LITREMETER
Specialist flow measurement engineering

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DIMENSIONS AND INSTALLATION

FLOWMETER MM SERIES TYPES SN, SP, SPVDF, SPFA VERSION CE

These units are flowmeters having an integral electronics transmitting a pulse output linear to flow. The meters are rated to 10 or 40 bars pressure and 70°C but for longest component life the continuously rated temperature should ideally be less than 60°C. There is a supplemental note on .....FIN and .....HT versions that are rated to higher temperatures. This note includes revised installation drawings.

The meter body is made in 316 stainless steel and sizes MM12.5 to MM30 have parallel thread BSP process connections (" to 1 "). A spot facing area is provided for sealing via a Dowty washer system if required. Larger meters MM37 to MM200 are designed to be mounted between flanges and inside the bolt circle diameter. This arrangement is compatible with most flange designs but there are a few exceptions in certain sizes.

All IS versions are rated to 40 bar pressure. Please consult the transmitter calibration certificate to establish the pressure rating of the unit that is supplied. The main meter body is made in 316 stainless steel. The rotor shaft is stainless steel with sapphire/sapphire bearings. The rotor is equipped with 6 ferrites which are sensed by a coil mounted in the electronics housing. The standard O-ring material is Viton for the electronics/body seal.

If it is necessary to remove the electronics then the line should be non-pressurised and drained down. The turbine ring assembly can then be simply pulled out. If it is held against the underside of the electronics and gently blown then the flowmeter action will be duplicated. (Ensure that any dangerous fluids that may be on the rotor assembly are removed before this test). On the ....FIN and ....HT versions the electronics can be removed without breaking the liquid seal (see supplement).

The transmitter electronics have top mounted push on terminals. The terminal's cover provided as standard is the LMH rubber protective hat. This is a push-on fit over the transmitter electronics and is a sliding fit on the cable. This protective hat or boot has no official designation for environmental protection standards. However, it has been found to be highly reliable in service both in industry and for agricultural spraying. An optional "Q" or “PM” ABS enclosure rated to IP65 is available as per optional extras.

In Intrinsically Safe versions the electronics are protected by an IP65 die cast aluminium epoxy coated or plastic enclosure. The sensor coil can be removed while the line is pressurised. The cap remains in situ and the box and sensor can be released using the 2 socket cap head screws on the inside of the electronics enclosure.

Flowmeter Materials

SN Type
The rotor is provided in glass-filled nylon.

SP Type
The rotor is provided in glass-filled polypropylene.

SPVDF Type
The rotor is provided in PVDF (polyvinyliden fluoride) for many corrosive metering applications.

SPFA Type
The rotor is provided in perfluoroalkoxy (Teflon) for the most corrosive of metering applications.

Installation

The MM flowmeter is designed with an orifice having flow tappings on the upstream and downstream side which divert flow through the Pelton Wheel turbine measurement chamber. As it includes an orifice, the normal practice associated with orifice plate installation should be adopted. For screwed meters, reduced bore couplings should be avoided as they will cause serious errors in measurement.

Where possible the flowmeter should be fitted in a horizontal pipe run with ideally 25 x pipe diameter of straight pipe upstream and 5 x diameter downstream where the diameter is of the same nominal bore as the flowmeter. This is illustrated on the accompanying drawings C3706 and C3678. To duplicate the factory calibration method, the word "top" should appear in the position shown. If however the electronics is required to be installed at 180° from this position it will have no measurable effect on accuracy with the installation design as detailed above.

The meter installation should avoid the following undesirable situations. Some of these are shown on drawing number C3729.

1) An elbow bend or a tee piece upstream of the flowmeter will affect accuracy. A minimum of 10 x pipe diameters should be present as per C3706 or C3678.

2) Two or more elbow bends or loops in different planes. This causes swirl in the pipe which could be corrected by separating the two bends by, if possible, 25 diameters and providing 25 diameters of straight pipe after the second bend which is immediately upstream of the flowmeter.

3) Partly closed valves should be avoided as these cause the flow across the pipe to travel at different velocities. This poor velocity profile can cause either high or low readings depending on the relative orientation of the flowmeter. Filters and bends have similar effects and in most cases 25 to 30 diameters of straight pipe would eradicate these disturbances. If the flowmeter is installed after a valve that can be more than half closed, up to 50 diameters of pipe may be required for the highest accuracy of measurement.

If the installation is poor then it may be possible to effect an in-situ flow calibration at various flow rates to establish the effect on the flowmeter. If the operating flow range is small, a new "meter factor" of pulses per litre could be used optimised for the smaller range as a result of in-situ testing. Non-linearity over a wide flow range can be minimised using a microprocessor instrument having a linearising signal processing facility. In this case the display or flow rate signal will have an enhanced accuracy over and above the flowmeter performance.

Viscosity Effects

Viscosity affects all turbine type meters. If the viscosity is low this is minimal. Viscosity imposes drag on the rotor reducing the RPM even at high flows. Rangeability (turndown) is also reduced and it is desirable to operate in the higher end of the meter flow range as non-linearity appears particularly at low flows.

A relatively high viscosity fluid can be metered if the flow rate is stable or of a limited range and if the application temperature and resulting viscosity of the fluid is also stable. This applies to many batching systems where simple recalibration will provide system accuracy.

All viscous fluids create an increased pressure drop throughout the pipe line systems. Since it is desirable to operate flowmeters at the higher end of their flow range, most users operate pumped rather than gravity fed systems for viscous fluids.