



## Liquid Ultrasonic Flow Transmitters

Model FTCSLFB, DC Powered, Frequency Output, Flows to 120 GPM, 3/4" to 2" Pipe

### DESCRIPTION

Clark Sonic® ultrasonic flow transmitters are ideal for measurement of flow rates of acoustically conductive liquids including most clean liquids and many liquids with entrained solids. The transmitters are optionally supplied with a built-in platinum 100 Ohm RTD temperature sensor to monitor the process temperature.

Main advantages include excellent long term stability, no pressure drop, broad fluid compatibility, high accuracy and low cost. Also, there are no moving parts.

At the heart of the transmitter is a proprietary mixed signal ASIC which allows sophisticated timing, control and transducer drive circuitry to be combined on a single integrated circuit. The ASIC uses a special algorithm that is an improvement upon the standard single-path measurement technique. Using the "sing around" method, the ultrasonic transducer alternates between transmitting and receiving to measure differences in flight time between upstream and downstream transmissions. A sound pulse is transmitted from an upstream transducer towards a downstream transducer like a traditional time-of-flight measurement. However, the received sound pulse then triggers a second downstream transmission, that then triggers a third and so on for a specific number of cycles. This process is repeated in the upstream direction.

Because it takes an average flight time over multiple cycles to compute the difference in flight times, the approach yields a significant improvement in timing accuracy when compared with the time-of-flight difference of a single sound pulse in each direction. This algorithm, combined with the pico-second timing resolution of the ASIC, provides the precise time measurement capability necessary for compact, small diameter ultrasonic meters.

The output of the transmitter is unaffected by changes in fluid temperature, density and viscosity as the flow calculation is independent of the speed of sound.

Wetted materials include ULTEM® encapsulated ultrasonic transducers with a choice of elastomer seals and Brass body material.

### SPECIFICATIONS

#### GENERAL

**Flow Range:** Bi-directional, field selectable per "Standard Models" table

**Accuracy:** ±0.75% of full scale

**Operating Temperature:** -40 to 190°F (-40 to 87.8°C)

**Response Time:** User Selectable, 2 or 10 seconds

**Viscosity Range:** 0.2 to 150 cSt (0.2 to 150 mPas)

**Liquid Density:** 30.6 to 74.9 lb/cu.ft. (490 to 1200 kg/m<sup>3</sup>)

**Max. Working Pressure:** 250 PSI (17.2 bars)

**Pipe Sizes:** 3/4", 1", 1-1/2", 2"

**Pipe Connections:**

Sizes 3/4" to 2" - Female NPT, BSP

**Electrical Enclosure:** Integral to Body casting with gasketed cover; One 1/2" NPT conduit connection (plugged when model ordered with metric threads) and one M16 x 1.5 connection (plugged when model ordered with NPT threads)

**Electrical Connections:** Screw terminal connections on PC board

**Optional Electrical Connections:** 4 or 8 pin circular receptacle installed in 1/2" conduit connection and internally wired to transmitter connections. Available in 2, 5 and 10 meter lengths (other lengths on request).

**Enclosure Rating:** NEMA 4 (IP 65)

**Power:** 18 to 36 VDC

**Optional Temperature Sensor:** 3 wire RTD, 100 Ohm, Platinum, 0.06% accuracy. Built in to transducer shell for monitoring process temperature. Optional 8 pin electrical connector standardly supplied with this option

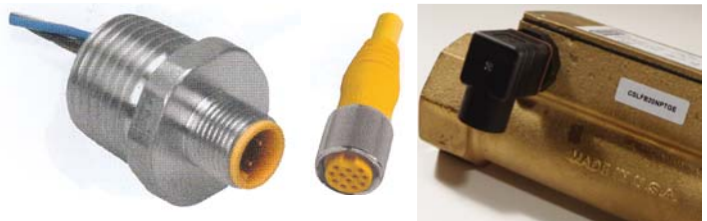
#### WETTED MATERIALS

**Ultrasonic Transducers:** ULTEM® Encapsulated  
**Seals:** EPDM, Buna-N, Neoprene™, FKM, or other  
**Body Material:** Brass (UNS C83600)

#### OUTPUT

**Frequency:** output is an optically isolated NPN transistor capable of sinking up to 25 mA from a voltage source of no more than 48 VDC. Frequency output is from 25 to 1200 pulses/gallon depending on range (see Standard Model table)

Optional NEMA 4 four or eight-pin receptacles installed in transmitter conduit connection and factory wired along with mating simplify field installation

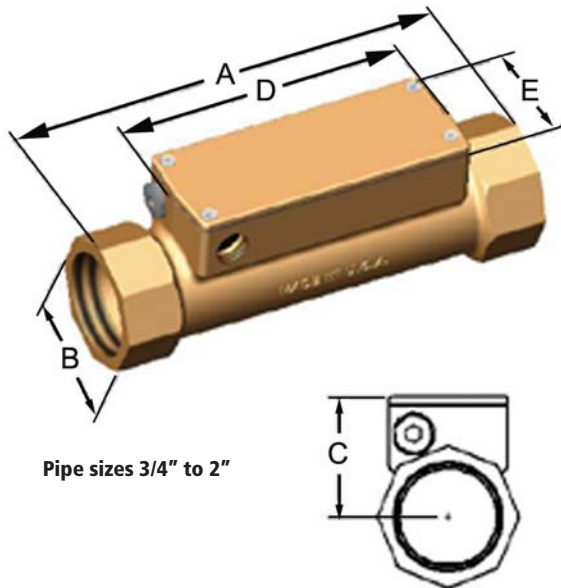


4R/C & 8R/C circular

4H-Hirschmann Connector



## DIMENSIONS



Pipe sizes 3/4" to 2"

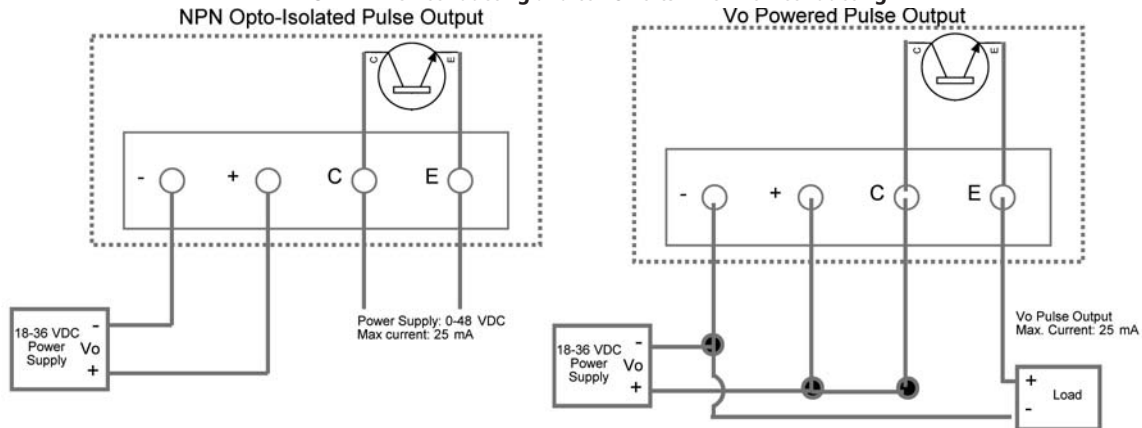
| Size/Connection | A      |     | B      |       | C      |       | D      |     | E      |       |
|-----------------|--------|-----|--------|-------|--------|-------|--------|-----|--------|-------|
|                 | Inches | mm  | Inches | mm    | Inches | mm    | Inches | mm  | Inches | mm    |
| 3/4" & 1"       | 9.20   | 234 | 1.62   | 41.10 | 2.06   | 52.30 | 6.40   | 163 | 2.40   | 61.00 |
| 1-1/2" & 2"     | 9.88   | 251 | 2.75   | 69.90 | 2.51   | 63.80 | 6.40   | 163 | 2.40   | 61.00 |

## STANDARD MODELS

| Model     | Pipe Size/Thread Size | Full Scale Ranges (GPM) |      |               | Full Scale Ranges (LPM) |      |              |
|-----------|-----------------------|-------------------------|------|---------------|-------------------------|------|--------------|
|           |                       | Min.                    | Max. | Pulses/gallon | Min.                    | Max. | Pulses/liter |
| FTCSLFB34 | 3/4" NPT or BSP       | 0.38                    | 25   | 1200          | 1.50                    | 100  | 360          |
| FTCSLFB10 | 1.0" NPT or BSP       | 0.75                    | 50   | 600           | 3.00                    | 200  | 160          |
| FTCSLFB15 | 1.50" NPT or BSP      | 1.20                    | 80   | 375           | 4.50                    | 300  | 85           |
| FTCSLFB20 | 2.0" NPT or BSP       | 1.80                    | 120  | 200           | 6.80                    | 455  | 50           |

## WIRING

The opto-isolated NpN transistor that generates the square wave pulse output is limited to 25 mA when conducting and to 48 volts when non-conducting



## ORDERING INFORMATION

Example: FTCSLFB10NPTGBRTD8R

ULTEM® is a registered trademark of The General Electric Company  
Neoprene® is a registered trademark of DuPont Dow

| A Model  | B Pipe Thread   | C Units of Measure                                   | D Transducer Seal                              | E Options   |
|--|---|--|--|---|
| FTCSLFB34<br>FTCSLFB10<br>FTCSLFB15<br>FTCSLFB20 | 3/4" to 2"<br>NPT= Female NPT<br>BSP=Female British Standard Pipe (G) | G= Gallons Per Minute (U.S.)<br>L= Liters Per Minute | E= EPDM<br>B= Buna-N<br>N= Neoprene®<br>V= FKM | RTD= Integrated RTD<br>4R= 4-Pin Female Circular Receptacle Connector<br>8R= 8-Pin Female Circular Receptacle Connector (use with RTD Option)<br>4C=4-Pin Male Circular Connector, Field Wired<br>8C=8-Pin Male Circular Connector, Field Wired<br>4H=Hirschmann 4-conductor 1/2" NPT Receptacle (factory installed, female 1/2" NPT connector supplied for field wiring) |