

## TRANSIT-TIME ULTRASONIC FLOWMETER “CLAMP-ON”

### Description

The BSUF-TTCL wall-mount Clamp-on Ultrasonic Flow meter family provides abundant capabilities for accurate liquid flow measurement from outside of a pipe. It utilizes state-of-the-art technologies on ultrasonic transmission /receiving, digital signal processing and transit- time measurement. The proprietary signal quality tracking and selfadapting technologies allow system to optimally adapt to different pipe materials automatically.

The flow meters of the BSUF-TTCL family are carefully designed so that their user-interfaces are self-explanatory and their operation is simple and easy. The unique clamp-on fixture design makes the installation very simple and no special skills or tools are required.

Due to the non-invasive nature of the clamp-on technology, there is no pressure drop, no moving parts, no leaks, no risk of contamination, no risk of corrosion, no pressure dependency.

### Features

- Cost effective and versatile
- High accuracy, better than 1.0% read
- Noninvasive, no moving parts, no pressure drop, no maintenance
- Easy and economical installation, no pipe cutting
- Wide measurement range, -12 to 12m/s (-40 to 40ft/s)
- Wide pipe size range, DN 10 to 6000mm (3/8 to 240 inches)
- Suitable for all commonly used pipe materials
- Signal quality tracking and self-adjusting capabilities automatically match transducer to pipe materials
- Velocity, volumetric and totalized flow display
- Easy to use and set up. Self-explanatory menu-driving programming
- Rich input and output functionalities
- Ideal for both clean and opaque liquid flow measurements, In fact, most any liquid containing less than 5% total suspended solids (TSS) or aeration or 10.000 mg/l
- Bi-directional. Totalizer for net, positive and negative flow display



### Applications

The BSUF-TTCL flow meters are ideal for process-control or flow measurement at fixed locations. Their non-invasive nature makes them indispensable in applications such as chemical liquid processing, hygienic process monitoring, high-pressure flow measurement, etc. Benefited from our advanced digital signal processing technology, the flow meter works reliably in both clean and opaque liquid flow.

Examples of applicable liquids are:

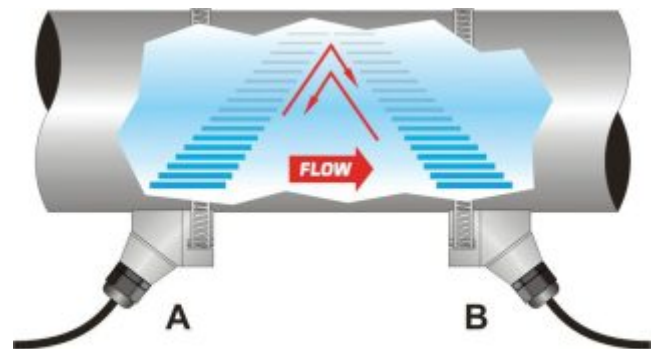
- Water, including hot water, chilled water, city water, sea water, etc.*
- Secondary sewage, waste treatment, etc.*
- Oil, including lubricating oil, diesel oil, fuel oil, etc.*
- Chemicals, including alcohol, acids, etc.*
- Solvents*
- Beverage, food and pharmaceutical processors where non-contact is a must.*
- HVAC, energy measurement system, etc.*

## Specifications

DESCRIPTION	SPECIFICATION
Liquid Types	Virtually most any liquid containing less than 5% total suspended solids (TSS) or aeration.
Power	10-28 VDC @3VA max.; 115/230 VAC 50/60Hz 15% @6VA max
Velocity	-12 to 12m/s (-40 to 40ft/s) bi-directional
Signal Outputs	Current output: 4...20mA Impedance 0...1k ohms, accuracy 0.1% OCT output: pulse signal for, flow rate, total flow (positive, negative and net flow)
Display	LCD with backlight. 2x20 letters. Display flow rate, total flow (positive, negative and net flow), velocity, time, etc.
Units	English (U.S.) or metric
Enclosure	IP65(NEMA 4X) for transmitters and IP68 for sensors
Temperature	-40°C to 121°C
Communication Interface	RS-485-MODBUS
Transducer	Automatically record the following data: 1. The totalizer data of the last 512 days/128 months/10 years 2. The time and corresponding flow meter of the last 64 times of power on and off events 3. The working status of the last 32 days.
Line Sizes	(Std) 2 to 40 inches [50 to 1000 mm] pipe I.D, 12-240 inches (300- 6000 mm) and 3/8" to 4 inches (10...100 mm)opt.
Transducer to Transmitter Distance	Shielded transducer cable. Standard length 10m Can be extended to 990 (300 m).
Weight	BSUF-TT01 3 kg BSUF-TT02 3,5 kg BSUF-TT03 4 kg
Repeatability	Better than 0.2% read
Accuracy	Better than 1.0 % of read
Response Time	0.5s
Pipe Material	All metals, most plastics, fiber glass, etc., allow pipe liner.
Straight Pipe Section	Section Longer than 8D, where D is pipe diameter. If a pump is near, the straight pipe section following the pump should be >15D.

## Measuring Principle

BSUF-TTCL transit time flow meters utilize two transducers, shown as elements A and B in Figure 1, which function as both ultrasonic transmitters and receivers. The transducers are clamped on the outside of a closed pipe at a specific distance from each other. (The transducers can be mounted in V-mode as shown in Figure 1, W-mode where the sound transverses the pipe four times, or in Z-mode where the transducers are mounted on opposite sides of the pipe. This selection is based on pipe and liquid characteristics.) The flow meter operates by alternately transmitting and receiving a frequency modulated burst of sound energy between the two transducers. The burst is first transmitted in the direction of fluid flow and then against fluid flow. 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. If the fluid is not moving, the time of flight difference will be zero and the flow meter will indicate zero flow. The sound time of flight is accurately measured in both directions and the difference in time of flight is calculated. The liquid velocity (V) inside the pipe can be related to the difference in time of flight (dt) through the following equation:  $V = K \cdot D \cdot dt$ , where K is a constant and D is the distance between the transducers.



**Reflect-Mode Configuration  
Transit Time**