

# Economical Non-intrusive Ultrasonic Flowmeter

- Advanced Transit-time Technology for Accurate Flow Measurement



## Features:

- Compact and robust design
- High accuracy, better than  $\pm 1\%$
- Non-intrusive. No risk of leakage or contamination. No pressure drop
- No moving parts, no maintenance
- Easy clamp-on installation. No pipe cutting, no hole drilling. Save installation cost
- Bi-directional
- Wide measurement range,  $\pm 16\text{m/s}$
- Wide pipe size range, DN25~6,000mm
- Large turn-down ratio
- Suitable for all commonly used pipe materials
- Suitable for most pure liquids and liquids with minor particles
- Built-in flow totalizers, batch controller and task scheduler
- Local LCD display and one browsing key
- Optional thermal energy measurement module

- Automatically match transducer to pipe material and liquid property with proprietary signal quality tracking and self-adaptation technology
- Can be pre-programmed in the factory. This makes the unit plug and play
- Optional StufManager™ PC software for programming and data acquisition
- Isolated RS-485 interface with power surge protection. Support MODBUS. Well suited for reliable networking
- Versatile inputs/outputs, such as isolated 4-20mA output, OCT output, analog inputs
- IP65 weather-proof plastic enclosure. Light weight (just 450g/1lb)
- Low power consumption, less than 0.5Watt at 9VDC

STUF-300EB clamp-on ultrasonic flowmeter is the latest innovation from Shenitech. It employs cutting-edge technologies on ultrasonic transit-time measurement, digital signal processing and surface mounting electronics. It provides abundant capabilities for accurate liquid flow measurement from outside of a pipe. The proprietary signal quality tracking and self-adapting techniques allow the system to optimally adapt to different pipe materials and liquid property changes automatically.

The transducers are carefully paired and calibrated in the factory in order to assure the 1% accuracy. They are simple to install and no special skills or tools are required.

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

of corrosion and no pressure dependency.

The STUF-300EB has a surge-protected, isolated RS485 interface with MODBUS support. This feature makes it suitable for reliable flowmeter networking. In this compact unit, there is a local LCD which can be set to display flowrate and totalizer values. The flowmeter can be easily configured through our StufManager™ PC software.

In brief, STUF-300EB is well suited for large quantity, low cost applications. Its unique features, particularly *low cost, high performance, low-power consumption and small outline*, make it the ideal choice for industrial automation, processing control, water source management, flow meter networking and other OEM applications.

## Specifications:

Main Unit	Repeatability	Better than 0.2%
	Accuracy	$\pm 1\%$ of reading, plus $\pm 0.006\text{m/s}$ ( $\pm 0.02\text{ft/s}$ ) in velocity*
	Response Time	0.5s. Configurable between 0.5s and 99s
	Velocity	-16 ~ +16m/s (-52 ~ +52 ft/s), bi-directional.
	Display	Local 96 segment LCD Display flow rate, totalizer value (positive, negative and net rates), velocity, time, analog inputs, temperature, thermal energy, etc.
	Units	English (U.S.) or metric. Flow rate could be GPM, LPM, m <sup>3</sup> /hour, l/hour, etc.
	Signal Outputs	Current output: isolated 4-20mA output for flowrate, velocity or sound speed. Impedance 0-1k. Accuracy 0.1% OCT output: two channels. Up to 0.2A load. Can be programmed as pulse signal for flow totalization (positive, negative and net rates); ON/OFF signal for relay drive or alarm drive; batch control
	Signal Inputs	RTD interface (optional): two temperature channels for thermal energy measurement. Analog inputs: three channels. Can be used for signals such as temperature, pressure, liquid level, etc. Note that these analog channels can be used as digital channels
	Recording	Automatically record the totalizer data of the last 128 days / 64 months / 5 years Optional USB data logger available upon request
	Communication Interface	Isolated RS-485 link with power surge protection. Support MODBUS protocol StufManager™ PC software for real-time data acquisition (optional)
Enclosure	Plastic, IP65 weather-proof, rack mounting support. Dimension: 158x90x60mm <sup>3</sup> (6.2"x3.5"x2.4")	
Liquids	Liquid Types	Virtually all commonly used liquids (full pipe)
	Liquid Temp	-40°C ~ 100°C or -40°C ~ 155°C, depending on transducer type
	Suspension concentration	<20,000ppm, or, < 2%, particle size smaller than 100um.
Pipe	Pipe Size	DN25 ~ DN6,000mm (1" ~ 240")
	Pipe Material	All metals, most plastics, fiber glass, etc. Allow pipe liner.
	Straight Pipe Section	Longer than 15D, where D is pipe diameter. If a pump is near upstream, the straight pipe section following the pump should be > 30D.
Cable	Shielded transducer cable. Standard length 15' (5m). Can be extended to 1640' (500m). Contact the manufacturer for longer cable requirement. Cable should not be laid in parallel with high-voltage power lines, neither should it be close to strong interference source such as power transformers.	
Environment	Temperature	Main unit: -10°C ~ 70°C (14°F ~ 158°F C) Transducer: -40°C ~ 100°C (-40°F ~ 212°F) for standard version -40°C ~ 155°C (-40°F ~ 312°F) for higher temperature version.
	Humidity	Main unit: 85% RH Transducer: water-immersible, water depth less than 10' (3m)
Power	DC: 8 ~ 36VDC, or, AC: 10 ~ 36VAC Power consumption: < 0.5W at 9VDC	
Weight	450g (1lb)	

\*Note: Velocity accuracy may vary on small pipes.

Flow rate is calculated as the product of velocity and pipe cross-section area.

## Applications:

STUF-300EB economical flowmeter is designed for large quantity, low cost applications. Benefited from our non-intrusive clamp-on and transit-time flow measurement technologies, the flowmeter is the ideal choice for industrial automation, processing monitoring, water source management, flow meter networking and OEM applications. It provides reliable measurement in both clean and opaque liquid flow without contacting the fluids. Examples of applicable liquids are:

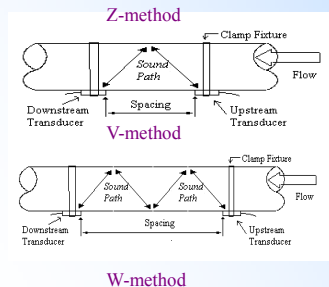
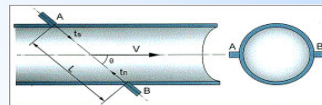
- Water, including hot water, chilled water, city water, sea water, etc.
- Sewage, waste treatment, etc.
- Oil, including crude oil, diesel oil, fuel oil, lubricating oil, etc.
- Chemicals, including alcohol, acids, etc.
- Solvents
- Beverage, food and pharmaceutical processors where non-contact is a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

## Measurement Principle:

The STUF-300EB flowmeter is based on transit-time measurement principle, as shown in the following figure.

A typical transit-time flow measurement system utilizes two transducers (A and B) that function as both ultrasonic transmitter and receiver. The transducers are clamped on the outside of a closed pipe at a specific distance from each other. The flow meter operates by alternately transmitting and receiving a coded burst of sound energy between the two transducers and measuring the transit time that it takes for sound to travel between the two transducers. The difference in the transit time measured is directly and exactly related to the velocity of the liquid in the pipe.

The transducers can be mounted in three methods, Z-method, V-method and Ws-method, depending on pipe size. Z-method is used for large pipe. The two transducers are installed on opposite sides of the pipe. V-method is used for medium size pipe. The two transducers are on the same side, thus, the sound transverses the flow twice. W-method is usually used for small pipe. The sound transverses across the flow four times.



	Type M1: Standard-M1 transducer (magnetic) for medium size pipe DN50 ~ DN700mm (2" ~ 28")
	Type M1HT: High-temp M1 transducer for medium size pipe DN50 ~ DN700mm (2" ~ 28") Temperature range -40°C ~ 155°C (-40°F ~ 312°F)
	Type L1: Standard-L1 transducer for large size pipe DN300 ~ DN6,000mm (11" ~ 240")

## Model Selection:

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**Transducer:**  
 S1 – Standard S1-type for pipe DN25 – DN100mm  
 S1HT – High-temperature version of S1-type  
 M1 – Standard M1-type for pipe DN50 – DN700mm  
 M1HT – High-temperature version of M1-type  
 L1 – Standard L1-type for pipe DN300 – DN6,000mm

**Pipe Size:**  
 DNxxx (metric) or INxxx (English)

**Transducer Cable Length:**  
 Mxx – Cable length in meters  
 Fxx – Cable length in ft

**4-20mA Output:**  
 AO – With 4-20mA output  
 NAO or absent – No 4-20mA output

**Others:**  
 DL – With data logger module (USB type)  
 SW – With PC software (StufManager™)  
 485USB – With RS485-USB converter

Example:

Model# STUF-300EB-M1-DN100-M5-AO-SW stands for standard flowmeter main unit, M1-type clamp-on transducer for pipe size DN100mm, 5 meter transducer cable, with 4-20mA output and PC software.

If you prefer to work with English system for the model number, please put "IN" (for inch) or "F" (for feet) right before the dimension values. For example, the above model# in English system will be:

STUF-300EB-M1-IN4-F15-AO-SW.

*Note that a sample tube of acoustic couplant and a sample set of clamp fixture will normally be offered for free.*

**Important!** In order to program STUF-300EB, you need to have either a computer with a RS485-USB converter plus StufManager™ PC software or a Stuf-300DK display/keypad box.

You may also ask the factory to preprogram the unit for you when placing order. You need to provide your pipe and liquid information in advance.

## Transducer Options:

	Type S1: Standard-S1 transducer (magnetic) for small size pipe DN25 ~ DN100mm (1" ~ 4") <i>For pipe of 1" and below, we recommend our flow-cell transducer (Stuf-300EG)</i>
	Type S1HT: High-temp S1 transducer for small size pipe DN25 ~ DN100mm (1" ~ 4") Temperature range -40°C ~ 155°C (-40°F ~ 312°F)



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