http://www.samson.de/reach-en.html*

**Definition of signal words**

***DANGER!***
*Hazardous situations which, if not avoided, will result in death or serious injury*

***WARNING!***
*Hazardous situations which, if not avoided, could result in death or serious injury*

***NOTICE***
*Property damage message or malfunction*

***Note:***
*Additional information*

***Tip:***
*Recommended action*

# 1 General safety instructions

– All safety instructions and warnings given in these mounting and operating instructions, particularly those concerning installation, start-up and maintenance, must be strictly observed.
– The device must be mounted, started up or serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. Make sure employees or third persons are not exposed to any danger.
– According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
– The devices comply with the requirements of the European Pressure Equipment Directive 2014/68/EU. Devices with a CE marking have an EC declaration of conformity, which includes information about the applied conformity assessment procedure. This declaration of conformity can be provided on request.
– To ensure appropriate use, only use the device in applications where the operating pressure and temperatures do not exceed the specifications used for sizing the device at the ordering stage.
– The manufacturer does not assume any responsibility for damage caused by external forces or any other external factors.
– Any hazards that could be caused in the regulator by the process medium, operating pressure or by moving parts are to be prevented by taking appropriate precautions.
– Proper transport, storage, installation, operation and maintenance are assumed.

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***Note:***
*Non-electric valve versions whose bodies are not lined with an insulating material coating do not have their own potential ignition source according to the risk assessment stipulated in EN 13463-1: 2009, section 5.2, even in the rare incident of an operating fault. Therefore, such valve versions do not fall within the scope of Directive 2014/34/EU.*
*For connection to the equipotential bonding system, observe the requirements specified in section 6.4 of EN 60079-14: 2011 (VDE 0165 Part 1).*

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## 2 Process medium and scope of application

Flow rate and differential pressure regulation or flow rate and pressure regulation in district heating supply networks and industrial plants · Valves **DN 15** to **50** · Nominal pressure **PN 16** and **25** · Suitable for **liquids** up to **150 °C**, **air** and **nitrogen** up to **150 °C** [1)]

The valve closes when the flow rate or differential pressure rises.

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1) Diaphragms and seals made of FPM (FKM) and PN 25 version

## 3 Transportation and storage

The regulator must be carefully handled, transported and stored. Protect the regulator against adverse influences, such as dirt, moisture or frost, during storage and transportation.

When regulators are too heavy to be lifted by hand, fasten the lifting sling at a suitable place on the valve body support on the valve.

## 4 Design and principle of operation

*See Fig. 1 on page 7 and Fig. 2 on page 8.*

The flow and differential pressure regulators basically consist of a valve with balanced plug and a closing actuator with two diaphragms. The regulators are used to limit the differential pressure and flow rate to the set points adjusted at the actuator. The valve closes when the differential pressure or flow rate increases.

**Type 46-7 and Type 47-5**

Designed for installation in the low-pressure pipe, e.g. return flow pipe of a district heating substation

**Type 47-1 and Type 47-4**

Designed for installation in the high-pressure pipe, e.g. flow pipe

The medium flows through the valve in the direction indicated by the arrow. The areas released by the restriction (1.2) and the plug (3) determine the flow rate and the differential pressure Δp or downstream pressure $p_2$ (Type 47-1). The differential pressure Δp is converted by the first operating diaphragm (6.1) and the differential pressure created at the restriction based on the flow rate by the second operating diaphragm (6.3) into a positioning force. The largest signal is always used to control the regulator.

### Type 46-7 and Type 47-5

To control the flow rate, the low pressure downstream of the restriction (1.2) is transmitted through a hole in the plug (3) to the top diaphragm chamber A. The high pressure of $\dot{V}$ is transmitted through the attached control line (11) to the diaphragm chamber B.

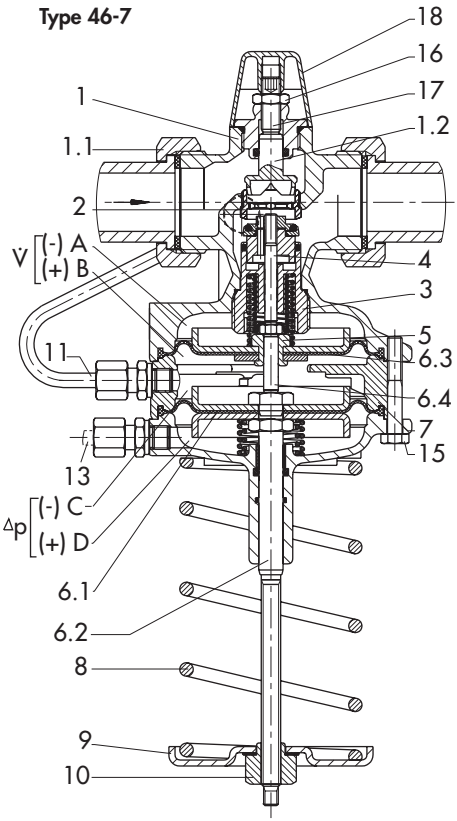
To control the differential pressure, the high pressure of $\Delta p$ must be transmitted through the external control line (13), which is attached on the site of installation, to the bottom diaphragm chamber D. The low pressure of $\Delta p$ is equal to the high pressure of the $\dot{V}$ and acts in the diaphragm chambers B and C which are connected to each other.

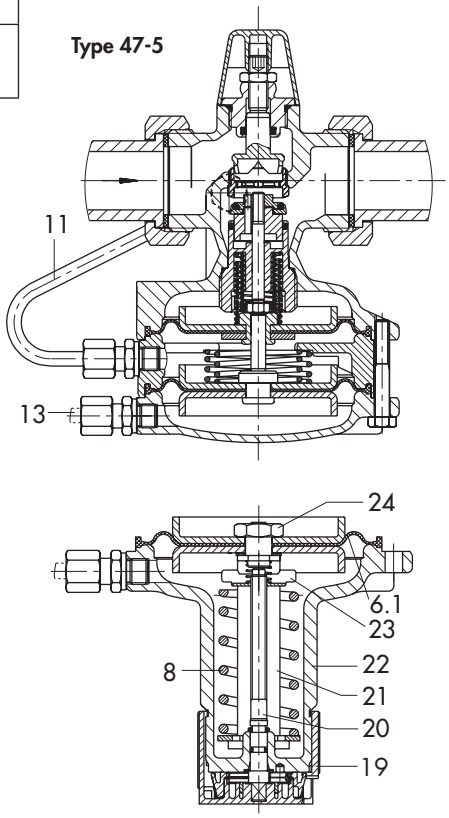
Legend for Fig. 1

1 Valve body
1.1 Connection nut with seal and welding end
1.2 Restriction
2 Seat
3 Guide nipple with plug section
4 Plug stem
5 Valve spring
6 Actuator
6.1 First operating diaphragm
6.2 First actuator stem
6.3 Second operating diaphragm
6.4 Second actuator stem
7 Intermediate ring
8 Set point spring
9 Spring plate
10 Set point adjuster for differential pressure
11 Control line (+) $\dot{V}$
12 Control line (+) $\Delta p$
13 External control line (+) $\Delta p$
14 External control line (–) $\Delta p$
15 Screws
16 Lock nut
17 Set point screw for flow rate (hexagon socket screw SW 4)
18 Cap
19 Manual adjuster for differential pressure
20 Spindle
21 Support
22 Bottom section of the body
23 Spring plate
24 Nut
A to D = Diaphragm chambers

**Table 1:** *Tightening torques in Nm*

| Position | DN | Nm |
|---|---|---|
| Plug (3) | 15 to 25 | 70 |
| | 32 to 50 | 110 |
| Screws (15) | 15 to 32 | 8 |
| | 40 to 50 | 18 |




**Type 47-1/46-7**

DN 15 to 32, set point range 0.2 to 0.6 bar and 0.2 to 1 bar, with manual adjuster and scale for Δp set point adjustment.

**Fig. 1:** *Functional diagrams of Type 46-7, Type 47-1 and Type 47-5 Flow and Differential Pressure Regulators*

**Type 47-1 and Type 47-4**

To control the flow rate, the low pressure of $\dot{V}$ downstream of the restriction (1.2) is transmitted through a hole in the plug (3) to the top diaphragm chamber A. The high pressure of $\Delta p$ is transmitted through the attached control line (11) to the diaphragm chamber B. To control the differential pres-

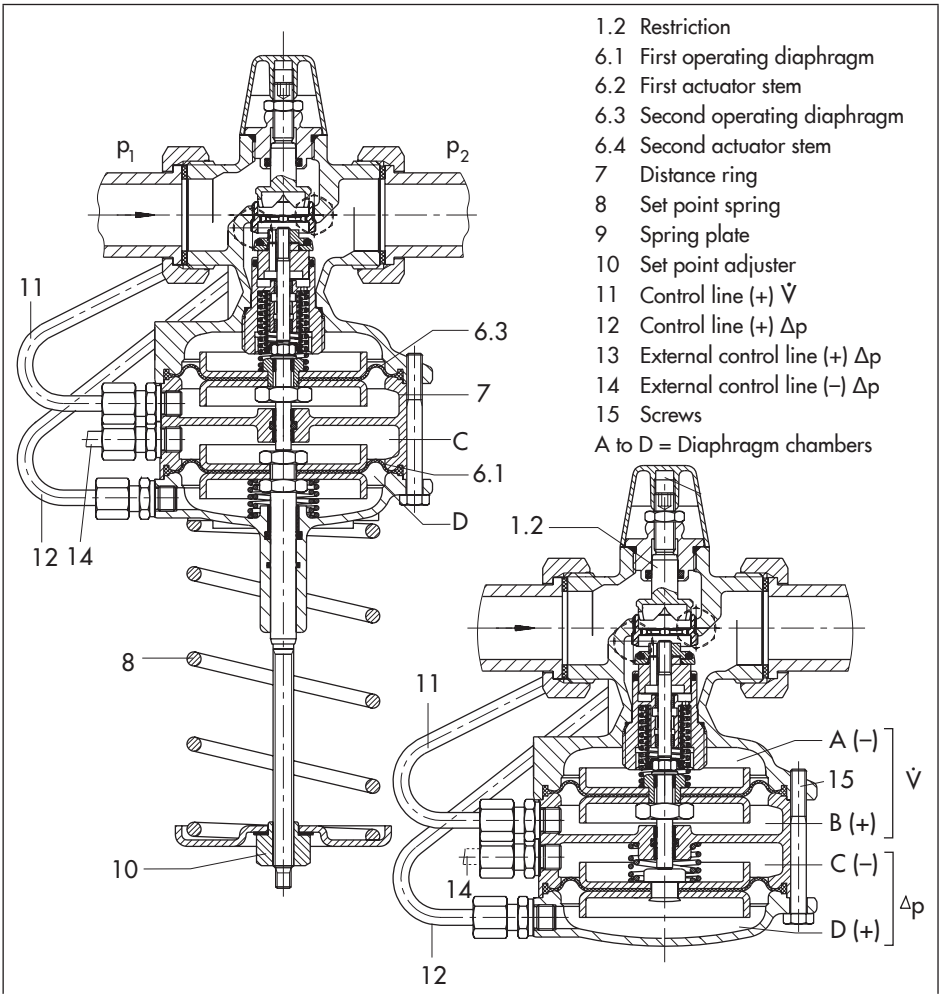



**Fig. 2:** *Functional diagrams of Type 47-1 and Type 47-4 Flow and Differential Pressure or Pressure Regulators*

sure, the high pressure of Δp is transmitted through the attached control line (12) to the bottom diaphragm chamber D. The low pressure of Δp must be transmitted through the external control line (14), which is attached on the site of installation, to the diaphragm chamber C.

When the Type 47-1 is used as a flow regulator and pressure reducer, diaphragm chamber D is connected with the downstream pressure $p_2$. The control line connection of diaphragm chamber C remains open to the atmosphere.

***Note:***
*Flow and differential pressure regulators with **Type 5824** or **Type 5825** Electric Actuator:*
*In these regulators, the signal of an electric control device can be applied to achieve additional temperature control by altering the restriction position. For details, refer to Mounting and Operating Instructions ▶ EB 3135-2, ▶ EB 5824-1 and ▶ EB 5824-2.*

# 5 Installation

## 5.1 Mounting position

*See Fig. 1 on page 7 and Fig. 2 on page 8.*

**Standard installation** · Install the regulators in horizontal pipelines with the actuator facing down.

The regulator in nominal sizes **DN 15** to **25** can also be installed in vertical pipes.

The following generally applies:

– Choose a place of installation that allows you to freely access the regulator even after the entire plant has been completed.
– Install a strainer (e.g. SAMSON Type 1 NI) upstream of the regulator (see section 5.2).
– The direction of flow must match the direction indicated by the arrow on the body.
– Connect external control lines at the side of the main pipe (see Fig. 4).

***NOTICE***
*Incorrectly installed regulator*
*The regulator can be damaged.*
*Make sure the regulator is installed free of stress. Observe permissible mounting position.*

***NOTICE***
*Possible malfunction and damage due to adverse effects of weather conditions (temperature, humidity).*
*Do not install the regulator outdoors or in rooms prone to frost. If such a location cannot be avoided, protect the regulator against freezing up if the process medium flowing through the valve can freeze up. Either heat the regulator or remove it from the plant and completely drain the residual medium.*

## 5.2 Strainer (filter)

A strainer installed upstream in the flow pipe holds back any dirt or other foreign particles. For example, the SAMSON Type 1 NI Strainer is suitable (▶ T 1010).

- Install the strainer upstream of the regulator.
- The direction of flow must correspond to the arrow on the body.
- The filter element must be installed to hang downwards.
- Remember to leave enough space to remove the filter element.

## 5.3 Shut-off valve

Install a hand-operated shut-off valve both upstream of the strainer and at the outlet of the return flow pipe (see Fig. 3). This allows the plant to be shut down for cleaning and maintenance, and when the plant is not used for longer periods of time.

## 5.4 Pressure gauge

Install a pressure gauge at a suitable point to monitor the pressures prevailing in the plant (see Fig. 3).

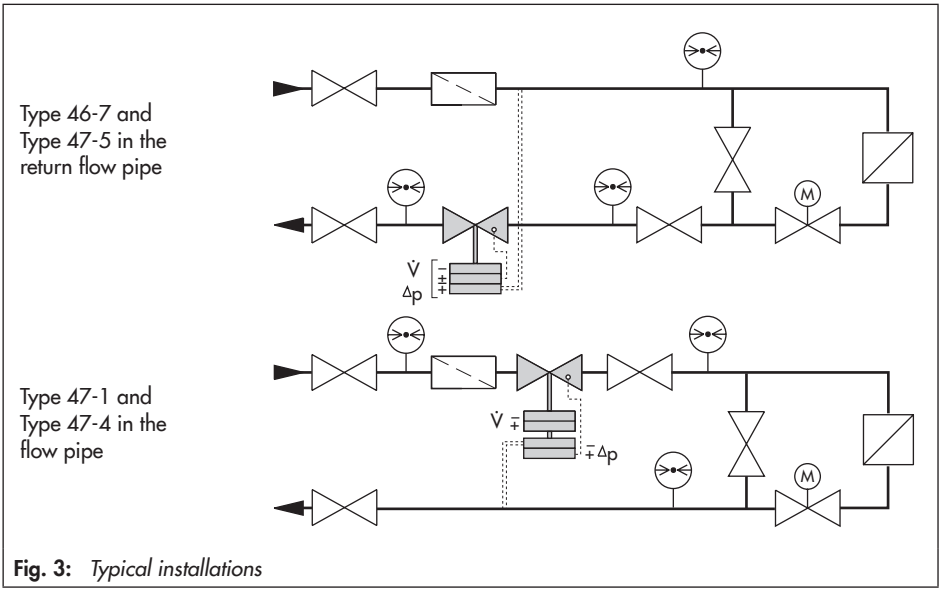
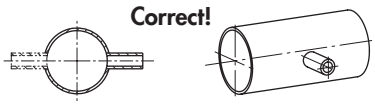
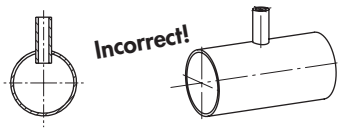


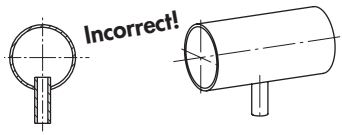

**Fig. 3:** *Typical installations*



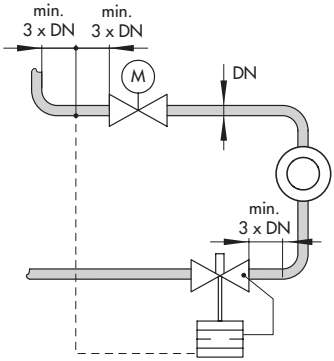

Connection at the side – optimal




Connection at the top – incorrect position




Connection at the bottom – incorrect position




Control line connection, depending on how the pipeline is routed

**Fig. 4:** *Control line connection*

## 5.5 Control line

**Control line** (see Fig. 4) · Depending on the regulator version, a control line (standard: 6x1 mm pipe diameter) must be adapted and mounted on site. Make sure that the control line is free of dirt.
The control line for tapping pressure from the pipeline must be installed at least 3 x DN away from any pipe fittings (e.g. restrictions, bends or branches), that may cause turbulence in the flow. How the lines are routed generally depends on the installation site.
Preferably connect the control line to the side of the main pipe.
Do not change the pipe diameter of the main pipeline so that it is off center.
Refer to installation schematics (Fig. 3) for line routing.

# 6 Operation

*See Fig. 1 on page 7 and Fig. 2 on page 8.*

## 6.1 Start-up

➔ First start up the regulator after mounting all parts.

➔ Make sure the control lines are open and correctly connected.

➔ Open the shut-off valves **slowly** preferably starting from the return flow pipe.

*Note:*
*On filling the plant, make sure the restriction (1.2) is open by turning the set point screw (17) counterclockwise (↺) as far as it will go.*

**Pressure testing of the plant** · All plant components must be designed for the test pressure. Replace the regulator, if necessary.

*NOTICE*
*Impermissible excessive pressure.*
*The diaphragm actuator can be damaged.*
*The pressure at the actuator must not exceed the* ***nominal pressure by 1.5 times*** *on testing the pressure of the plant when the regulator is already installed.*

**Rinsing the plant** · After filling the plant, first completely open the consumers. Set the maximum flow cross-section (by turning the set point screw counterclockwise (↺) as far as it will go) and the maximum differential pressure (by tensioning the set point spring). Rinse out the pipeline at full flow rate for several minutes. Check the installed strainer (e.g. by measuring the pressure drop). Clean the strainer, if necessary.

## 6.2 Adjusting the set point

### 6.2.1 Flow rate

For **Type 46-7** and **Type 47-1**, the **differential pressure** must be adjusted to its maximum value (maximum spring tension) before adjusting the flow rate. Make sure all control and shut-off valves or a bypass valve in the plant are fully open.

➔ Turn the set point adjuster (10) or manual adjuster (19) clockwise ↻ to fully load the springs (8).

➔ Unscrew cap (18) and undo lock nut (16). Turn set point screw (17) clockwise ↻ using a 4 mm Allen key (SW 4) as far as it will go to open the restriction (1.2).

➔ Refer to the diagram (Fig. 5) to find out how many turns are required to set the flow rate.

➔ Turn set point screw (17) counterclockwise ↺ by the required number of turns.

For exact adjustment, verify adjusted value with a heat or flow meter.

➔ Turn clockwise ↻:
The restriction closes. The flow rate drops.

➔ Turn counterclockwise ↺:
The restriction opens. The flow rate rises.

Retighten the lock nut (16) and screw the cap (18) back on after the required flow rate is reached. For the special version with a manual adjuster, the set point can be adjusted directly (one marked scale division corresponds to one turn of the set point screw).

**Table 2:** *Flow rate set point ranges for water in m³/h*

| **Nominal size DN** | **15** | | | | **20** | **25** | **32** | **40** [1] | **50** [1] |
|---|---|---|---|---|---|---|---|---|---|
| **$K_{VS}$ coefficient** | 0.4 | 1 | 2.5 | 4 | 6.3 | 8 | 12.5 | 16/20 [2] | 20/25 [2] |
| Set point range in **m³/h** with $\Delta p_{restriction}$ = 0.2 bar | – | | | 0.6 to 1.3 [3] | 0.8 to 2.3 [3] | 0.8 to 3.5 [3] | 2 to 5.8 [3] | 3 to 9.1 [3] | 4 to 14.1 [3] |
| | 0.01 to 0.2 | 0.12 to 0.64 | 0.2 to 1.2 | 0.6 to 2.5 | 0.8 to 3.6 | 0.8 to 4.2 [4] | 2 to 10 | 3 to 12.5 | 4 to 15 |

1) Also as version with flanged valve body
2) $K_{VS}$ coefficient with flanged valve body
3) An increase in noise level can be expected when the specified flow rates are exceeded.
4) 5 m³/h with $\Delta p_{restriction}$ = 0.3 bar (special version)

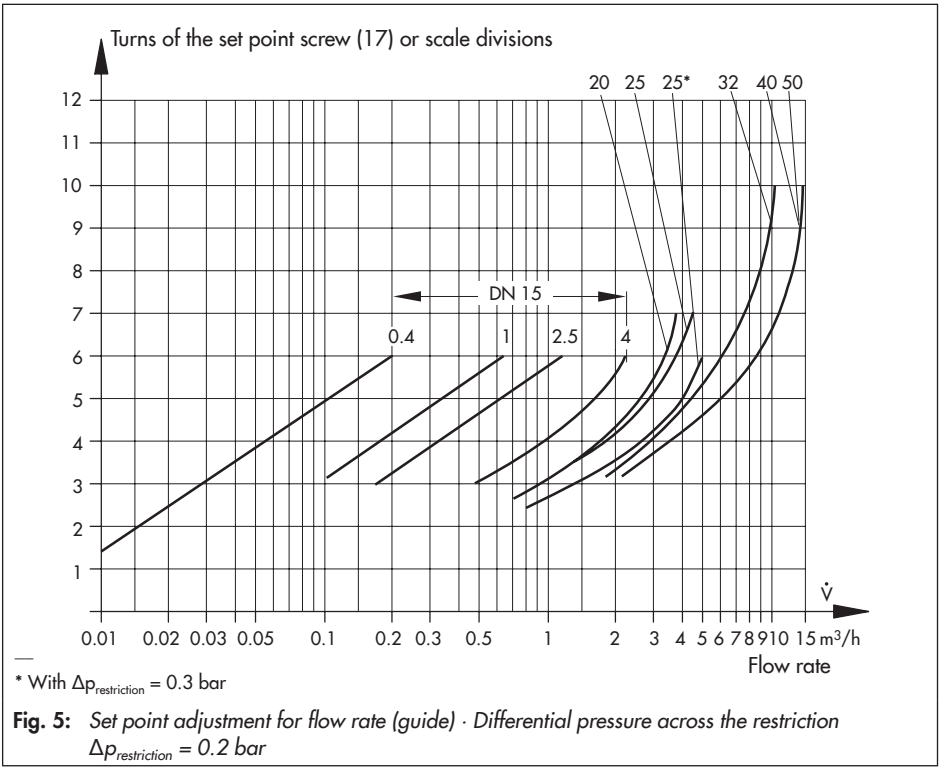



**Fig. 5:** *Set point adjustment for flow rate (guide) · Differential pressure across the restriction $\Delta p_{restriction}$ = 0.2 bar*

## 6.3 Differential pressure with Type 46-7 and Type 47-1

➔ Before adjusting the differential pressure, close the shut-off valves or the bypass to reduce the maximum flow rate to approx. 5 to 10 %.

If you are using a motorized valve, close it to approx. 10 to 30 % of its travel.

Adjust the required differential pressure at the set point adjuster (10).

➔ Turn clockwise ↻:
Tensioning the springs (8) increases the Δp set point.

➔ Turn counterclockwise ↺:
Relieving the spring tension reduces the Δp set point.

For regulators in sizes DN 15 to 32 with set point ranges from 0.2 to 0.6 bar and 0.2 to 1 bar, the set point springs are installed in the bottom section of the valve body.

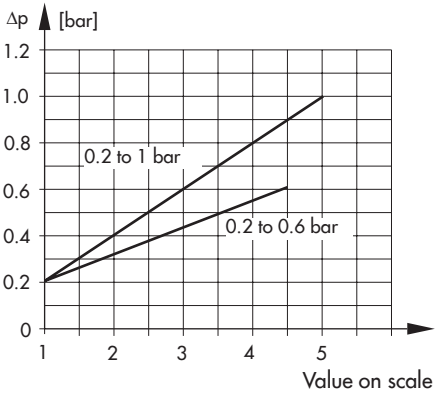



**Fig. 6:** *Differential pressure set point adjusted according to the value on the scale*

In this case, the set point can be directly adjusted at the manual adjuster according to the scale (see Fig. 6).

***Note:***
*The maximum value on the scale of the manual adjuster is 8. However, the maximum set point is reached earlier as shown in Fig. 6.*

One turn of the manual adjuster will change the differential pressure by approx. 0.033 bar in the range from 0.2 to 1 bar and by approx. 0.02 bar in the range from 0.2 to 0.6 bar.

***Note:***
*Do not adjust the set point to a value on the scale lower than 1. Under unfavorable conditions, the set point cannot be adjusted anymore as a result. In this case, the following action is recommended:*
*– Relieve the regulator of pressure.*
*– Turn the manual adjuster counterclockwise ↺ as far as it will go to its lowest position.*
*– Turn the manual adjuster back clockwise ↻ at least past the the value 1 to 2 on the scale.*
*The set point can be adjusted again.*

## 6.4 Decommissioning

Preferably close first the shut-off valve on the upstream side of the valve and then on the downstream side of the valve.

# 7 Maintenance · Replacing parts

*See Fig. 1 on page 7 and Fig. 2 on page 8.*

The regulator does not require any maintenance. Nevertheless, it is subject to natural wear, particularly at the seat, plug and operating diaphragm. Depending on the operating conditions, check the regulator at regular intervals to avoid possible malfunctions.

Details on faults and how to remedy them can be found in Table 3. If faults cannot be remedied following the recommended action, contact SAMSON.

To replace the plug and operating diaphragm, proceed as described in section 7.1 and 7.2.

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***WARNING!***
*Before performing any work on the regulator, make sure the relevant plant section has been depressurized and, depending on the process medium, drained as well. We recommend removing the valve from the pipeline. When used at high temperatures, allow the plant section to cool down to ambient temperature.*
*Disconnect or shut off the control line to prevent the risk of moving regulator parts. As valves are not free of cavities, remember that residual process medium might still be contained in the valve.*

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## 7.1 Cleaning or replacing the plug

1. Unscrew the external control line (13, 14) and remove the device from the pipeline.
2. For Type 46-7 and Type 47-1, completely relieve the tension from the spring (8) by turning the set point adjuster (10) or manual adjuster (19) counterclockwise.
3. Unscrew the attached control lines (11, 12).
4. Loosen the screws (15) and lift the actuator off the valve body. Pull the valve spring (5), if installed, out of the body.
5. For valve sizes DN 15 to 25, unscrew and pull out the guide nipple with plug section (3) using a socket wrench (order no. 1280-3001).
6. For valve sizes DN 32 to 50, unscrew the stopper first and pull out the plug section.
7. Clean the seat and plug thoroughly. Check the control line for any blockages. If the plug is damaged, replace the entire plug section with a new one.
8. To reassemble, proceed in reverse order. Observe the tightening torques specified in Table 1 in Fig. 1.

## 7.2 Replacing the diaphragms

*See Fig. 1 on page 7 and Fig. 2 on page 8.*

1. Unscrew the external control line (13, 14) and remove the device from the pipeline.
2. For Type 46-7 and Type 47-1, completely relieve the tension from the spring (8) by turning the set point adjuster (10) or manual adjuster (19) counterclockwise.
3. Unscrew the attached control lines (11, 12).
4. Loosen the screws (15). Take off the intermediate ring (7), bottom diaphragm case and actuator stems together with diaphragms and diaphragm plates one after the other.

   Pull the valve spring (5), if installed, out of the body.
5. Check which diaphragm is defective and replace it with a new one (it can only be replaced together with the diaphragm plates in some versions).
6. To reassemble, proceed in reverse order. Observe tightening torques specified in Table 1 in Fig. 1.

**Type 46-7 and Type 47-1: version with manual adjuster**

1. Unscrew the control line (11).
2. Completely relieve the tension from the spring (8) by turning the manual adjuster (19) counterclockwise until a clicking noise is heard.
3. Remove screws (15). Take off the bottom section of the body (22), intermediate ring (7) and top diaphragm (6.3) together with diaphragm plates and the actuator stem. Pull the valve spring (5), if installed, out of the body.
4. Check which diaphragm is defective and replace it with a new one (it can only be replaced together with the diaphragm plates in some versions).

   If the bottom diaphragm (6.1) is defective, proceed as follows:
5. Unscrew the complete unit, consisting of diaphragm (6.1) together the diaphragm plates, spring (8) and support (21), from the spindle (20) by turning the unit counterclockwise. Remove it from the bottom section of the valve body.
6. Push the new complete unit over the spindle (20) and turn it clockwise one turn to fasten it onto the spindle.
7. Lift the diaphragm plate to check whether the thread of the spring plate (23) has engaged. If not, turn it once more.
8. To continue assembly, proceed in reverse order and as described in step 1 to 3.

For start-up, proceed as described in section 6.1.

**Table 3:** *Troubleshooting*

| Malfunction | Possible reasons | Recommended action |
|---|---|---|
| Flow rate or differential pressure exceeds adjusted set point | Leak between seat and plug | Remove valve from the pipeline and clean seat and plug. Renew plug, if necessary (see section 7.1). If this is not possible, return regulator to SAMSON for repair. |
| | Defective operating diaphragm | Replace diaphragm (see section 7.2) or return regulator to SAMSON for repair. |
| | Control line blocked | Remove control line and clean it. |
| | Valve too large for control task (flow rate) or too small (differential pressure) | Recalculate $K_{VS}$ and contact SAMSON for further action. |
| Flow or differential pressure set point not reached | Leak between seat and plug | Remove valve from the pipeline and clean seat and plug. Renew plug, if necessary (see section 7.1). If this is not possible, return regulator to SAMSON for repair. |
| | Incorrect set point range selected. | Check set point range and contact SAMSON for further action. |
| | Safety device, e.g. pressure limiter, has been triggered. | Check plant. Unlock safety device. |
| | Plant differential pressure too low | Compare differential pressure in the plant with the plant's drag. |
| | Strainer blocked | Drain and clean filter of the strainer. |
| | Incorrectly installed valve (direction of flow). | Install the valve in such a way that the flow of direction corresponds with the direction indicated by the arrow on the valve body. |
| Control loop hunts. | Valve too large for control task | Recalculate $K_{VS}$ and contact SAMSON for further action. |

# 8 Customer inquiries

Contact SAMSON's After-sales Service department for support concerning maintenance or repair work or when malfunctions or defects arise.

**E-mail**

You can reach the After-sales Service Department at aftersalesservice@samson.

**Addresses of SAMSON AG and its subsidiaries**

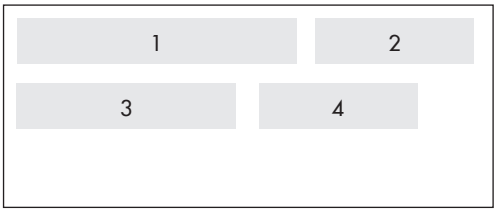
The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on the SAMSON website (▶ www.samson.de) in all SAMSON product catalogs or on the back of these Mounting and Operating Instructions.

To assist diagnosis and in case of an unclear mounting situation, specify the following details (so far as possible). See section 9:

- Device type and nominal size
- Model number or configuration ID (Var.-ID)
- Upstream and downstream pressure
- Temperature and process medium
- Min. and max. flow rate
- Is a strainer installed?
- Installation drawing showing the exact location of the regulator and all the additionally installed components (shut-off valves, pressure gauge, etc.)

***Note:***
***Conversion from chromate coating to iridescent passivation***
*We at SAMSON are converting the surface treatment of passivated steel parts in our production. As a result, you may receive a device assembled from parts that have been subjected to different surface treatment methods. This means that the surfaces of some parts show different reflections. Parts can have an iridescent yellow or silver color. This has no effect on corrosion protection.*
*For further information go to ▶ www.samson.de/chrome-en.html*

# 9 Nameplate




1 Configuration ID (Var.-ID)
2 Type designation
3 Model number
4 Date of manufacture

In the other fields:

$K_{VS}$ or $C_V$ coefficient

Max. permissible temperature in °C or °F

Differential pressure set point range in bar or psi

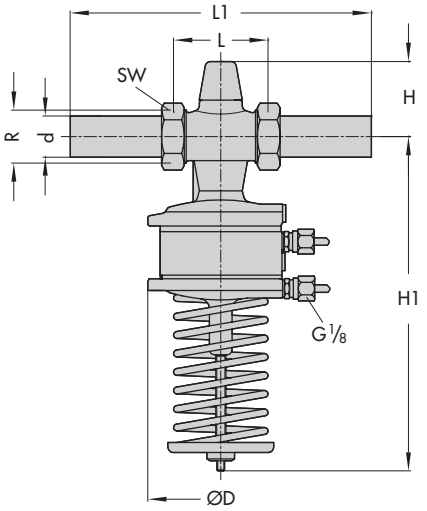
Flow rate set point range in $m^3/h$

Max. perm. differential pressure Δp

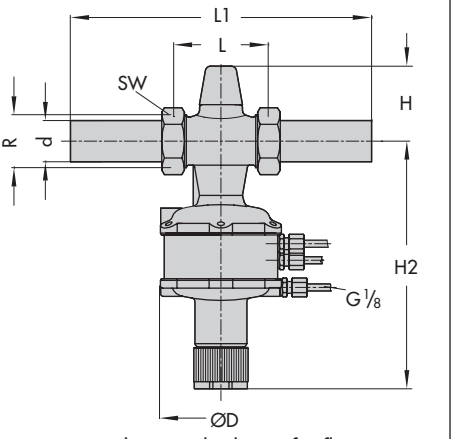
Nominal pressure PN or ANSI Class

**Fig. 7:** *Nameplate*

# 10 Dimensions and weights

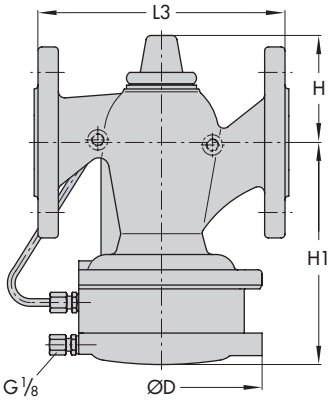



**Type 46-7, Type 47-1** · DN 15 to 50 with welding ends

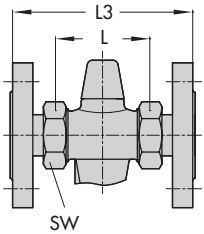



Version with manual adjuster for flow rate set point adjustment

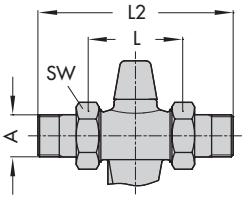
**Type 46-7, Type 47-1** · DN 15 to 32, set point ranges 0.2 to 0.6 and 0.2 to 1 bar with welding ends



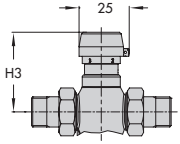

**Type 47-4, Type 47-5** · Flanged body, DN 32 to 50




With flanges




With threaded ends




Version with scaled cap for flow rate set point adjustment

**Fig. 8:** *Dimensional drawings*

**Table 4:** *Regulator **with** connecting parts · Dimensions in mm and weights in kg*

| Valve size | | DN 15 | DN 20 | DN 25 | DN 32 | DN 40 | DN 50 |
|---|---|---|---|---|---|---|---|
| **With welding ends** | | | | | | | |
| L1 | | 210 | 234 | 244 | 268 | 294 | 330 |
| Weight, approx. kg | 46-7 | 2.6 | 2.7 | 2.8 | 4 | 12 | 12.5 |
| | 47-1 | | | | | | |
| | 47-4 | 2.2 | 2.3 | 2.4 | 3.5 | 6.2 | 6.7 |
| | 47-5 | | | | | | |
| **With threaded ends** | | | | | | | |
| L2 | | 129 | 144 | 159 | 192 | 206 | 228 |
| Male thread A | | G ½ | G ¾ | G 1 | G 1¼ | G 1½ | G 2 |
| Weight, approx. kg | 46-7 | 2.6 | 2.7 | 2.8 | 4 | 12 | 12.5 |
| | 47-1 | | | | | | |
| | 47-4 | 2.2 | 2.3 | 2.4 | 3.5 | 6.2 | 6.7 |
| | 47-5 | | | | | | |
| **With flanges [1] [2] or with flanged body (DN 32 to 50)** | | | | | | | |
| L3 | | 130 | 150 | 160 | 180 | 200 | 230 |
| Weight, approx. kg | 46-7 | 4.0 | 4.7 | 5.3 | 7.2 | 16.0 | 17.5 |
| | 47-1 | | | | | | |
| | 47-4 | 3.6 | 4.3 | 4.9 | 6.7 | 10.2 | 11.7 |
| | 47-5 | | | | | | |

1) PN 16/25

2) Flanges are already mounted on valves in DN 40 and 50

**Table 5:** *Regulators **without** connecting parts · Dimensions in mm*

| Valve size | | DN 15 | DN 20 | DN 25 | DN 32 [1] | DN 40 [1] | DN 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 |
| H | | 65 | | | 85 | | |
| H1 | 46-7 | 248 | | | 265 | 415 | |
| | 47-1 | 265 | | | 285 | 425 | |
| | 47-4 | 122 | | | 140 | 192 | |
| | 47-5 | 108 | | | 125 | 175 | |
| H2 | 46-7 | 185 | | | 205 | – | |
| | 47-1 | 200 | | | 220 | | |
| H3 | | 75 | | | 95 | | |
| 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.

# 11 Technical data

| Nominal size | DN 15 | | | | DN 20 | DN 25 | DN 32 [2] | DN 40 [2] | DN 50 [2] |
|---|---|---|---|---|---|---|---|---|---|
| $K_{VS}$ coefficient | 0.4 [1] | 1 [1] | 2.5 | 4 [1] | 6.3 | 8 | 12.5 | 16/20 [2] | 20/25 [2] |
| $x_{FZ}$ value | 0.6 | | | | | 0.55 | 0.55/0.45 [2] | | 0.45/ 0.4 [2] |
| Nominal pressure | PN 16/25 | | | | | | PN 25 | | |
| Max. permissible differential pressure Δp across the valve | 10 [3]/20 bar | | | | | | | 16 bar | |
| Max. permissible temperature | Liquids: 130 °C [3] · Air and nitrogen: 150 °C | | | | | | | | |
| Pressure above adjusted differential pressure set point at which internal excess pressure limiter responds (Types 46-7 and 47-5) | 0.5 bar | | | | | | | | |
| **Differential pressure set point ranges** | | | | | | | | | |
| Types 46-7 and 47-1, continuously adjustable | 0.2 to 0.6, 0.2 to 1, 0.5 to 2 bar | | | | | | | 0.2 to 0.5, 0.2 to 1, 0.5 to 2 bar | |
| Types 47-4 and 47-5, fixed set point | 0.2, 0.3, 0.4 or 0.5 bar | | | | | | | | |

1) Special versions
2) Additional version: Valve with flanged body made of spheroidal graphite iron (EN-JS1049)
3) For PN 16 version
4) Only in PN 25 version and diaphragm and seals made of FPM (FKM)

The minimum required differential pressure $\Delta p_{min}$ across the valve is calculated as follows:

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

$\Delta p_{min}$ Minimum differential pressure across the valve in bar

$\Delta p_{restriction}$ Differential pressure created at the restriction for measuring the flow rate

$\dot{V}$ Adjusted flow rate in $m^3/h$

$K_{VS}$ Valve flow coefficient in $m^3/h$

***Note:***

*Medium temperatures below 0 °C may cause ice to form on the valve, depending on the air humidity. This may affect, in particular, the functioning of the stem guide or set point adjuster. This must be prevented on site by taking appropriate precautions (e.g. enclosure, trace heater etc.).*

*In principle, the materials are also resistant to high concentrations of glycol. Nevertheless, glycol reacts when it comes into contact with metals and causes acids to form. We cannot prevent this reaction. Therefore, plant operators must prevent it by using suitable inhibitors.*

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