

SCOPE:

This specification covers an ultrasonic Transit Time flow meter as manufactured by Greyline Instruments, Massena, New York / Long Sault, Ontario. The instrument shall provide for non-intrusive flow measurement, indication, totalizing and transmitting of the flow rate in a full pipe.

GENERAL:

Each Transit Time ultrasonic flow meter shall have the following design features and engineering specifications:

1. PERFORMANCE SPECIFICATIONS

- 1.1 The ultrasonic flow meter shall have an accuracy of $\pm 1\%$ of flow rate in clean fluid applications depending on pipe size and flow regime. Have repeatability and linearity of $\pm 0.25\%$.
- 1.2 Shall operate on clean liquids in full pipes with less than 2% solids or gas bubbles at flow velocities from ± 0.07 to 39 ft/sec (± 0.02 to 12 m/sec).
- 1.3 Operate on the following pipe materials: carbon steel, stainless steel, PVC, PVDF, fiberglass, galvanized steel, mild steel, glass, copper, brass and pipes with bonded liners including epoxy, rubber and Teflon.

2. TRANSDUCERS

- 2.1 The flow meter shall have a dual transmitting/receiving, clamp-on transducers. The transducers shall be waterproof and operate continuously at temperatures from -40°F to 300°F (-40°C to 150°C)
- 2.2 The standard transducer pair shall be designed to install on pipes with inside diameter ranging from 1/2" to 48" (12 mm to 1200 mm).
- 2.3 Have 25 ft (7.6 m) length coaxial cables from the electronics with BNC connectors to transducers.
- 2.4 Shall include manufacturer's recommended sensor coupling compound. Shall include stainless steel mounting hardware with pipe clamps.
- 2.5 Shall include BNC seal jackets for transducer operation in wet or submerged conditions.

3. TRANSMITTER

- 3.1 The transmitter indicator shall be housed in a watertight and dust tight NEMA4X (IP 66) polyester enclosure with a gasketed, shatter proof polycarbonate window, and suitable for wall mounting.
- 3.2 Flow meter electronics shall be designed to operate at temperatures from -5°F to 140°F (-20°C to 60°C). Electronic circuits are interchangeable with other flow meters having the same model number. The transmitter circuit and calibration frequency standard

shall be crystal controlled. The transmitter shall be powered by 100-240VAC 50/60Hz requiring less than 4 Watts.

- 3.3 The transmitter shall include a built-in 5-Key calibration system with operator selection of parameters through visual prompts from a Menu calibration system. Systems requiring calibration by Parameter codes or external calibrators shall not be accepted.
- 3.4 The 4-20mA shall be flow proportional and isolated, with programmable zero and full scale offsets. Maximum resistive load shall be 1000 ohms. It shall include automatic high voltage bleeds for nearby lightning strikes.
- 3.5 Shall include noise suppression circuitry to filter electrical interference.
- 3.6 Have a white, backlit matrix LCD display indicating flow rate in user-selected engineering units, units of calibration, relay states, signal strength and 14-digit totalizer.
- 3.7 Have 2 control relays rated 5 ampere SPDT. Relays shall be programmable for flow proportional pulse output, or as flow rate alarms with separate ON/OFF set points.
- 3.8 Shall display and totalize forward and reverse flow.
- 3.9 Electronics shall be modular and field replaceable by means of plug-in circuit boards. The instrument shall detect and load software menus automatically for field-installed options.

4. OPTIONS

- 4.1 Transducer cables shall be 50 ft (15m) length coaxial with BNC transducer connections.
- 4.2 Transducer cable shall be extended length shielded coaxial pair up to 250 ft (75 m) with NEMA4X (IP 66) Junction Box.
- 4.3 Have a thermostatically controlled AC-powered enclosure heater for condensation protection in locations with temperature below -5°F (-20°C).
- 4.4 Have power input of 9-32VDC.
- 4.5 Have 4 additional (6 total) control relays, rated 5 amp SPDT and programmable for flow rate alarms or flow totalizer pulse.
- 4.6 Have a built-in 20 million point Data Logger with USB output to flash drive or mass storage device. Include Windows software.

5. MANUFACTURER

The instrument shall be a TTFM 1.0 Ultrasonic Transit Time Flow Meter by Greyline Instruments Inc., and warranted against defects in materials and workmanship for one year.