

AccuLERT™ Smart Pre-Amp ID 2000

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Smith Meter® Turbine Meters

The Smith Meter AccuLERT Smart Pre-Amp ID 2000 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 the rotation of the rotor. AccuLERT also acts as a:

- Standard single- or dual-channel preamplifier
- Bidirectional totalizer
- Meter pulses and volume recorder
- Flow direction detector
- Recordkeeper by recording chronological alarms, batch pulse and volumes, daily pulse and volumes, hourly pulse and volumes, and diagnostic information

When performing diagnostic functions, AccuLERT compares the current signature values of the turbine meter against a set of predefined signature values in an effort to detect and alarm:

- Damaged, broken, or missing blades/buttons
- Damaged or worn bearings
- Debris buildup affecting the rotation of the rotor
- Poor hydraulic conditions
- Flow profile problems

AccuLERT features two distinct mounting options. First, it can be mounted on the turbine meter in an explosionproof 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, including hourly, daily, and batch
- Historical diagnostic reporting, including hourly and daily
- Chronological alarms reporting that assists operators in understanding when and why an alarm was detected
- Low susceptibility to electromagnetic interference/radio frequency interference (EMI/RFI)

Features

- Windows-compatible computer software for configuration and data retrieval
- Modbus communications protocol
- IP 252-76 Level A pulse security

Specifications

Direct Current (DC) Power

10 to 24 volts direct current (VDC) $\pm 10\%$

Switch: 5 to 36 VDC

Current consumption: Less than 100 milliamperes (mA) at 24 volts

Input Sensitivity

Adjustable gain settings 50 millivolt peak-to-peak (mVpp) at 25 °C and 10 hertz (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 volts peak-to-peak Vp-p maximum, 4,500 Hz maximum NAMUR as per Section 5 of EN 60947-5-6:2001

Input Impedance

Greater than 80 kilo ohms

Status Inputs

Type: One 4.7kilo ohms resistor in series with isolator diode

Input voltage range: 4 to 36 VDC

Pickup voltage: 4 VDC maximum

Drop-out voltage: 2 VDC maximum

Current: 10 mA maximum

Common mode: ± 250 VDC to chassis ground

Transient protection: 39 volt Zener diodes

Electrical Outputs

Pulse output: See the following table for normal minimum voltages.

Conditions	Output Signal
+12 VDC input power, no load	+10 volts peak minimum
+12 VDC input power, 270 ohms load	+7 volts peak minimum
+24 VDC input power, no load	+21 volts peak minimum
+24 VDC input power, 270 ohms load	+17 volts peak 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 to 36 VDC

Load current: 50 mA at 24 VDC, 100 mA at 12 VDC

Common mode: ± 250 VDC to chassis ground

Transient protection: 39 volt Zener diodes across Darlingtons

Environmental

Ambient Operating Temperature

-40 to 158 °F (-40 to 70 °C)

For operation below -20 °C, use 24 VDC power only.

Ambient Storage Temperature

-40 to 185 °F (-40 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 bits per second (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 (American Standard Code for Information Interchange (ASCII) or remote terminal unit (RTU))

EIA-232

Configuration: Three-wire (transmission (Tx), receive (Rx), ground (Gnd)), non-multi-drop.

Transient protection: 60 V bidirectional (BD) transient-voltage-suppression diode (transorbs) across Tx and Rx lines, 1.5 kilovolt (kV) maximum

EIA-485

Configuration: Half duplex; jumper selectable

Termination: Switch-selectable 120-ohms termination resistors for multi-drop capabilities

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

Electrical Approvals (Explosion Proof Version Only)

Instruments are 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 and D; Class I, Zone I, Group IIB; Class I, Zone I, AExd IIB T6 IP66; UNL-UL ENCL. 4, CNL-CSA ENCL. 4; Tamb -40 to +70 °C

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

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

Flame Proof Enclosures “d”

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

EMC compliance: 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 volts per meter (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

Note: If interfacing to a turbine meter that is not rated explosion proof or 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 feet (731 meters)	#20 American Wire Gauge (AWG)	0.010150 ohms per foot
Up to 3,800 feet (1,158 meters)	#18 AWG	0.006385 ohms per foot
Up to 6,000 feet (1,828 meters)	#16 AWG	0.004016 ohms per foot

Notes:

1. Cable loop resistance should be limited to 50 ohms maximum.
2. Cable loop resistance is equal to two times the cable length (feet) times the cable resistance in ohms per foot.

AccuLERT Modeling

1	2
ID2000	XU

Position 1: Modeling Designation

ID2000—AccuLERT ID 2000

Position 2: Housing/Approvals

XC—ATEX/IECEX Certified

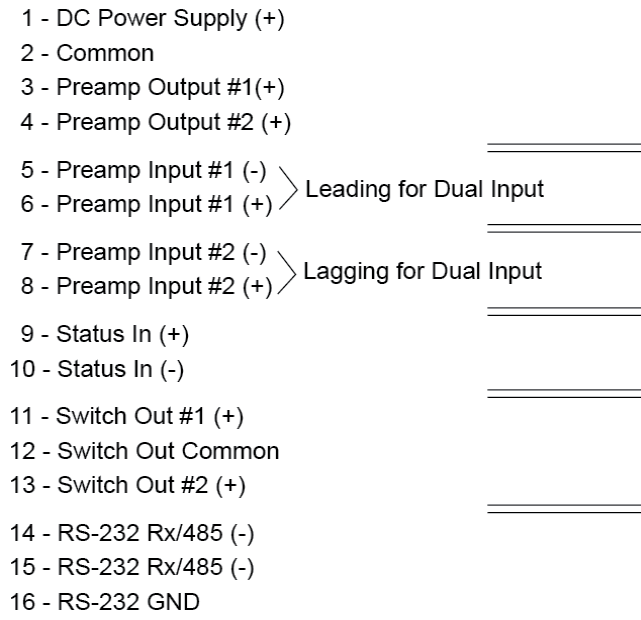
XU—UL/CUL

Ordering Information

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

Wiring Diagram

Connector J1

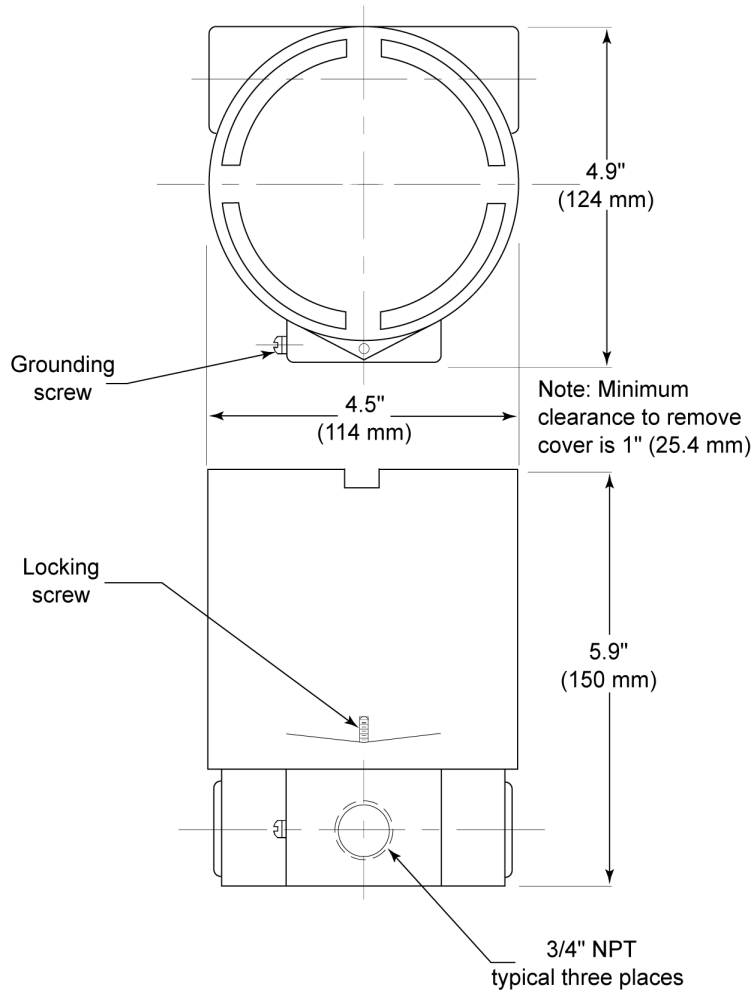


Terminal Connections

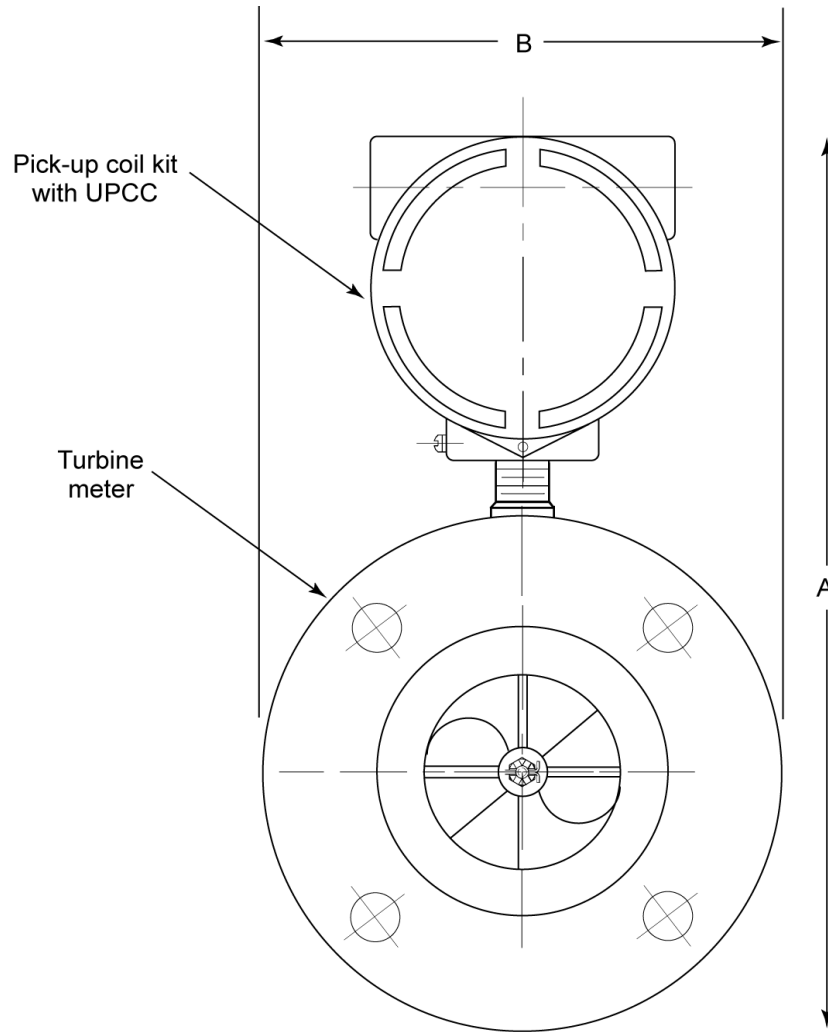
Dimensions

The dimensions in the following drawings are shown in inches (") to the nearest tenth (millimeters (mm) to the nearest whole mm), each independently dimensioned from respective engineering drawings.

Housing Dimensions

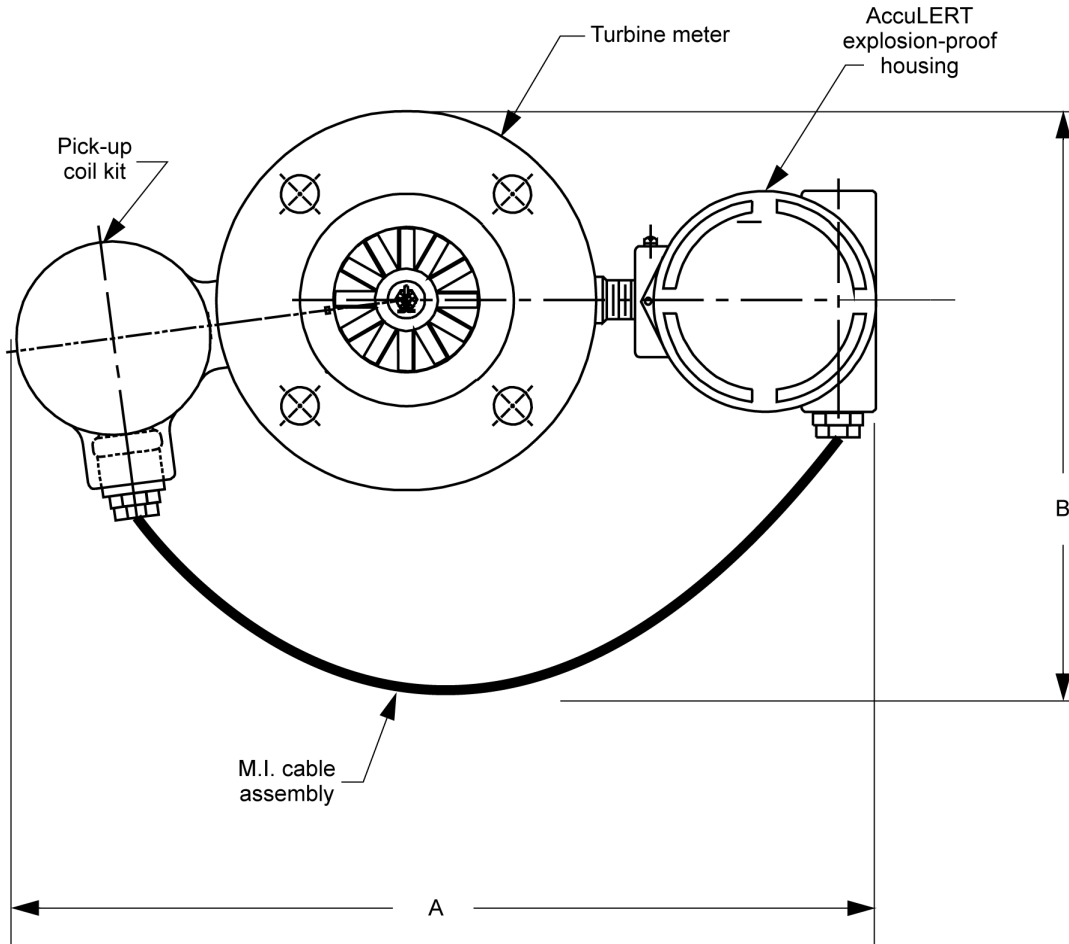


Factory-Mounted Envelope Dimensions for 150-Pound Flanged Meter With Single Coil Pickup



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

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



Size	1.5"	2"	3"	4"	6"	8"	10"	12"
A	20.1"	20.5"	17.5"	18.9"	21.1"	23.1"	25.3"	27.3"
B	14.5"	15.0"	15.5"	17.0"	19.0"	21.5"	24.0"	27.0"

The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacture 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.

USA Operations
1602 Wagner Avenue
Erie, PA 16510 USA
+1 814.898.5000

TechnipFMC Corporate Headquarters
13460 Lockwood Road
Building S01
Houston, TX 77044 USA
+1 281.591.4000

Germany Operations
Smith Meter GmbH
Regentstrasse 1
25474 Ellerbek, Germany
+49 4101 304.0

TechnipFMC.com

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