

# ULTRASONIC FLOWMETER

## Enhanced Doppler



Series 901 Enhanced Ultrasonic Doppler Flowmeters measure solids-bearing or aerated liquids in metal or plastic pipe. Proprietary circuitry allows this instrument to operate with lower concentrations of suspended solids than any competitive Doppler flowmeter--expanding the instrument's range of applications and reliability. Clamp-on, non-invasive transducers permit the instrument to be installed in minutes without interrupting system pressure or flow. In addition, no pressure head-loss is created; therefore system pump horsepower requirements are reduced. The Series 901 transmitter has a full keypad designed for simple field setup and application versatility. The two-line, backlit, alphanumeric display shows instantaneous flow rate and totalized flows in a variety of user selectable engineering units.

## Features

- The system can be field configured to pipe sizes ranging from 0.25 to 120 inches [6 to 3050 mm]
- Non-fouling transducer is immune to build-up of grease, paraffin and other coating materials
- Solid-state measurement never requires re-calibration and is virtually maintenance-free
- Operates with relatively clean liquids as well as liquids with concentrations of suspended solids or aeration
- Does not require long straight runs of pipe
- Industry standard outputs allow direct interface to loggers and controls systems

## Applications

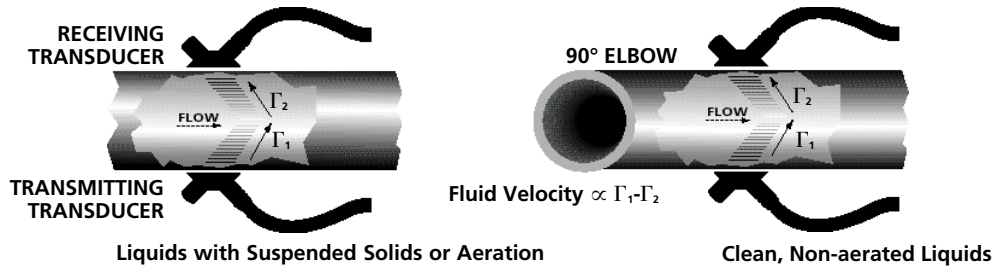
- Raw sewage
- Return activated sludge
- Pulp and paper slurries
- Chemical slurries
- Waste activated sludge
- Ground water
- Mining recirculate
- Animal renderings

# ULTRASONIC FLOWMETER

Series 901

## Principles of Operation

TOP VIEW OF PIPE

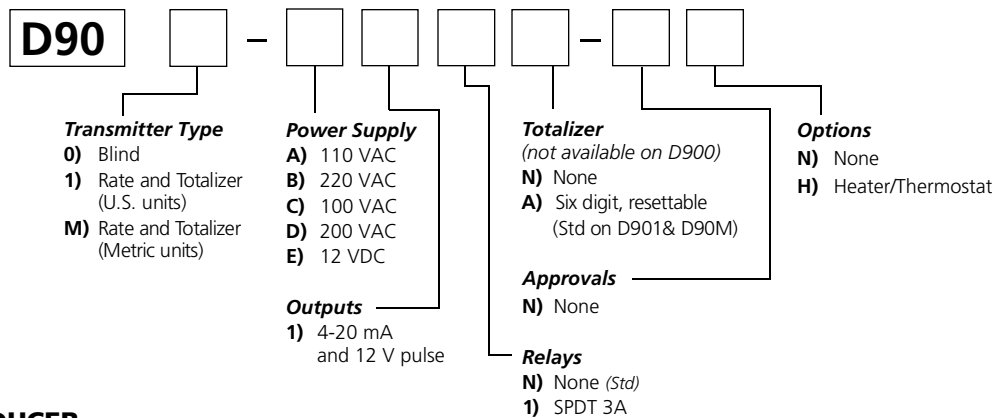


Ultrasonic Doppler flowmeters operate by transmitting and receiving ultrasonic sound signals in liquids. An instrument, such as the Dynasonics Series 901, incorporates dual transducers that are clamped on opposite sides of a liquid filled pipe. Each transducer contains a piezoelectric crystal. Referring to the above illustration, the  $\Gamma_1$  transducer transmits an ultrasonic signal through the pipe wall into the liquid. A portion of this signal is reflected by suspended solids, entrained gases or flow turbulence moving with the fluid, back toward the second transducer,  $\Gamma_2$ . Electronic circuitry compares the transmitted frequency with the received frequency. The difference, or frequency shift, is proportional to fluid velocity, in accordance with principles developed by Christian Johann Doppler. If the liquid is not moving (a zero flow condition) the transmitted and received frequencies are identical.

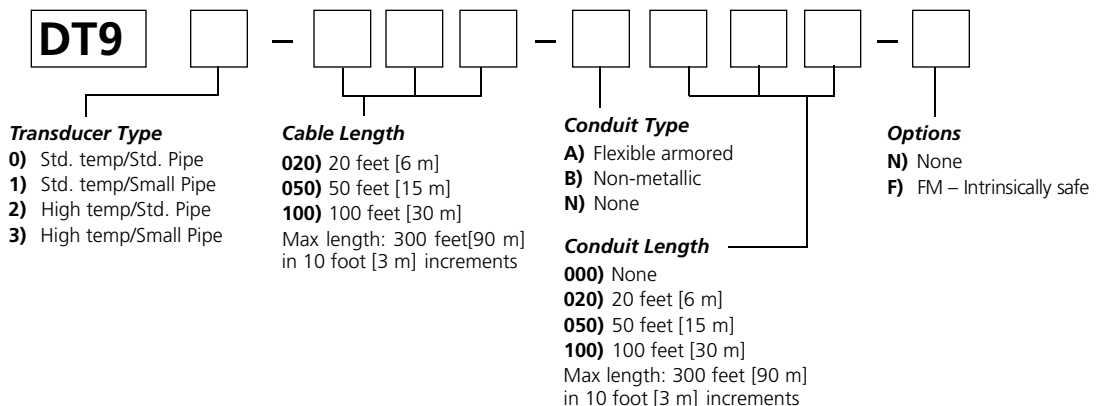
The Series 901 features advanced signal processing and an exclusive auto-adapting digital filter to produce accurate and stable indications of flow rate and totalized flows. A full function keypad allows field configuration of pipe size, engineering units, the 4-20mA output and all operating parameters.

## Part Number Construction

### TRANSMITTER



### TRANSDUCER



# Series 901

## Enhanced Doppler

## Specifications

### TRANSMITTER

DESCRIPTION	SPECIFICATION
POWER REQUIREMENTS	115/230 VAC 50/60 Hz $\pm 10\%$ . (Opt) 100/200 VAC 50/60 Hz $\pm 10\%$ and 12VDC. Power consumption less than 12 VA.
VELOCITY	0.5 - 20 FPS [0.15 - 6.08 MPS]
OUTPUTS	4-20 mA, 600 Ohms max., isolated. 12 VDC pulse, 50 mS duration, 0-1 Hz to 0-10 Hz, user adjustable for driving electro mechanical totalizer. (Opt) Relay, 3A @ 250VAC resistive, SPDT
INDICATORS	Power, Signal Strength, Flow Analyzer, Fault, Over-range, Read
DISPLAY (D901 and D90M only)	2 line x 20 character alphanumeric LCD (backlit). Digit height 0.2 inches [5 mm], 6 digit rate, 6 digit totalizer (resettable)
UNITS (D901 and D90M only):	User configured
RATE U.S. [METRIC]	FPS, GPM, MGD [MPS, LPM, M <sup>3</sup> /hr]
TOTALIZER U.S. [METRIC]	Gallons [liters, M <sup>3</sup> ]
AMBIENT CONDITIONS	-22 to 160°F [-30 to 70 °C], 0-95% relative humidity, non-condensing.
ENCLOSURE	NEMA 4X, [IP-65] Fiberglass with SS hardware. 13.5H x 11.3W x 5.6D inches [343H x 287W x 141D mm]
NON-LINEARITY (ACCURACY)	$\pm 2\%$ Full Scale
SENSITIVITY	0.4% of Full Scale
REPEATABILITY	$\pm 0.4\%$ of Full Scale
RESPONSE TIME	5-50 seconds, user configured, to 90% of value, step change in flow.

### TRANSDUCER

DESCRIPTION	SPECIFICATION
LIQUID REQUIREMENTS	25 ppm of 30 micron size* suspended solids or entrained gases (air). * Less than this minimum will require transducer mount downstream of a 90° elbow.
TRANSDUCER TO TRANSMITTER DISTANCE	20 feet [6.08 meters], flexible armored conduit. lengths to 300 feet [100 meters]
PIPE SIZES	1 - 120 inches [25 - 3050 mm] Pipe I.D. (Opt) 0.25 - 1 inch [6 - 25 mm], Small Pipe Transducer
TEMPERATURE	(Std) -40° to 250°F [-40° to 121°C] (Opt) -40° to 400°F [-40° to 204°C]
HOUSING MATERIAL	(Std) Aluminum, Ultem™ w/epoxy encapsulation; (High Temp) Torlon™ w/SS
AGENCY APPROVAL	(Opt) FM approval I.S., Class 1, Div 1, Groups A-G. Cable lengths to 100 feet [30 meters]

**Factory  
Mutual  
System**

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## Dimensional Specifications

