Orifice Plate Flowmeters

Orifice Plate Flowmetering System (density compensated)

Description
The Orifice Plate Metering system is suitable for measuring the rate of flow of steam, liquids and most gases. For steam and gas flowmetering applications, it is important to take account of changes in flowing density due to flowing pressure and temperature variations. If ignored, these changes in flow density will cause significant measurement errors. Liquids being non-compressible do not suffer from this problem and generally density compensation is not required. Compatible Flow Computers, Pressure and Temperature Transmitters are listed in the Associated equipment section.

Options available:
The Orifice Plate Metering package is available in a number of options to suit most requirements. For applications requiring density compensation, select one of the four basic options and add a flow computer and pressure/temperature measuring equipment as required:

Option 1 M410 orifice plate and gaskets
Option 2 M410 orifice plate, gaskets and M610 DP transmitter assembly
Option 3 M410 orifice plate, gaskets, carrier ring assembly and F50C isolation valves
Option 4 M410 orifice plate, gaskets, carrier ring assembly and F50C isolation valves and M610 DP transmitter assembly

M410 orifice plate. This is installed in the line at the point where the flow is to be measured. It produces a differential pressure proportional to the rate of flow.

F50C isolation valves. These are used to isolate the impulse lines close to the orifice plate.

M610 DP transmitter assembly. This is installed close to the orifice plate and converts the differential pressure to a 4-20mA signal for retransmission to other equipment. The M610 is supplied ready fitted with a 3 way manifold which acts as secondary isolation and pressure equalization valve.

Associated Equipment
EL2600 Pressure transmitter. This is installed in the impulse piping (high pressure side) and provides a pressure signal for density compensation.

EL2271 Temperature sensor and transmitter assembly. This is installed in the line upstream of the orifice plate and provides a temperature signal for density compensation. (Suitable for temperatures up to 482°F).

EL2270 Temperature sensor. This is a Pt100 temperature sensor that is installed in the line to provide a temperature signal to the remote M800 temperature transmitter. (Suitable for temperatures up to 932°F).

M800 Series Steam flow computer. This flow computer is suitable for use with orifice plates on saturated and superheated steam flow applications. It uses the flow, pressure and temperature signals to carry out necessary density compensation calculations for all steam conditions up to a maximum of 690 psig/932°F. Outputs to drive the DP, pressure and temperature transmitters are standard.

M800 Series Gas flow computer. Details as for the M800 gas flow computer except that the M800 gas flow computer is for gas applications.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.
In the interests of development and improvement of the product, we reserve the right to change the specification.
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Density Compensated System Requirements
In addition to a M410 assembly (Option 1 - 4), the following components are required:

**Saturated Steam**
Either a EL2600 pressure transmitter or a EL2271 temperature transmitter (substitute with EL2270 for temperatures above 482°F), and a M800 series steam flow computer.

**Superheated Steam**
Both a EL2600 pressure transmitter and a EL2271 temperature transmitter (substitute with EL2270 for temperatures above 482°F), and a M800 series steam flow computer.

**Gases**
Both a EL2600 pressure transmitter and a EL2271 temperature transmitter (substitute with EL2270 for temperatures above 482°F), and a M800 series gas flow computer.

**Performance**
The performance of an orifice plate metering system can be greatly influenced by installation variables, so the figures given below are for guidance only:

- **Accuracy:** typically +/- 3% of actual flow.
  (equivalent to +/- 1.5% full scale deflection at 50% of rated maximum flow).
- **Repeatability:** typically +/- 0.3%.
- **Turndown:** typically 4:1.

**Installation**
It is important that all details of the installation conform to ASME-MFC-3M. Of special note, is the long, straight lengths of pipe that must be present upstream of the orifice plate. As an approximate guide, 20 to 30 pipe diameters upstream and 5 downstream should be adequate but it is recommended that reference is made to the relevant standard. A summary of the basic requirements is included with the M410 equipment.

**How to Specify**
1- M410 Orifice plate flowmeter system with automatic density compensation to meet requirements of ASME-MFC-3M.

**How to Order**
1- M410 Orifice Plate Steam Metering System to include tab handled plate and carrier, F50C isolation valves, M610 DP transmitter assembly, EL2600 pressure transmitter and M800 Steam Flow Computer.