

Differential Pressure Regulator Type 45-6



Fig. 1 · Type 45-6

Mounting and Operating Instructions

EB 3126 EN

Edition January 2004



| Contents | | Page |
|-----------------|--|------|
| 1 | Design and principle of operation | 4 |
| 2 | Installation | 5 |
| 2.1 | Installation position | 5 |
| 2.2 | Strainer | 5 |
| 2.3 | Shut-off valves, pressure gauges | 5 |
| 3 | Operation | 6 |
| 3.1 | Start-up | 6 |
| 3.2 | Set point adjustment | 6 |
| 4 | Maintenance – Replacement | 6 |
| 4.1 | Cleaning or replacing the plug | 7 |
| 4.2 | Replacing the diaphragm | 7 |
| 5 | Troubleshooting | 8 |
| 6 | Description of the nameplate | 9 |
| 7 | Customer inquiries | 9 |
| 8 | Dimensions and weights | 10 |

General safety instructions



- ▶ Only fully trained and qualified personnel may mount, start up, and service the device, observing the accepted industry codes and practices. Make sure employees or third persons are not exposed to any danger. All safety instructions and warnings in these instructions, particularly those concerning installation, start-up, and maintenance, must be strictly observed.
- ▶ The regulator fulfills the requirements of the European Pressure Equipment Directive 97/23/EC. Valves with a CE marking have a declaration of conformity that includes information on the applied conformity assessment procedure. The declaration of conformity can be viewed and downloaded on the Internet at <http://www.samson.de>.
- ▶ For appropriate operation, make sure that the regulator is only used in applications where the operating pressure and temperatures do not exceed the operating values based on the valve sizing data submitted in the order. Note that the manufacturer does not assume any responsibility for damage caused by external forces or any other external influences. Any hazards which could be caused in the regulator by the process medium, the operating pressure, or moving parts are to be prevented by means of appropriate measures.
- ▶ Proper shipping and appropriate storage are assumed.

Caution!

- ▶ Prior to removing the regulator from the pipeline, always depressurize the relevant section of the plant and drain the pipeline if the process medium is a liquid. If necessary, allow the regulator to cool down or heat up to reach ambient temperature prior to starting any work on the regulator.
- ▶ Protect the regulator against frost when controlling freezing media.

Note! Non-electrical control valves, whose valve 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: 2001, paragraph 5.2, even in the rare incident of an operating fault. Therefore, such valve versions **do not** fall within the scope of Directive 94/9/EC.

1 Design and principle of operation

The differential pressure regulator consists of a valve with a balanced plug and of an opening actuator with an operating diaphragm and a spring assembly.

The differential pressure regulator is designed to maintain the differential pressure

at the adjusted set point.

The valve opens as the differential pressure rises. The medium flows through the valve in the direction indicated by the arrow. The pressure in the valve outlet (low pressure), transmitted via the attached control line (10), acts on the lower diaphragm chamber. The high pressure, transmitted through

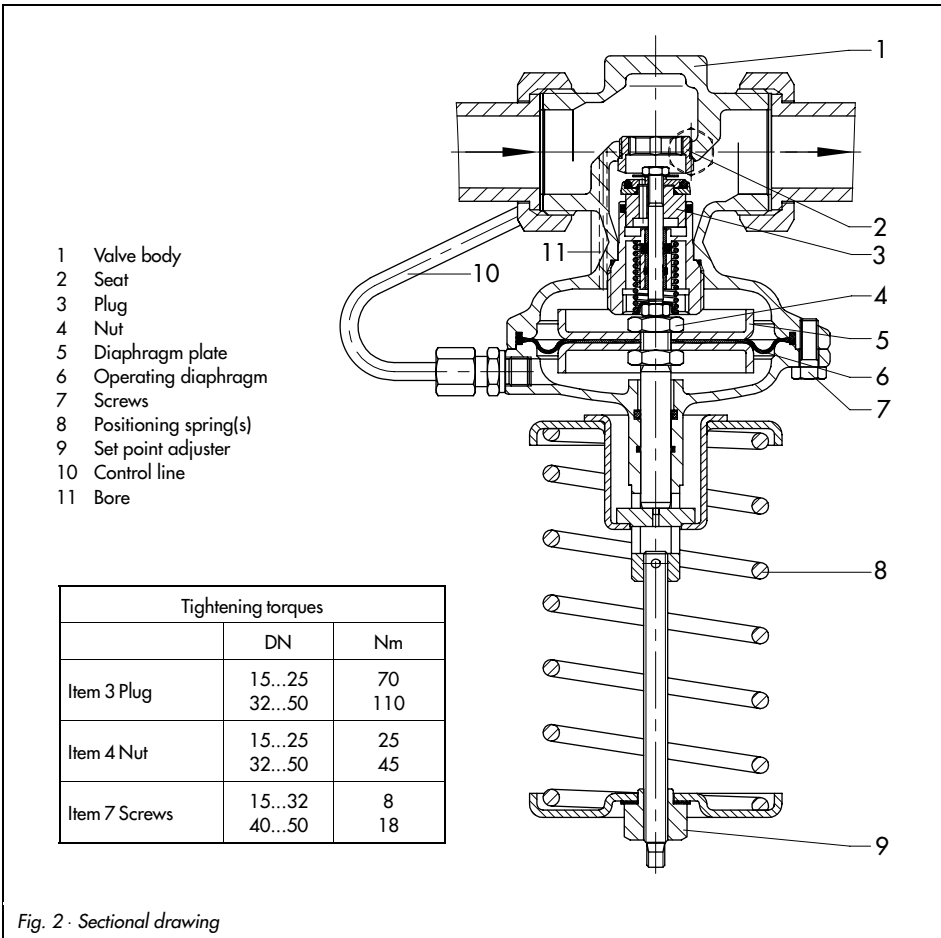


Fig. 2 · Sectional drawing

the bore (11) in the valve body, acts on the upper diaphragm chamber of the actuator. The differential pressure creates a positioning force at the operating diaphragm which is used to position the plug depending on the force of the positioning springs (8). The force of the spring assembly, i.e. the set point, is modified by turning the set point adjuster (9).

2 Installation

2.1 Installation position

The differential pressure regulators must be installed in horizontal bypass or short-circuit pipes with the actuator suspended downward (see Fig. 3).

Regulators in sizes DN 15 to DN 25 can be installed in vertical pipelines, too. For medium temperatures above 80 °C, the regulator must not be installed with the diaphragm actuator pointing vertically upward. The medium must flow through the valve in the direction indicated by the arrow on the valve body.

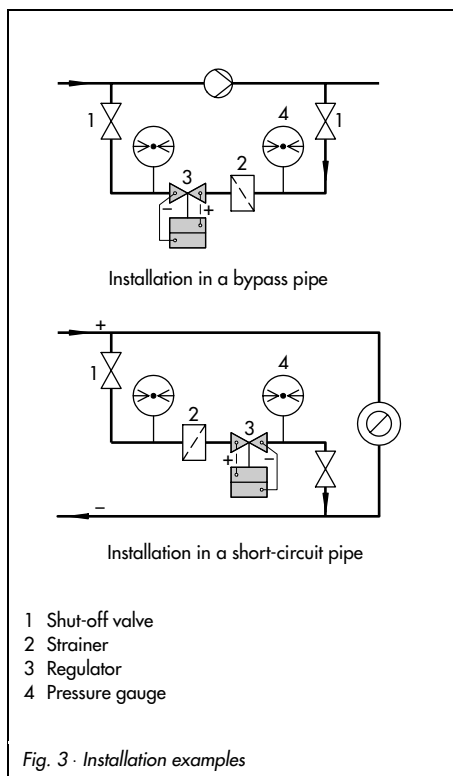
2.2 Strainer

Since sealing parts, globules, and other impurities carried along by the medium may impair the proper functioning of the valve and especially the tight shut-off, a strainer (SAMSON Type 1NI) must be installed upstream of the differential pressure regulator. The strainer must be installed so that the medium flows through it in the direction indicated by the arrow on the strainer body. The filter element must be suspended downward. Ensure that there is sufficient space available to remove the filter.

2.3 Shut-off valves, pressure gauges

We recommend the installation of hand-operated shut-off valves both upstream of the strainer and downstream of the regulator. This allows the plant to be shut down for cleaning and maintenance routines or when it is not operated for extended periods.

Install pressure gauges upstream and downstream of the valve to monitor the pressures prevailing in the plant.



3 Operation

3.1 Start-up

Fill the plant very slowly on start-up. When pressure-testing the pipelines with the regulator installed, make sure the test pressure does not exceed 1.5 times the nominal pressure.

3.2 Set point adjustment

The required differential pressure is adjusted at the set point adjuster (9) which loads the spring(s).

- ▶ Turn the set point adjuster clockwise to increase the differential pressure.
- ▶ Turn the set point adjuster counterclockwise to reduce the differential pressure.

4 Maintenance – Replacement

The regulator is maintenance-free, but is subject to wear and tear, especially at the seat, plug, and operating diaphragm. Depending on the application conditions that prevail, the regulator must be inspected at appropriately scheduled intervals to prevent any problems before they occur. Details on faults and how to correct them can be found in the table on page 8. If a problem cannot be solved with the help of the information specified in the table, contact SAMSON.

In order to replace the plug and operating diaphragm, proceed as described in sections 4.1 and 4.2.



Caution

If you intend to carry out any work on the differential pressure regulator, you are required to remove the device from the pipeline. For this purpose, first allow the relevant section of the plant to cool down in case of high temperatures. Then, depressurize and drain this section prior to removing the regulator.

4.1 Cleaning or replacing the plug

1. Disassemble springs (8).

Caution!

The springs are pre-loaded. Take proper precautionary measures or, if necessary, make a disassembly tool.

2. Unscrew the control line (10).
3. Loosen screws (7) and lift off actuator.
4. For valve sizes DN 15 to 25, unscrew and remove the guide nipple with plug (3) using a socket wrench (order no. 1280-3001).

The wrench can be made, for example, from a Gedore screwdriver bit (IN 19-19) by boring a 17 mm hole with a 17 mm diameter into the 19 mm hexagon bit.

For valve sizes DN 32 to 50, first remove the stopper and then pull out the plug.

5. Clean seat and plug thoroughly. Check control line and screw connections and bore (11) for any blockages.

Should the plug be damaged, replace the entire plug.

To reassemble the regulator, proceed in reverse order.

Make sure that the diaphragm is inserted properly in the body groove before fastening the components.

Refer to tightening torques listed in the table in Fig. 2.

4.2 Replacing the diaphragm

1. Disassemble springs (8).

Caution!

The springs are pre-loaded. Take proper precautionary measures or, if necessary, make a disassembly tool.

2. Unscrew control line (10).
3. Loosen screws (7) and lift off actuator.
4. Unscrew nut (4) sealed with paint while holding lower nut stationary.
5. Lift off diaphragm plate and replace diaphragm.
6. To reassemble, proceed in reverse order.

Make sure that the diaphragm is inserted properly in the body groove before fastening the components.

Refer to tightening torques listed in the table in Fig. 2.

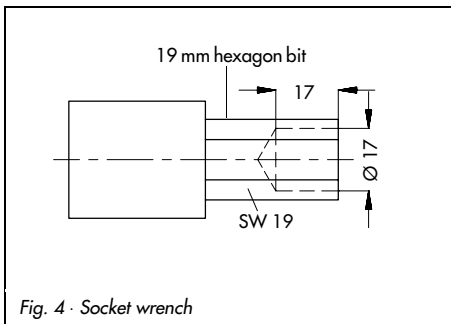
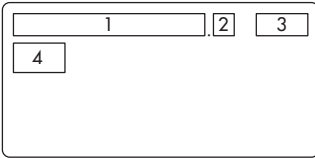


Fig. 4 · Socket wrench

5 Troubleshooting

| Fault | Possible cause | Solution |
|--|--|--|
| Differential pressure set point is exceeded | Valve too large for control task | Recalculate the valve sizing flow coefficient, K_{VS} , and contact SAMSON. |
| | Seat and plug untight | Remove valve, clean seat and plug. If necessary, replace plug (section 4.1). Otherwise, return device for repair. |
| | Operating diaphragm defective | Replace diaphragm (section 4.2) or return the device to SAMSON for repair. |
| | Control line plugged | Remove control line and clean it. |
| Differential pressure set point is not reached | Valve too small for control task | Check set point range and contact SAMSON. |
| | Safety device, e.g. pressure limiter, has been triggered | Check plant, unlock safety device. |
| | Insufficient pressure drop across the plant | Compare existing differential pressure in the plant with the plant's drag. |
| | Strainer blocked | Drain and clean filter of the strainer. |
| | Wrong installation of valve | Reinstall the valve in such a way that the medium flows through the valve in the direction indicated by the arrow. |
| Control loop hunts | Valve too large for control task | Recalculate the valve sizing flow coefficient, K_{VS} , and contact SAMSON. |

6 Description of the nameplate



- 1 Model number
- 2 Index
- 3 Date
- 4 Type designation

In the other fields:

Nominal pressure PN or ANSI Class

K_{VS} or C_V coefficient

Max. perm. temperature °C or °F

Set point range: differential pressure in bar or psi

Max. perm. differential pressure Δp

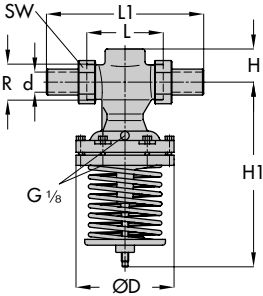
Fig. 5 · Labeling

7 Customer inquiries

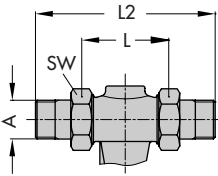
In case of inquiries, please submit the following details:

- ▶ Regulator type and nominal size
- ▶ Thread or flange connection
- ▶ Model number
- ▶ Upstream and downstream pressures
- ▶ Flow rate in m^3/h
- ▶ Has a strainer been installed?
- ▶ Installation diagram

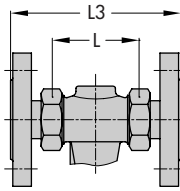
8 Dimensions and weights



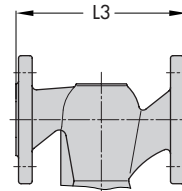
Connection nuts with
weld-on fittings



Connection nuts with
threaded ends



Connection nuts with
flanges



Flanged body DN 40 and 50

| | | | | | | |
|---|-------|-------|---------|---------|---------|---------|
| Nominal size DN | 15 | 20 | 25 | 32 | 40 | 50 |
| Inside pipe diameter d | 21.3 | 26.8 | 32.7 | 42 | 48 | 60 |
| Connection D | G 3/4 | G 1 | G 1 1/4 | G 1 3/4 | G 2 | G 2 1/2 |
| Width across flats SW | 30 | 36 | 46 | 59 | 65 | 82 |
| Length L | 65 | 70 | 75 | 100 | 110 | 130 |
| Height H | 32 | | 45 | | 45 | |
| Height H1 | 240 | | 260 | | 405 | |
| Height H2 | 160 | | 180 | | - | |
| Height H3 | 85 | | 105 | | 140 | |
| Diameter D | 116 | | | | 160 | |
| Weld-on fittings L1 | 210 | 234 | 244 | 268 | 294 | 330 |
| Weight appr. kg | 2.0 | 2.1 | 2.2 | 8.5 | 9 | 9.5 |
| Special version with threaded ends (male thread) | | | | | | |
| Length L2 | 129 | 144 | 159 | 180 | 196 | 228 |
| Male thread A | G 1/2 | G 3/4 | G 1 | G 1 1/4 | G 1 1/2 | G 2 |
| Weight appr. kg | 2.0 | 2.1 | 2.2 | 8.5 | 9 | 9.5 |
| Special version with flanges PN 16/25 or version with flanged body (DN 40/50) | | | | | | |
| Length L3 | 130 | 150 | 160 | 180 | 200 | 230 |
| Weight appr. kg | 3.4 | 4.1 | 4.7 | 11.7 | 13 | 14.5 |



SAMSON AG · MESS- UND REGELTECHNIK
Weismüllerstraße 3 · 60314 Frankfurt am Main · Germany
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
Internet: <http://www.samson.de>

EB 3126 EN

S/Z 2004-01