

Self- operated Regulators Series 45



Differential Pressure Regulator

Type 45-2 • 45-4 • The valve closes when pressure differential rises

with 2 Test Points

General Description

The purpose of this regulator is to restrict the circulating head applied to circuits connected to large heating and other systems where, because of the size of the distribution network and large fluctuations of demand, the pressure differential may vary considerably at different times of the day and night.

The Regulator is sensitive only to the pressure drop across, or circulating head applied to, the controlled circuit and various ranges are available to suit the designed level. It is nearly unaffected by the static head or pressurization applied on larger systems.

The preferred installation is with the actuator vertically below the valve body.

Location of installation

Differential Pressure Controllers can be mounted in the supply or return and are usually assembled in our works for a specific location to minimize the number of site connections. The pressure sensing pipes are connected to the valve in a different way in the supply and return mounting versions. The connection arrangements are shown in Fig. 1.

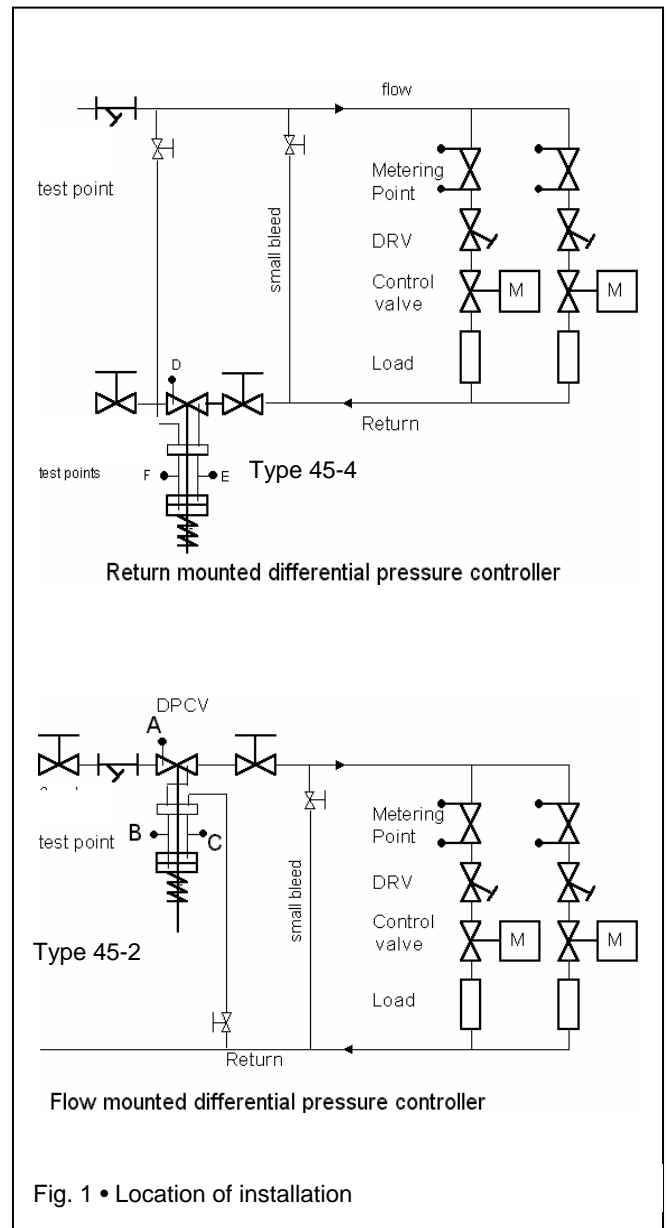
In both configurations, the supply pipe pressure is connected to the underside of the actuator marked (+). The return pipe pressure is similarly transmitted to the top side of the actuator (-).

1/8" copper or stainless steel tube is often used to make this connection and a 1/8" NPT-F connection is fitted for 1/8" NPT-1/8" compression fittings.

The tubing is pre-assembled for installation in

- Type 45-2 return pipe from a sub-circuit
- Type 45-4 flow pipe from a sub-circuit

Test points B/C resp. F/E are preassembled on the valve.



Commissioning procedure

It is assumed that the systems will have been filled, pressurized and the main circulating pumps will be running.

Mechseal test points have been fitted to the actuator. A good quality differential pressure gauge of suitable range should be connected so as to display the head across the circuit.

The valve is now operational and the spring adjuster nut underneath the bottom pressure plate may be adjusted until the desired pressure differential is achieved.

Introduction

The circuits shown in Fig. 2 are a typical installation of a type 45-2/ 45-4 differential pressure regulator. The intention is that flow rate limitation will be provided to the sub-circuit and the motorized valve controlling the load will have good authority. An installation measuring and control the differential pressure across the motor valve only gives best results regarding valve authority.

Commissioning Procedure

1. Ensure that the impulse connections to the diaphragm actuator are connected to the flow and return pipes. Isolating valves and test points etc. may be included in the impulse pipes. It is desirable to be able to measure the pressures where test points A, B, C are shown.

When several loads are controlled by one differential pressure regulator, it is not possible to control the differential pressure across the motorized valves alone. It is necessary to control the pressure drop across the motorized valves, loads, and double regulating valves (DRV). The drawing below shows this. In these cases it is not possible to achieve approximately 100% valve authority but acceptably high values can be obtained (30-50%).

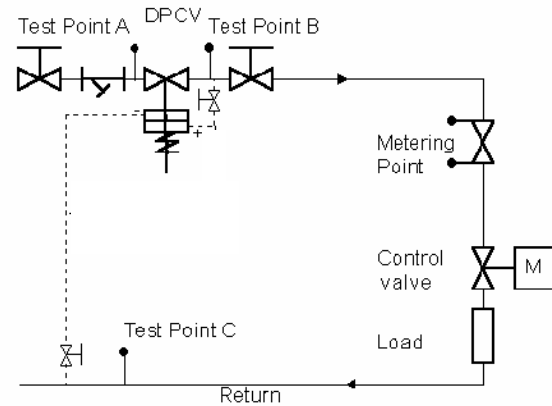
The differential pressure regulator has to be adjusted so that the sub-circuit requiring the highest differential is catered for. For example, suppose that the minimum pressure drop across MV1 and Load 1 at design flow is 4 psi, and the minimum pressure drop across MV2 and Load 2 at design flow is 6 psi. The differential pressure controller must be adjusted to control a differential of 5.5 psi + a suitable allowance for the pressure drop through pipe-work and the associated DRV. This might typically come to 7 psi.

With each motorized valve fully open, the DRVs should be adjusted until the design flow rate is achieved.

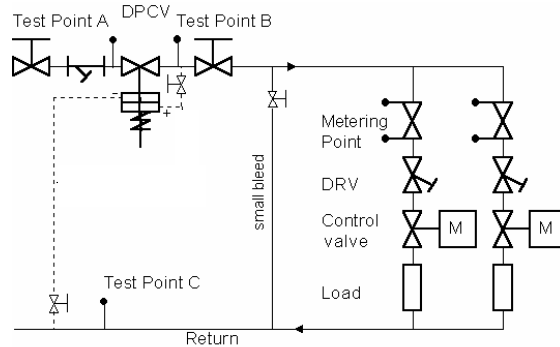
2. Connect a flow indicator to the metering point, open the motorized valve fully, and adjust the spring compression on the differential pressure regulator until the valve design flow rate is achieved.

The differential pressure regulator is now commissioned.

3. To check that the differential pressure regulator is working correctly, measure the pressure differential across the sub-circuit (B-C) and note how it changes if the motorized valve



Differential Pressure Controller controlling single load
(Differential pressure can also be assembled controlled across the motor valve only)



Differential Pressure Controller controlling several loads

Fig. 2 • number of loads

is moved through its stroke. There will be some rise in differential measured because the differential pressure regulator provides proportional control, but until the motorized valve is nearly closed, there should not be a significant rise in controlled differential.

Point to consider during commissioning

4. The circuit can only operate correctly as described above if there is sufficient differential pressure on the supply side at all load condition to overcome the sub-circuit resistance. The difference between pressures at A-C must be greater than the design pressure drops for the sub-circuit and differential pressure regulator added together. This should be checked at full load to check that there is sufficient head available.

5. The resistance offered by the motorized valve and load must be within the set-point range of the differential pressure controller. For example if a differential pressure controller with range 3-15 psi is provided, it will not work very well if the pressure drop across the load is only 2 psi.

Fault Finding

Δ .P. Valves should be installed as Data Sheet instructions supply and return mounting etc.

1. Lack of Flow

- Insufficient Mains differential available.
- If spring is fully compressed and still low flow, then check motorized valves fully open, strainers are not blocked (or any pipe work blocked). If sufficient mains Δ .P. is available then spring range not high enough.
- Check impulse lines are connected properly.

2. Too Much Flow

- Sub-circuit resistance small compared to spring range.

Note: Valve closes on increased pressure differential. (Valve is in a normally open position).

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