The FPI Mag® (Full Profile Insertion) electromagnetic flow meter is the only hot tap full profile insertion flow meter available on the market. The FPI Mag installs without service interruption making it ideal for retrofits, upgrades and maintenance projects and sites never metered before. The hot tap installation significantly reduces installation time eliminating the need to de-water lines or cut pipe.

The multi-electrode sensor delivers an accurate measurement of the full pipe profile rivaling the performance of a full-bore mag meter. The repeatable, stable measurement across the entire flow profile compensates for variable flow profiles, including swirl and turbulent conditions.

The FPI Mag is the industry's most economical flow metering solution offering unbeatable value in the cost of installation and ownership reducing installed costs by more than 45 percent in medium and large line sizes. The compact insertion design fits in confined spaces and offers complete accessibility. The flow meter can be removed in pipes under pressure for easy inspection, cleaning, calibrating, or verification. Installation costs are reduced by eliminating the need for heavy equipment and extensive manpower.

The innovative flow meter comes pre-calibrated from McCrometer's NIST traceable calibration labs and requires no recalibration in the field. With no moving parts and a single-piece design, the FPI Mag's sensor contains nothing to wear or break and is generally immune to clogging by sand, grit, or other debris. The electrodes are encased in a heavy-duty 316 stainless steel sensor body for maximum structural integrity and coated with a NSF certified 3M™ fusion-bonded epoxy coating for operational longevity.

The FPI Mag® Sensor

The FPI Mag® Flow Meter with Procomm Converter - CE Compliant

**MUNICIPAL WATER AND WASTEWATER**

- Water
  - Distribution
  - Effluent
  - Filter balancing and backwash
  - Pumping stations
  - UV dosing
  - Wells and booster stations

- Wastewater
  - Effluent
  - Recycle / reclaim

The FPI Mag is ideal for chilled water in campus style facilities, hospitals, airports, hotels, casinos, etc.

**INDUSTRIAL FACILITIES**

The FPI Mag is also suitable for a variety of industrial facilities: power plants (including cogeneration), paper mills, chemical & petrochemical plants, metals & mining, and food & beverage.

**Applications Include**

- Cooling water
- Fire water
- Raw water
- Feed water
- Inlet to surge basin
- Effluent wastewater

**Benefits:**

- Hot Tap Installation - No service interruption
- Accurate – Measures the full flow profile
- Lower Cost – Installed savings more than 45%
- Robust – No moving parts to wear or break
- Versatile – Great for plant maintenance, upgrades and retrofits
- Accessible – Insertion design provides easy access
- Virtually No Maintenance – No field calibration required
### FPI MAG Part Number Matrix

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>0100</td>
<td>0150</td>
<td>0200</td>
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<td>1650</td>
<td>1800</td>
<td>1950</td>
<td>2100</td>
<td>2500</td>
<td></td>
</tr>
</tbody>
</table>

### Electrode Material Options
- S316 Stainless Steel (Standard)
- Hastelloy

### Cable Connector Options
- Quick Connect (Standard)
- Strain Relief

### Remote Cable Length Options
- 7 m (Standard) (23 ft) 007
- 15 m (49.2 ft) 015
- 23 m (75.5 ft) 023
- 30 m (98.4 ft) 030
- 38 m (124.7 ft) 038
- 46 m (150.9 ft) 046
- 54 m (177.2 ft) 054
- 61 m (200.1 ft) 061
- 76 m (248.0 ft) 076
- 91 m (300.1 ft) 091
- 107 m (350.8 ft) 107
- 122 m (400.1 ft) 122
- 152 m (500.1 ft) 152
- Custom Length Cable [User Specified] CST

### Converter Power Options
- AC Power A
- DC Power D

*Contact Factory for Larger Line Sizes Larger*
### FPI MAG PART NUMBER MATRIX (CONT.)

<table>
<thead>
<tr>
<th>CONVERTER OUTPUT OPTIONS</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual 4-20mA Analog, Dual Digital (Standard)</td>
<td>1</td>
</tr>
<tr>
<td>Modbus + STD (Two 4-20, two Dig)</td>
<td>2</td>
</tr>
<tr>
<td>Hart + STD (Two 4-20, two Dig)</td>
<td>3</td>
</tr>
<tr>
<td>Datalogger/BIV + STD (Two 4-20, two Dig)</td>
<td>4</td>
</tr>
<tr>
<td>Datalogger/BIV + Modbus + STD (Two 4-20, two Dig)</td>
<td>5</td>
</tr>
<tr>
<td>Datalogger/BIV + Hart + STD (Two 4-20, two Dig)</td>
<td>6</td>
</tr>
<tr>
<td>Datalogger/BIV + AMI Smart Output + STD (Two 4-20, two Dig)</td>
<td>7</td>
</tr>
<tr>
<td>AMI Smart Output + STD (Two 4-20, two Dig)</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BALL VALVE OPTIONS</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2” NPT SS Ball Valve</td>
<td>N</td>
</tr>
<tr>
<td>2” BSP Brass Ball Valve</td>
<td>B</td>
</tr>
<tr>
<td>No Valve, NPT Hardware</td>
<td>X</td>
</tr>
<tr>
<td>No Valve, BSP Hardware</td>
<td>Y</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SMART OUTPUT PROTOCOL OPTIONS *</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>No AMI Outputs</td>
<td>-</td>
</tr>
<tr>
<td>Sensus Protocol (1.8m/6ft cable, Nicor Connector hardwired only)</td>
<td>SEN</td>
</tr>
<tr>
<td>Itron 6 digit Protocol (1.8m/6ft cable, Nicor Connector hardwired only)</td>
<td>IT6</td>
</tr>
<tr>
<td>Itron 9 digit Protocol (1.8m/6ft cable, Nicor Connector hardwired only)</td>
<td>IT9</td>
</tr>
</tbody>
</table>

* Smart Output protocol options require selection of converter option 7 or 8.
## PROCOMM CONVERTER PART NUMBER MATRIX

<table>
<thead>
<tr>
<th>PC</th>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter Mount</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote Mount</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CONVERTER MOUNTING OPTIONS

<table>
<thead>
<tr>
<th>Converter Power Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Power</td>
</tr>
<tr>
<td>DC Power</td>
</tr>
</tbody>
</table>

### CONVERTER OUTPUT OPTIONS

- Dual 4-20mA Analog, Dual Digital (Standard)  
  - Convertor Power 1
- Modbus + STD (Two 4-20, two Dig)  
  - Convertor Power 2
- Hart + STD (Two 4-20, two Dig)  
  - Convertor Power 3
- Datalogger/BIV + STD (Two 4-20, two Dig)  
  - Convertor Power 4
- Datalogger/BIV + Modbus + STD (Two 4-20, two Dig)  
  - Convertor Power 5
- Datalogger/BIV + Hart + STD (Two 4-20, two Dig)  
  - Convertor Power 6
- AMI Smart Output + STD (Two 4-20, two Dig)  
  - Convertor Power 7
- Datalogger/BIV + AMI Smart Output + STD (Two 4-20, two Dig)  
  - Convertor Power 8

### SMART OUTPUT PROTOCOL OPTIONS *

- No AMI Outputs  
  - SEN
- Sensus Protocol (1.8m/6ft cable, Nicor Connector hardwired only)  
  - IT6
- Itron 6 digit Protocol (1.8m/6ft cable, Nicor Connector hardwired only)  
  - IT9
- Itron 9 digit Protocol (1.8m/6ft cable, Nicor Connector hardwired only)  
  - IT9

* Smart Output protocol options require selection of convertor output option 7 or 8.
### FLOW METER SPECIFICATIONS

The full pipe averaging flow meter comes complete with Mounting Hardware, AC Converter with Dual 4-20mA output, 7.5 m (25’

of Dual Submersible Cables with quick connects at sensor, Stainless Steel Body, 316 Stainless Steel Electrodes, NSF Approved Fusion Bonded Epoxy Coating, 2” Brass BSP threaded ball valve (minimum of 1-7/8” port I.D.), 2” Stainless Steel BSP threaded nipple, 2-Year Warranty.

#### Measurement

| Volumetric flow in filled flow conduits DN100 to DN3500 utilizing insertable electromagnetic averaging sensor. Flow indication in English Standard or Metric units |

#### Flow Measurement

<table>
<thead>
<tr>
<th>Method</th>
<th>Electromagnetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibrated accuracy</td>
<td>±0.5% from 0.3 m/s to max velocity (on next page), up to ±1% for 0.1 to 0.3 to 1 m/s</td>
</tr>
<tr>
<td>Linearity</td>
<td>0.1% of range</td>
</tr>
<tr>
<td>Repeatability</td>
<td>0.2% of reading</td>
</tr>
<tr>
<td>Direction measurement</td>
<td>• 395E sensor - Forward flow measurement and reverse flow indication</td>
</tr>
<tr>
<td></td>
<td>• 394E sensor - Bidirectional flow measurement</td>
</tr>
</tbody>
</table>

#### Materials

| Coating                 | Fusion bonded epoxy (NSF 61 approved) coated 316 stainless steel |
| Insertion hardware      | 316 Stainless Steel                                           |
| Compression seal        | Silicone Rubber                                               |
| Sensor electrodes       | 316 Stainless Steel                                           |
| Ball valve              | Brass                                                          |

#### Temperature Range

| Operation               | -10 to 60°C (14 to 140°F) up to 17 bar                      |
| Storage                 | -15 to 60°C (5 to 140°F)                                    |

Note regarding storage: During freezing conditions and when meter is not in use, sensor must be removed from pipe and stored in dry conditions.

**NOTE:** Damage to the sensor caused by allowing the sensor to freeze in the pipe is not covered by the warranty.

#### Electrical Connections

| Quick connect (IP68) |

#### IP Rating

| Submersible sensor IP68 |

#### Sensor Submersibility Depth

<table>
<thead>
<tr>
<th>With standard quick connect</th>
<th>1.8 m (6 ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With optional strain relief cable</td>
<td>9 m (30 ft.)</td>
</tr>
</tbody>
</table>
## Certifications and Approvals

- ISO 9001:2015 certified quality management system
- NSF/ANSI/CAN 61 & NSF/ANSI 372
- Listed by MET to 61010-1; Certified by MET to UL 61010-1 and MET C22.2 No.61010-1-04
- WRAS
- CE

## System Options

- Hastelloy® electrodes
- Additional sensor cable up to 144.75 m/475’ (152.4 m/500’ max for model 395E and 61m/200’ max for model 394E)
- Extension to hardware clearance
- Annual verification / calibration
- Sensor insertion tool
- Stainless steel ID tag
# FLOW METER PIPE SIZES AND FLOW RANGES

<table>
<thead>
<tr>
<th>Pipe Size (Nominal)</th>
<th>Pipe ID Range</th>
<th>Flow Ranges (m³/h standard)</th>
<th>Standard Program Defaults¹</th>
<th>Minimum Clearance Required During Installation (cm)²</th>
<th>Velocity Range² (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min Pipe ID (mm)</td>
<td>Max Pipe ID (mm)</td>
<td>Min (m³/h)¹</td>
<td>Max (m³/h)¹</td>
<td>20mA</td>
</tr>
<tr>
<td>DN100</td>
<td>95</td>
<td>127</td>
<td>3</td>
<td>290</td>
<td>135</td>
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<tr>
<td>DN110</td>
<td>127</td>
<td>184</td>
<td>6</td>
<td>635</td>
<td>295</td>
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<td>DN200</td>
<td>184</td>
<td>235</td>
<td>11</td>
<td>1135</td>
<td>535</td>
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<tr>
<td>DN250</td>
<td>235</td>
<td>285</td>
<td>18</td>
<td>1815</td>
<td>900</td>
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<td>DN300</td>
<td>286</td>
<td>330</td>
<td>25</td>
<td>2500</td>
<td>1250</td>
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<tr>
<td>DN350</td>
<td>330</td>
<td>381</td>
<td>35</td>
<td>3400</td>
<td>1700</td>
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<tr>
<td>DN400</td>
<td>381</td>
<td>425</td>
<td>45</td>
<td>4550</td>
<td>2150</td>
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<tr>
<td>DN450</td>
<td>426</td>
<td>478</td>
<td>55</td>
<td>5900</td>
<td>2700</td>
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<tr>
<td>DN500</td>
<td>478</td>
<td>578</td>
<td>70</td>
<td>6350</td>
<td>3400</td>
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<tr>
<td>DN600</td>
<td>578</td>
<td>635</td>
<td>95</td>
<td>7500</td>
<td>4650</td>
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<tr>
<td>DN750</td>
<td>635</td>
<td>863</td>
<td>135</td>
<td>10000</td>
<td>6800</td>
</tr>
<tr>
<td>DN900</td>
<td>864</td>
<td>1016</td>
<td>230</td>
<td>10900</td>
<td>8200</td>
</tr>
<tr>
<td>DN1050</td>
<td>1016</td>
<td>1168</td>
<td>295</td>
<td>12700</td>
<td>10200</td>
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<tr>
<td>DN1200</td>
<td>1168</td>
<td>1321</td>
<td>385</td>
<td>14000</td>
<td>12500</td>
</tr>
<tr>
<td>DN1350</td>
<td>1321</td>
<td>1473</td>
<td>500</td>
<td>18000</td>
<td>14750</td>
</tr>
<tr>
<td>DN1500</td>
<td>1473</td>
<td>1625</td>
<td>590</td>
<td>22000</td>
<td>18000</td>
</tr>
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<td>DN1650</td>
<td>1626</td>
<td>1778</td>
<td>725</td>
<td>24000</td>
<td>20500</td>
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<tr>
<td>DN1800</td>
<td>1778</td>
<td>1930</td>
<td>865</td>
<td>29000</td>
<td>22500</td>
</tr>
<tr>
<td>DN2000 and up</td>
<td>1931</td>
<td>3505</td>
<td>Available - Call Factory at 1-800-220-2279</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Default totalizer units measured as m³.

2 Hardware clearance after installation for all sizes is 700 mm.

3 Flow temperature range -10° to 60° C (14° to 140° F) up to 17 bar, max pressure is 17 bar.

---

**Required Information**

At the time of ordering, please be prepared to provide the following information:

1. Pipe ID and pipe OD
2. Unit of measure (m³ is default)
3. Maximum pressure
4. FPI specification data sheet for custom length sensors

Consult factory if any chemicals are in use.
## PROCOMM PART NUMBER MATRIX

<table>
<thead>
<tr>
<th>PC</th>
<th>M</th>
<th>R</th>
<th>A</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONVERTER MOUNTING OPTIONS</td>
<td>Meter Mount</td>
<td>Remote Mount</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONVERTER POWER OPTIONS</td>
<td>AC Power</td>
<td>DC Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONVERTER OUTPUT OPTIONS</td>
<td>Dual 4-20mA Analog, Dual Digital (Standard)</td>
<td>Modbus + STD (Two 4-20, two Dig)</td>
<td>Hart + STD (Two 4-20, two Dig)</td>
<td>Datalogger/BIV + STD (Two 4-20, two Dig)</td>
</tr>
<tr>
<td>SMART OUTPUT PROTOCOL OPTIONS*</td>
<td>No AMI Outputs</td>
<td>Sensus Protocol (1.8m/6ft cable, Nicor Connector hardwired only)</td>
<td>Itron 6 digit Protocol (1.8m/6ft cable, Nicor Connector hardwired only)</td>
<td>Itron 9 digit Protocol (1.8m/6ft cable, Nicor Connector hardwired only)</td>
</tr>
</tbody>
</table>

*Smart Output protocol options require selection of converter output option 7 or 8.
# PROCOMM CONVERTER SPECIFICATIONS

## Power Source

<table>
<thead>
<tr>
<th>AC</th>
<th>100-240 VAC / 45-66 Hz (10 W)</th>
<th>Note: AC or DC must be specified at time of ordering.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>10-35 VDC (10 W)</td>
<td></td>
</tr>
</tbody>
</table>

## Standard Outputs

- Dual 4-20mA Outputs: Galvanically isolated and fully programmable for zero and full scale (0-21mA rangeability)
- Two separate digital programmable outputs: open collector transistor usable for pulse, frequency, or alarm settings.
  - Volumetric Pulse
  - Flow Rate (Frequency)
  - Hardware Alarm
  - High/Low Flow Alarms
  - Empty Pipe
  - Directional Indication
  - Range Indication
  - Maximum switching voltage: 40 VDC
  - Maximum switching current: 100mA
  - Maximum switching frequency: 1250 Hz
  - Insulation from other secondary circuits: 500V

## Optional Outputs

- Modbus
- HART
- Smart Output™ (Sensus, Itron 6, Itron 9)
- Datalogger
- Built-in verification

## Galvanic Isolation

All inputs / outputs are galvanically isolated from power supply up to 500 V

## Engineering Units

- Cubic Meter
- Cubic Centimeter
- Milliliter
- Liter
- Cubic Decimeter
- Decaliter
- Hectoliter
- Cubic Inches
- US Gallons
- Imperial Gallons
- Cubic Feet
- Kilo Cubic Feet
- Standard Barrel
- Oil Barrel
- US Kilogram
- Ten Thousands of Gallons
- Imperial Kilogram
- Acre Feet
- Megagallon
- Imperial Megagallon
- Hundred Cubic Feet
- Megaliters

## Conductivity

Minimum conductivity of 5µS/cm

## Electrical Connections

- Connection options: Compression gland seals for 0.24” to 0.47” diameter round cable
- Conduit option: 1/2”NPT threaded connections

## Sensor Cable Lengths

- **Standard**
  - 25'/7.6 m McCrometer supplied submersible cable with each remote mount unit.
- **Optional**
  - Up to 500'/152.4 m, or 25'/7.6 m max for battery powered.
- **Quick Connect** *
  - Available in standard cable lengths:
    - Feet: 25, 50, 75, 100, 125, 150, 175, 200, 500
    - Meters: 7.6, 15.25, 22.5, 30.5, 38.1, 45.75, 53.3, 61, 152.4
  - Custom cable lengths at additional cost.

---

*Not available with SPI Mag*
**IP Rating**

<table>
<thead>
<tr>
<th></th>
<th>IP67 Die cast aluminum converter (only when connected using compression gland seals)</th>
</tr>
</thead>
</table>

**Certifications and Approvals**

<table>
<thead>
<tr>
<th>Model</th>
<th>Certifications</th>
</tr>
</thead>
</table>
| Standard Model | • ISO 9001:2015 certified quality management system  
• CE  
• Certified by MET to UL 61010-1 |
| HL Model       | • ISO 9001:2015 certified quality management system  
• CE  
• Certified by MET to UL 61010-1 and MET C22.2 No. 61010-1-04  
  • Class I, Division 2, Groups A-D, T5  
  • Class I, Zone 2 IIC T5 |

**Important:**

Electrical safety certifications above do not apply to model 282L Single Point Insertion (SPI Mag) Electromagnetic Flow Meter.

**System Options**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| Hastelloy® electrodes | • Hastelloy® electrodes*  
• DC power  
• Additional sensor cable up to 475'/144.75 m (500'/152.4 m max for FPI Mag)  
• Extension to hardware clearance  
• Annual verification / calibration  
• Sensor insertion tool*  
• Stainless steel ID tag |

**Temperature Range**

<table>
<thead>
<tr>
<th></th>
<th>-4° to 140° F (-20° to 60° C)</th>
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</thead>
</table>

**Converter Dimensions**

<table>
<thead>
<tr>
<th>Mount</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote mount*</td>
<td>7.3”</td>
<td>8.5”</td>
<td>4.3”</td>
</tr>
<tr>
<td>Meter mount</td>
<td>6.9”</td>
<td>7.2”</td>
<td>6.2”</td>
</tr>
</tbody>
</table>

**Keypad and Display**

Can be used to access and change set-up parameters using six membrane keys and an LCD display

* Not available with SPI Mag

**Note regarding cable length:** McCrometer recommends minimizing cable length. Electromagnetic flow meters may have unfavorable signal strength to noise ratio in electrically noisy environments. Longer lengths of cable increase the likelihood of interference. In those cases where the meter’s signal must be transmitted a long distance, or where the environment may be particularly noisy, we suggest using the converter's analog output(s). That allows locating the converter as close as possible to the metering location.
CONVERTER DIMENSIONS
Remote Mount Converter Dimensions

Height 7.3" (18.5 cm)
Width 8.5" (21.6 cm)
Depth 4.3" (10.9 cm)