Fluidic Flowmeters, *LLC*

Model 140MX Fluidic Flowmeter – Fuel Oil Flow Measurement

Problem:
Optimize the operation of industrial boilers used to generate steam required for the processes. Expensive fuels, like No. 2 and No. 6 fuel oil, are frequently used for the burners. Optimizing performance of the boiler requires proper fuel flow. Too much fuel flow can waste expensive fuels, while too little fuel flow means taking longer for the boiler to produce steam.

Solution:
Utilize a Model 140MX Fluidic Flowmeter in the fuel line to accurately measure fuel flow. The Model 140MX monitors the fuel flow and provides an output signal to the boiler burner control system. As boiler fuel requirements change, the fuel flow to the burners can be adjusted with a flow control valve. Closing the control loop by measuring fuel flow with a Fluidic Flowmeter can insure proper fuel flow to the burners, thus optimizing boiler performance, saving expensive fuel and helping to reduce boiler maintenance costs.

The Model 140MX Fluidic Flowmeter was specifically designed for volumetric flow measurement of fuel oil. The 140MX is an oscillatory flowmeter that works on the fluid phenomenon of momentum exchange. The geometric shape of the meter body creates a sustained oscillation of the fluid whose frequency is proportional to volumetric flow. The oscillations are sensed, counted and a 4-20 mAdc output proportional to flow is generated.

The Model 140MX consists of a meter body and a two wire transmitter. The rugged meter body includes a self-contained strain gauge sensor for direct, in-line installation into new or existing piping. The Model 140MX Flowmeter is constructed to resist harsh industrial environments. It can be subjected to flow over-ranges and the resulting pressure surges of up to 400% of full scale with no damage to the meter body or sensor and no shift in calibration.

The Model 140MX Flowmeter contains **no moving parts**, which minimizes maintenance and service needs. This design eliminates the need for costly, periodic meter recalibration. In addition, there are no gears that can bind or jam, resulting in interruption of flow.

The design of the 140MX does not require a maintained turbulent flow in the pipe for operation. This allows it to be used with **high viscosity fluids** and/or low flow rates. It operates within its specified accuracy at Reynolds Numbers as low as 400 and will continue to provide an output signal at Reynolds Numbers as low as 75. Fluids with Kinematic viscosities up to 80 centistokes can be metered, which provides capabilities for No. 6 fuel oil and other heavy oils.

This sustained oscillation provides accurate flow measurement for difficult to handle, **laminar flow**, high viscosity and low flow rate applications found in fuel oil feed applications. It features:

- ✱ Accurate and repeatable flow measurement
- ✱ High turndown
- ✱ No moving parts to damage or wear
- ✱ Withstands over-ranges of up to 400% of full scale
- ✱ Two-wire transmitter provides 4-20mAdc signal
- ✱ Output linear with flowrate
- ✱ Rugged and reliable sensors
- ✱ Highly immune to shock and vibration
- ✱ No piping run requirements, simplifying installation
- ✱ No meterbody calibration shifts

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Specifications

Performance

Accuracy: Typically ±1% of flow rate above pipe Reynolds Number of 400

Repeatability: 0.25% of rate

Pressure Loss:

#2 Fuel Oil at 40°F

Capacity	Min Flow (GPM)	Max Flow (GPM)	Pressure Loss (psi) @ Max Flow	Pressure Loss (psi) @ 25% Max Flow
3/4	0.35	12	37.2	2.3
1	0.75	25	36.2	2.3
1 1/2	2	80	33.6	2.1

#6 Fuel Oil at 210°F

Capacity	Min Flow (GPM)	Max Flow (GPM)	Pressure Loss (psi) @ Max Flow	Pressure Loss (psi) @ 25% Max Flow
3/4	0.8	12	42.5	2.7
1	1.6	25	43.1	2.6
1 1/2	4	80	38.4	2.4

Pressure Rating

Maximum working pressure is flange dependent. Flange ratings per ANSI B16.5

150# RF Flange – 230 psig
300# RF Flange – 600 psig

Temperature

Meter Body: -40° to 350°F (-40° to 175°C)
Two-Wire Transmitter: -40° to 185°F (-40° to 85°C)

Signal Cable

Two-Wire Transmitter
Meterbody must be located within 50 cable feet

Flow Over-range Protection

Flow over-ranges of up to 400% of full scale will not damage the meterbody or sensor.

Position Effect

The flowmeter can be mounted in horizontal, vertical or inclined pipelines having an upward direction of flow with no effect on performance. It is important that the pipeline be kept full of fluid for accurate flow measurement.

Electrical Connections

Meter Body: 1/2" NPT connection
Two-Wire Transmitter: Two 1/2" NPT conduit connections

Enclosure Specification

Meterbody: NEMA 4/IP 65
Two-Wire Transmitter: NEMA 4/IP 65

Hazardous Area Classifications

Model 140MX Flowmeter
FM approved for:
- Class I, Division 1, Groups A, B, C and D
- Class II, Division 1, Groups E, F, and G
- Class III, Division 1

Model 14 Two-Wire Transmitter (P/N 15973-10)
FM approved for:
- Class I, Division 1, Groups A, B, C and D
- Class II, Division 1, Groups E, F, and G
- Class III, Division 1 FM approved without barriers for:
- Class I, Division 2, Groups A, B, C and D

Materials of Construction

Process Wetted Parts

Meterbody: 316L SS
Sensor: 316L SS with Hastelloy® C
O-Ring: Viton® A

Non-Wetted Parts

Meterbody
Cover: 18-8 SS
Gasket: Neoprene®
Two-Wire Transmitter
Cover: Aluminum
Gasket: Neoprene
Housing: Low Copper Cast Aluminum

Weights

Meter Size (in/mm)	¾ (19) & 1 (25)		1 ½ (38)	
Flange Rating (lb)	150	300	150	300
Weight lb (kg)	24 (10.9)	27 (12.2)	56 (25.4)	61 (27.7)

Two-Wire Transmitter: 3 lbs. (1.86 Kg)