**SECTION 40 72 13 or 40 71 69**

**ULTRASONIC LEVEL TRANSMITTER and/or Open Channel Flowmeter**

***PART 1 GENERAL***

**1.01 SUMMARY**

1. FMU30 is suited for continuous, non-contact level measurement of fluids, pastes, sludge and powdery to coarse bulk solids and flow measurement in open channels or at weirs. The two-wire compact transmitter can be used in applications with storage tanks, agitators, on stockpiles and conveyor belts. The envelope curve can be shown on the on-site display for simple diagnosis. Linearization function (up to 32 points) for conversion of the measured value into any unit of length, volume or flow rate.

**1.02 SUBMITTALS**

1. Furnish complete Product Data, Shop Drawings, Test Reports, Operating Manuals, Record Drawings, Manufacturer’s certifications, Manufacturer’s Field Reports
2. Product Data:
   1. Dimensional Drawings.
   2. Materials of Construction:
      1. Flanges / Process connection.
      2. Housing
   3. Measurement accuracy.
   4. Range and range ability.
   5. Enclosure Rating.
   6. Classification Rating.
   7. Power:
      1. Voltage.
      2. Wattage.
   8. Output options.

**1.03 QUALITY ASSURANCE**

1. Manufacture instruments facilities certified to the quality standards of ISO Standard 9001 - Quality Systems - Model for Quality Assurance in Design/Development, Production, Installation, and Servicing.

**1.04 DELIVERY, STORAGE, AND HANDLING**

1. Store all instruments in a dedicated structure with space conditioning to meet the recommended storage requirements provided by the Manufacturer.
2. Any instruments that are not stored in strict conformance with the Manufacturer’s recommendation shall be replaced.

**1.05 PROJECT OR SITE CONDITIONS**

1. Provide instruments suitable for the installed site conditions including, but not limited to, material compatibility, site altitude, process and ambient temperature, and humidity conditions.

**1.06 MAINTENANCE**

A. Provide all parts, materials, fluids, etc. necessary for maintenance and calibration purposes throughout the warranty period. Deliver all of these supplies before project substantial completion.

**1.07 CALIBRATION AND WARRANTY**

1. The meter shall have standard one year warranty from date of shipment and if the meter is commissioned by a factory certified technician, the warranty is extended to three years from the date of shipment.

**1.08 LIFECYCLE MANAGEMENT**

A. Instrument documentation, like original calibration certificates, manuals and product status information shall be accessed via a web enabled system with a license. The instrument-specific information shall be accessed via its serial number. When services are provided by an authorized service provider the services information like subsequent field calibrations shall be archived and accessible via this web enabled system.

***PART 2 PRODUCTS***

**2.01 MANUFACTURER**

1. One of the following:
2. Endress+Hauser- Prosonic M FMU30

**2.02 MANUFACTURED UNITS**

A. The sensor shall be loop-powered, compact, downward-looking pulse time of flight measurement utilizing ultrasonic pulses.

B. The Pulse Time of Flight PP (Polypropylene) sensor transmits high frequency ultrasonic pulse and receives echo signal back from a reflection off the medium’s surface. The signal is then transferred to transmitter.

C. Temperature limits for the sensor are minus 4 degrees F to 140 degrees F; relative humidity – 0 to 100 percent; process pressure 10 to 44 psia; measuring range as per schedule.

D. Sensors shall be provided with NPT thread or ANSI flange as specified in schedule for mounting. Where hazardous area approvals are required, sensors will be provided with appropriate ratings for that area.

E. The transmitter shall be 2 wire loop-powered; compact mounted microprocessor electronics package.

F. The transmitter shall generate signal to sensor, receive echo signal back from sensor, calculate distance based on time for signal return; transmit a linear 4-20mA signal as required that is proportional to distance or level measured while providing local indication.

G. Output for the transmitter shall be – one 4 – 20 mA DC; Built-in features required – interference echo suppression; automatic volume calculation for horizontal or vertical tanks with 32 point linearization; integral 3-button keypad for menu-driven programming with each transmitter; automatic integral temperature compensation.

H. The transmitter shall have a plastic housing; where hazardous areas are indicated, the equipment shall be rated for that area; Mounting – integral to sensor; local indicator – 4-line LCD display scaled to read in engineering units of level or volume; 24VDC loop power input with digital communication capability.

I. The measuring uncertainty of the transmitter shall be +/- .2% of set measuring range.

J. The transmitter shall either provide measurements up to 26 feet in fluids and 11 feet in bulk materials dependent on which sensor is picked.

K. Sunshields shall be provided for all units mounted in direct sunlight are optional.

L. the transmitter shall be fully configurable from the 3 buttons on the display or via a computer utilizing the free provided software (Device Care).

2.03 Accessories

1. Weather Protection Cover part # 71127762
2. Cantilever installation bracket part # 942669-0000 (1-1/2”) or # 942669-0001( 2”)
3. Thread-on mounting flanges FAX50-XXXX
4. Remote display FHX40
5. Remote display for up to 8 Profibus indicator RID14

2.04 SOURCE QUALITY CONTROL

1. Provide complete documentation covering the manufacturing of the transmitter.
2. Provide ISA data sheet ISA-TR20.00.01. Use the latest revision of form 20F2321. Complete the form with all known data, and dash out the inapplicable fields. Incomplete data sheets submitted will be result in a rejected submittal.

2.05 SAFETY

A. All electrical equipment shall meet the requirements of ANSI/NFPA 70, NATIONAL ELECTRIC CODE, latest addition.

B. All devices shall be certified for use in hazardous areas: Class I, Div. 1, Groups A-D. using IS wiring methods.

C. All devices shall be suitable for use as non-incendive devices when used with appropriate non-incendive associated equipment. Devices with intrinsically safe ratings will normally be acceptable with vendor’s approval.

D. Electrical equipment housing shall conform to NEMA 4x classification.

E. Non-intrinsically safe electrical equipment shall be approved by a Nationally Recognized Testing Laboratory (NRTL) such as FM, or CSA, etc.) for the specified electrical area classification.

***PART 3 EXECUTION***

3.01 EXAMINATION

1. Examine the complete set of plans, the process fluids, pressures, and temperatures and furnish instruments that are compatible with installed process condition.
2. Examine the installation location for the instrument and verify that the instrument will work properly when installed.

3.02 INSTALLATION

1. As shown on installation details and mechanical Drawings.
2. As recommended by the manufacturer’s installation and operation manual.
3. Specific attention should be given to the following technical requirements:
   * 1. There is a blocking distance associated with any ultrasonic transmitter. See Technical Information for value for the spec model to be used.

3.03 FIELD QUALITY CONTROL

1. Demonstrate the performance of all instruments to the ENGINEER before commissioning.
2. ENGINEER to witness all instrument calibration verification in the field.
3. Each instrument shall be tested before commissioning and the ENGINEER shall witness the response in the PLC control system and associated registers.
4. Manufacturer’s Field Services:
5. Notify the ENGINEER in writing of any problems or discrepancies and proposed solutions.

3.04 ADJUSTING

1. Verify factory calibration of all instruments in accordance with the Manufacturer’s instructions.

3.05 PROTECTION

1. All instruments shall be fully protected after installation and before commissioning.
2. Replace any instruments damaged before commissioning:
3. The ENGINEER shall be the sole party responsible for determining the corrective measures.