



## Liquid Ultrasonic Flow Transmitters

Model FTCSLFC, DC Powered, Frequency Output, Flows to 3000 GPM, 3" to 10" Pipe

### DESCRIPTION

Clark Sonic® Ultrasonic Flowmeters 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 epoxy coated carbon steel body material.

### SPECIFICATIONS

#### GENERAL

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

**Accuracy:**  $\pm 0.75\%$  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:** 200 PSI (13.8 bars)

**Pipe Sizes:** 3", 4", 6", 8", 10"

**Pipe Connections:** ASME class 150 flange

**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

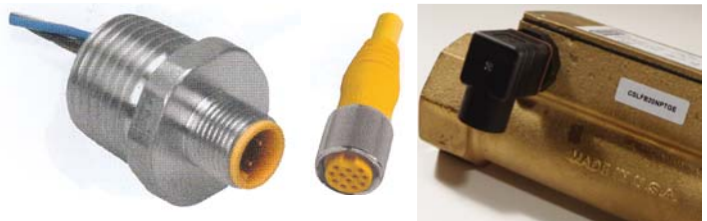
#### WETTED MATERIALS

**Ultrasonic Transducers:** ULTEM® Encapsulated  
**Seals:** EPDM, Buna-N, Neoprene™, FKM, or other  
**Body Material:** Schedule 40, epoxy coated, carbon steel pipe

#### 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 10 to 1200 pulses/gallon depending on range (see Standard Model table)

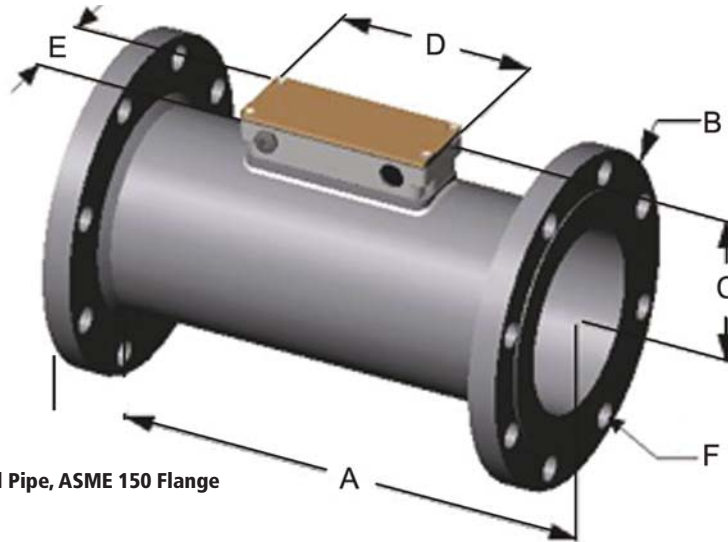
Optional NEMA 4 four or eight-pin receptacles installed in transmitter conduit connection and factory wired along with mating simplify field installation



4R/C & 8R/C circular

4H-Hirschmann Connector

## DIMENSIONS



4-10" Schedule 40 Carbon Steel Pipe, ASME 150 Flange

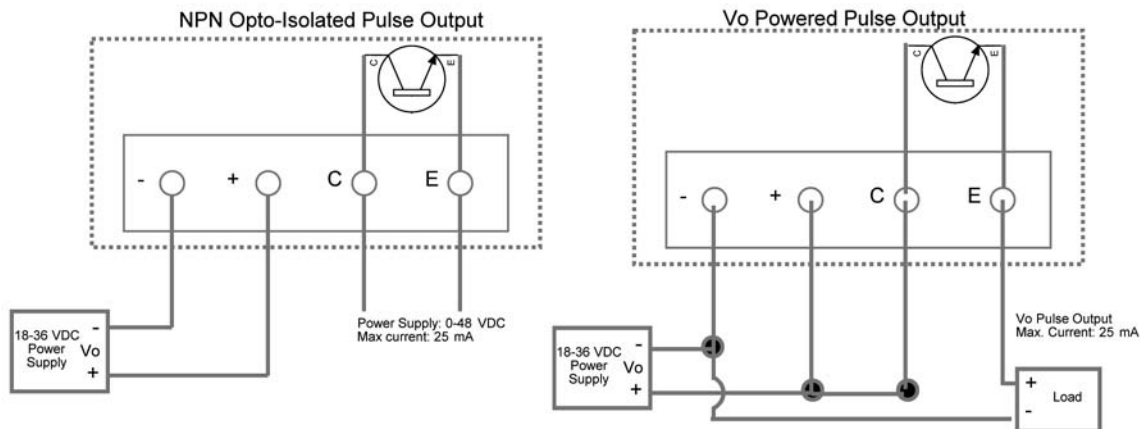
Pipe Size	Dimensions (Inches)						Bolt Circle Diameter	Number of Holes
	A	B	C	D	E	F		
3"	11.00	7.50	3.50	6.54	2.62	0.75	6.00	4
4"	13.00	9.00	4.00	6.54	2.62	0.75	7.50	8
6"	16.00	11.00	5.09	6.54	2.62	0.88	9.50	8
8"	18.00	13.50	6.11	6.54	2.62	0.88	11.75	8
10"	22.00	16.00	7.18	6.54	2.62	1.00	14.25	12

## STANDARD MODELS

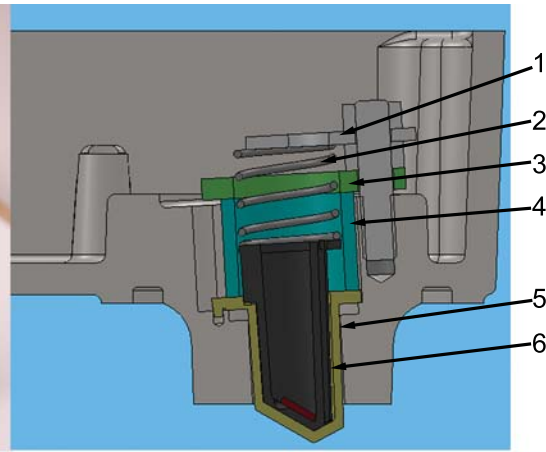
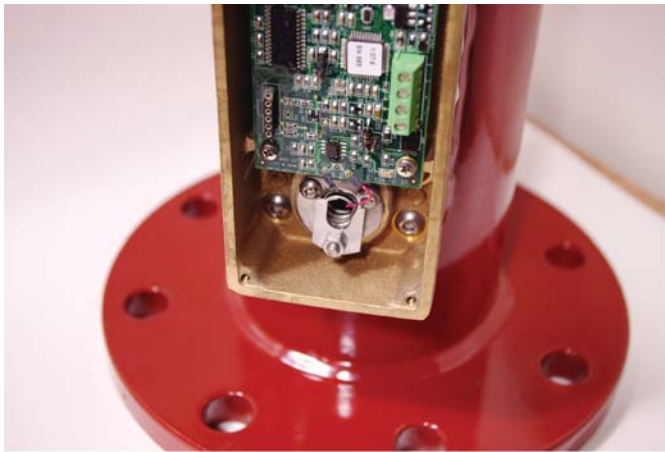
Model	Pipe Size	Full Scale Ranges (GPM)			Full Scale Ranges (LPM)		
		Min.	Max.	Pulses/gallon	Min.	Max.	Pulses/liter
FTCSLFC3	3"	6	400	75	23	1500	20
FTCSLFC4	4"	7.5	500	60	29	1900	16
FTCSLFC6	6"	18	1200	25	68	4500	7
FTCSLFC8	8"	15	2000	15	114	7600	4
FTCSLFC10	10"	45	3000	10	165	11000	3

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

## WIRING



## FIELD SERVICE



Two opposing FTCSLFC ultrasonic transducers are inserted into fixed ULTEM® drywells and held in place with light spring force. A locating keyway in the drywell aids insertion and positioning of the transducers. In the event of field failure of a transducer, replacement is straightforward and can be accomplished without removing the pipe spool and shutting down the process.

The electrical PC board can also be field replaced. Calibration factor and other specific information are maintained at the factory for all transmitters shipped.

Transducer Components	
1	Spring Retainer
2	Spring
3	Clamp
4	Bushing
5	Drywell
6	Ultrasonic Transducer

## DP/DS PANEL METER/DISPLAY OPTION

Digital panel meter installed on transmitter  
 Display: 4 1/2 Digit LED, 0.6"  
 Case: NEMA 4X  
 Versions: DP Option: Displays 0-100% F.S  
 DS Option: Scaled to customer requirement



Panel Meter/  
 Display option  
 Four or eight pin  
 receptacle connector  
 recommended

## ORDERING INFORMATION

**ORDER NUMBER (ABCD)**  
 Example: FTCSLFC10GBRTD8R

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

A Model	B Units of Measure	C Transducer Seal	D Options
FTCSLFC3 FTCSLFC4 FTCSLFC6 FTCSLFC8 FTCSLFC10	G= Gallons Per Minute (U.S.) L= Liters Per Minute	E= EPDM B= Buna-N N= Neoprene® V= FKM	DP=Display % F.S DS=Display in Engineering Units RTD= Integrated RTD 4R= 4-Pin Female Circular Receptacle Connector 8R= 8-Pin Female Circular Receptacle Connector ( use with RTD Option) 4C=4-Pin Male Circular Connector, Field Wired 8C=8-Pin Male Circular Connector, Field Wired 4H=Hirschmann 4-conductor 1/2" NPT Receptacle (factory installed, female 1/2"NPT connector supplied for field wiring)

Ask about our  
 remote mount series  
 1000 & 2000 flow  
 rate indicators and  
 totalizers

