

# FM50 FLOW METER

## **BENEFITS**

- Provide instantaneous or totalized flow
- Wide range load control
- Very accurate mass flow measurement
- Full authority
- Fast and simple installation
- No moving parts
- very low pressure drop
- Auto zeroing
- Dirt tolerant
- 2.4 GHz wireless radio Modbus communication
- CSA compliant
- Class 1 Division 2 Field Calibration Possible
- Reduced piping length requirements
- High turn-down ratio

## **APPLICATION**

Various agencies now require fuel measurement on individual turbines and gas engines. The FM50 offers a very simple to install option that can provide instantaneous flow or totalized flow over a period of hours, days or months. Installation and commissioning is very fast and simple. The FM50 provides a true Mass Flow Calculation which corrects for temperature and pressure fluctuations.

## **COMMUNICATIONS**

Data can be stored locally or can be transmitted via: CAN J-1939, Modbus, or via a 2.4 Ghz wireless radio. CALIBRATION Each meter is carefully calibrated at the factory. Auto zeroing corrects for pressure sensor drift each time the meter is powered down.

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## **MINIMAL PRESSURE DROP**

The Venturi used for flow measurement has been carefully designed to minimize pressure drop across the device.



## EMISSIONS

The FM50 uses accurate mass calculation correct for temperature, and pressure inconsistencies; designed for the engine, the turbine range from 75 to 7457 kW. The FM50 provides near-instant flow momentary measurements and measurements either averaged or totaled over a period of hours, days or months. It can correct temperature and pressure inconsistencies resulting in an accuracy of 3% of reading or 0.5% of full scale, whichever is greater.

The scalable design of the FM50 remains the same, no matter what engine or turbine it is installed on, and the unit is sized to match the needs of a particular engine. 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 heated backlit display built. Data can be stored locally on a USB portable drive communicated via CAN J-1939, Modbus, and Ethernet. The FM50 is beneficial for the bi-fuel gas substitution system.

## THEORY OF OPERATION

The FM50 flow meter measures flow by measuring the pressure drop across a Venturi. Typically, Venturi is a tube with large openings at both ends and a narrowing in the middle. This narrowing is 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 leave the Venturi. The FM50 has up to a 90% pressure recovery. This means that if the pressure drop is 10psi at the throat of the Venturi, the pressure will raise back up to 9psi as the gas leaves the Venturi.

Three different sensors are used to measure the flow:

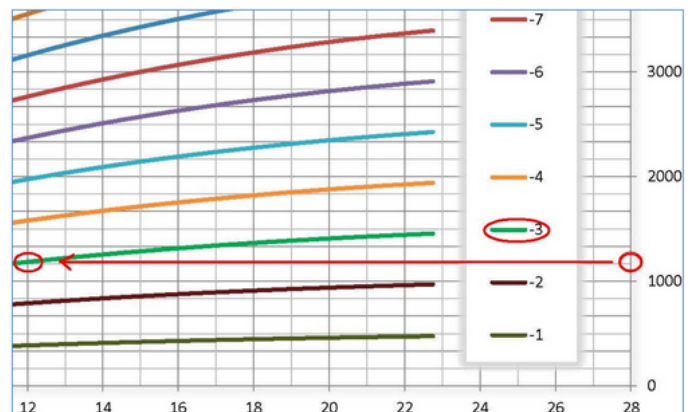
- 1) A pressure transducer that measures the absolute pressure upstream of the Venturi
- 2) A pressure transducer that measures the difference in pressure between the throat and upstream of the Venturi
- 3) A temperature sensor that measures the gas temperature

## CONFIRGURATION DATA


The table below is provided to determine the correct sizing of the FM50 flow meter. To determine the correct 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. 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 50psa would require a Dash-3 configuration.



## SPECIFICATION

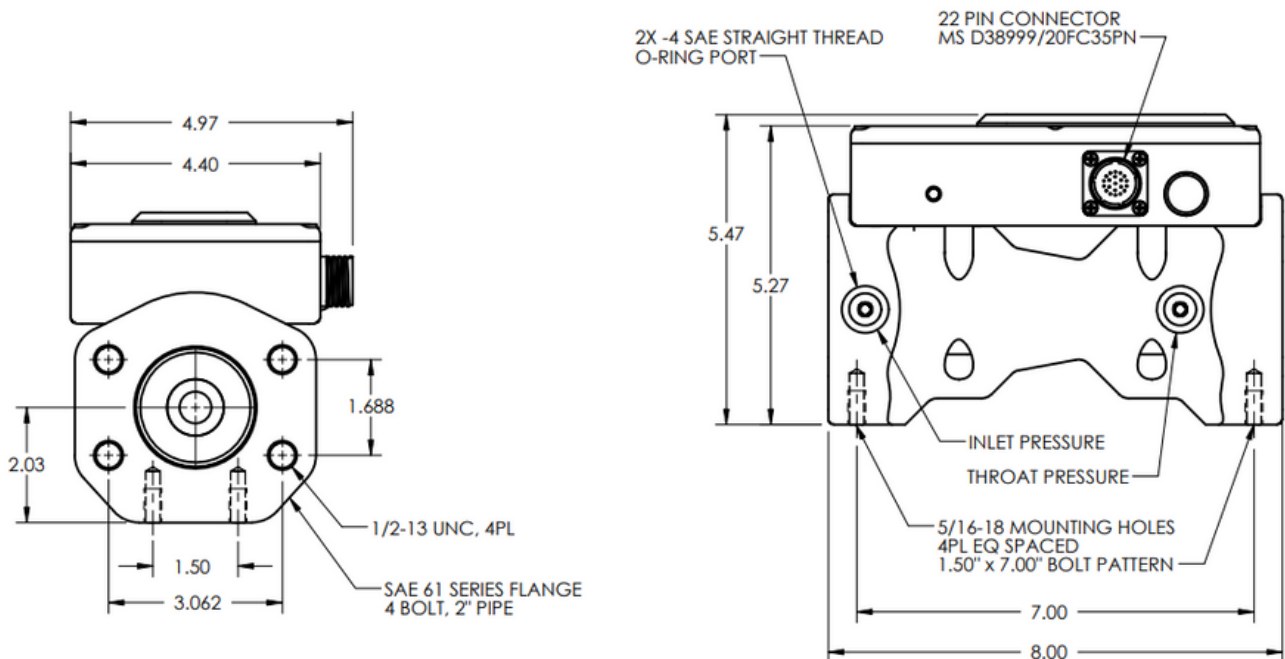
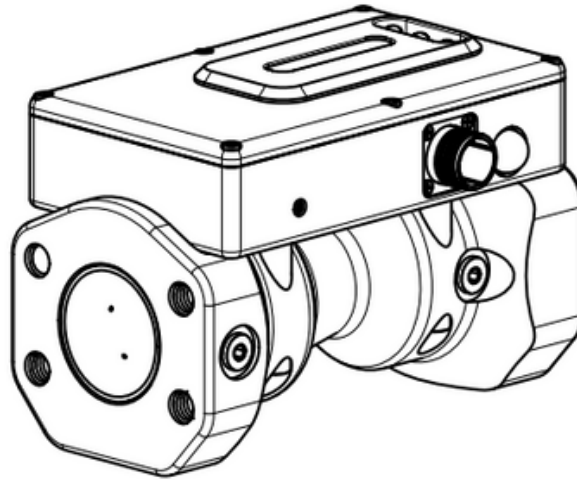
Flow Capacity:	1550 scfm (4341 lbs/hr) Natural Gas (supply pressure & fuel composition dependent)
Fuel:	Natural Gas, Propane Gas, Other Gaseous Hydrocarbons
Maximum Operating Pressure:	500 psig
Minimum Filtration Requirement:	50 Micron Absolute
Operating Temperature:	-40° C (-40° F) to +85° C (+185° F) (Temperature below 35°F require a supply voltage above 14VDC)
Flow Accuracy:	The greater of: $\pm 2.0\%$ of reading or 0.5 % of full scale
Fuel Feedback Signal:	4-20 mA Loop Power (Standard) & J1939 CAN Bus
Power Input:	10-30 Vdc (25 Watts) (Temperature below 35°F require a supply voltage above 14VDC)
Electrical Interface:	22 pin MS Connector MS D38999/20FC35PN
Communication Interface:	RS232 Modbus RTU, J1939 CAN Bus, 2.4 GHz Radio 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 pounds
Certifications:	 Class I, Division 2, Group D: T4 ISO 9001 CERTIFIED

## LIST OF PARTS

54701507-2-30	Cable, interface, 30 feet, FM50	SELECT 1
54701507-2-60	Cable, Interface, 60 feet long, FM50	
54709039	Kit, Mounting, 2" pipe SAE split flange (MAIN P/N: MK2737)	
54709019	Flange, Split, SAE, 4-bolt pattern, 2" pipe	
54709029	Flange Head, NPTF threaded, 2" pipe SAE split flange	SELECT 1
54709049	Flange Head, Butt Weld, 2" pipe SAE split flange*	

## INSTALLATION

The following are list of parts, system requirements, mechanical assembly, wiring, GSS and ECU communication, software settings, GSS laptop interface and etc.



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