This guide provides general rules for the selection of an appropriate Dynasonics ultrasonic technology—it is neither exhaustive nor absolute. System factors such as temperature, pipe materials, suspended solids composition and liquid velocity can influence product selection. It is best to present application information to a Dynasonics Sales Representative or to the Dynasonics factory for evaluation.

Dynasonics offers the most comprehensive line of ultrasonic transit time and Doppler flow meters in the world. These meters are clamp-on, non-invasive flow meters that require a good acoustical path between the outside of the pipe and the liquid inside. In some instances, such as non-saturated concrete pressure pipe, ultrasonic energy will not readily pass. For these installations, Dynasonics offers the Series MFX MagProbeTM.

Please consult a Dynasonics Sales Representative or the Dynasonics factory to discuss the use of these products in your flow measurement application.

**PORTABLE ENHANCED DOPPLER FLOW METER**

The Series 902 Portable Enhanced Ultrasound Doppler Flow Meter provides accurate and reliable readings on closed full pipe applications containing relatively clean liquids as well as liquids with higher concentrations of suspended solids or aeration. Clamp-on non-invasive transducers permit the instrument to be installed in minutes without interrupting the system pressure or flow, providing a simple and cost-effective solution to flow verification. The Series 902 transducers function on metal or plastic pipes size ¼” (6 mm) and above. They have a NEMA 6P (IP-68) rating, and have the ability to work with temperatures up to +450 °F (+232 °C).

The Dynasonics Series 902 is designed for rugged field use in its NEMA 4 watertight enclosure. The rechargeable battery housed inside of the 902 enclosure provides a full eight hours of continuous operation. A complete 902 flow meter system includes one set of transducers, one tube of acoustic couplant, two mounting straps, a power cord and a 4-20 mA cable.

**FEATURES**

- Clamp-on non-invasive transducers provide simple and cost effective flow measurement.
- NEMA 6P (IP-68) rated transducers and NEMA 4 (IP-65) enclosure.
- Reliable readings on closed full pipes size ¼” (6 mm) and above.
- Rechargeable battery with eight hours of continuous operation included.
- Standard 4-20 mA output.
- Ability to measure relatively clean liquids as well as liquids containing higher concentrations of suspended solids or aeration.
- Accuracy of ±2% full scale and repeatability of ±0.4% of full scale.
- Measures fluid velocities from 0.5 to 20 FPS (0.15 to 6 MPS).
- For applications such as ground water, lifting stations, wastewater sludges, and mining recirculate.
**Figure 1**

The Series 902 flow meter operates by transmitting ultrasonic sound from its transmitting transducer through the pipe wall into the flowing liquid. Each transducer contains piezoelectric crystals to transmit this signal. The sound will be reflected by useful sonic reflectors suspended within the liquid and recorded by the receiving transducer (see Figure 1). If the sonic reflectors are moving within the sound transmission path, sound waves will be reflected at a frequency shifted (Doppler shift) from the transmitted frequency. The difference between the reflected frequencies and transmitted frequencies is directly proportional to the speed of the sonic reflectors, resulting in a liquid flow rate that is converted to various user defined measuring units.

**Power Requirements**
- Internal Lead acid Gel Cell battery provides 8 hours of continuous operation. AC charging: (Std) 115V/230V WAC 50/60 Hz ±10%. (Opt) 100/200 VAC 50/60 Hz ±10%. (Opt) 12 VDC

**Flow Range**
- 0.5 to 20 FPS (0.15 to 6 MPS)

**Outputs**
- 4-20 mA, 600 Ohms max. isolated

**Indicators**
- Power, Signal Strength, Flow Analyzer, Read Fault, Overrange, Charging and Low Battery

**Display**
- 2 line × 20 character alphanumeric LCD (blacklit). Digit height 0.2 inches (5 mm), 6 digit rate, 6 digit totalizer (resettable)

**Units**
- User configured

**Rate**
- U.S. (Metric)
  - FPS, GPM, MGD (MPS, LPM, M3/hr)

**Totalizer**
- U.S. (Metric)
  - Gallons (liters, M3)

**Ambient Conditions**
- -22 to +160 °F (-30 to +70 °C), 0-95% relative humidity, non-condensing.

**Enclosure**
- NEMA 4, (IP-65) ABS with SS hardware. 11W × 17L × 8D inches (279W × 432L × 203D mm)

**Accuracy**
- ±2% Full Scale

**Sensitivity**
- 0.4% of Full Scale

**Repeatability**
- ±0.4% of Full Scale

**Response Time**
- 5-50 seconds, user configured, to 90% of value, step change in flow

**Liquid Requirements**
- 25 ppm of 30 micron size suspended solids or entrained gases.

**Transducer Cable**
- (Std) 20 feet (6 mm), retractable cord.

**Pipe Sizes**
- (Std) 1 inch (25 mm) and above
- (Small pipe) 1/4 to 1 inch (6 to 25 mm)

**PART NUMBER CONSTRUCTION**

**SPARE PARTS AND ACCESSORIES**

**Description**
- Std Temp/Std Pipe Transducer
  - D070-1004-001
- High Temp/Std Pipe Transducer
  - D070-1006-001
- Std Temp/Small Pipe Transducer
  - D070-1004-003
- High Temp/Small Pipe Transducer
  - D070-1006-003
- Gel Cell Battery
  - D005-1201-001
- Couplant, Silicone (for temporary mounting)
  - D002-2011-001
- U.S. Power Cord
  - D005-2109-002
**PRINCIPLE OF OPERATION / TRANSDUCER OPTIONS**

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**SPECIFICATIONS**

**Power Requirements**
- Internal Lead acid Gel cell battery provides 8 hours of continuous operation. AC charging: (Std) 115/230 VAC 50/60 Hz ±10%. (Opt) 100/200 VAC 50/60 Hz ±10%. (Opt) 12 VDC

**Flow Range**
- 0.5 to 20 FPS (0.15 to 6 MPS)

**Outputs**
- 4-20 mA, 600 Ohms max. isolated

**Indicators**
- Power, Signal Strength, Flow Analyzer, Read Fault, Overrange, Charging and Low Battery

**Display**
- 2 line × 20 character alphanumeric LCD (blacklit). Digit height 0.2 inches (5 mm), 6 digit rate, 6 digit totalizer (resettable)

**Units**
- User configured

**Rate**
- U.S. (Metric) FPS, GPM, MGD (MPS, LPM, M3/hr)

**Totalizer**
- U.S. (Metric) Gallons (liters, M3)

**Ambient Conditions**
- -22 to +160 °F (-30 to +70 °C), 0-95% relative humidity, non-condensing.

**Enclosure**
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- ±2% Full Scale

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- 5-50 seconds, user configured, to 90% of value, step change in flow

**Liquid Requirements**
- 25 ppm of 30 micron size suspended solids or entrained gases.

**Transducer Cable**
- (Std) 20 feet (6 mm), retractable cord.

**Pipe Sizes**
- (Std) 1 inch (25 mm) and above
- (Small pipe) 1/4 to 1 inch (6 to 25 mm)

**Measuring Units/ Transducer Type**
- US Metric
- US (High Temp)
- Metric (High Temp)
- US (Small Pipe)
- Metric (High Temp & Small Pipe)

**Approvals**
- N) None

**Options**
- N) U.S. Power Cord
- E) U.K. Power Cord
- G) Euro Power Cord

**PART NUMBER CONSTRUCTION**

**D9**
- Measuring Units/ Transducer Type
- D01) US
- D02) Metric
- D10) High Temp
- D12) Small Pipe
- D22) US High Temp
- D23) Metric High Temp
- D32) US High Temp & Small Pipe
- D33) Metric High Temp & Small Pipe

**Totalizer**
- A) Six digit repeatable

**Output 1**
- 4-20mA

**Output 2**
- None

**Power Supply**
- A) 115 VAC
- B) 230 VAC
- C) 100 VAC
- D) 200 VAC
- E) 12 VDC

**SPARE PARTS AND ACCESSORIES**

**Description**
- Std Temp/Std Pipe Transducer
- High Temp/Std Pipe Transducer
- Std Temp/Small Pipe Transducer
- High Temp/Small Pipe Transducer
- Gel Cell Battery
- Couplant, Silicone (for temporary/mounting)

**Part Number**
- D00-1004-001
- D00-1005-001
- D00-1006-001
- D00-1007-001
- D00-1201-001
- D00-1202-001
- D00-2109-001

**Note:** The Series D002 is shipped with one set of standard transducers, acoustic couplant, two mounting straps, power cord and a 4-20mA cable.
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### Features
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- NEMA 6P (IP-68) rated transducers and NEMA 4 (IP-65) enclosure.
- Reliable readings on closed full pipes size ¼" (6 mm) and above.
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- Ability to measure relatively clean liquids as well as liquids containing higher concentrations of suspended solids or aeration.
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