

DIMENSIONS AND INSTALLATION

FLOWMETER LM SERIES TYPE SS (and Ti/Ha/Du)

This unit is a flowmeter with an integral electronics that transmits a pulse output linear to flow. Various pressure rating types are available with the most popular being 30 bar, 100 bar, 120 bar and 200 bar. Please consult the transmitter calibration certificate to establish the pressure rating of the unit that is supplied. The temperature rating is 135°C subject to chemical compatibility. The integral electronics is stalk mounted to reduce its temperature to less than 70°C. Again, please check the certificate. Some versions use a direct mount or screw-in electronics.

The SS meter is constructed in 316 stainless steel. Ti, Ha, Du are constructed in other materials. The turbine rotor is normally of PFA Teflon on a 316 stainless steel shaft with sapphire bearing balls. The rotor is equipped with ferrites which are sealed against the process medium and sensed by a coil mounted in the transmitter stalk, producing a linear pulse output in relation to flow rate. Please consult the calibration certificate to confirm materials used. There is an M12 sensor connector (see LM0092 for wiring detail) *except Intrinsically Safe models*.

The transmitter electronics has a 4-way M12 sensor connector [IEC-61076-2-101] rated to IP67 e.g. compatible with Brad Harrison, Hirschmann, ERNI, Murr and Turck Banner. The flowmeter is normally supplied with a separate 5m lead with the mating connector. The signal is an NPN open collector, 8 to 28Vdc input. *TTL and PNP are optional outputs.* (see LM0092 for wiring detail).

In most versions the stalk may be removed from the cap under pressure by knocking out the 1/8" cross pin. In the 120bar version the electronics may be unscrewed under pressure. *In intrinsically safe versions the coil cartridge is removed by undoing the nut nearest the flowmeter body on the main connection between the body and the electronics enclosure and then undoing the retaining screw (max pressure 590 bar) or undoing the knurled nut.* If it is necessary to remove the cap, then the line should be non-pressurised and drained down. The turbine ring assembly can then be simply pulled out and cleaned for handling. If it is held against the cap and gently blown, then the flowmeter action will be duplicated.

Options (check with transmitter certificate in all cases):

Most meters are supplied with ¼" BSP male connections. Please check calibration certificate. Higher pressure units tend to have in-line female connections such as ¼" and ½" BSP. NPT, ½" OD plain ends, wafer fitting flanges, hubs, Autoclave Engineers AE MP and others are also available.

SS 30 bar	This meter is rated to 30 bar pressure and is sealed by an FPM O-ring as standard. FPM can be substituted by EPDM, Nitrile, PTFE covered or Kalrez™. The cap can be removed by unscrewing it from the body. Only slightly firmer than hand tightness is required.
SS 100 bar & 120 bar	This meter is rated to 100 or 120 bar pressure and uses a PTFE gasket. The cap is fixed by 8 off M6 bolts.
SS 200 bar	This meter has a larger diameter body with the seal being a Viton O-ring. The cap is fixed by 8 off M10 socket cap head bolts. The pipes are usually welded into the body.
SS 345 bar	This meter has a larger diameter body sealed with a Viton O-ring. The cap is fixed by 8 off M10 socket cap head bolts. The connections are normally female in-line or wafer.
Other	Other pressure ratings and specials are available. Please consult the calibration certificate to confirm materials used.
Ti, Du or Ha 50 bar	This meter uses the same body style as the lower pressure 100 bar stainless steel versions but all wetted metallic parts are in Titanium, Duplex or Hastelloy.

Installation

30 bar, 100bar and 120bar: The inlet tube is curved with a male ¼" bsp thread connection.
200 bar and 345 bar and others. The inlet and outlets are in line. It is desirable that valves, smaller connectors or tee pieces are not mounted directly on to this inlet pipe as a change in calibration from the factory calibration certificate will result. We recommend at least 100mm of straight pipe before and after the flowmeter. Sometimes air is trapped inside the chamber of smaller meters (typically LM003, 005 and 01). Manipulation of the meter to allow the air to escape naturally may be required. Failure to remove the air in the chamber will lead to under-reading and an inability to reach low flows. In larger flow meters air is naturally removed at start-up by the higher velocity liquid of the application. LM003 and 005 measure liquid at extremely low velocities and the air is not removed naturally.

The transmitter should be installed in the horizontal plane with the inlet and outlet and the electronics enclosure horizontal. On one face of the stainless steel body will be inscribed the word 'TOP' which confirms the correct way up for the transmitter to duplicate the factory calibration method. There is also an arrow indicating the direction of flow. This installation attitude will duplicate that of the Flowmeter's calibration test.

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.

30 bar, 100 bar and 120 bar: If for any reason the supplied inlet and outlet pipes are removed from the body, then it is essential that PTFE tape or other pipe sealant be placed on the pipe thread before re-assembly with the body. Care should be taken that small pieces of tape do not shred and enter the flowmeter. *LM003 and 005 versions have an internal jet system. This can only be accessed by taking off the cap and removing the ring assembly. The plate is held in by an M3 cross head screw.*

It is quite common for the meters to have pipes welded into the bodies. This enables an in-line connection, with or without flanges, which can be preferable to the standard right angle configuration. If

the pipes are welded then LM sizes 003, 005, 01, 05, 24 and 45 etc will have separate jets within the turbine chamber.

The caps can be removed without affecting calibration. After de-pressurisation simply undo the screws and remove the cap. (30bar: unscrew the cap using the flats) The ring assembly can be taken out and cleaned (see separate instructions). Some jets are screwed into the base of the chamber. These can be removed with the appropriate tool and cleaned, if required.

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.

Possible sources of error – specific to low flow:

1. That small particles may be affecting/blocking the jet. The size of the jet hole is just 0.38mm for the 005 and 0.3mm for the 003. We recommend a 40 micron filter for the 005 and 003.
2. The installation must have the flowmeters inlet and outlet pipes in the horizontal plane. In addition, the electronics must also be in the horizontal plane. This ensures that the rotor axis is vertical and that there is minimum friction on the bearings. With higher friction, then at lower flows errors will be observed. In the worst case, the minimum flow measurable will be higher as well.
3. Air pockets within the flowmeter. When we calibrate on our flow rig, we are able to remove the air pockets by manipulating a flexible hose. This is necessary on all flowmeters below LM01 in size. Above this size then the simple throughput of water removes the air, but below this size then some assistance is required. Removing the air pocket can also be effected just by twisting the flowmeter along the axis of the pipe.
4. Vibrations in the pipe and flowmeter may cause extra pulses to occur but we would find this unusual. Clamping the meter may assist.