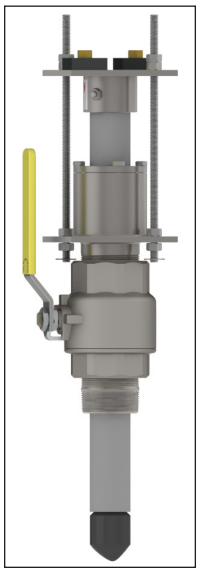
SPI Mag™

Specification Sheet
SPI Mag Model Flow Meter with Converter

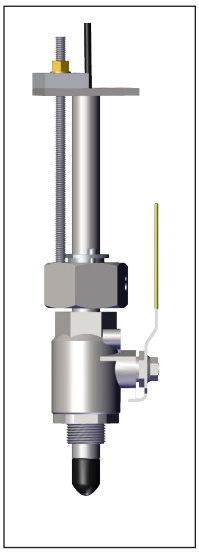
SPI Mag® Sensor



ProComm Converter

ProComm GO Converter

The SPI Mag™ (Single Point Insertion) Electromagnetic Flow Meter is a hot tappable single point insertion flow meter for measuring forward flow. The sensor is available for one-inch or two-inch taps, depending upon line size and application.



The SPI Mag is a cost effective flow meter solution with a purchase price that is independent of line size making the cost to meter a sixty-inch line the same as a two-inch. The SPI Mag's hot tap installation allows for uninterrupted service as it installs without system shut-down, de-watering lines, cutting pipe or welding flanges. Installation costs are reduced by eliminating the need for heavy equipment or extensive manpower. The SPI can be easily re-located to various 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. It is particularly cost-effective for retrofit applications replacing flow meters or in sites never metered before.

This cost effective flowmeter is available for line sizes from 2 to 240 inches. The flow sensor comes pre-calibrated from McCrometer's NIST traceable Calibration Lab and requires no recalibration in the field. With no moving parts and a single-piece design, the SPI Mag's sensor contains nothing to wear or break, and it is generally immune to clogging by sand, grit or other debris.

The SPI Mag is easily installed without interruption of the flow process. Sensor insertion hardware is utilized to insert the sensor through a ball valve or corporation stop in the flow conduit. Measurements are taken at the nearest pipe wall with negligible pressure drop in the pipe.

The SPI Mag allows profiling of the pipe inside diameter, further enhancing its measurement accuracy by allowing precise determination of mean velocities.

TYPICAL WATER APPLICATIONS

Both 1" and 2" sizes can be used for waste water and clean water.

Wastewater

- Effluent
- Waste Activated Sludge (WAS)
- Return Activated Sludge (RAS)
- Reclaim / Recycle

Clean Water

- Raw Water Intake
- Clear Wells

BENEFITS

- Easy to relocate to various line sizes
- Ease of hot-tap installation
- Installs without service interruption
- Insertion design for total accessibility
- Price is independent of line size
- No moving parts
- Does not require recalibration in the field

PROCOMM CONVERTER

- Pre-programmed
- Curve-fitting algorithm to improve accuracy
- 4-20mA (1000 ohm) analog output
- Eight line graphical display
- Six key touch programming
- Rugged enclosure meets IP67

McCROMETER

PART NUMBER MATRIX FOR SPI MAG WITH PROCOMM CONVERTER

28	_	_	-	_	_	_	_	_	_	_	_	-	_
Small or Large Body Sensor													
Small 1" Body Sensor	1												
Large 2" Body Sensor	2												
Meter Type													
Meter (Sensor, Tube, & Converter)		L											
Sensor Tube Length Options													
12" Tube Length				012									
18" Tube Length				018									
24" Tube Length				024									
30" Tube Length				030									
36" Tube Length				036									
Non Standard Tube Length				XXX									
Tube Material Options													
S316 Stainless Steel					S								
PVC Plastic					P								
Ball Valve Options													
Stainless Steel Valve (1" NPT 281, 2" NPT 282 Sensor)						N							
No Valve, hardware only (1" NPT 281, 2" NPT 282 Sensor)						X							
Converter Power Options													
Battery Power *(Standard)*							B						
Solar Power, Battery Backup							S						
A/C Power, Battery Backup							E						
DC Power, Battery Backup							F						
Converter Output Options													
No Outputs *(Standard)*								-					
No Outputs, DC Cable Only								0					
Two Digital Out								1					
4-20mA Analog only								2					
4-20mA Analog + Two Dig Out								3					
AMI Smart Output only								4					
AMI Smart Output + Two Dig Out								5					
AMI Smart Output + 4-20mA Analog								6					
AMI Smart Output + 4-20mA Analog + Two Dig Out								7					
DC Power/ Analog Out Cable Options													
No DC Power or Outputs *(Standard)*									-				
No Cable - Output Configured (Quick Conn)									0				
6 ft (Open Leads)									1				
25 ft (Open Leads)									2				
50 ft (Open Leads)									3				
Pulse Cable Length Options													
No Outputs *(Standard)*										-			
No Cable - Output Configured (Quick Conn)										0			
6 ft (Open Leads)										1			
25 ft (Open Leads)										2			
50 ft (Open Leads)										3			
25 ft (7-Pin Male connector for Telemetry)										4			
50 ft (7-Pin Male connector for Telemetry)										5			

PART NUMBER MATRIX FOR SPI MAG WITH PROCOMM GO CONVERTER

28 _ _ - _ _ _ _ _ _ _ - _	
Output Cable Terminal Options	
Strain Relief *(Standard)*	1
Quick Connect Cable Terminals (25 & 50 ft only)	2
Smart Output Protocol Options (*7 or 8 output option required)	
No AMI Outputs	-
Sensus Protocol (6ft cable, Nicor Connector hardwired only)	SEN
Itron 6 digit Protocol (6ft cable, Nicor Connector hardwired only)	IT6
Itron 9 digit [100W] Protocol (6ft cable, Nicor Connector hardwired only)	IT9
Neptune Protocol (6ft cable, Nicor Connector hardwired only)	NEP
Battery Power/ ATT wireless Telemetry System (RTU, Solar Panel, 7 Pin Cable)	ATT
Battery Power/ Verizon wireless Telemetry System (RTU, Solar Panel, 7 Pin Cable)	VZW

continued on next page

PART NUMBER MATRIX FOR SPI MAG WITH PROCOMM GO CONVERTER (CONT.)

28	_	_	-	_	_	_	_	_	_	-	_
Small or Large Body Sensor											
Small 1" Body Sensor	1										
Large 2" Body Sensor	2										
Meter Type											
Meter (Sensor, Tube, & Converter)		L									
Sensor Tube Length Options											
12" Tube Length			012								
18" Tube Length			018								
24" Tube Length			024								
30" Tube Length			030								
36" Tube Length			036								
Non Standard Tube Length			XXX								
Tube Material Options											
S316 Stainless Steel				S							
PVC Plastic				P							
Ball Valve Options											
Stainless Steel Valve (1" NPT 281, 2" NPT 282 Sensor)					N						
No Valve, hardware only (1" NPT 281, 2" NPT 282 Sensor)					X						
Remote Cable Length Options											
25 feet (Standard)						025					
50 feet						050					
75 feet						075					
100 feet						100					
125 feet						125					
150 feet						150					
175 feet						175					
200 feet						200					
500 feet						500					
Converter Power Options											
A/C 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 + STD (Two 4-20, two Dig)								4			
Datalogger + Modbus + STD (Two 4-20, two Dig)								5			
Datalogger + Hart + STD (Two 4-20, two Dig)								6			
AMI Smart Output + STD (Two 4-20, two Dig)								7*			
Datalogger + AMI Smart Output + STD (Two 4-20, two Dig)								8*			
Smart Output Protocol Options (*7 or 8 output option required)											
No AMI Outputs											-
Sensus Protocol (6ft cable, Nicor Connector hardwired only)											SEN
Itron 6 digit Protocol (6ft cable, Nicor Connector hardwired only)											IT6
Itron 9 digit [100W] Protocol (6ft cable, Nicor Connector hardwired only)											IT9
Neptune Protocol (6ft cable, Nicor Connector hardwired only)											NEP
Battery Power/ ATT wireless Telemetry System (RTU, Solar Panel, 7 Pin Cable)											ATT
Battery Power/ Verizon wireless Telemetry System (RTU, Solar Panel, 7 Pin Cable)											VZW

PART NUMBER MATRIX FOR STANDALONE SPI MAG

28	—	—	-	——
Small or Large Body Sensor				
Small 1" Body Sensor	1			
Large 2" Body Sensor	2			
Meter Type				
Sensor Only (No tube or Converter)		S		
Remote Cable Length Options				
25 feet (Standard)				025
50 feet				050
75 feet				075
100 feet				100
125 feet				125
150 feet				150
175 feet				175
200 feet				200
500 feet				500

FLOW METER SPECIFICATIONS

Measurement

- Volumetric flow in filled flow conduits 2" (50mm) to 240" (6,096 mm) diameter utilizing insertable velocity sensor. 1" meter = 2" to 30" pipe I.D.; 2" meter = 6" to 240" pipe I.D.
- Flow indication in English Standard or Metric units

Flow Measurement

Method	Electromagnetic
Accuracy	+/- 2% of measured value ±0.03 ft/s (±0.009 m/s)
Velocity range	+0.3 to +32 ft/s (+0.09 to +10 m/s)
Direction measurement	Has reverse flow indication

Materials

Sensor	Polyurethane exposed to flow
2" sensor mounting	PVC and Stainless Steel exposed to flow. (Stainless Steel Insertion Tube Optional)
Compression seal	Buna "N" O-Ring seal exposed to flow

Environmental Ranges

Pressure/ temperature limits

- PVC Insertion Tube: Up to 105°F (41°C) at 150 PSI
- Stainless Steel Insertion Tube: Up to 160°F (71°C) at 250 PSI (McCrometer recommends the use of Stainless Steel)

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

Compression gland seals for 0.125" to 0.375" dia. round cable

Sensor Cable Lengths

Standard	25' McCrometer supplied submersible cable with each remote mount unit.
Optional	Up to 200 feet, or 25 feet max for battery powered.

IP Rating

IP68 submersible sensor

FLOW METER SPECIFICATIONS (CONT.)

Insertion Tube

To determine insertion tube length for typical near wall installations, divide the pipe I.D. by 8 and add 18".

For full profiles, add 18" to the pipe I.D.

Tube assemblies include rods and mounting hardware

1" tube	• Stainless steel tube, 12" length. Will profile 4" pipe I.D. • Stainless steel tube, 24" length. Will profile 16" pipe I.D. • Stainless steel tube, 36" length. Will profile 28" pipe I.D.
2" tube	• PVC tube, 18" length. Will profile a 10" pipe I.D. • PVC tube, 24" length. Will profile a 16" pipe I.D. • PVC tube, 30" length. Will profile a 22" pipe I.D. • Opt.: stainless steel tube. Specify length - 240" maximum

System Options

- Stainless Steel ID Tag
- Sensor Insertion Tool
- Additional Sensor Cable up to 200' (for longer lengths consult factory)
- Valves

Ordering Requirements

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

- Model and tap size
- Insertion tube length
- Pressure
- Minimum flow
- Maximum flow
- Typical flow
- Fluid
- Pipe I.D.
- Cable length
- Temperature
- Any other chemicals in use
- Indicator and totalizer units

PROCOMM CONVERTER PART NUMBER MATRIX

PC -	—	—	—	-	—	-	—
Converter Mounting Options							
Remote Mount	R						
Meter Mount	M						
Converter Power Options							
A/C 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 (*7 or 8 output option required)							
No AMI Outputs					-		
Sensus Protocol (6ft cable, Nicor Connector hardwired only)					SEN		
Itron 6 digit Protocol (6ft cable, Nicor Connector hardwired only)					IT6		
Itron 9 digit [100W] Protocol (6ft cable, Nicor Connector hardwired only)					IT9		
Neptune Protocol (6ft cable, Nicor Connector hardwired only)					NEP		
ATT Wireless Telemetry System (RTU, Solar Panel, 15 ft 7 pin Cable)					ATT		
Verizon Wireless Telemetry System (RTU, Solar Panel, 15 ft 7 pin Cable)					VZW		
Hazardous Area Location							
Class 1, Division 2, Groups A-D, T5							HL

PROCOMM GO CONVERTER PART NUMBER MATRIX

PG -	—	—	—	—	—	—	-	——	-	——
Converter Mounting Options										
Meter Mount Converter *(Standard)*	M									
Remote Mount	R									
Converter Power Options										
Battery Power *(Standard)*		B								
Solar Power, Battery Backup		S								
A/C Power, Battery Backup		E								
DC Power, Battery Backup		F								
Converter Output Options										
No Outputs *(Standard)*			-							
No Outputs, DC Cable Only			0							
Two Digital Out			1							
4-20mA Analog only			2							
4-20mA Analog + Two Dig Out			3							
AMI Smart Output Only			4							
AMI Smart Output + Two Dig Out			5							
AMI Smart Output + 4-20mA Analog			6							
AMI Smart Output + 4-20mA Analog + Two Dig Out			7							
DC Power/ Analog Out Cable Options										
No DC Power or Outputs *(Standard)*				-						
No Cable - Output Configured (Quick Conn)				0						
6 ft (Open Leads - Strain Relief)				1						
25 ft (Open Leads)				2						
50 ft (Open Leads)				3						
Pulse Cable Length Options										
No Outputs (Standard)					-					
No Cable - Output Configured (Strain Relief or Quick Conn)					0					
6 ft (Open Leads)					1					
25 ft (Open Leads)					2					
50 ft (Open Leads)					3					
25 ft (7-Pin Male connector for Telemetry)					4					
50 ft (7-Pin Male connector for Telemetry)					5					
Output Cable Terminal Options										
Strain Relief *(Standard)*						1				
Quick Connect (25 & 50 ft Cable length only)						2				
Smart Output Protocol Options (*4 - 7 output option required)										
No AMI Outputs								-		
Sensus Protocol (6ft cable, Nicor Connector hardwired only)								SEN		
Itron 6 digit Protocol (6ft cable, Nicor Connector hardwired only)								IT6		
Itron 9 digit [100W] Protocol (6ft cable, Nicor Connector hardwired only)								IT9		
Neptune Protocol (6ft cable, Nicor Connector hardwired only)								NEP		
ATT Wireless Telemetry System (RTU, Solar Panel, 15 ft 7 pin Cable)								ATT		
Verizon Wireless Telemetry System (RTU, Solar Panel, 15 ft 7 pin Cable)								VZW		
Hazardous Area Location										
Class 1, Division 2, Groups A-D, T5										HL

PROCOMM CONVERTER SPECIFICATIONS

Physical Specifications

Electronic Housing	Diecast aluminum, powder coated enclosure w/ tamper resistant seal	
Converter Dimensions	Remote Mount: Height: 7.3" (18.5 cm) Width: 8.5" (21.6 cm) Depth: 4.3" (10.9 cm) Meter Mount: Height: 6.9" (17.5 cm) Width: 7.2" (18.25 cm) Depth: 6.2" (15.7 cm)	
Power	AC Power: 100-240 VAC / 45-66 Hz (10 W)	Note: AC or DC must be specified at time of ordering.
	DC Power: 12-48 VDC (10 W)	
Connection Options	• Compression gland seals for 0.24" to 0.47" diameter round cable • Conduit option: 1/2" NPT threaded connections	
Galvanic Isolation	All inputs / outputs are galvanically isolated from power supply up to 500 V	
Conductivity	Minimum conductivity of 5µS/cm	

Performance and Operational Specifications

Location	Indoor or outdoor use		
Operating and Storage Temperature	-4° to 140° F (-20° to 60° C)		
IP Rating	IP67 Die cast aluminum converter (only when connected using compression gland seals)		
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

Display and Measurement

Keyboard and Display	Can be used to access and change set-up parameters using six membrane keys and an LCD display		
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 Kilogallon • Ten Thousands of Gallons	• Imperial Kilogallon • Acre Feet • Megagallon • Imperial Megagallon • Hundred Cubic Feet • Megaliters

PROCOMM CONVERTER SPECIFICATIONS (CONT.)

Other Specifications

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 B C D, T5
	  • Class I, Zone 2 IIC T5

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.

PROCOMM GO CONVERTER SPECIFICATIONS

Physical Specifications

Electronic Housing	Diecast aluminum, powder coated enclosure w/ tamper resistant seal, 6½" x 6½" x 43/8" tall
Converter Dimensions	See "Dimensions" section for meter mount and remote mount converter dimensions.
Power	**Battery:** Standard: three 3.6V lithium-thionyl chloride (Li-SOCI2) D size batteries with two AA backup batteries **AC Power:** 100-240VAC/45-66Hz (4W) **DC Power:** Linear power supply 10-35VDC (4 W)
Electrical Connections	• Optional shielded cable for 10-32VDC/4-20 mA output • Optional shielded cable for pulse out

Performance and Operational Specifications

Battery Life	Five-year expected battery life, five-year battery warranty
Location	Indoor or outdoor use
Altitude	Operating: 2000 meters Storage: 12,000 meters
Operating Temperature	-4° to 140° F (-20° to 60° C)
Storage Temperature	-4° to 140° F (-20° to 60° C)
Relative Humidity	0% to 100%
IP Rating	IP67 Die cast aluminum converter
Outputs	**Digital output:** Digital pulse (open collector) output for volumetric - Two isolated digital pulse (open collector) outputs for volumetric - AMI output **Analog output:** 4-20mA: Galvanically Isolated, 16 Bit resolution. All power configurations (including battery). Note: 9-30 VDC loop power required (not supplied via converter)

Display and Measurement

Display	• 2-Line LCD display (no backlight) • Non-volatile memory • Anti-reverse totalizer (standard) • Total (to 9 digits of precision)	• Flow rate and velocity (to 5 digits of precision) • Two alarms: low battery and empty pipe (optional) • Opening lid activates display
Digits	5 Rate, 9 Total	

Units

GPM	Gallons per minute	IGM	Imperial gal per minute	CFM	Cubic feet per minute
MGD	Mega gal per day	MI9	Miners inch (9G)	B5M	Barrels per minute (55G)
CFS	Cubic feet per second	MI1	Miners inch (11.22G)	B5H	Barrels per hour (55G)
MLD	Megaliters per day	APD	Acre feet per day	B5D	Barrels per day (55G)
LPS	Liters per second	KLH	Kiloliters per hour	B4M	Barrels per minute (42G)
CMH	Cubic meters per hour	LPH	Liters per hour	B4H	Barrels per hour (42G)
LPM	Liters per minute	CMM	Cubic meters per minute	B4D	Barrels per day (42G)
GPH	Gallons per hour	CFM	Cubic feet per minute		

PROCOMM GO CONVERTER SPECIFICATIONS (CONT.)

Totalizer Units	GAL	Gallons	B42	Barrel (42G)	MH1	Miners Inch Hour (11.22G)
	CUF	Cubic Feet	B46	Barrel (46G)	MD1	Miners Inch Day (11.22G)
	AFT	Acre Feet	B55	Barrel (55G)	MH9	Miners Inch Hour (9G)
	CUM	Cubic Meters	IMG	Imperial Gallon	MD9	Miners Inch Day (9G)
	LIT	Liters	AIN	Acre Inch	KGL	Kilo Gallons
	MML	Megaliter	TON	Ton (Short)	MGL	Mega Gallons
	MTT	Metric Ton (KL)	MM1	Miners Inch Minute (11.22G)	IN3	Cubic Inch
	B31	Barrel (31G)	MM9	Miners Inch Minute (9G)		
Data Logger	Standard with all models, minimum of five years of data stored					

Other Specifications

Options and Accessories	• Data Logger - included as standard with five years of data storage at default (12hr) interval. (Cable sold separately) • AC, DC, and battery powered with battery backup powered available
Safety	• IEC 61010-1, Pollution Degree II • Overvoltage protection Category III

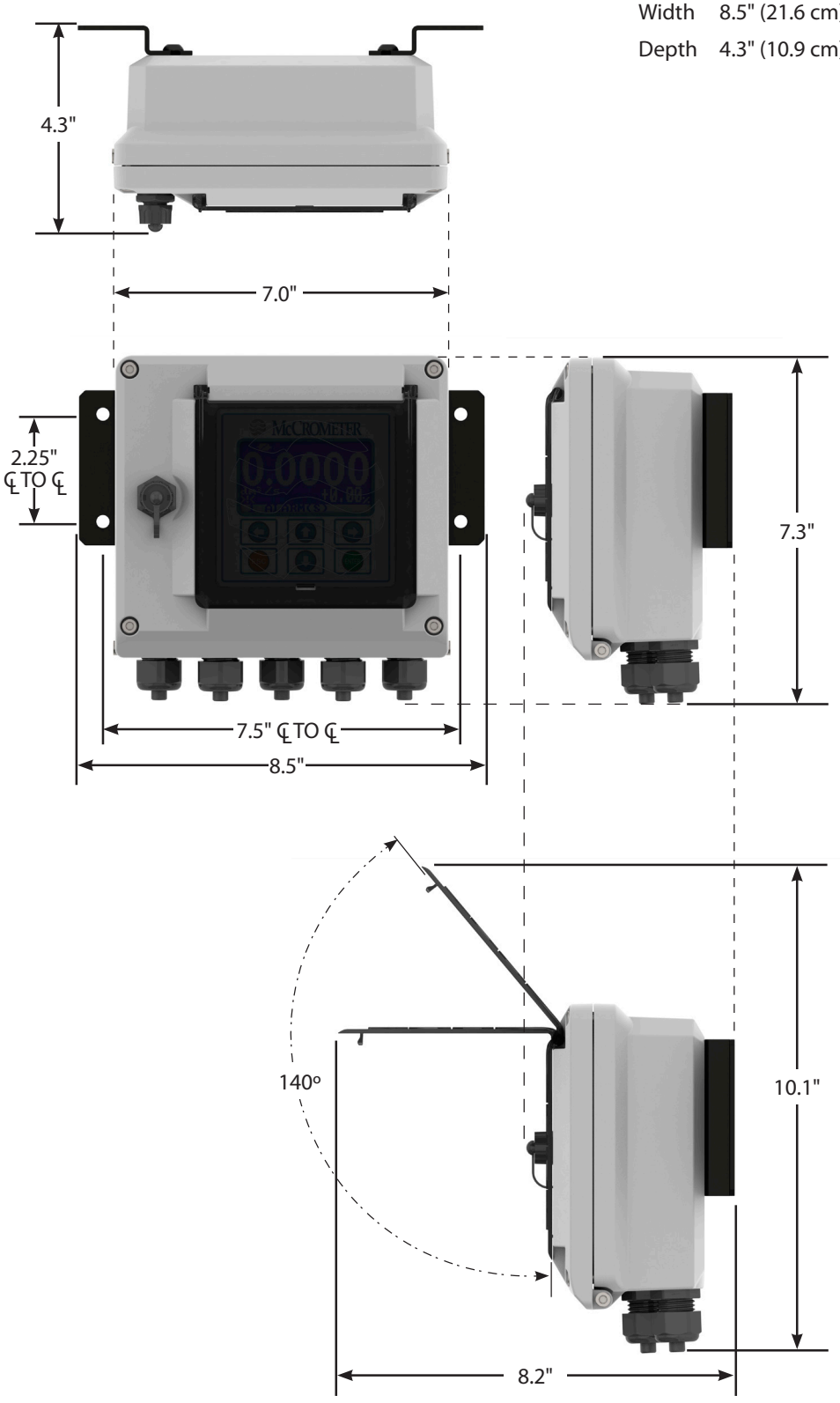
Certifications

Standard Model	• ISO 9001:2015 certified quality management system • Certified by MET to UL 61010-1	

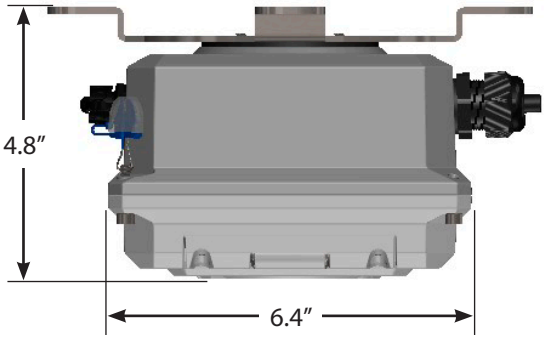
HL Model	• ISO 9001:2015 certified quality management system
	• Certified by MET to UL 61010-1 and MET C22.2 No. 61010-1-04
	  • Class I, Division 2, Groups A B C D, T5
	  • Class I, Zone 2 IIC T5	

PROCOMM CONVERTER DIMENSIONS

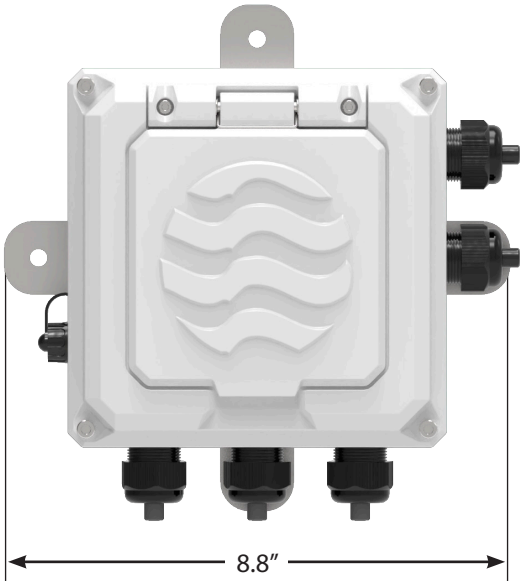
Height 7.3" (18.5 cm)
Width 8.5" (21.6 cm)
Depth 4.3" (10.9 cm)

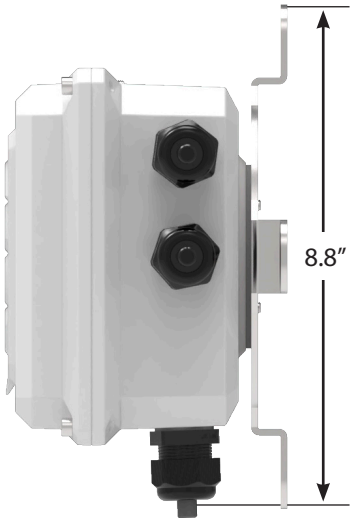


PROCOMM GO CONVERTER DIMENSIONS



Remote mount converter





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