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, °F, °C
- Two analog output signals
- 4-pin M12 quick disconnect
- 5-year warranty

Output Function Selections
Output 1:
Analog temperature
Output 2:
Analog flow rate

### ProSense FMM Series (-1002) Magnetic Flow Meters

<table>
<thead>
<tr>
<th>Model</th>
<th>FMM50-1002</th>
<th>FMM75-1002</th>
<th>FMM100-1002</th>
<th>FMM150-1002</th>
<th>FMM200-1002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>$476.00</td>
<td>$516.00</td>
<td>$570.00</td>
<td>$854.00</td>
<td>$921.00</td>
</tr>
<tr>
<td>Weight</td>
<td>1.14 lb</td>
<td>1.23 lb</td>
<td>1.36 lb</td>
<td>6.76 lb</td>
<td>6.76 lb</td>
</tr>
<tr>
<td>Range</td>
<td>0 to 6.6 GPM</td>
<td>0 to 13.2 GPM</td>
<td>0 to 26.4 GPM</td>
<td>0 to 79.3 GPM</td>
<td>0 to 158.5 GPM</td>
</tr>
<tr>
<td>Process Connection</td>
<td>1/2” FNPT</td>
<td>3/4” FNPT</td>
<td>1” FNPT</td>
<td>1-1/2” FNPT</td>
<td>2” FNPT</td>
</tr>
</tbody>
</table>
| 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 | III |
| Reverse Polarity Protection | YES |

#### Output Functions

<table>
<thead>
<tr>
<th>Output Type / Function</th>
<th>OUT1: analog signal / temperature</th>
<th>OUT2: analog signal / flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog Output</td>
<td>4-20 mA max 22mA Max. load: 500Ω (4-20 mA) Overload protection: Yes</td>
<td></td>
</tr>
</tbody>
</table>

#### Flow Rate Monitoring

| 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 GPM |
| Resolution             | 0.010 GPM | 0.020 GPM | 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 | 5.300 to 26.400 GPM | 15.900 to 79.300 GPM | 31.700 to 158.500 GPM |
| In Steps Off           | 0.010 GPM | 0.020 GPM | 0.050 GPM | 0.100 GPM | 0.100 GPM |
## ProSense FMM Series (-1002) Magnetic Inductive Flow Meters

### Model
- **FMM50-1002**
- **FMM75-1002**
- **FMM100-1002**
- **FMM150-1002**
- **FMM200-1002**

<table>
<thead>
<tr>
<th>Temperature Monitoring</th>
<th>Measuring Range</th>
<th>Resolution</th>
<th>Analog Start Point, ASP</th>
<th>Analog End Point, AEP</th>
<th>In Steps Of</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-4 to 176°F [-20 to 80°C]</td>
<td>0.5°F (0.2°C)</td>
<td>-4.0 to 140°F [-20 to 60°C]</td>
<td>32 to 176.0°F [0.0 to 80°C]</td>
<td>0.5°F (0.28°C)</td>
</tr>
</tbody>
</table>

### Accuracy / Deviations

#### Flow Monitoring
- **Accuracy¹**: ± (2% MW + 0.5% VMR)  ± (0.8% MW + 0.5% VMR)
- **Repeatability¹**: ± 0.2% VMR

#### Temperature Monitoring
- **Accuracy**: ± 2.5°K (Q > 0.26 GPM)  ± 1°K (Q > 4.00 GPM)

### Reaction Times

#### Flow Monitoring
- **Power-On Delay Time**: 5s
- **Response Time**: < 0.150s (dAP = 0)  < 0.350s (dAP = 0)
- **Display Damping, dAP**: 0.0 to 3.0s  0.0 to 5.0s

#### Temperature Monitoring
- **Response Time**: T09 = 3s (Q > 4.00 GPM)

### Environment

#### Ambient Temperature
- 14 to 140°F [-10 to 60°C]

#### Storage Temperature
- -13 to 176°F [-25 to 80°F]

#### Protection
- IP 67  IP 65, IP 67

### Mechanical Data

#### Process Connection
- 1/2” NPT female  3/4” NPT female  1” NPT female  1-1/2” NPT female  2” NPT female

#### Materials (wetted parts)
- Stainless steel 316L / 1.4404; PEEK (polyether ether ketone); FKM
- Stainless steel 316L / 1.4404; stainless steel 316Ti / 1.4571; PEEK (polyether ether ketone); Hastelloy C-4 (2.4610); Cetellen: FKM

#### Housing 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

### Displays / Operating Elements

<table>
<thead>
<tr>
<th>Display</th>
<th>Display unit: 6 x LED green (l/min, m³/h, GPM, GPH, °C, °F)  Measured values: 4-digit alphanumeric display (7.5 mm)  Programming: 4-digit alphanumeric display (7.5 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function display</td>
<td>1 x LED yellow (10³)  Measured values: 4-digit alphanumeric display (7.5 mm)  Programming: 4-digit alphanumeric display (7.5 mm)</td>
</tr>
</tbody>
</table>

### Electrical Connection

- **Connection**: M12 connector; gold-plated contacts

### 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

#### Shock Resistance
- DIN IEC 68-2-27: 20g (11ms)

#### Vibration Resistance
- DIN IEC 68-2-6: 5g (10 to 2,000Hz)

#### Approvals*  
- UL (E320431), CE, RoHS

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¹ MW = Measured value; VMR = Final value of the measuring range

**Note:** Check the chemical compatibility of the sensor’s wetted parts with the medium to be measured.

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For the latest prices, please check AutomationDirect.com.
FMM Series (-1002) Magnetic-Inductive Flow Meters

Wiring Diagram

Output Function Selections

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

Output 1:
Analogue temperature

Output 2:
Analogue flow rate

Pressure Loss/Flow Rate*

FMM50-1002

FMM75-1002

FMM100-1002

FMM150-1002

* when used with water @ 68°F [20°C]
prosense® FMM Series (-1002) Magnetic-Inductive Flow Meters

Dimensions

**Part No. FMM50-1002**

**Part No. FMM75-1002**

**Part No. FMM100-1002**

**Part No. FMM150-1002**

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

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Flow Sensors

1-800-633-0405
FMM Series (-1002) Magnetic-Inductive Flow Meters

Dimensions

Part No. FMM200-1002

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

Video Links

- Click on the thumbnail or go to https://www.automationdirect.com/VID-FL-0003 for a short Quick Start video for the 0.5", 0.75 and 1" FMM Series Magnetic-Inductive Flow Meters
- Click on the thumbnail or go to https://www.automationdirect.com/VID-FL-0004 for a short Quick Start video for the 1.5" and 2.0" FMM Series Magnetic-Inductive Flow Meters
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.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Price</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMM-GND1</td>
<td>ProSense 316 stainless steel grounding clamp for</td>
<td>$6.25</td>
<td>0.015 lb</td>
</tr>
<tr>
<td></td>
<td>magnetic flow meters with an M12 connector.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dimensions**

**mm [inches]**

<table>
<thead>
<tr>
<th>Part No. FMM-GND1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.0 (0.12)</td>
</tr>
<tr>
<td></td>
<td>3.6 (0.14)</td>
</tr>
<tr>
<td>1.6 (0.06)</td>
<td>7.4 (0.29)</td>
</tr>
<tr>
<td>2.8 (0.11)</td>
<td>24.9 (0.98)</td>
</tr>
<tr>
<td>10.5 (0.41)</td>
<td></td>
</tr>
<tr>
<td>8mm</td>
<td></td>
</tr>
<tr>
<td>3.2mm</td>
<td></td>
</tr>
<tr>
<td>20mm</td>
<td></td>
</tr>
<tr>
<td>M4 x 0.7 THREAD</td>
<td></td>
</tr>
<tr>
<td>4mm</td>
<td></td>
</tr>
</tbody>
</table>

Grounding Clamp Installation

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

Note: the ground wire shown above is not included.

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

### ProSense FMM Series Magnetic-Inductive Flow Meters

Magnetic-Inductive Flow Meters

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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: