Pressure Reducing Valve for Steam
Type 39-2

Fig. 1 · Type 39-2

1. Design and principle of operation

The pressure reducing valve basically consists of the valve body with the seat, the plug stem with plug and balancing bellows, and the actuator with the operating diaphragm.

The pressure reducing valve is designed for maintaining the pressure downstream of the valve to an adjusted set point value.

The valve closes when the downstream pressure rises.

Edition September 1995

Mounting and operating instructions

EB 2506 E

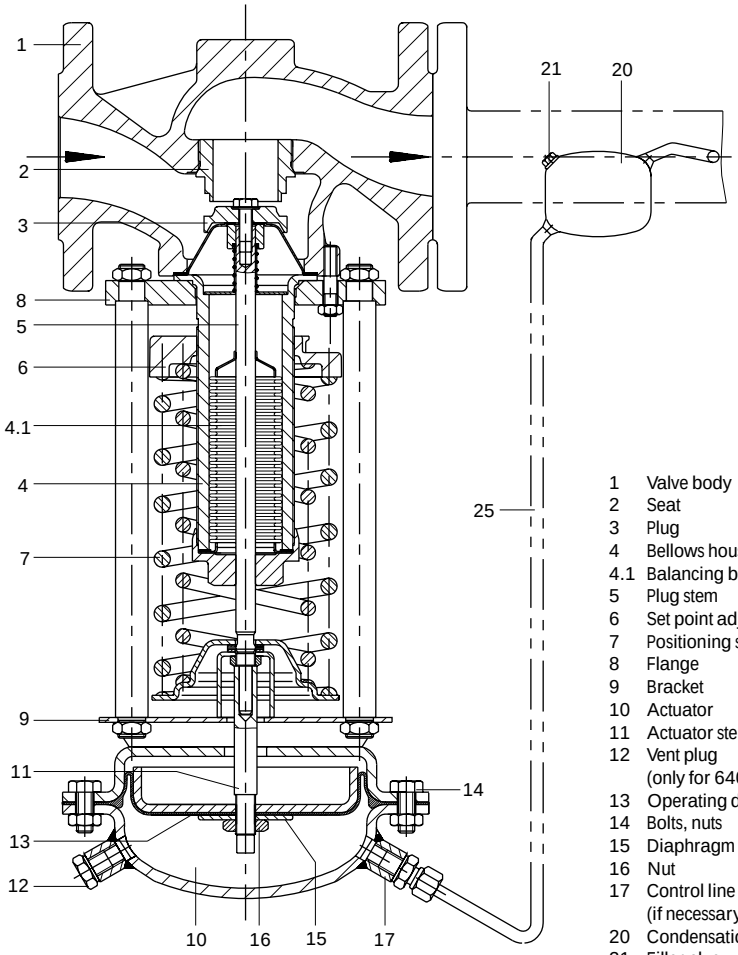
The medium to be controlled flows through the free area between the seat (2) and plug (3) in the direction indicated by the arrow.

The position of the valve plug determines the flow rate and hence the pressure ratio across the valve. The downstream pressure is transmitted via the condensation chamber (20) and the control line (25) to the operating diaphragm (13), where it is transformed into a positioning force. This positioning force is used to position the valve plug with dependence on the force of the operating springs (7).

The spring force can be adjusted using the set point adjustment (6).

The steam pressure reducing valve is fully balanced (upstream and downstream pressure).

The upstream pressure acts onto the bottom surface of the plug and onto the equally sized surface of the balancing bellows (4.1). This bellows is also used to seal the plug. The downstream pressure acts onto the top surface of the plug and onto the operating diaphragm. A section of the diaphragm, which



1 Valve body
2 Seat
3 Plug
4 Bellows housing
4.1 Balancing bellows
5 Plug stem
6 Set point adjustment
7 Positioning springs
8 Flange
9 Bracket
10 Actuator
11 Actuator stem
12 Vent plug (only for 640 cm^2)
13 Operating diaphragm
14 Bolts, nuts
15 Diaphragm plate
16 Nut
17 Control line connection (if necessary with restriction)
20 Condensation chamber
21 Filler plug
25 Control line

Fig. 2 · Sectional drawing (DN 15 to 50)

has about the size of the plug surface, is used as balancing area.

In this way, the forces produced by the upstream and downstream pressure, acting on the valve plug, are compensated.

2. Installation

2.1 Mounting location

The pressure reducing valve is to be installed in a horizontal pipeline with the actuator vertically suspended. The direction of medium flow through the valve must coincide with the arrow on the valve body.

When selecting the mounting location, ensure that the regulator remains easily accessible after the plant has been installed.

Make sure that the regulator is installed free of stress. If necessary, support the pipeline near the connecting flanges. **Never attach supports on the valve or on the actuator !**

The pipeline should be installed with a slight downward slope on both sides of the valve to allow any condensate forming to drain off. If the piping upstream and downstream of the valve is laid vertically, always provide a steam trap (SAMSON Type 13E Steam Trap).

Never install any type of devices reducing the cross-sectional area between the pressure tap point and the valve (e.g. temperature regulator or shut-off valve).

If a by-pass is intended, this must join behind the place where the pressure is tapped. A shut-off valve is to be installed directly in the by-pass line.

The pipeline must be thoroughly flushed before the regulator is installed, ensuring that parts of sealing, globule and other contaminants carried along by the medium do not impair proper operation, especially tight shut-off. Always install a strainer (SAMSON Type 2 Steam Trap) upstream of the pressure reducing valve (see section 2.3).

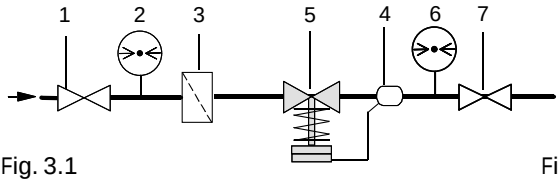


Fig. 3.1
Control line connection (pipeline)

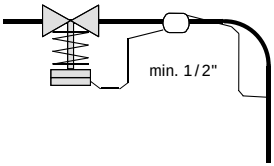


Fig. 3.3
Connection below center of flange

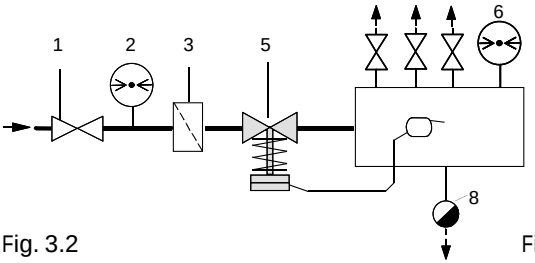


Fig. 3.2
Control line connection (manifold)

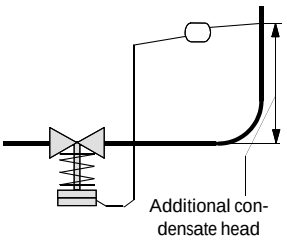


Fig. 3.4
Connection above center of flange

Fig. 3 · Installation example

1 Shut-off valve
2 Upstream pressure gauge
3 Strainer
4 Condensation chamber
5 Pressure reducing valve
6 Downstream pressure gauge
7 Shut-off valve
8 Steam trap

2.2 Control line and condensation chamber

The control line is to be provided as a 3/8"-pipe by the customer. If the line is to be constructed of copper, the use of a pipe with a diameter of 12 x 1 mm is recommended.

A condensation chamber is required to allow the formation of condensate in order to protect the operating diaphragm against excessive temperatures.

The control line is to be connected on the downstream pressure line (Fig. 3.1) at least 1 m away from the valve outlet.

If a manifold is located downstream of the pressure reducing valve (Fig. 3.2), connection is made to the manifold, even when it is located several meters away.

If the downstream pressure line behind the valve is extended by means of a conical expansion piece, the control line must always be connected in the expanded section of the line. The control line must be welded laterally in the center of the pipe, sloping at a ratio of approximately 1 : 10 up to the condensation chamber.

The mounting location of the condensation chamber is marked on the adhesive label identified with an arrow and by the word "Top" stamped on the top side. This specific mounting location must always be adhered to, since reliable operation of the pressure reducing valve cannot be guaranteed otherwise.

The line from the pressure tap point is welded to the 3/8"-pipe socket on the condensation chamber. The condensation chamber is always to be arranged at the highest point of the pipeline. This means, the control line between the condensation chamber and the actuator must be laid with a downward slope. In this case, use a 3/8"-pipe with screwed connection.

If the control line connection is located below the center of the valve outlet flange, the condensation chamber is to be arranged at the level of the outlet flange (Fig. 3.3). The control line installed from the tap point to the condensation chamber is to be at least a 1/2"-pipe. When the control line must be connected above the center of the valve outlet, the condensation chamber is to be installed at the level of the downstream pressure tap point (Fig. 3.4). The additional pressure of the condensate column is to be compensated by adjusting the set point to a higher value.

2.3 Strainers

The strainer is to be installed upstream of the pressure reducing valve. The direction of medium flow must coincide with the arrow on the body. The strainer filter must hang downwards. Make sure that sufficient space is available for removing the filter.

2.4 Shut-off valve

We recommend that a hand-operated shut-off valve be installed both upstream of the strainer and downstream of the pressure reducing valve. This will allow the plant to be isolated when cleaning or maintenance work is required or when left unused for extended periods.

2.5 Pressure gauge

To inspect the pressures prevailing in the plant, a pressure gauge should be installed both upstream and downstream of the regulator. Never, however, install the pressure gauge arranged on the downstream pressure side in front of the downstream pressure tap point.

3. Operation

3.1 Start-up

Unscrew the filler plug (21) on the condensation chamber, and fill with so much water using the enclosed plastic funnel or a can until the water starts to overflow at the filler socket. For an actuator with an effective diaphragm area of 640 cm^2, additionally remove the vent plug (12).

Screw in filler plug and tighten. The pressure reducing valve is now ready for operation.

Open the hand-operated shut-off valves very slowly in order to avoid water hammer.

3.2 Set point adjustment

The downstream pressure desired is to be adjusted by turning the set point adjustment (6) accordingly. Turning to the right (clockwise direction) increases the downstream pressure and to the left (counterclockwise direction) decreases the downstream pressure. The pressure gauge arranged on the downstream pressure side allows checking of the adjusted set point.

3.3 Faults

If the downstream pressure (see pressure gauge located downstream of the valve) deviates considerably from the adjusted set point value, first check the passage of the control line and the sealing ability (leakage) of the operating diaphragm.

When faults occur due to other reasons, such as damaged seat and plug, we recommend you to contact our after sales service or return the valve to the manufacturer for repair.

If the operating diaphragm is defective, proceed according to section 3.3.1.

3.3.1 Exchanging the operating diaphragm

Shut down the plant by slowly closing the shut-off valves.

The applicable part of the plant must be relieved of pressure and, when necessary, drained.

Remove the control line (25) and clean.

Unloosen the bolts and nuts (14) on the actuator, and remove the cover plate.

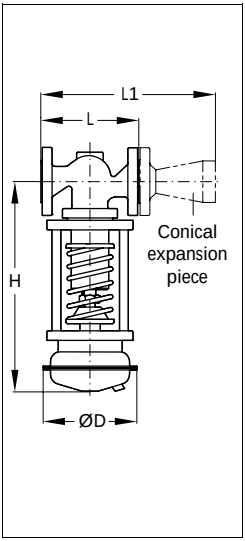
Unthread the nut (16), and lift off the diaphragm plate (15).

Exchange the operating diaphragm (13).

To assemble, proceed in the reverse order. To put into operation, proceed as described in section 3.1.

4. Dimensions in mm and weights

Nominal size	DN	15	20	25	32	40	50	65	80	100
Length	L	130	150	160	180	200	230	290	310	350
Length L1	PN 16 PN 25	220	256	278	314	337	380	464 471	510	556 570
Set point range in bar										
0.02 to 0.25	Height H	425			480			610		625
	Actuator	Ø D = 38 A = 640 cm²								
	Spring force F	1750 N								
0.1 to 0.6	Height H	425			480			610		625
	Actuator	Ø D = 38 A = 640 cm²								
	Spring force F	4400 N								
0.2 to 1.2	Height H	410			460			590		605
	Actuator	Ø D = 28 A = 640 cm²								
	Spring force F	4400 N								
0.8 to 2.5	Height H	410			465			595		610
	Actuator	Ø D = 22 A = 160 cm²								
	Spring force F	4400 N								
2 to 5	Height H	390			445			595		610
	Actuator	Ø D = 170 A = 80 cm²						D=225, A=160		
	Spring force F	4400 N						8000N		
4.5 to 10	Height H	390			445			575		590
	Actuator	D=170, A=40			Ø D = 17 A = 80 cm²					
	Spring force F	4400			8000			7000		
8 to 16	Height H	390			445			575		590
	Actuator	Ø D = 17 A = 40 cm²						D=170, A=80		
	Spring force F	8000 N								
0.02...0.6	Approx. weight for cast iron PN 16 in kg	21	22	22	28	30	34	50	57	66
0.1...1.2		16	17	17	22	24	28	45	52	61
0.8...2.5		14	15	15	21	22	26	42	49	58
2...16		12	13	13	18	21	24	40	47	56



5. Customer inquiries

Should you have any inquiry on the regulator, please submit:

1. Type and nominal size of the pressure reducing valve
2. Product and order number (indicated on the name plate)
3. Upstream and downstream pressure
4. Flow rate in m^3/h
5. Has a strainer been installed?
6. Installation drawing

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