DrSense FMM Series (-1002) Magnetic-Inductive Flow Meters



Part No.FMM75-1002



Part No. FMM200-1002

Overview

AutomationDirect's ProSense FMM Series (-1002) Magmeters are designed to reliably detect the flow rate of conductive media up to 158.5 gallons per minute. The stainless steel, mechanically-robust design mounts directly in-line providing a compact, low-profile installation for process control. A 4-digit numeric display with pushbutton setup indicates flow rate and fluid temperature with selectable engineering units. Two outputs are available to remotely monitor the analog status of flow rate and temperature parameters. Simple to set up, easy to install and with no moving parts, the FMM series is a reliable alternative to traditional flow meters and mechanical flow switches.

Features

- 1/2 to 2" NPT female process connections
- Measure up to 158.5 GPM
- Measure fluid temperature in addition to flow
- 4-digit numeric display with pushbutton setup
- Selectable engineering units: GPM, GPH, LPM, m³/h, $^\circ F, ^\circ C$
- Two analog output signals
- 4-pin M12 quick disconnect
- 5-year warranty

Output Function Selections

Analog temperature

Output 2: Analog flow rate



ProSense FMM Series (-1002) Magnetic Flow Meters								
Model	FMM50-1002	FMM75-1002	FMM100-1002	FMM150-1002	FMM200-1002			
Price	\$460.00		\$499.00 \$550.00		\$890.00			
Weight	<i>ight</i> 1.14 lb		1.36 lb	6.76 lb	6.76 lb			
Range	0 to 6.6 GPM	0 to 13.2 GPM	0 to 26.4 GPM	0 to 79.3 GPM	0 to 158.5 GPM			
Process Connection	1/2" FNPT	3/4" FNPT	1" FNPT	1-1/2" FNPT	2" FNPT			
Application	Conductive liquids: ≥ 20 µS/cm (micro Siemens per centimeter) liquids / viscosity: < 70cSt (centiStoke) at 104°F							
Pressure Rating	232PSIG [16bar]							
Medium Temperature	14 to 158°F [-10 to 70°C]							
Operating Voltage	20 to 30VDC 18 to 32VDC							
Current Consumption	120mA < 150mA							
Insulation Resistance	> 100MΩ (500VDC)							
Protection Class								
Reverse Polarity Protection	YES							
		Output F						
Output Type / Function		01	JT1: analog signal / temperature OUT2: analog signal / flow					
Analog Output	4-20 mA max 22mA Max. load: 500Ω (4-20 mA) Overload protection: Yes							
		Flow Rate						
Measuring Range	0.030 to 6.600 GPM	0.020 to 13.200 GPM	0.100 to 26.400 GPM	1.300 to 79.300 GPM	1.300 to 158.500 GPM			
Display Range	-7.920 to 7.920 GPM	-15.860 to 15.860 GPM	-31.700 to 31.700 GPM	-95.100 to 95.100 GPM	-190.200 to 190.200 GPN			
Resolution	0.010 GPM 0.020 G		0.050 GPM	0.100 GPM	0.100 GPM			
Analog Start Point, ASP	0.000 to 5.280 GPM	0.000 to 10.580 GPM 0.000 to 21.100 GPM		0.000 to 63.400 GPM	0.000 to 126.800 GPM			
Analog End Point, AEP	1.320 to 6.600 GPM	2.640 to 13.220 GPM	2.640 to 13.220 GPM 5.300 to 26.400 GPM		31.700 to 158.500 GPM			
In Steps Of	0.010 GPM	0.020 GPM	0.050 GPM	0.100 GPM	0.100 GPM			



Prices as of April 15, 2015. Check Web site for most current prices.

Drives

Control

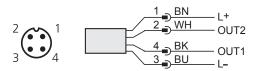
Properse FMM Series (-1002) Magnetic-Inductive Flow Meters

Model FMM150-1002 FMM170-1002 FMM150-1002 FMM120-1002 Temperature Monitoring Measuring Range		ProSense FMM	M Series (-1002) Magne	etic Flow Meters			
Measuring Range -4 to 176°F [-20 to 80°C] Resolution 0.5°F [0.2°C] Analog Ed Point, ASP -4.0 to 140°F [-20 to 6°C] Analog Ed Point, ASP -3.0 to 140°F [-20 to 6°C] In Steps Of 0.5°F [0.2°C] In Steps Of 0.5°F [0.2°C] Accuracy / Deviations ± (0.8% MW + 0.5% VMR) Flow Monitoring ± (0.8% MW + 0.5% VMR) Accuracy ± (0.2% VMR Temperature Monitoring ± (0.2% VMR) Response Time - ± 1°K (0.> 4.00 GPM) Response Time < 0.150s (dAP = 0) Display Damping, dAP 0.0 to 3.0s 0.0 to 5.0s Temperature Monitoring 109 - 3s (0.> 4.00 GPM) Environment Armbient Temperature -14 to 140°F [-10 to 60°C] 100 to 5.0s Temperature Monitoring 14 to 140°F [-10 to 60°C] 2° NPT lemale Process Connection 1/2° NPT lemale 1° NPT lemale 1-1/2° NPT lemale 2° NPT lemale Materials (wetted parts) Stainless steel 316L / 1.4404, PEEK (polyether ether ketone); FRM Stainless steel 316L / 1.4504, FPEF (-50 to 60°C] Stainless steel 316L / 1.4504; FPEF (-50 to 60°C] Display unit: 6 x LED green (/min, m/h, GPM, GF	lel			1	FMM200-1002		
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Materials (wetted parts) Stainless steel 316L / 1.4404; PEEK (polyether ether ketone); FKM Stainless steel 316L / 1.4404; stainless steel 316Ti / 1.4571; ether ether ketone); Hastelloy C-4 (2.4610); Cetellen: F Housing Materials Stainless steel 316L / 1.4404; PEEK (polyether ether ketone); FKM Stainless steel 316L / 1.4404; stainless steel 316Ti / 1.4571; PBT-GF 20; PC; EPDM/X Display Materials Stainless steel 316L / 1.4404; PBT-GF 20; PC; EPDM/X Stainless steel 316L / 1.4404; stainless steel 316Ti / 1.4571; PBT-GF 20; elastolan Display Int: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Display unit: 6 x LED green (l/min, m³/h, GPM, GFH, °C, °F) Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Display unit: 6 x LED green (l/min, m³/h, GPM, GFH, °C, °F) Display unit: 6 x LED green (l/min, m³/h, GPM, GFH, °C, °F) Display unit: 6 x LED green (l/min, m³/h, GPM, GFH, °C, °F) Display 4-digit alphanumeric display (7.5 mm) Pogramming: 4-digit alphanumeric display Programming: 4-digit alphanumeric display (7.5 mm) Display unit: 6 x LED green (l/min, m³/h, GPM, GFH, °C, °F) Display Measured values: 4-digit alphanumeric display (7.5 mm) Display (7.5 mm) Programming: 4-digit alphanumeric display 4-digit alphanumeric display Material S Material S			Mechanical Data	·			
Housing Materials Stainless steel 316L / 1.4404; PBT-GF 20; PC; EPDM/X Stainless steel 316L / 1.4404; stainless steel 316Ti / 1.4571; PBT-GF 20; elastolan Displays Operating Elements Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Display Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Display Display unit: 6 x LED green (l/min, m³/h, GPM, GPM, GPM, °C, °F) Display unit: 6 x LED green (l/min, m³/h, GPM, GPM, GPH, °C, °F) Measured values: 4-digit alphanumeric display (7.5 mm) Display unit: 6 x LED green (l/min, m³/h, GPM, GPM, GPH, °C, °F) Vertical Electrical Connection Display unit: 6 x LED green (l/min, m³/h, GPM, GPM, GPM, GPH, °C, °F) Measured values: 4-digit alphanumeric display (7.5 mm) Display (7.5 mm) Display unit: 6 x LED green (l/min, m³/h, GPM, GPM, GPM, GPM, GPM, GPM, GPM, GPM	ess Connection	1/2" NPT female 3/4" NP	PT female 1" NPT female	1-1/2" NPT female	2" NPT female		
Displays / Operating Elements Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Measured values: 4-digit alphanumeric display (7.5 mm) Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Programming: 4-digit alphanumeric display (7.5 mm) Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Programming: 4-digit alphanumeric display (7.5 mm) Measured values: 4-digit alphanumeric display Electrical Connection M12 connector; gold-plated contacts	erials (wetted parts)				stainless steel 316Ti / 1.4571; PEEK (poly stelloy C-4 (2.4610); Cetellen: FKM		
Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F) Measured values: 4-digit alphanumeric display (7.5 mm) Display unit: 6 x LED green (l/min, m³/h, GPM, GPM, GPH, °C, °F) Version: 4-digit alphanumeric display (7.5 mm) Measured values: 4-digit alphanumeric display Programming: 4-digit alphanumeric display (7.5 mm) Display unit: 6 x LED green (l/min, m³/h, GPM, GPM, GPM, GPM, GPM, GPM, GPM, GPM	sing Materials	Stainless steel 316L / 1.4404;	; PBT-GF 20; PC; EPDM/X	Stainless steel 316L / 1.4404; stainless steel 316Ti / 1.4571; PEI; FKM; PBT-GF 20; elastolan			
Display Display Unit: 6 x LED green (virtin, mP/n, GP/n, G, Fr, G, Fr) Function display: 1 x LED yr Measured values: 4-digit alphanumeric display (7.5 mm) Function display: 4-digit alphanumeric display Programming: 4-digit alphanumeric display (7.5 mm) Function display: 4-digit alphanumeric display Electrical Connection M12 connector; gold-plated contacts		Di	Displays / Operating Elem	ents			
Connection M12 connector; gold-plated contacts	ılay	Measured values: 4-digi	git alphanumeric display (7.5 mm)	Function display: Measured values:	ED green (I/min, m ³ /h, GPM, GPH, °C, °F 1 x LED yellow (10 ⁹) 4-digit alphanumeric display (7.5 mm) 4-digit alphanumeric display (7.5 mm		
			Electrical Connection	·			
	nection		M12 connector;	gold-plated contacts			
Tests / Approvals			Tests / Approvals				
EMC EN 61000-4-2: 4kV CD / 8kV AD EN 61000-4-3 HF radiated: 10 V/m EN 61000-4-4 Burst: 2kV EN 61000-4-5 Surge: 0.5 kV EN 61000-4-6 HF conducted: 10V	;	EN 61000-4-2: 4kV CD / 8kV AD EN 61000-4-3 HF radiated: 10 V/m EN 61000-4-4 Burst: 2kV EN 61000-4-5 Surge: 0.5 kV					
Shock Resistance DIN IEC 68-2-27: 20g (11ms)	ck Resistance		DIN IEC 68-2-27:	20g (11ms)			
Vibration Resistance DIN IEC 68-2-6: 5g (10 to 2,000Hz)	ation Resistance		DIN IEC 68-2-6:	5g (10 to 2,000Hz)			
Approvals* UL (E320431), CE, RoHS * To obtain the most current agency approval information, see the Agency Approval Checklist section on the specific part number's web page at							

NOTE: CHECK THE CHEMICAL COMPATIBILITY OF THE SENSOR'S WETTED PARTS WITH THE MEDIUM TO BE MEASURED.

PrSense[®] FMM Series (-1002) Magnetic-Inductive Flow Meters

Wiring Diagram



Cable Assembly Wiring Colors:

- Pin 1 Brown
- Pin 2 White
- Pin 3 Blue
- Pin 4 Black

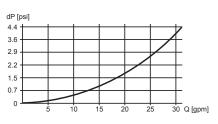
Colors to DIN EN 60947-5-2

For additional wiring details see individual product manuals.

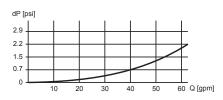
Use FMM-GND1 if meter is installed in ungrounded pipe system.

Pressure Loss/Flow Rate*

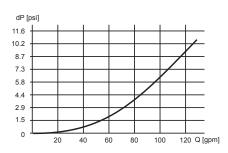
FMM50-1002



FMM75-1002



FMM100-1002



* when used with water @ 68°F [20°C]

Output Function Selections

Models:

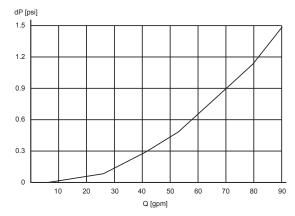
FMM50-1002, FMM75-1002, FMM100-1002, FMM150-1002, FMM200-1002

Output 1: Analog temperature

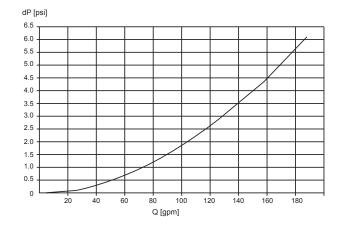
Output 2: Analog flow rate

Note: Wiring colors are based on AutomationDirect CD12L and CD12M 4-pole cable assemblies.

FMM150-1002



FMM200-1002



Automation Direct

Company Information

Drives Soft Starters

Motors

Power Transmission

Motion: Servos and Steppers

Motor Controls

Sensors: Proximity

Sensors: Photoelectric

Sensors: Encoders

Sensors: Limit Switches

Sensors: Current

Sensors: Pressure

Sensors: Temperature

Sensors: Level

Sensors Flow

Pushbuttons and Lights

Stacklights

Signal Devices

Process

Relays and Timers

Pneumatics: Air Prep

Pneumatics: Directional Control

Pneumatics: Cylinders

Pneumatics: Tubing

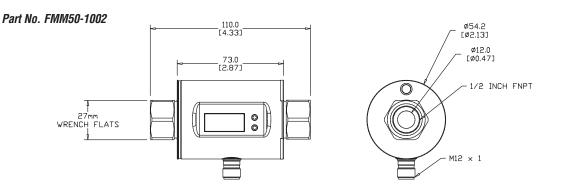
Pneumatics: Air Fittings

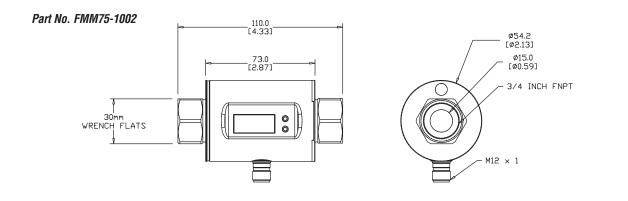
Valves

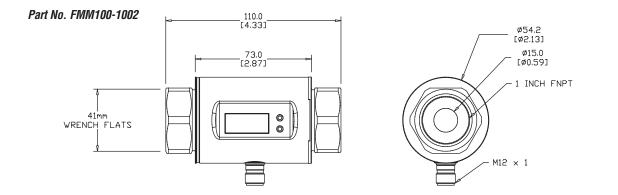
PrSense[®] FMM Series (-1002) Magnetic-Inductive Flow Meters

Dimensions

mm [inches]







Appendix Book 2

Terms and Conditions

See our website www.AutomationDirect.com for complete Engineering drawings.

Book 2 (14.3)

eFL-13

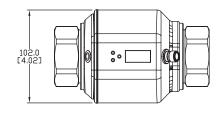
Flow Sensors

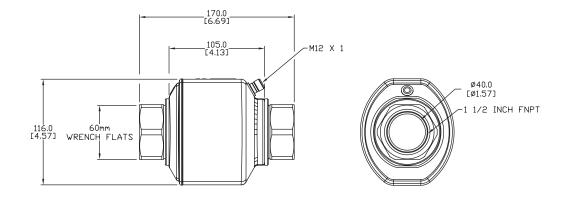
DrSense FMM Series (-1002) Magnetic-Inductive Flow Meters

Dimensions

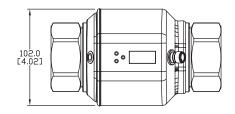
mm [inches]

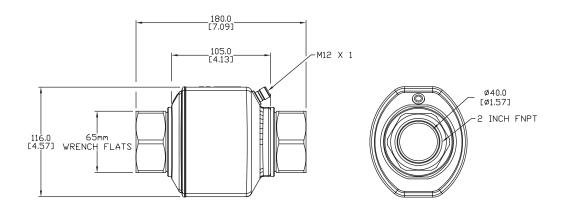
Part No. FMM150-1002





Part No. FMM200-1002





See our website www.AutomationDirect.com for complete Engineering drawings.



DrSense Magnetic-Inductive Flow Meter Accessories



The FMM-GND1 Grounding Clamp is used when an FMM series Magnetic-Inductive Flow Meter is installed in an ungrounded pipe system (e.g. PVC pipe).

Simply place the FMM-GND1 Grounding Clamp around the base of the M12 connector and attach a grounded wire to FMM-GND1 Grounding Clamp with the supplied machine screw and nut.

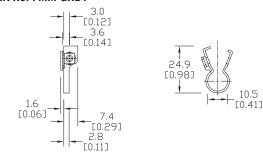
Note: Improper grounding may cause inaccurate readings

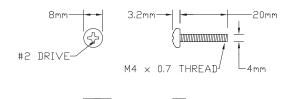
ProSense Magnetic Flow Meter Accessories					
Part No.	Description	Price	Weight		
FMM-GND1	ProSense 316 stainless steel grounding clamp for magnetic flow meters with an M12 connector.	\$6.00	0.015 lb		

Dimensions

mm [inches]







See our website www.AutomationDirect.com for complete Engineering drawings.



Grounding Clamp Installation

The ProSense magnetic flow meter grounding clamp is installed as shown above.

Note: the ground wire shown above is not included.



Company Information

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Signal Devices Process

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Pneumatics: Air Prep

Pneumatics: Directional Control Valves

Pneumatics: Cylinders

Pneumatics: Tubing

Pneumatics: Air Fittings

Appendix Book 2

Terms and Conditions



DrSense FMM Series Magnetic-Inductive **Flow Meters**



Magnetic-Inductive Flow Meter Application

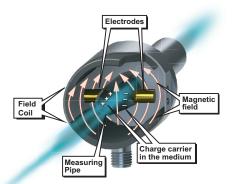
Magnetic-inductive flow meters (Magmeters) are one of the most widely used technologies for liquid flow monitoring in industrial process markets such as wastewater, mining and minerals, utilities, food and beverage, and pharmaceuticals. To ensure reliable and accurate operation, some important application requirements should be considered. Meeting the minimum conductivity of the liquid and properly installing with a full pipe are required in order to avoid significant error or the

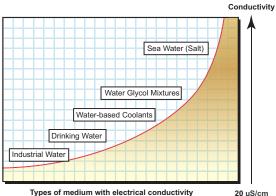
meter not functioning at all. Additionally, the presences of air bubbles should be avoided as they will affect the accuracy of the meter's measurements. Installation location in the piping is important because disturbances in the flow caused by bends in the pipe, valves, reductions, etc. can cause inaccuracies. Refer to the magmeter's specifications and operating instruction documents for specific information regarding application and installation requirements.

Magnetic-Inductive Flow Meter Measuring Principle

Magmeters operate by using the magnetic-inductive measuring principle in which a magnetic field is generated in the specified measuring pipe by current-carrying coils. When the media flows through the pipe, the ions of the conductive media are diverted perpendicularly to the magnetic field with the positive and negative charge carriers flowing in opposite directions. The two electrodes that are in contact with

the medium then measure the voltage that is induced. The measured signal voltage is proportional to the average flow velocity. By knowing the inside pipe diameter of the unit, the volumetric flow rate is determined. Magmeters are suitable for use with a variety of conductive liquids in industrial process applications such as those in the following graph:





Types of medium with electrical conductivity

I	Valves
I	
I	
I	Pneumatics:
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Drives Soft Starters Motors

Power Transmission

Motion: Servos

and Steppers

Motor Controls

Sensors: Proximity

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Pneumatics: Air Prep

Pneumatics Directional Control

Pneumatics Tubing

Pneumatics Air Fittings

Appendix Book 2

Terms and Conditions

ProSense FMM Series Magnetic Flow Meter Selection Guide								
Model	Price	Process Connection	Flow Range	Temperature Range	Display Units	Output 1	Output 2	Empty Pipe Detection
FMM50-1001	\$460.00	1/2" FNPT	0 to 6.6 GPM		GPM, GPH, GAL, or °F	Switch or pulse (flow) Switch, pulse or frequency (flow)	Switch, analog or reset input (flow or temperature)	No
FMM75-1001	\$499.00	3/4" FNPT	0 to 13.2 GPM					
FMM100-1001	\$550.00	1" FNPT	0 to 26.4 GPM					
FMM150-1001	\$825.00	1-1/2" FNPT	0 to 80 GPM					Yes
FMM200-1001	\$890.00	2" FNPT	0 to 160 GPM	-4 to 176°F				
FMM50-1002	\$460.00	1/2" FNPT	0 to 6.6 GPM	[-20 to 80°C]				
FMM75-1002	\$499.00	3/4" FNPT	0 to 13.2 GPM		GPM, GPH, LPM, m³/h, °F, °C	h, 4-20 mA	Analog 4-20 mA (flow)	No
FMM100-1002	\$550.00	1" FNPT	0 to 26.4 GPM					
FMM150-1002	\$825.00	1-1/2" FNPT	0 to 79.3 GPM					Yes
FMM200-1002	\$890.00	2" FNPT	0 to 158.5 GPM					

