

# Smith Meter® AccuLERT™ Smart Pre-Amp ID 2000

Bulletin SS02015 Issue/Rev. 0.6 (9/17)

The Smith Meter Smart Pre-Amp is designed for use with turbine meters. Its primary function is to perform real-time diagnostics of the turbine meter's performance by monitoring the consistency of rotation of the rotor. AccuLERT also performs many other functions—it functions as a standard single- or dual-channel preamplifier; it functions as a bidirectional totalizer, recording meter pulses and volume; it functions as a flow direction detector; and, it functions as a record keeper by recording chronological alarms, batch pulse and volumes, daily pulse and volumes, hourly pulse and volumes, and diagnostic information.

When performing the diagnostic functions, AccuLERT compares the current signature values of the turbine meter against a set of pre-defined signature values in an effort to detect and alarm such things as damaged, broken, or missing blades/buttons; damaged or worn bearings; debris buildup affecting the rotation of the rotor; poor hydraulic conditions; and flow profile problems.

AccuLERT features two distinct mounting options. First, it can be mounted on the turbine meter in an explosion-proof housing where it uses the meter primary transducer signal as input from the meter and produces the square wave pulses as output for other instrumentation. Second, it can be mounted in the control room where it typically uses the square wave pulses from another preamplifier as input from the meter and produces the square wave output for other instrumentation.

## Applications

- Designed for use with all gas or liquid turbine meters
- Ideal for applications where proving is difficult, inconvenient, or infrequent



## Features

- Immediate Diagnostics for improved reliability
- Single or Dual Pickup
- Reluctance, Namur, Open Collector, or Contact Closure Input
- Two Separate Pulse Amplifiers in one instrument
- Bidirectional Meter Totalization
- Flow Direction Detection
- Seven-Point Meter Factor Linearization
- Pulse per Unit Volume Output
- Historical Pulse and Volume Reporting – Hourly, daily, and batch
- Historical Diagnostic Reporting – Hourly and daily
- Chronological Alarms Reporting – Assisting the operators in understanding when and why an alarm was detected
- Low Susceptibility to EMI/RFI Interference
- Windows Compatible Computer Software – Used for configuration and data retrieval
- Modbus Communications Protocol
- IP 252-76 Level A Pulse Security

## Specifications

### DC Power

10-24 Vdc  $\pm$ 10%

Switch: 5-36 Vdc.

Current Consumption: Less than 100 mA at 24 volts.

### Input Sensitivity

Adjustable gain settings 50 mVp-p @ 25°C and 10 Hz minimum.

### Input Signal

Preamplifier: Sinusoidal, no dc offset, 10,000 Hz maximum.

Diagnostic: Sinusoidal, no dc offset, 4,500 Hz maximum.

Square wave contact/open collector, no dc offset, 24 Vp-p (max.), 4,500 Hz (max.).

Namur as per Section 5 of EN 60947-5-6:2001.

### Input Impedance

Greater than 80k  $\Omega$ .

### Status Inputs

Type: One 4.7k  $\Omega$  resistor in series with isolator diode.

Input Voltage Range: 4-36 Vdc.

Pickup Voltage: 4 Vdc maximum.

Drop-Out Voltage: 2 Vdc maximum.

Current: 10 mA maximum.

Common Mode:  $\pm$ 250 Vdc to chassis ground.

Transient Protection: 39 volt zener diodes.

### Electrical Outputs

**Pulse Output:** See the table below for normal minimum voltages.

Conditions	Output Signal
+12 Vdc input power, no load	+10 volts <sub>peak</sub> minimum
+12 Vdc input power, 270 $\Omega$ load	+7 volts <sub>peak</sub> minimum
+24 Vdc input power, no load	+21 volts <sub>peak</sub> minimum
+24 Vdc input power, 270 $\Omega$ load	+17 volts <sub>peak</sub> minimum

### Pulse Duration

Duty cycle range 30/70 to 70/30. Maximum input frequency not to exceed 10,000 Hz.

### Switch Outputs

Type: Two open-collector transistors.

Voltage Range: 6-36 Vdc.

Load Current: 50 mA @ 24 Vdc, 100 mA @ 12 Vdc.

Common Mode:  $\pm$ 250 Vdc to chassis ground.

Transient Protection: 39 volt zener diodes across Darlington transistors.

## Environmental

### Ambient Operating Temperature

-40°F to 158°F (-40°C to 70°C)<sup>1</sup>.

### Ambient Storage Temperature

-40°F to 185°F (-40°C to 85°C).

### Humidity

0 to 95% non-condensing.

## Communications

### General

Configuration: Switch selectable between EIA-485 and EIA-232.

Data Rates: Programmable to asynchronous data rates of 1200, 2400, 4800, 9600 or 19,200 bps.

Data Format: One start bit, one stop bit, programmable, seven or eight data bits – even, odd, or no parity.

Data Structure: Modicon Modbus protocol with two modes of transmission (ASCII or RTU).

### EIA-232

Configuration: Three-wire (Tx, Rx, Gnd); non-multi-drop.

Transient Protection: 60V (bd) bidirectional transorbs across Tx and Rx lines. 1.5 kV maximum.

### EIA-485

Configuration: Half duplex; jumper selectable.

Termination: Switch selectable 120  $\Omega$  termination resistors for multi-drop capabilities.

Transient Protection: 60V (bd) bidirectional transorbs across Tx lines and across Rx lines, 1.5 kV maximum.

## Electrical Approvals (Explosion Proof Version Only)

Instruments supplied in Explosion Proof/Flame Proof Instrument Housing: It is the design intention that the housing is to be directly coupled to a turbine meter with Explosion Proof/Flame Proof pick-up bosses.

**UL/CUL, Listed 557 N:** Class I, Groups C & D; Class I, Zone I, Zone I, Group IIB; Class I, Zone I, AExd IIB T6 IP66; UNL-UL ENCL. 4, CNL-CSA ENCL. 4; Tamb -40°C to +70°C.

**PTB 10 ATEX 1039X/IEC Ex PTB 10.0052X:** Ex d IIC T6 Tamb -40°C to +70°C IP66.

<sup>1</sup> For operation below -20°C, use 24 Vdc power only.

## Essential Health and Safety Requirements

**EN/IEC 60079-0:** Electrical apparatus for potentially explosive atmospheres – General requirements.

**EN/IEC 60079-1:** Electrical apparatus for potentially explosive atmospheres – Flameproof enclosures “d”.

**EN 60529:** Degrees of protection provided by enclosures (IP code).

**EMC Compliance:** (by Council Directive 2004/108/EC)

**Electromagnetic Emissions:** EN61000-6-3.

**Electromagnetic Immunity:** EN 55022.

**IEC 61000-4-2:** Electrostatic Discharge (ESD), Level 3+ (8.0 kV by contact, 12 kV by air).

**IEC 61000-4-3:** Radiated Electromagnetic Field, Level 3 (10 V/m)

**IEC 61000-4-4:** Electrical Fast Transient (Burst), Level 2 (1 kV)

**IEC 61000-4-5:** Electrical High Energy Pulses (Surge), Installation Class 3, Criterion B

### Instruments Supplied in DIN Rail Housings (No

**Electrical Safety Approvals):** When the AccuLERT is supplied in a General Purpose housing, it must be installed in a suitable enclosure to protect it from the environment.

**Note:** If interfacing to a Turbine Meter that is not rated Explosion Proof Flame Proof but rather Intrinsic Safe, then an approved Intrinsic Safe barrier must be used according to the manufacturer's control drawing between the meter sensing device and the AccuLERT.

## Signal Cable

Distance	Wire Size	Resistance/Foot
Up to 2,400 ft/ (731 m)	#20 AWG	0.010150 Ω/ft.
Up to 3,800 ft/ (1158 m)	#18 AWG	0.006385 Ω/ft.
Up to 6,000 ft/ (1828 m)	#16 AWG	0.004016 Ω/ft.

### Notes:

1. Cable loop resistance should be limited to 50 Ω maximum.
2. Cable loop resistance = 2 x cable length (ft) x cable resistance (Ω/ft).

## Ordering Information

A complete model number should be specified when ordering the AccuLERT Model ID 2000.

## AccuLERT Modeling

**ID2000 – XU**

**Modeling Designation**

**Housing/Approvals**

**ID 2000 –**  
AccuLERT ID 2000

**XC – ATEX / IEC Ex Certified**  
**XU – UL/CUL**

## Wiring Diagram

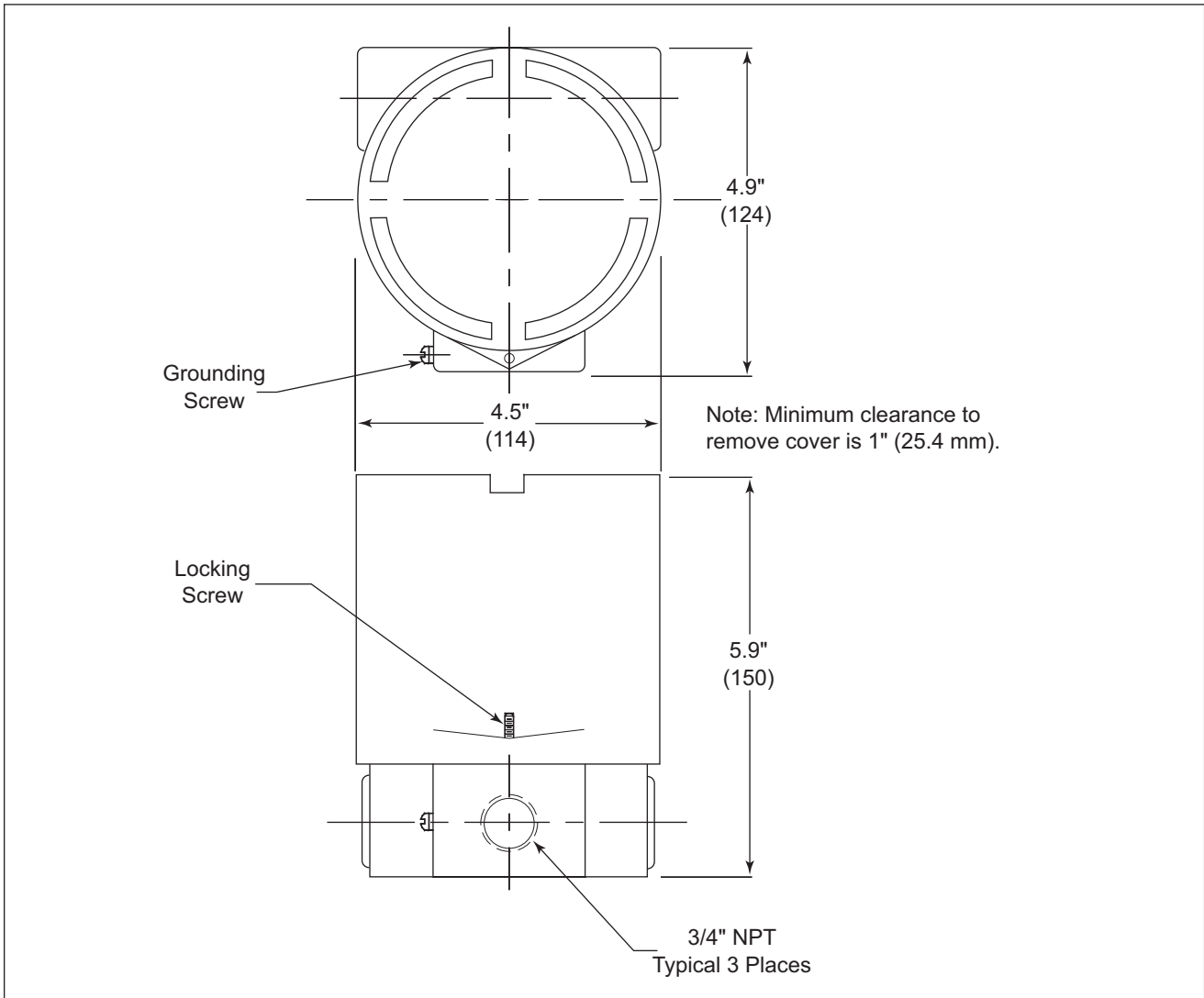
### Connector J1

1 - DC Power Supply (+)	
2 - Common	
3 - Preamp Output #1(+)	
4 - Preamp Output #2 (+)	
5 - Preamp Input #1 (-)	} Leading for Dual Input
6 - Preamp Input #1 (+)	
7 - Preamp Input #2 (-)	} Lagging for Dual Input
8 - Preamp Input #2 (+)	
9 - Status In (+)	
10 - Status In (-)	
11 - Switch Out #1 (+)	
12 - Switch Out Common	
13 - Switch Out #2 (+)	
14 - RS-232 Rx/485 (-)	
15 - RS-232 Rx/485 (-)	
16 - RS-232 GND	

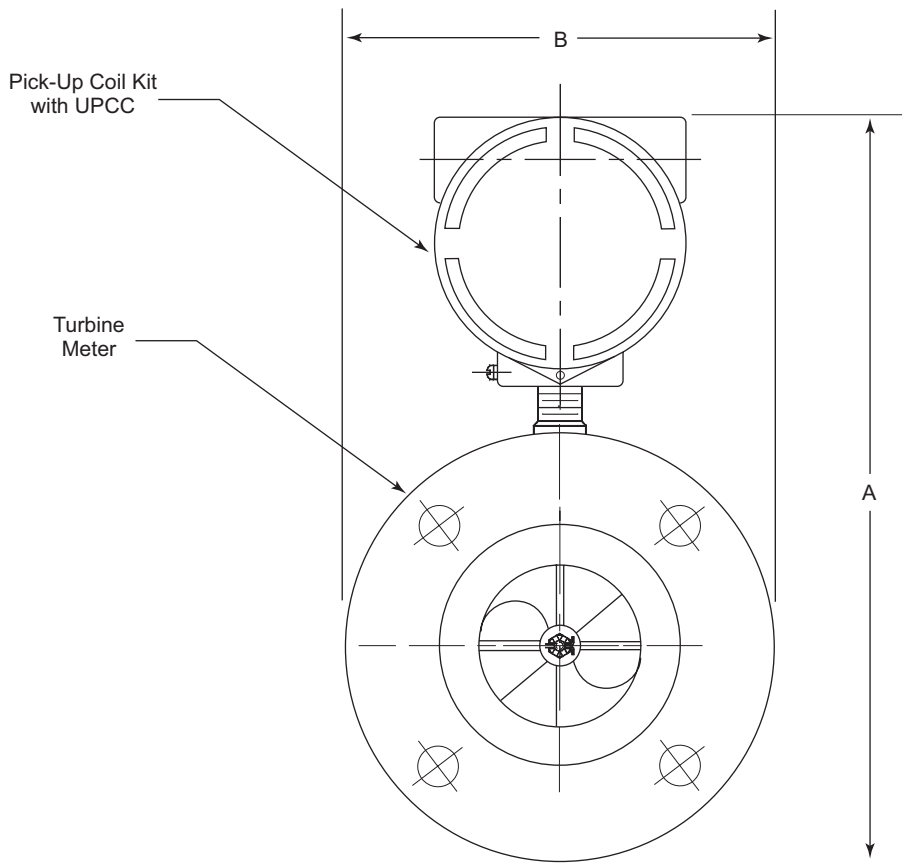
### Terminal Connections

## Dimensions

Inches (mm)

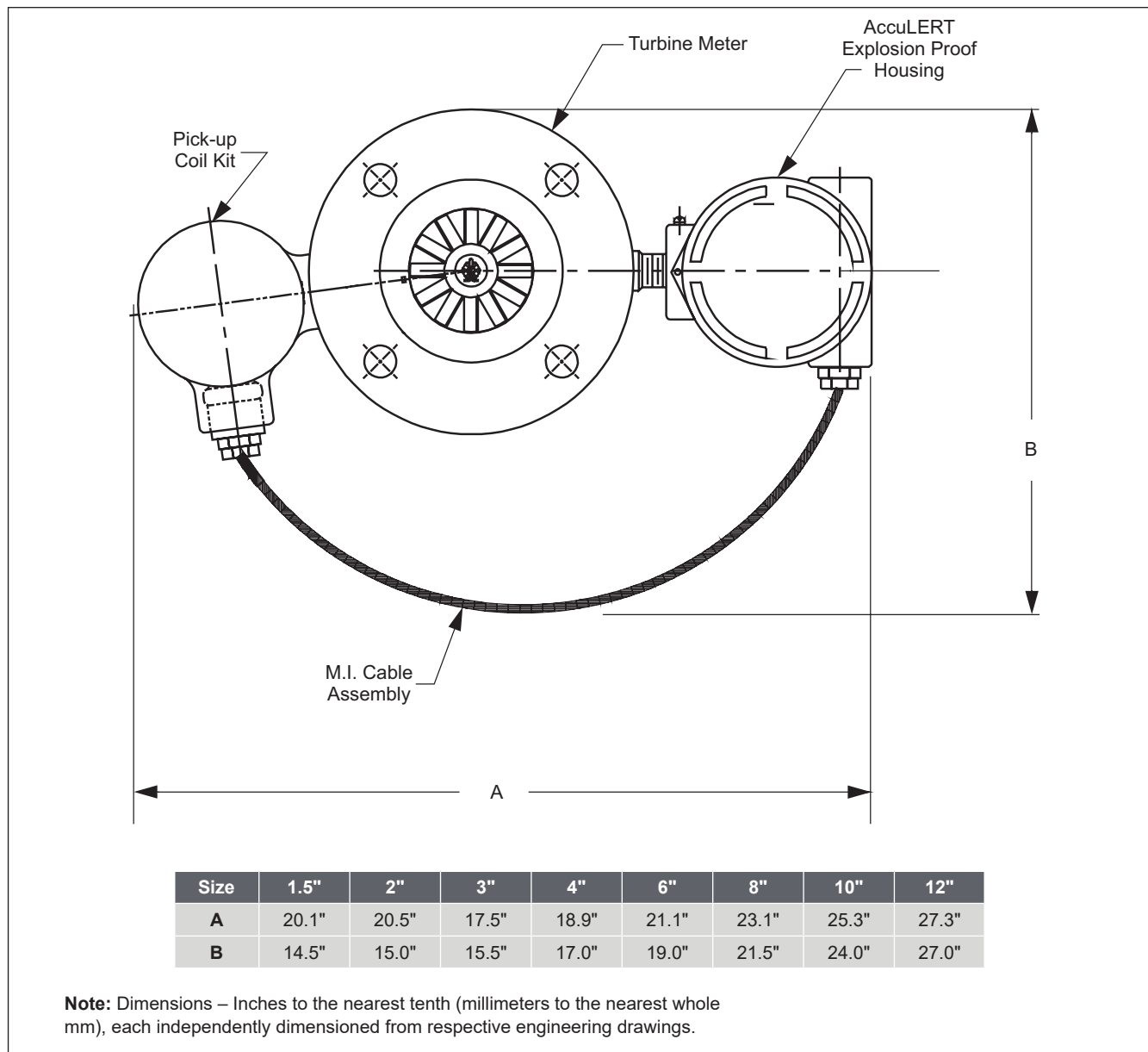


Housing Dimensions



Size	3"	4"	6"	8"	10"	12"	16"
<b>A</b>	14.4 (366)	15.8 (401)	17.9 (455)	20.2 (513)	22.5 (572)	25.0 (635)	28.9 (734)
<b>B</b>	7.5 (191)	9.0 (228)	11.0 (279)	13.5 (343)	16.0 (406)	19.0 (483)	23.5 (597)

**Factory-Mounted Envelope Dimensions for 150# Flanged Meter with Single Coil Pickup**



**Factory-Mounted Envelope Dimensions for 150# Flanged Meters with Dual Pick-Up Coil**

**Revisions included in SS02015 Issue/Rev. 0.6 (9/17):**

GP removed from AccuLERT Modeling, page 3. Dimensional outline dimensions removed from page 4.

The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.