

# NON-INTRUSIVE ULTRASONIC FLOWMETER

*- Advanced Clamp-on Transit-time Technology for Accurate Flow Measurement*

## Features:

- **Non-intrusive clamp-on technology.** Easy and economical installation. No pipe work needed
- **No moving parts to wear out.** Maintenance-free
- **No contact with liquids.** No pressure drop
- **High accuracy.** Normally 1% of velocity. Could reach to 0.5% with in-situ calibration
- **Bi-directional**
- **Suitable for all commonly used pipes**
- **Suitable for pure liquids and liquids with some particles.** No dependency on conductivity
- **Automatically adapts to pipe material and liquid property variations**
- **Built-in flow totalizers and batch controller**
- **Isolated RS-485 interface with power surge protection.** Supports the MODBUS protocol
- **Optional GPRS/GSM module for remote flow monitoring or leakage detection**
- **Abundant input/output, isolated 4-20mA output, relay, pulse output, alarm output**
- **Easy to use and set up.** Self-explanatory menu-driven programming
- **Wide pipe size range, 0.5" ~ 240"**
- **NEMA 4X (IP65) weather-resistant enclosure, IP67 available upon request**
- **Optional large data logger to record multiple variables**
- **Optional intrinsically-safe transducer for hazardous environment application**



The STUF-300FxB Advanced General Purpose Wall-Mount Clamp-on Ultrasonic Flowmeter is the first member of the 3rd generation ultrasonic flow meters from Shenitech. Compared with its predecessors, the 3rd generation ultrasonic flowmeters offer better performance and a richer feature set, all at a lower price.

The STUF-300FxB is designed to be installed at a fixed location for long-term flow measurement from outside of a pipe carrying pure liquid and liquids with minor suspended particles. It utilizes cutting-edge technologies such as advanced transducer design, low voltage transmission, digital signal processing, self adaptation, etc., to achieve high performance.

As QUALITY is of crucial importance, all transducers are carefully paired, and all flowmeters are wet-calibrated in the factory to further assure the system accuracy and reliability.

STUF-300FxB provides versatile input/output interfaces, such as digital and relay outputs, batch control, alarm and flow totalizing, 4-20mA output, optional thermal energy measurement, which can be easily used by a host computer or a flow controller for process monitoring and control. Besides, the built-in isolated RS-485 port and the optional GPRS/GSM module make remote flow monitoring easy and reliable.

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, no pressure dependency and no blockage on the flow. The installation is also simple and requires no special skills or tools. The cost of installation, operation and maintenance is lower than that of conventional flowmeters.

STUF-300FxB is an ideal choice for demanding applications where low-cost, high-performance and non-intrusive are a must.

## Specifications:

<b>Main Unit</b>	Repeatability	Better than 0.2%
	Accuracy	±1% of reading, plus ±0.006m/s (±0.02ft/s) in velocity
	Response Time	0.5s. Configurable between 0.5s and 99s
	Velocity	-16 ~ +16m/s (-52 ~ +52 ft/s), bi-directional
	Display / Keypad	LCD with backlight. 2 x 20 letters. 4 x 4 tactile-feedback membrane keypad. Displays instantaneous flow rate, accumulated flow rate (positive, negative and net rates), velocity, time, analog inputs, etc.
	Units	English (U.S.) or metric
	Signal Outputs	Current output: 4-20mA isolated output for flowrate, velocity or sound speed. Impedance 0-1k. Accuracy 0.1%
		OCT output: isolated Open Collector Transistor output. Up to 0.5A load Relay output: 1A@125VAC or 2A@30VDC Can be programmed as pulse signal for flow totalization; ON/OFF signal for relay drive or alarm drive; batch control
		Sound alarm
	Signal Inputs	RTD interface (optional): two temperature channels that can accommodate two PT100 3-wire temperature sensors for thermal energy measurement. Analog input: one channel of 4-20mA input. Can be used for temperature, pressure or liquid level sensor
	Recording	Automatically records the totalizer data of the last 128 days / 64 months / 5years Optional SD data logger (2GB space) or external USB data logger
Communication Interface	Isolated RS-485 with power surge protection. Supports the MODBUS protocol StufManager™ PC software for real-time data acquisition (optional) GPRS / GSM module for wireless networking, remote monitoring and remote control (STUF-300FnB only)	
Enclosure	Protection Class: IP65 (NEMA 4X) weather-resistant. Additional protection enclosure (large polycarbonate enclosure) available upon request (STUF-300F2B model only) Dimension: 230mm x 150mm x 75mm (9" x 5.9" x 3")	
<b>Liquids</b>	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.
<b>Pipe</b>	Pipe Size	DN15 ~ DN6,000mm (0.5" ~ 240"), depending on transducer type
	Pipe Material	All metals, most plastics, fiber glass, etc. Allows for pipe liner.
	Straight Pipe Section	Longer than 15D, where D is pipe diameter. If a pump or a valve is close-by upstream, the straight pipe section following the pump should be > 25D.
<b>Cable</b>	Shielded transducer cable. Standard length 15' (5m). Can be extended to 1640' (500m). Contact the manufacturer for longer cable requirement.	
<b>Environment</b>	Temperature	Main unit: -10°C ~ 70°C (14°F ~ 158°F)
		Transducer: -40°C ~ 100°C (-40°F ~ 212°F) for standard version -40°C ~ 155°C (-40°F ~ 312°F) for higher temperature version. -40°C ~ 85°C (-40°F ~ 185°F) for intrinsically-safe version
	Humidity	Main unit: 85% RH
		Transducer: water-immersible, water depth less than 10' (3m)
Hazardous Env.	M1Ex clamp-on transducer and IS barrier can be used for Class 1, Div 1 environment	
<b>Power</b>	DC: 12 ~ 24VDC, or, AC: 90 ~ 260VAC Power consumption: < 1W at 12VDC	
<b>Weight</b>	Main unit: 2 kg (4 lbs) for standard version, 2.5 kg (5 lbs) for network version Transducer weight depends on pipe size	

## Applications:

The STUF-300FxB Advanced General Purpose Ultrasonic Flowmeter is ideal for process control and flow measurement at fixed locations. Its non-intrusive nature makes the device indispensable in applications such as chemical liquid processing, hygienic process monitoring, chemical process control, high-pressure flow measurement, etc. Benefited from Shenitech's advanced digital signal processing technology, this flowmeter works reliably in both clean and opaque liquid flow. Furthermore, it can measure pure paper pulp or fluids with higher density of suspend particles.

Applications include:

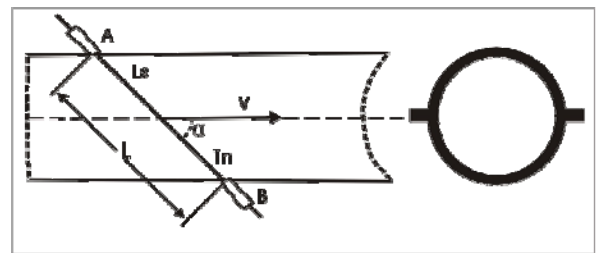
- Water management in buildings, metropolitans, water / wastewater treatment plants, irrigation systems, etc.
- Liquid process control in chemical plants and industrial automation. Chemicals include alcohol, glycol, acids, solvents, etc.
- Oil/fuel transfer. Oil includes crude oil, diesel oil, fuel oil, lubricating oil, hydraulic oil
- Efficiency monitoring and improvement of liquid-based heating / cooling systems, including solar/geothermal systems.
- Beverage, food and pharmaceutical processors where non-contact is a must
- Remote flow monitoring network

## Measurement Principle:

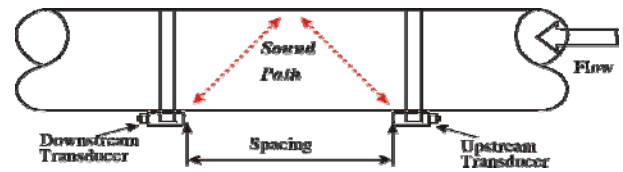
The STUF-300FxB flowmeter is based on the transit-time measurement principle, as shown in the right figure.

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 onto 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 it takes for sound to travel between the two transducers. The difference in the transit time measured is directly related to the velocity of the liquid in the pipe.

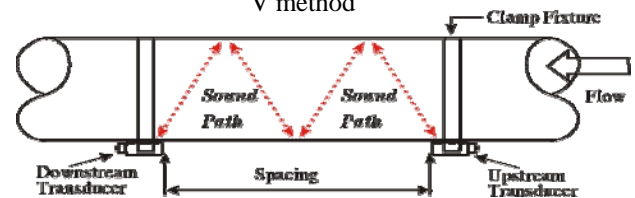
The transducers can be mounted using three methods, Z-method, V-method and W-method, depending on pipe size. The Z-method is used for large pipes. The two transducers are installed on opposite sides of the pipe. The V-method is used for medium size pipes. The two transducers are on the same side, thus,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



Z method









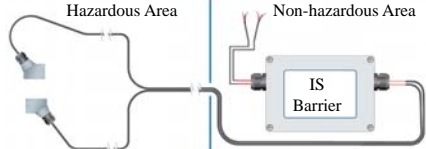
V method



W method

## Transducer Options:

	<p>Type HFx: Special transducer for small size pipes DN15 ~ DN25mm (0.5" ~ 1")            Temperature range -20°C ~ 60°C (0°F ~ 140°F)            x represents pipe material: 0-Copper; 1-Tubing; 2-ANSI Plastic; 3-ANSI Metal</p>
	<p>Type S1x: Standard-S1 transducer (magnetic) for pipes DN25 ~ DN100mm (1" ~ 4"),            Temperature -40°C ~ 80°C (-40°F ~ 175°F)            x represents pipe material. Same as above</p>

	Type S1HTx: High-temp S1 transducer for pipes DN25 ~ DN100mm (1" ~ 4") Temperature range -40°C ~ 155°C (-40°F ~ 312°F) x represents pipe material. Same as above
	Type M1: Standard-M1 transducer (magnetic) for medium size pipes DN50 ~ DN700mm (2" ~ 28") Temperature -40°C ~ 80°C (-40°F ~ 175°F)
	Type M1HT: High-temp M1 transducer for medium size pipes DN50 ~ DN700mm (2" ~ 28") Temperature range -40°C ~ 155°C (-40°F ~ 312°F)
	Type L1: Standard-L1 transducer for large size pipes DN300 ~ DN6,000mm (11" ~ 240") Temperature -40°C ~ 80°C (-40°F ~ 175°F)
	Type M1Ex: Intrinsically-safe transducer and IS barrier for medium size pipes, DN50 ~ DN700mm (2" ~ 28") Class I Div 1, Groups C & D Temperature range -40°C ~ 85°C (-40°F ~ 185°F)

## Model Selection:

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### Model:

1 – Standard model 2 – Enhanced enclosure  
3 – IP67 enclosure n – GSM/GPRS-enabled

### Transducer:

HFx – Special transducer for DN15~DN25 \*  
S1x – Standard S1-type for pipes DN25 ~ 100 \*  
S1HTx – High-temperature version of S1-type \*  
M1 – Standard M1-type for pipes DN50~700  
M1HT – High-temperature version of M1-type  
L1 – Standard L1-type for pipes DN300~6,000  
M1Ex – IS transducer & IS barrier for pipes DN50~700

\* x is pipe material: 0-Copper, 1-Tubing, 2-ANSI Plastic, 3-ANSI Metal

### Pipe Size:

DNxxx (metric) or INxxx (English)

### Transducer Cable Length:

Mxxx – Cable length in meters  
Fxxx – Cable length in feet

### 4-20mA Output:

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

### Other Options:

DLUSB – With external USB data logger  
DLSD – With SD data logger (2GB)  
SW – StufManager™ PC software  
485USB – RS485-USB converter

### Example:

Model#  
STUF-300F1B-M1-DN100-M5-AO-DLSD  
stands for standard main unit, M1-type clamp-on transducer for pipe size DN100mm, 5 meter transducer cable, 4-20mA output and SD data logger.

If you prefer to work with the English system for the model number, please put "IN" (for inch) or "F" (for foot) right before the dimension values. For example, the above model# in the English system will be:  
STUF-300F1B-M1-IN4-F15-AO-DLSD

Note: A sample tube of acoustic couplant and a sample set of clamp fixture will normally be offered for free with the purchase of the flowmeter.

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