

FPI Mag® Sensor



ProComm® Converter



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.

MUNICIPAL WATER AND WASTEWATER

The FPI Mag Full Profile Insertion mag meter supports the following water and wastewater treatment applications:

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
- Feed water
- Raw 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

39	E	-	-	-	-	-	-	-	-
SINGLE DIRECTION/DIRECTIONAL									
394 - Bidirectional		4							
395 - Single Direction		5							
NOMINAL DIAMETER									
100mm Nominal [4in]			0100						
150mm Nominal [6in]			0150						
200mm Nominal [8in]			0200						
250mm Nominal [10in]			0250						
300mm Nominal [12in]			0300						
350mm Nominal [14in]			0350						
400mm Nominal [16in]			0400						
450mm Nominal [18in]			0450						
500mm Nominal [20in]			0500						
600mm Nominal [24in]			0600						
750mm Nominal [30in]			0750						
900mm Nominal [36in]			0900						
1050mm Nominal [42in]			1050						
1200mm Nominal [48in]			1200						
1350mm Nominal [54in]			1350						
1500mm Nominal [60in]			1500						
1650mm Nominal [66in]			1650						
1800mm Nominal [72in]			1800						
Contact Factory for Larger Line Sizes			Larger						
ELECTRODE MATERIAL OPTIONS									
S316 Stainless Steel (Standard)			S						
Hastelloy			H						
CABLE CONNECTOR OPTIONS									
Quick Connect (Standard)			Q						
Strain Relief			R						
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						
150 m (492.1 ft)			150						
Custom Length Cable [User Specified]			CST						
CONVERTER POWER OPTIONS									
AC Power			A						
DC Power			D						

continued next page



FPI MAG PART NUMBER MATRIX (CONT.)

CONVERTER OUTPUT OPTIONS		
Dual 4-20mA Analog, Dual Digital (Standard)	1	
Modbus + STD (Two 4-20, two Dig)	2	
Hart + STD (Two 4-20, two Dig)	3	
Datalogger/BIV + STD (Two 4-20, two Dig)	4	
Datalogger/BIV + Modbus + STD (Two 4-20, two Dig)	5	
Datalogger/BIV + Hart + STD (Two 4-20, two Dig)	6	
AMI Smart Output + STD (Two 4-20, two Dig)	7	
Datalogger/BIV + AMI Smart Output + STD (Two 4-20, two Dig)	8	
BALL VALVE OPTIONS		
2" NPT SS Ball Valve	N	
2" BSP Brass Ball Valve	B	
No Valve, NPT Hardware	X	
No Valve, BSP Hardware	Y	
SMART OUTPUT PROTOCOL OPTIONS *		
No AMI Outputs	-	
Sensus Protocol (1.8m/6ft cable, Nicor Connector hardwired only)	SEN	
Itron 6 digit Protocol (1.8m/6ft cable, Nicor Connector hardwired only)	IT6	
Itron 9 digit Protocol (1.8m/6ft cable, Nicor Connector hardwired only)	IT9	

* Smart Output protocol options require selection of converter 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

Method	Electromagnetic
Calibrated accuracy for forward and bidirectional sensors	±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
Linearity	0.1% of range
Repeatability	0.2% of reading
Direction measurement	<ul style="list-style-type: none"> • 395E sensor - Forward flow measurement and reverse flow indication • 394E sensor - Bidirectional flow measurement

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.

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.

Electrical Connections

Quick connect (IP68)

IP Rating

Submersible sensor IP68

Sensor Submersibility Depth

With standard quick connect

1.8 m (6 ft.)

With optional strain relief cable

9 m (30 ft.)

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
- CE



System Options

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

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.



FLOW METER PIPE SIZES AND FLOW RANGES

Pipe Size (Nominal)	Pipe ID Range		Flow Ranges (m ³ /h standard)		Standard Program Defaults ¹	Minimum Clearance Required During Installation (cm) ²	Velocity Range ³ (m/s)	
	Min Pipe ID (mm)	Max Pipe ID (mm)	Min (m ³ /h) ¹	Max (m ³ /h) ¹	20mA			
S = Standard (Available in 395E models pipe sizes 100 mm - 600 mm as shown in table below) C = Custom (Available in all 394E and 395E models pipe sizes 100 mm - 3,500 mm) Standard length hardware and installation clearance dimensions are based on a 100 mm maximum height coupling and pipe schedule standard								
DN100	95	127	3	290	135	129.5	0.1 - 10	
DN150	127	184	6	635	295	129.5	0.1 - 10	
DN200	184	235	11	1135	535	139.7	0.1 - 10	
DN250	235	285	18	1815	900	139.7	0.1 - 10	
DN300	286	330	25	2500	1250	149.9	0.1 - 10	
DN350	330	381	35	3400	1700	149.9	0.1 - 10	
DN400	381	425	45	4550	2150	149.9	0.1 - 10	
DN450	426	478	55	5900	2700	160.0	0.1 - 10	
DN500	478	578	70	6350	3400	160.0	0.1 - 8.5	
DN600	578	635	95	7500	4650	170.2	0.1 - 7	
DN750	635	863	135	10000	6800	181.0	0.1 - 6	
DN900	864	1016	230	10900	8200	196.2	0.1 - 4.5	
DN1050	1016	1168	295	12700	10200	211.5	0.1 - 4	
DN1200	1168	1321	385	14000	12500	226.7	0.1 - 3.5	
DN1350	1321	1473	500	18000	14750	241.9	0.1 - 3.5	
DN1500	1473	1625	590	22000	18000	257.2	0.1 - 3.5	
DN1650	1626	1778	725	24000	20500	272.4	0.1 - 3	
DN1800	1778	1930	865	29000	22500	287.7	0.1 - 3	
DN2000 and up	1931	3505	Available - Call Factory at 1-800-220-2279					

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

PC	-	-	-	-
CONVERTER MOUNTING OPTIONS				
Meter Mount	M			
Remote Mount	R			
CONVERTER POWER OPTIONS				
AC Power	A			
DC Power	D			
CONVERTER OUTPUT OPTIONS				
Dual 4-20mA Analog, Dual Digital (Standard)		1		
Modbus + STD (Two 4-20, two Dig)		2		
Hart + STD (Two 4-20, two Dig)		3		
Datalogger/BIV + STD (Two 4-20, two Dig)		4		
Datalogger/BIV + Modbus + STD (Two 4-20, two Dig)		5		
Datalogger/BIV + Hart + STD (Two 4-20, two Dig)		6		
AMI Smart Output + STD (Two 4-20, two Dig)		7		
Datalogger/BIV + AMI Smart Output + STD (Two 4-20, two Dig)		8		
SMART OUTPUT PROTOCOL OPTIONS *				
No AMI Outputs				-
Sensus Protocol (1.8m/6ft cable, Nicor Connector hardwired only)				SEN
Itron 6 digit Protocol (1.8m/6ft cable, Nicor Connector hardwired only)				IT6
Itron 9 digit Protocol (1.8m/6ft cable, Nicor Connector hardwired only)				IT9

* Smart Output protocol options require selection of converter output option 7 or 8.



PROCOMM CONVERTER SPECIFICATIONS

Power Source		
AC	100-240 VAC / 45-66 Hz (10 W)	Note: AC or DC must be specified at time of ordering.
DC	10-35 VDC (10 W)	
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.		
<ul style="list-style-type: none"> • 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		
<ul style="list-style-type: none"> • 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		
<ul style="list-style-type: none"> • 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 Kilogallon • Ten Thousands of Gallons • Imperial Kilogallon • Acre Feet • Megagallon • Imperial Megagallon • Hundred Cubic Feet • Megaliters 		
Conductivity		
Minimum conductivity of 5µS/cm		
Electrical Connections		
Connection options	<ul style="list-style-type: none"> • Compression gland seals for 0.24" to 0.47" diameter round cable • Conduit option: 1/2" NPT threaded connections 	
IP Rating		
IP67 Die cast aluminum converter (only when connected using compression gland seals)		

Certifications and Approvals

Standard Model	<ul style="list-style-type: none"> • ISO 9001:2015 certified quality management system • CE • Certified by MET to UL 61010-1
HL Model	<ul style="list-style-type: none"> • ISO 9001:2015 certified quality management system • CE • Certified by MET to UL 61010-1 and MET C22.2 No. 61010-1-04 <ul style="list-style-type: none"> • 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.



IMPORTANT

Refer to certification requirements. Do not substitute components.



IMPORTANT

The ProComm converter, models PC-RA1-HL series and PC-MA1-HL series have no user serviceable parts.

Temperature Range

Operating and storage	-4° to 140° F (-20° to 60° C)
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Converter Dimensions

Remote mount	<ul style="list-style-type: none"> • Height: 7.3" (18.5 cm) • Width: 8.5" (21.6 cm) • Depth: 4.3" (10.9 cm)
Meter mount	<ul style="list-style-type: none"> • Height: 6.9" (17.5 cm) • Width: 7.2" (18.25 cm) • Depth: 6.2" (15.7 cm)

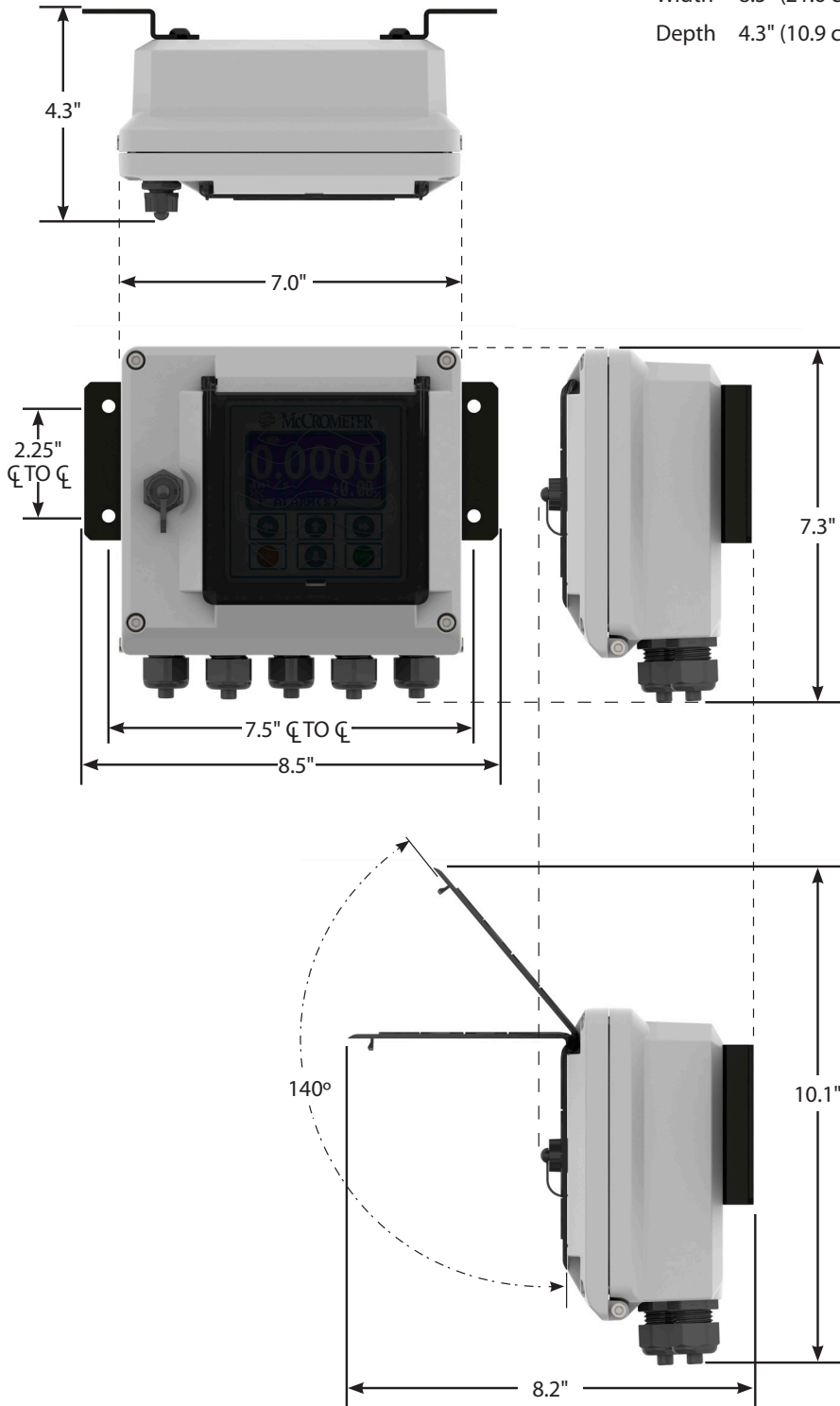
Keypad and Display

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

CONVERTER DIMENSIONS

Remote Mount Converter Dimensions

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



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