

## HYBRID ULTRASONIC FLOW METER

The Dynasonics Fusion hybrid flow meter utilizes both Doppler and transit time ultrasonic sound technologies. This dual technology allows the Fusion to accurately measure the volumetric flow of clean, solids-bearing or gaseous liquids on full, closed-pipe, systems. It automatically switches and selects the best technology to calculate accurate flow rate and total flow. The “flow-through” stainless steel sensor withstands adverse flow conditions without clogging, damaging, or effect on accuracy. Fusion meters are fully calibrated and sensors are pre-installed on a spool piece for easy and quick installation. A simple keypad interface permits measurement unit selection and adjustment of output span.



### FEATURES

- Automatically switches between Doppler and transit time to determine best technology and calculate accurate flow rates.
- Rugged, all metal construction ensures a long service life in harsh outdoor environments.
- CSA Class 1 Division 2 Groups C&D compliant.
- Utilizes flow-through stainless steel flow sensors.

### BENEFITS

- Quick and easy installation - sensors are calibrated and pre-installed on spool piece.
- No moving parts, so product maintenance, repairs, and calibrations are eliminated.
- Flow-through stainless steel sensors do not clog or become damaged.
- Simultaneous display of flow rate and accumulated total on a large, easy to read LCD display.





## OPERATING PRINCIPLE

The Fusion consistently measures liquid flow by using both Doppler and transit time ultrasonic hardware and algorithms. It automatically determines which principle to use, providing the most accurate measurement for the present conditions of the application. The Fusion's dual technology is capable of reliably measuring clean, dirty and gassy liquids - Patent Pending. Fusion retains all user configured data and accumulated flows (totalizers) in non-volatile Flash memory indefinitely.



When in transit time mode, the flow meter operates by transmitting and receiving a frequency modulated burst of sound energy between two transducers. The burst is first transmitted in the direction of fluid flow and then against fluid flow (see Figure 1). Since sound energy in a moving liquid is carried faster when it travels in the direction of fluid flow (downstream) than it does when it travels against fluid flow (upstream), a differential in the times of flight will occur. The difference between the two travel times is then used to calculate the flow rate.



Figure 1

When in Doppler mode, the flow meter transmits an ultrasonic sound from its transmitting transducer into the flowing liquid. The sound will be reflected by sonic reflectors (gas bubbles or particulate) suspended within the liquid and recorded by the receiving transducer (see Figure 2). If the sonic reflectors are moving within the sound transmission path, sound waves will be reflected at a frequency shifted (Doppler frequency) from the transmitted frequency. The shift in frequency will be directly related to the speed of the moving particle or bubble, resulting in a liquid flow rate that is interpreted by the instrument and converted to various user defined measuring units.

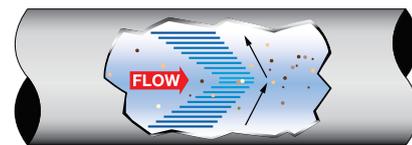


Figure 2

## PART NUMBER CONSTRUCTION

**D F S N 2 - [ ] N 1 - N N**

**Pipe Sizes NPT (female)**

- A) 1/2 inch
- C) 1 inch
- F) 2 inch

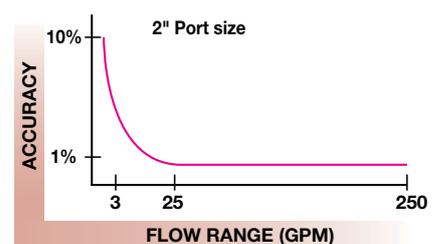
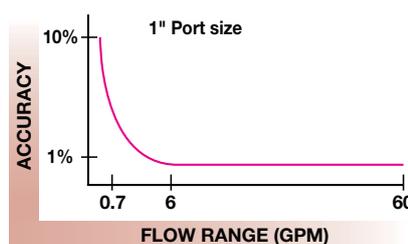
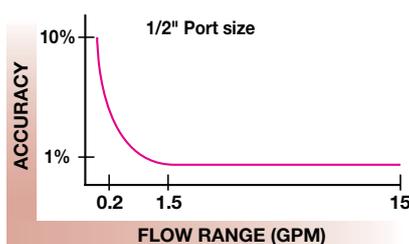
**Connection Options**

- N) (2) 1/2 inch NPT Conduit Holes
- (1) 3/4 inch NPT Conduit Hole

**Output Options**

- 1) 4-20mA, RS485 (Modbus)
- Rate Pulse, Total Pulse

## ACCURACY CHARTS\*



\*Single phase liquids

## SPECIFICATIONS

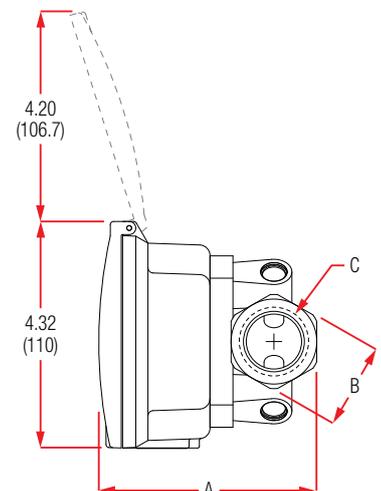
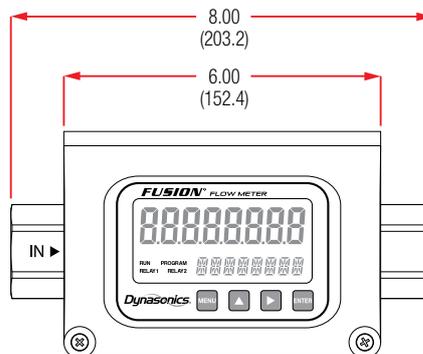
# FUSION

<b>Measurement Type</b>	Ultrasonic Doppler and transit time hybrid, automatic selection
<b>Input Voltage</b>	12-30 VDC @ 0.1 A Max; reverse polarity protection; auto-reset polyfuse; transient voltage suppression
<b>Flow Range</b>	<p>½" NPT (female): 0.20 - 15 GPM (6.9 - 514 BPD) 0.80 - 57 LPM (0.05 - 3.40 M³/H)</p> <p>1" NPT (female): 0.70 - 60 GPM (24 - 2057 BPD) 2.60 - 227 LPM (0.16 - 13.6 M³/H)</p> <p>2" NPT (female): 3.00 - 250 GPM (102.9 - 8571 BPD) 11.40 - 946 LPM (0.70 - 56.80 M³/H)</p>
<b>Accuracy</b>	1% of Rate over the top 10:1 measuring range, single-phase liquids
<b>Pressure Temperature</b>	300 PSI (2,070 kPa); -30 to +160 °F (-34 to +70 °C)
<b>Outputs</b>	Fusion cannot output 4-20mA and Rate Pulse simultaneously; selection via keypad entry
<b>4-20mA</b>	12-bit; source from DC supply voltage; scalable to flow rate via keypad entry
<b>Rate Pulse</b>	0 - 1,000 Hz scalable to flow rate via keypad entry; open collector; internal/external pull-up; TTL square-wave or turbine flow meter simulation; 50% duty cycle
<b>Total Pulse</b>	Open collector, internal/external pull-up; 33 mSec duration
<b>RS485</b>	¼-node; 128 addresses, 9.6/19.2 kb; Modbus command set
<b>Rate Units</b>	GPM, BPD, LPM, M³/H
<b>Total Units</b>	GAL, BBL, LIT, M³
<b>Wetted Materials</b>	316 SS, polyetherimide, Buna-N (alternate o-ring materials can be provided)
<b>Enclosure</b>	NEMA 4; powder coated aluminum, SS, polycarbonate, urethane, PVC
<b>Electrical Ports</b>	(2) ½" NPT, (1) ¾" NPT
<b>Display</b>	Flow Rate: auto ranging 4-digit LCD Flow Total: 8-digit, E-2 to E+3 exponents
<b>Approvals</b>	Class I Division 2 Groups C&D; CSA 22.2 No. 142 & 213, UL 508, ISA 12.12.01

## DIMENSIONAL SPECIFICATIONS

### MECHANICAL DIMENSIONS: INCHES (MM)

METER SIZE	A	B	C
½"	3.75 (95)	1.25 (32) HEX	½ -14 NPT
1"	4.12 (105)	1.62 (41) HEX	1-11½ NPT
2"	5.18 (132)	2.75 (70) HEX	2-11½ NPT



## TECHNOLOGY SELECTION GUIDE

### Liquid Type (in order of increasing % of suspended solids)

- Ultrapure Liquids
- Deionized Water
- Water Filter-Bed Effluent
- 
- Chiller Water
- Hydraulic Oil
- 
- Refined Hydrocarbons
- Beverages
- Well Water
- Reclaimed Water
- 
- Cooling Tower
- Ground Water
- 
- Raw Sewage
- Gray Water
- 
- Beverages - Carbonated
- 
- Waste Activated Sludge
- Return Activated Sludge
- 
- Mining Slurries
- 
- Filter Backwash
- 
- Paper Pulp Stock
- 
- Preprocessed Crude Oil
- 
- Primary Sludge
- Lime Sludge
- Digested Sludge
- Dredging Applications
- 
- Concrete



Transit Time

Enhanced Doppler

Doppler

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 solid 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 include 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 an insertion Doppler probe.

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



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