

# FFM100

## Fuel/Fluid Flow Monitoring

The FFM100 provides precision fuel flow information to help optimize fuel consumption, which can save thousands of dollars in fuel operating cost. The FFM100 uses state-of-the-art, positive displacement metering technology for unprecedented accuracy. In fact, the accuracy of the FFM100 is nearly that of commercial vessel systems costing tens of thousands of dollars, yet the FFM100 costs less than existing recreational systems found on the market today. Additional benefits of the positive displacement metering technology are the elimination of flow conditioning components such as straighteners and pulsation dampers. Other flow meter technologies require flow conditioning components that increase system and installation costs. The FFM100 also uses true temperature compensation with embedded temperature sensors within the meters. The returning fuel is generally hotter than the supply fuel and if not properly compensated, inaccuracies as much as 5% can occur in computing the engine's fuel consumption. The FFM100 also detects momentary reverse flow in the fuel lines due to fluctuating pressure caused by the injection pump. Less accurate systems count the reverse fuel flow as part of the consumed fuel where the FFM100 properly accounts for momentary reverse flow. Lastly, the FFM100 can be used for fluid types other than fuel (e.g., water, oil, etc.) by ordering the appropriate flow sender.

### Product Features

- FFM100 converts a variety of flow senders (e.g., fuel, water, etc.) to NMEA 2000® Network Data
- All flow senders ordered separately depending on application (i.e., single fuel flow sender for gas engine, dual fuel flow senders for diesel engine, water flow sender for sea water, etc.)
- Fuel flow senders facilitate fuel consumption optimization for reduced fuel operating cost
- Fuel flow senders use positive displacement metering technology for superior accuracy over other measurement technology such as turbine meters
- Fuel flow senders do not require costly fuel conditioning components like flow straighteners and pulse dampers
- Fuel flow senders implement true temperature compensation with precision built-in thermistors for increased accuracy
- Fuel flow senders automatically detect reverse flow due to fluctuating pressure difference from injection pumps
- Fuel flow senders pass particle sizes up to 70 micrometers (diesel fuel filters normally filter down to 2 micrometers to prevent clogging injectors)

Available accessories for the FFM100:

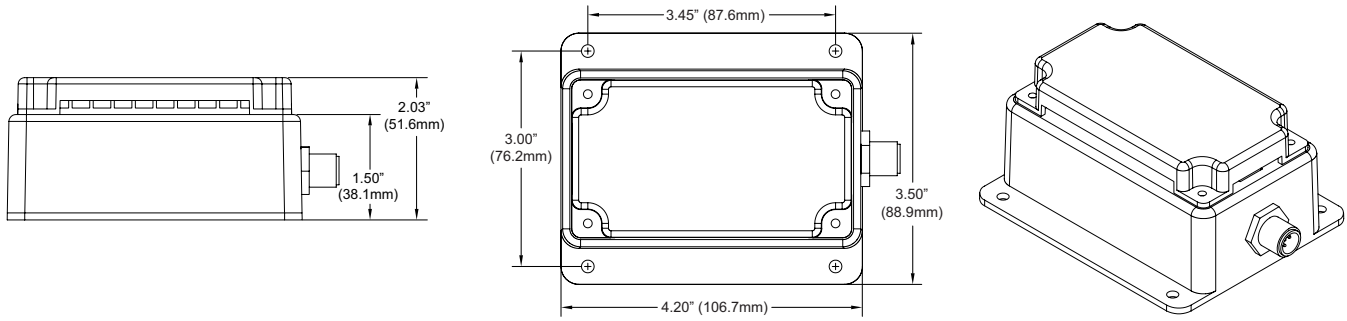


### PRODUCTS

PART NUMBER	DESCRIPTION
FFM100-01	Fuel Flow Monitor
M1AR	Fuel Flow Sensor 2-100 LPH (0.53-26.4 GPH)
M2AR	Fuel Flow Sensor 25-500 LPH (6.6-132 GPH)
M4AR	Fuel Flow Sensor 180-1500 LPH (48-396 GPH)
M8AR	Fuel Flow Sensor 8-70 LPM (2.1-18.5 GPM)
M16AR	Fuel Flow Sensor 10-100 LPM (2.6-26.4 GPM)



DSM Series Screen Shots



## SPECIFICATIONS

PARAMETER	VALUE	COMMENT
Accuracy (Differential Mode)	±1.75% of reading	K factors programmed into FFM1000
		4:1 fuel feed / fuel consumption ratio
Accuracy (Two Independent Sensors)	±0.25% of reading	K factors programmed into FFM100
Resolution	0.1 LPH (0.026 GPH)	

## NMEA 2000® PARAMETER GROUP NUMBERS (PGNs)

DESCRIPTION	PGN#	PGN NAME	DEFAULT RATE
Periodic Data PGNs	065286	Fluid Flow Rate (Maretron Proprietary)	2 Times/Second
	065287	Trip Volume (Maretron Proprietary)	2 Times/Second
	127489	Engine Parameters, Dynamic	2 Times/Second
	127497	Trip Parameters, Engine	1 Time/Second
	130312	Temperature	0.5 Times/Second
	130316	Temperature, Extended Range	0.5 Times/Second
Response to Requested PGNs	126464	PGN List (Transmit and Receive)	N/A
	126996	Product Information	N/A
	126998	Configuration Information	N/A
Protocol PGNs	059392	ISO Acknowledge	N/A
	059904	ISO Request	N/A
	060928	ISO Address Claim	N/A
	065240	ISO Address Command	N/A
	126208	NMEA Request/Command/Acknowledge	N/A
Maretron Proprietary PGNs	126720	Device Configuration Information	N/A
	130818	Device Label	N/A

## ELECTRICAL

PARAMETER	VALUE	COMMENT
Operating Voltage	9 to 32 Volts	DC Voltage
Power Consumption	150mA	Maximum Current Drain
Load Equivalence Number (LEN)	3	NMEA 2000® Spec. (1LEN = 50mA)
Reverse Battery Protection	Yes	Indefinitely
Load Dump Protection	Yes	Energy Rated per SAE J1113

## MECHANICAL

PARAMETER	VALUE	COMMENT
Size	3.50" x 4.20" x 2.03" (88.9mm x 106.7mm x 51.6mm)	Including Flanges for Mounting
Weight	13 oz. (368.5 g)	

## ENVIRONMENTAL

PARAMETER	VALUE
IEC 60945 Classification	Exposed
Degree of Protection	IP64
Operating Temperature	-25°C to 55°C
Storage Temperature	-40°C to 70°C
Relative Humidity	93%RH @40° per IEC60945-8.2
Vibration	2-13.2Hz @ ±1mm, 13.2-100Hz @ 7m/s² per IEC 60945-8.7
Solar Radiation	Ultraviolet B, A, Visible, and Infrared per IEC 60945-8.10
Corrosion (Salt Mist)	4 times 7days @ 40°C, 95%RH after 2 hour Salt Spray Per IEC 60945-8.12
Electromagnetic Emission	Conducted, Radiated Emission per IEC 60945-9
Electromagnetic Immunity	Conducted, Radiated, Supply, and ESD per IEC 60945-10
Safety Precautions	Dangerous Voltage, Electromagnetic Radio Frequency per IEC 60945-12

## CERTIFICATIONS

PARAMETER	COMMENT
NMEA 2000® Standard	Level A
Maritime Navigation and Radio Communication Equipment & Systems	IEC 61162-3
Maritime Navigation and Radio Communication Equipment & Systems	Tested to IEC 60945
FCC and CE Mark	Electromagnetic Compatibility