CONTINENTAL CONTROLS CORPORATION

– A VALVE YOU CAN TRUST –

FM50

FLOW METER

BENEFITS

- Wide range load control
- Highly accurate mass flow measurement
- Fast and simple installation
- No moving parts
- Minimal pressure drop
- Auto zeroing (optional)
- Dirt tolerant
- 2.4 GHz wireless radio (optional)
- Modbus communication
- CSA compliant Class 1, Division 2
- Field calibration possible
- Reduced piping length requirements
- High turndown ratio

APPLICATION

Various agencies now require fuel measurement on individual turbines and gas engines. The FM50 offers a simple-to-install option that provides instantaneous and totalized flow over a period of hours, days, months, or years.

Installation and commissioning is fast and simple. The FM50 provides a true mass flow calculation which corrects for temperature and pressure fluctuations.

COMMUNICATIONS

Data is stored locally, and can be transmitted via RS-232 Modbus RTU.

CALIBRATION

Each meter is precisely calibrated in our San Diego, California facility using high accuracy reference standards. Optional auto-zeroing corrects for pressure sensor drift.

MINIMAL PRESSURE DROP

The venturi used for flow measurement is designed to minimize pressure drop across the device. It recovers 70–80% of pressure drop.



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EMISSIONS

The FM50 uses a mass flow calculation corrected for temperature and pressure; and is designed for engines in the 75—7457 kW range.

The FM50 provides near-instant flow, momentary measurements, and measurements either averaged, or totalized, across different time scales. It corrects temperature and pressure fluctuations, resulting in an accuracy of 3% of reading, or 0.5% of full scale, whichever is greater. The scalable design of the FM50 ensures consistent performance across engines of all sizes, with each unit precisely calibrated to meet the specific requirements of its application.

CCC also calibrates the meter, which automatically adjusts to re-zero the transducers each time the meter is powered down. The FM50 comes with a built-in heated backlit display. Data can be communicated via RS-232 Modbus RTU.

The fuel flow measurement is critical for emissions testing in most regions.

THEORY OF OPERATION

The FM50 measures flow by measuring the pressure drop across the venturi. Typically, a venturi is a tube with large openings at both ends, and a narrowing in the middle, referred to as the “throat.” The gas passes through the venturi and accelerates while moving through the throat. The gas moving faster causes pressure to drop. This is known as the Bernoulli Effect. Just like an airplane wing or a carburetor, the faster the gas moves, the more significant the pressure drops.

A venturi flow measurement is similar to a measurement with a sharp edge orifice with the added advantage of a majority of the pressure drop being recovered as the gas leaves the venturi. The FM50 has up to a 80% pressure recovery. This means that if the pressure drop is 10 psi at the throat of the venturi, the pressure will raise back up to 8 psi as the gas leaves the venturi.

Three different sensors are used to measure the flow:

1) A pressure transducer that measures the absolute pressure upstream of the venturi

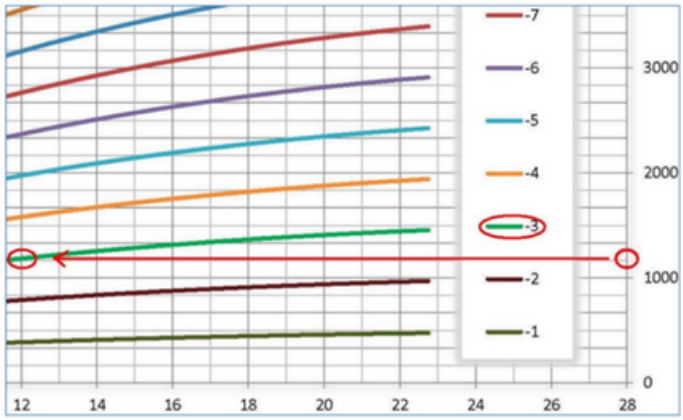
2) A pressure transducer that measures the difference in pressure between the throat and upstream of the Venturi

3) A temperature sensor that measures the gas temperature

CONFIGURATION DATA

The table below is provided to determine the correct sizing of the FM50 flow meter. To determine the correct part’s dash number, select the proper table based on the gas pressure where the meter will be located. Each table has the pressure located at the top of the table. On the right side of each table is a scale of the horsepower of the engine being supplied by the gas the FM50 will be measuring. This number is based on an estimate of 9 SCFM per 100 horsepower. Locate the proper horsepower on the right of the appreciates chart, then follow the line to the left until it intersects with one of the colored lines on the graph. Find the dash number that corresponds with the colored line. This is the configuration, or dash number, for this application.

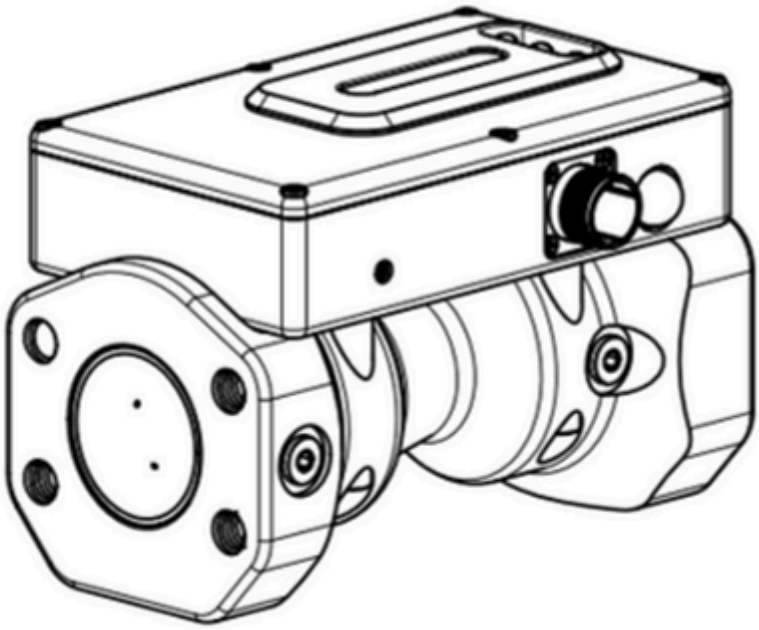
Example: A flow meter for a 1200-horsepower engine running on a supply pressure of 50 psi would require a Dash-3 configuration.

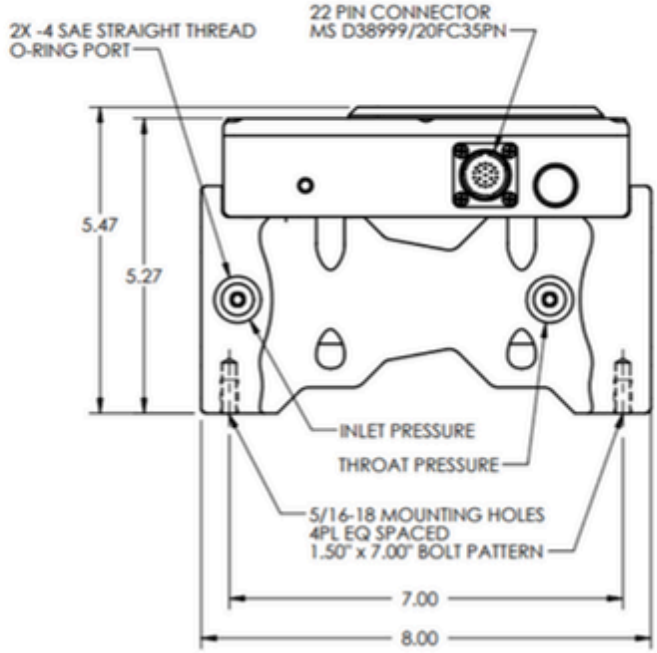


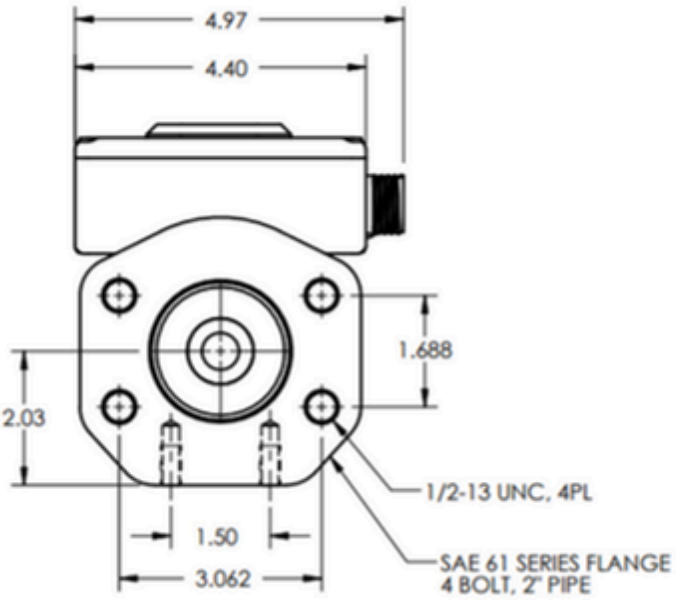
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INSTALLATION

The following are a list of parts, system requirements, mechanical assembly, wiring, etc.







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FM50 SPECIFICATIONS

Maximum fuel flow capacity:	6,000 SCFM (16,803 lbs/hr) supply pressure & fuel composition dependent
Fuel:	Natural gas, propane gas, ethane, biogas, and other gaseous hydrocarbons
Maximum operating pressure:	500 psig
Minimum filtration requirement:	10–20 micron absolute
Operating temperature:	-40°C (-40°F) to +85°C (+185°F) (temperature below 35°F requires a supply voltage above 14 VDC)
Flow accuracy:	The greater of: ±2.0% of reading or 0.5% of full scale
Fuel feedback signal:	4–20 mA loop power (standard) & proprietary CAN bus
Power input:	10–30 VDC (25 watts) (temperature below 35°F requires a supply voltage above 14 VDC)
Electrical interface:	22-pin MS connector (MS D38999/20FC35PN)
Data communication interface:	RS-232 Modbus RTU
Valve materials:	Body: 6061-T6 anodized aluminum Wetted components: 300 Series stainless steel, 6061-T6 anodized aluminum Seals: Nitrile
Flanges:	2" SAE Series 61, 4-bolt
Minimum pipe requirements	2" Schedule 40 pipe, 20" upstream, 10" downstream (straight pipe)
Dimensions:	8.0"L x 5.47"H x 4.97"W
Approximate weight:	8.3 lbs.
Certifications:	C US Class I, Div 2, Group D: T4

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