Introduction

Shenitech offers state-of-the-art ultrasonic products for accurate and reliable flow measurements. Powered by advanced signal processing and electronics technologies, as well as proprietary technologies on ultrasonic transmission/receiving and automatic signal quality tracking, the Shenitech STUF-xxx and STxxx series flowmeters can achieve high accuracy (better than 1%), high linearity (0.5%) and high repeatability (0.2%). They can adapt to diverse pipe materials and fluid conditions automatically. While they are most suited for clean liquids, they can also work reliably with liquids that have solids content as much as 5%.

Shenitech has designed a wide variety of products to meet the demanding requirements of today’s versatile applications. For portable applications, we have a handheld flowmeter that is light-weight, compact and very easy to install/uninstall. For non-intrusive applications (high-pressure pipes, hygienic processes, chemicals, food, etc), we offer non-intrusive flowmeters with transducers that can be clamped onto the outside of the pipe and have absolutely no contact with the liquids inside. For applications that require best accuracy, long-term stability and low maintenance, our insertion type and flow-cell type flowmeters are the best choice. For cost-sensitive, large-volume applications, such as steel plants that need to have many flowmeters installed and networked, our low-cost ST301 series would be the best product.

In today’s energy-sensitive economy, energy consumption metering has become very important. Shenitech has developed ultrasonic heat meters (BTU), non-intrusive thermal energy measurement systems as well as Automatic Meter Reading (AMR) systems to meet these urgent needs. Compared with traditional BTU meters, our products do not have moving parts, and thus need no maintenance and last much longer.

The list of applications of the Shenitech products is constantly expanding. In brief, wherever you have an application, we can provide you with a solution.

Application Support

Do you need help selecting the flowmeter or heat meter for your application? Are you concerned about how to find the proper product which could save you significant money and time? How well will the ultrasonic flowmeter work in your case? How are the transducers installed? How to connect the flowmeter to your system? What are some other options? For answers to these technical questions, please contact your nearest Shenitech distributor or sales representative. You may also contact us directly by email to support@shenitech.com or by phone at +1 781-932-0900.
Product Overview

Notes:
* The digital electromagnetic flowmeter Mag888 is not included in this document. Please visit [www.shenitech.com](http://www.shenitech.com) for the datasheet.
**STUF-200H Handheld Ultrasonic Flowmeter**

- High accuracy. ±1%
- Light weight and compact. Handset weighs about 538g (1.2 lbs) only
- Non-intrusive clamp-on installation. No pipe cutting or pipe fitting needed. Installs in a few minutes
- Wide flow range, -52 ft/s ~ 52 ft/s (~16 m/s ~ 16 m/s), bi-directional
- Pipe size 1”~240” (DN25~DN6,000 mm)
- Suitable for almost all liquids
- Suitable for all commonly used pipe materials
- Rechargeable battery for 10 hours of operation
- Built-in data logger
- RS232 link. Totalizer output through OCT
- Easy and straightforward programming
- Optional Windows PC software for data downloading and real-time data acquisition

- Ideal for both clean and opaque liquid flows. Applications include flow survey, HVAC, water/wastewater management, energy measurement, food/beverage process monitoring, chemicals and other corrosive liquids flow measurement.

### Standard Set

<table>
<thead>
<tr>
<th>Handset</th>
<th>Transducer (M1-type for N50-DN700)</th>
<th>Transducer Cable</th>
<th>Carrying Case</th>
</tr>
</thead>
</table>

### Optional Transducers

<table>
<thead>
<tr>
<th>Type HS</th>
<th>Type HM</th>
<th>Type M1</th>
<th>Type L1</th>
<th>Type S1HT</th>
<th>Type M1HT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small-size pipe transducer with mounting rack &amp; magnet. For pipes DN25 ~ DN100mm (1~4”)</td>
<td>Medium-size pipe transducer with mounting rack &amp; magnet. For pipes DN50 ~ DN700mm (2~28”)</td>
<td>Standard medium-size pipe transducer with magnet. For pipes DN50 ~ DN700mm (2~28”)</td>
<td>Standard large-size pipe transducer. For pipes DN300 ~ DN6,000mm (11~240”)</td>
<td>High-temp transducer for small-size pipes. Pipe sizes DN25 ~ DN100mm. Temp 32˚ F ~ 312˚ F (0˚C ~ 155˚C)</td>
<td>High-temp transducer for medium-size pipe s. Pipe sizes DN50 ~ DN700mm. Temp 32˚ F ~ 312˚ F (0˚C ~ 155˚C)</td>
</tr>
</tbody>
</table>

### Model Selection

Example: STUF-200H-HM1-1-1: handheld ultrasonic flowmeter with mounting-rail type transducer for pipes from 2” to 28”, PC software and 232-USB adapter.

Note that the clamp fixtures, battery charger, RS232 cable, transducer cable, and sonic couplant sample are free with the purchase of the flowmeter.
The STUF-300F series products are high-performance, NIST-standard compliant, wall-mount ultrasonic flowmeters. They are normally installed in fixed locations for long-term flow measurement. There are three categories in this product family:

- STUF-300FxB: non-intrusive clamp-on flowmeter
- STUF-300FxC: zero-maintenance insertion flowmeter
- STUF-300FxG: plug & play high-accuracy flow-cell flowmeter

The main differences among the three types of flowmeters are their transducers. Their base units (electronics consoles) are the same. The model number of the base unit is STUF-300F.

To accommodate different applications, the base unit STUF-300Fx also comes with four variations:

- Standard base unit STUF-300F1
- Enclosure-enhanced base unit STUF-300F2
- IP67-enclosure base unit STUF-300F3
- GSM/GPRS wireless-enabled base unit STUF-300Fn

All of the four base unit versions are based on the transit-time technology for high accuracy flow measurement. They usually work best with clean liquids. However, with our proprietary digital signal processing algorithms and automatic signal quality tracking functions, they can also work with liquids that have particle contents up to 5% in volume, and even up to 10% if the particle size is less than 50um. The base units also provide networking capabilities, analog input, analog output, digital output, etc. They can also be expanded to conduct thermal energy measurement.

The wall-mount ultrasonic flowmeters are generally used for liquid process control, continuous flow monitoring and any application where long-term flow measurements are needed. Examples of applicable liquids include: water (hot water, chilled water, city water, sea water, etc.); sewage, waste water; oil (crude oil, lubricating oil, diesel oil, fuel oil, etc.); chemicals (alcohol, acids, etc.); solvents; beverages and liquid food, etc.

In the following, we will use the standard version, STUF300F1, as an example wiring diagram. For other base unit versions, please contact Shenitech for availability.
STUF-300Fx B Clamp-on Wall-mount Flowmeter

- Non-intrusive. No contact with liquids, hence no contamination
- Easy clamp-on installation. Setup can be done within 10 minutes
- No moving parts for wear and tear, hence long life-span
- No maintenance required, hence low operation cost
- No pressure drop. No flow disturbance. Big savings on high pressure pipes
- NIST standard performance. High accuracy, 1% or better
- Wide flow velocity range, ±16m/s (±52ft/s), bi-directional
- Suitable for almost all liquids, including corrosive or hygienic liquids
- Suitable for all commonly used pipe materials and pipe sizes 0.5”~240” (DN15~DN6,000 mm)
- Isolated RS-485 interface with MODBUS support. Optional GPRS/GSM modem
- Built-in totalizers, batch controller, and task scheduler
- Abundant input/output interfaces, such as isolated 4-20mA output, relay, etc.
- Weather-resistant enclosure (IP65 / NEMA 4X)
- Applications: water/wastewater/seawater, oil/fuel/lubricant oil, liquid chemicals, food/drug and other hygienic liquids, heating/cooling system, etc.

Optional Transducers

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Temperature range</th>
<th>Pipe size</th>
<th>Pipe Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFx</td>
<td>Special transducer for small size pipes DN15 ~ DN25 mm (0.5”~1”)</td>
<td>-20°C ~ 60°C (-4°F ~ 140°F)</td>
<td>DN15 ~ DN25 mm</td>
<td>0-Copper; 1-Tubing; 2-ANSI Plastic; 3-ANSI Metal</td>
</tr>
<tr>
<td>S1x</td>
<td>Standard S1 transducer (magnetic) for pipes DN25 ~ DN100 mm (1”~4”)</td>
<td>-40°C ~ 80°C (-40°F ~ 175°F)</td>
<td>DN25 ~ DN100 mm</td>
<td>0-Copper; 1-Tubing; 2-ANSI Plastic; 3-ANSI Metal</td>
</tr>
<tr>
<td>S1HTx</td>
<td>High-temp S1 transducer for pipes DN25 ~ DN100 mm (1”~4”)</td>
<td>-40°C ~ 155°C (-40°F ~ 312°F)</td>
<td>DN25 ~ DN100 mm</td>
<td>0-Copper; 1-Tubing; 2-ANSI Plastic; 3-ANSI Metal</td>
</tr>
<tr>
<td>M1</td>
<td>Standard M1 transducer (magnetic) for medium size pipes DN50 ~ DN700 mm (2”~28”)</td>
<td>-40°C ~ 85°C (-40°F ~ 185°F)</td>
<td>DN50 ~ DN700 mm</td>
<td>0-Copper; 1-Tubing; 2-ANSI Plastic; 3-ANSI Metal</td>
</tr>
<tr>
<td>M1HT</td>
<td>High-temp M1 transducer for medium size pipes DN50 ~ DN700 mm (2”~28”)</td>
<td>-40°C ~ 155°C (-40°F ~ 312°F)</td>
<td>DN50 ~ DN700 mm</td>
<td>0-Copper; 1-Tubing; 2-ANSI Plastic; 3-ANSI Metal</td>
</tr>
<tr>
<td>L1</td>
<td>Standard L1 transducer for large size pipes DN300 ~ DN6,000 mm (11”~240”)</td>
<td>-40°C ~ 85°C (-40°F ~ 185°F)</td>
<td>DN300 ~ DN6,000 mm</td>
<td>0-Copper; 1-Tubing; 2-ANSI Plastic; 3-ANSI Metal</td>
</tr>
<tr>
<td>M1Ex</td>
<td>Intrinsically-safe transducer and IS barrier for medium size pipes DN50 ~ DN700 mm (2”~28”)</td>
<td>-40°C ~ 85°C (-40°F ~ 185°F)</td>
<td>Class I Div 1, Groups C &amp; D</td>
<td></td>
</tr>
</tbody>
</table>
**Model Selection**

<table>
<thead>
<tr>
<th>STUF - 300Fx B</th>
<th></th>
</tr>
</thead>
</table>

### Model:
1. Standard model
2. Enhanced enclosure
3. IP67 enclosure
n. GSM/GPRS-enabled model

### 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

### 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:
- RL: With relay
- DL: With data logger module (USB type)
- SW: StufManager™ PC software
- 485USB: RS485-USB converter

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

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-DL.

*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.*
• Insertion transducers for best long-term stability, strong signal and high signal quality, and robust performance
• No moving parts, no pressure drop, no disturbance on the flow
• Maintenance-free. Accuracy does not degrade over time
• 1% accuracy. Could reach 0.5% with on-site calibration
• Hot-tapping installation without shutting down the flow
• Bi-directional. Wide measurement range, ±16m/s (±52ft/s)
• Pipe size DN80 mm ~ DN6,000 mm (3”~240”)
• Suitable for all commonly used pipe materials and liquids
• Built-in totalizers, batch controller and task scheduler
• Isolated RS-485 interface. Supports the MODBUS protocol
• Optional GPRS/GSM module for remote flow monitoring or leakage detection
• Isolated 4-20mA output, relay, pulse output, alarm output, etc.
• Weather-resistant enclosure (IP65 / NEMA 4X).
• Ideal for both pure liquids and liquids with minor particles. Primary applications are in HVAC systems, water pipelines, water treatment plants, power plants, steel plants, oil/fuel oil pipes, etc.

Optional Transducers

Hot Tapping Tool Kit

This tool kit is for installing the insertion transducers without shutting down the flow.
Applicable products: STUF-300FxC, STUF-300R1C and ST301C.

Model Number:
This tool kit can be ordered together with the flowmeter system or separately as an accessory with the model number 300FA-HOT.
Model Selection

**Model:**
1 – Standard model. 2 – Enhanced enclosure. 3 – IP67 enclosure
n – GSM/GPRS-enabled

**Transducer:**
V – Vertical transducer type (installation spacing: ≥550mm)
I – Inclined transducer type (installation spacing: ≥360mm)

**Installation Tool:**
HOT – With hot-tapping tool. SD – With Saddle

**Pipe Size**
DNxx (metric) or INxx (English)

**Other Options:**
RL – With relay,
DL – With data logger module (USB type)
SW – StufManager™ PC software
485USB – RS485-USB converter

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

**Transducer Cable Length:**
Mxx – Cable length in meters
Fxxx – Cable length in feet
Flow-cell transducers for the best accuracy and best long-term stability
Plug and play. All parameters have been pre-programmed in factory
No moving parts, no pressure drop, no flow disturbance
Maintenance-free
Accuracy better than 1%. Could be as high as 0.5%
Accuracy does not degrade over time. No need for re-calibration
Pipe size DN10mm ~ DN1,000 mm (3/8”~40”)
Bi-directional. Wide measurement range, ±16m/s (±52 ft/s)
Suitable for all commonly used pipe materials and liquids
Built-in totalizers, batch controller and task scheduler
Isolated RS-485 interface. Supports the MODBUS protocol
Optional thermal energy measurement functionality
Optional GPRS/GSM module for remote flow monitoring or leakage detection
Isolated 4-20mA output, relay, pulse output, alarm output, etc.
Weather-resistant enclosure (IP65 / NEMA 4X)
Low-power consumption, less than 1Watt
Ideal for both pure liquids and liquids with minor particles
Applications: oil/fuel transfer or consumption measurement, process control, power plants, heating /cooling system, maintenance-free flow monitoring network, etc.

Optional Transducers

Note:
1 Higher pressure rating is available upon request.
2 Both threading and flange joints are available upon request. If threading joint, please specify NPT or BSP.
3 The flow-cell body is made from cast iron with coating. Stainless-steel or plastic making is available upon request.
4 Larger flow-cell transducers can be made upon request.

Model Selection

Base Unit:
1 – Standard model   2 – Enhanced Enclosure
3 – IP67 enclosure   n – GSM/GPRS-enabled

Transducer:
1B – Pi-type flow-cell transducer with BST thread joint
1N – Pi-type flow-cell transducer with NPT thread joint
1F – Pi-type flow-cell transducer with flange joint (DN15~DN40)
2F – Standard-type flow-cell transducer with flange joint (DN50~DN450)

Pipe Size:
DNxx (metric) or INxxx (English)

Other Options:
RL – With relay
DL – USB data logger (external)
SW – StufManager™ PC software
485USB – RS485-USB converter

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

Transducer Cable Length:
Mxx - Cable length in meters
Fxx – Cable length in feet
STUF-300Fn Wireless Ultrasonic Flowmeter

The base unit of the wall-mount ultrasonic flowmeter, STUF-300F, can be equipped with a GSM modem or a GPRS modem. The GSM/GPRS-enabled base unit, namely STUF-300Fn, can be used to measure liquid flow wirelessly. It can also be easily networked to form a wireless flow monitoring system.

Depending on the transducer used, the STUF-300Fn base unit can be used to compose a wireless clamp-on flowmeter (STUF-300FnB), a wireless insertion flowmeter (STUF-300FnC) or a wireless flow-cell flowmeter (STUF-300FnG).

- When the flowmeter is equipped with a GSM modem, you may use your cell phone to check the flowmeter reading and flowmeter working status anywhere and anytime
- When the flowmeter is equipped with a GPRS modem, you may use your computer to program the flowmeter, monitor the flowmeter status and read flow data continuously from a remote location. The data can then be recorded into your database
- Shenitech provides the PC software for flow monitoring system management. Please contact support@shenitech.com for details.

Applications include:
- Remote leakage detection system
- Solar-powered flow monitoring network
- Water distribution network
- Irrigation water resources management
- Wireless flow measurement in industrial plants

Example 1: GSM-based Leakage Detection System

Example 2: GPRS-based Wireless Flow Monitoring System
The STUF-300R1 thermal energy meter is used to measure the energy transfer/consumption of a liquid-based energy production or delivery system. It is consisted of a wall-mount ultrasonic flowmeter and a pair of PT100 temperature sensors (one for supply and the other for return).

The thermal energy consumption $Q_t$ is calculated as follows:

$$Q_t = Q \times (T_2 - T_1) \times C_t \quad \text{or} \quad Q_t = Q \times (T_{C2} - T_{C1}),$$

where $Q$ is the flow rate measured by the flowmeter, and $T_1$ and $T_2$ are the temperature measured by the two PT100 sensors at the supply and return points, respectively. $C_t$ is the specific heat (or the thermal capacity coefficient) of the fluid. $T_{C1}$ and $T_{C2}$ are the thermal capacities corresponding to the $T_1$ and $T_2$ temperature.

The flowmeter part of the thermal energy meter is similar to the STUF-300F1x high-performance ultrasonic flowmeter described in the previous pages. As there are three kinds of ultrasonic transducers, there are three types of thermal energy meters as well: STUF-300R1B for the clamp-on type, STUF-300R1C for the insertion type and STUF-300R1G for the flow-cell type.

The PT100 sensor is a standard 3-wire RTD temperature sensor. It comes with two varieties: the surface-mounting type and the insertion-mounting type (see flowing figures). The left is easy to install while the right has better accuracy. With temperature calibration, the STUF-300R1 is able to provide 0.1°C accuracy over a wide temperature range (-40°C~155°C.)

Note: you may use your own temperature sensors. Please specify that clearly when placing the order.

### Optional Transducer

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Temperature range</th>
<th>Pipe尺寸范围</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFx</td>
<td>Special transducer for small size pipes DN15 ~ DN25mm (0.5” ~ 1”)</td>
<td>-20°C ~ 60°C (0°F ~ 140°F)</td>
<td>0 - copper; 1 – ANSI; 2 - Tubing</td>
</tr>
<tr>
<td>S1x</td>
<td>Standard-S1 transducer (magnetic) for pipes DN25 ~ DN100mm (1” ~ 4”)</td>
<td>-40°C ~ 80°C (-40°F ~ 175°F)</td>
<td>x represents pipe material. Same as above</td>
</tr>
<tr>
<td>S1HTx</td>
<td>High-temp S1 transducer for small size pipes DN25 ~ DN100mm (1” ~ 4”)</td>
<td>-40°C ~ 155°C (-40°F ~ 312°F)</td>
<td>x represents pipe material. Same as above</td>
</tr>
<tr>
<td>M1</td>
<td>Standard-M1 transducer (magnetic) for medium size pipes DN50 ~ DN700mm (2” ~ 28”)</td>
<td>-40°C ~ 80°C (-40°F ~ 175°F)</td>
<td></td>
</tr>
<tr>
<td>M1HT</td>
<td>High-temp M1 transducer for medium size pipes DN50 ~ DN700mm (2” ~ 28”)</td>
<td>-40°C ~ 155°C (-40°F ~ 312°F)</td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td>Standard-L1 transducer for large size pipes DN300 ~ DN6,000mm (11” ~ 240”)</td>
<td>-40°C ~ 80°C (-40°F ~ 175°F)</td>
<td></td>
</tr>
</tbody>
</table>
PT100SM: surface-mount temperature sensor, 3-wire PT100
Thermal isolation around the sensor is recommended in order to get a temperature reading close to the liquid temperature

PT100IN: Insertion type temperature sensor, 3-wire PT100
Users may use their own RTD temperature sensor

Model Selection

(1) STUF-300R1B - non-intrusive energy meter
This energy measurement system is completely non-intrusive. The flow transducers are clamped onto the outside of the pipe, and the temperature sensors are the surface-mounting type, which are attached to the outer surface of the pipe. In order to obtain good temperature measurement, it is recommended that you wrap the temperature sensors with thermal-isolated materials (see figure on the left.)

Applicable pipe size: DN25mm~DN6,000mm (1”~240”).

Model Number:
**STUF-300R1B-SM** - - - - -

The option in SM is the wire length of the PT100 sensor. Available selections are 1 meter (SM1), 2 meters (SM2) and 3 meters (SM3).

The other s in the above model number are related to the ultrasonic flowmeter. Please refer to the STUF-300FxB products (page 7) for details.

(2) STUF-300R1C – maintenance-free insertion energy meter
This measurement system is aimed for zero-maintenance and high-accuracy thermal energy measurement.

The flow transducers are insertion ultrasonic transducers that can be hot-tapped into an existing pipeline. The temperature sensors are the PT100 insertion type.

Applicable pipe sizes: DN80mm (3”) or bigger.

Model Number: **STUF-300R1C-IN** - - - - -

The option in IN is the wire length of the insertion-type PT100 sensor. Available selections are 1 meter (IN1), 2 meters (IN2), 3 meters (IN3) and 5 meters (IN5).

The other s in the above model number are related to the ultrasonic flowmeter. Please refer to the STUF-300FxC products (page 9) for details.

(3) STUF-300R1G – high-accuracy energy meter
This measurement system is aimed for high accuracy as well as maintenance-free thermal energy measurement applications. The flow transducers are high-accuracy flow-cell ultrasonic transducers. The temperature sensors are PT100 insertion type sensors.

Applicable pipe sizes: DN15mm~DN1000mm (1/2”~40”).

Model Number: **STUF-300R1G-IN** - - - - -

The option in IN is the wire length of the insertion-type PT100 sensor. Available selections are 1 meter (IN1), 2 meters (IN2), 3 meters (IN3) and 5 meters (IN5).

The other s in the above model number are related to the ultrasonic flowmeter. Please refer to the STUF-300FxG products (page 10) for details.
ST301 Economical Ultrasonic Flowmeter

Low-cost ultrasonic flowmeter. Particularly beneficial for OEM or applications where multiple units are needed

- High accuracy. Normally ±1% velocity
- Wide flow range. Large turn-down ratio
- No moving parts for wear and tear. No maintenance required
- Suitable for all commonly used pipe materials
- Suitable for most pure liquids and liquids with minor particles
- Built-in flow totalizers, batch controller, task scheduler, etc.

Optional StufManager™ PC software for real-time data acquisition

- Isolated RS-485 interface with power surge protection. Support MODBUS. Well suited for reliable flowmeter networking
- Versatile input/output, such as isolated 4-20mA output, pulse output, etc.
- IP65 weather-proof plastic enclosure. Compact and light weight.
- Power consumption < 1.2Watt. Power supply: 9~24VDC

Optional Transducer

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST301B</td>
<td>Clamp-on Flowmeter</td>
</tr>
<tr>
<td>ST301C</td>
<td>Insertion Flowmeter</td>
</tr>
<tr>
<td>ST301G</td>
<td>Flow-cell Flowmeter</td>
</tr>
</tbody>
</table>

ST301 B - IN: for pipe size of DN80 (3”) and above
HOTTAP: hot-tapping tool for insertion transducer installation

- HFx: for pipe size DN15-DN25 (1/2”~1”, 2MHz)
- S1x: for pipe size DN25-DN100 (1”~4”) *
- S1HTx: for pipe size DN25-DN100 (1”~4”) with temperature up to 150°C
- M1: for pipe size DN50-DN700 (2”~28”)
- M1HT: for pipe size DN50-DN700 (2”~28”) with temperature up to 150°C
- L1: for pipe size DN300-DN6,000 (11”~240”)

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

Model Number:

ST301 x - - - - - -

where x can be B for the clamp-on type, C for the insertion type or G for the flow-cell type. The other s in the above model number are similar to those of the relevant wall-mount flowmeters (Refer to page 7 for details), except that the Relay option is not available.

Example: Model# ST301B-M1-DN100-M5-AO stands for economical flowmeter with M1 clamp-on transducer for pipe size DN100mm. 5 meter transducer cable. 4-20mA output. Note: 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: ST301B-M1-IN4-F15-AO.
**ST302 Solar Powered Ultrasonic Flowmeter**

- Low-power consumption for both GSM modem and ultrasonic flowmeter.
- Solar powered. No other power supply is needed. Solar panel rated at 20Watts.
- Built-in rechargeable battery (17AH) and charging circuit able to maintain 7 days of operation without sunshine.
- Robust, NEMA/UL-50 Type 4X/IP66 weather-proof enclosure.
- High accuracy. Normally ±1%. Could be 0.5% when in-situ calibration is available.
- Suitable for all commonly used pipe materials and for pure liquids and liquids with minor particles.
- Robust performance due to proprietary signal quality tracking and self-adaptation technology
- Internal data logger: last 512 daily net flow values and last 128 monthly net flow values
- External data logger (optional): 32,000 data capacity. USB interface
- Optional StufManager™ PC software for data collection
- RS-485 interface with power surge protection. Support MODBUS. Well suited for reliable networking
- Environment: For main unit: -10°C ~ 70°C, For transducers: -20°C ~ 80°C or –20°C ~ 150°C depending on transducer selected

**Model Selection**

**Transducer Options:**

1. Clamp-on type:
   - HF: for pipe size DN15-DN25 (1/2”~1”, 2MHz)
   - S1x: for pipe size DN25-DN100 (1”~4”) *
   - S1HTx: for pipe size DN25-DN100 (1”~4”) with temperature up to 150°C
   - M1: for pipe size DN50-DN700 (2”~28”) *x represents pipe material: 0-Copper, 1-SS, 2-ANSI Plastic, 3-ANSI Metal
   - M1HT: for pipe size DN50-DN700 (2”~28”) with temperature up to 150°C
   - L1: for pipe size DN300-DN6000 (11”~240”)

2. Insertion type:
   - IN: for pipe size of DN80 (3”) and above
   - HOT-TAP: hot-tapping tool for insertion transducer installation

3. Flow-cell type:
   - FC-DNx: flow-cell transducer for pipe size DNxx (in mm)
   - FC-INxx: flow-cell transducer for pipe size DNxx

**Model Number:**

**ST302 x - - - - - -**

where x can be B for the clamp-on type, C for the insertion type or G for the flow-cell type. The others in the above model number are similar to those of the relevant wall-mount flowmeters (Refer to page 7 for details), except that the Relay option is not available.

**Example:** Model# ST302G-FC-DN50-5M-1 stands for standard solar-powered flowmeter, flow-cell type transducer for pipe size DN50mm, 5 meter transducer cable, GSM wireless.

Note: 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: ST302G-FC-IN2-1SF-1.
STUF-280T Ultrasonic Heat Meter

- Wear-and-tear free ultrasonic heat energy measurement. Highly reliable, long life-span. Low cost of ownership
- Not affected by water impurity or magnetic interference
- Maintenance-free. Saves on the operational cost
- Low pressure drop
- Compact and robust design
- For both hot and cold water
- Free positioning for mounting
- Battery lasts for 6 or more years
- Nominal pressure up to 1.6MPa
- Suitable for both commercial and residential applications
- Pulse / M-Bus / RS485 for remote readout
- Optional BACnet module for building automation
- Optional AMR data management and billing software
- IP65 enclosure

The STUF-280T heat meter offers the most advanced BTU measurement by employing state-of-the-art ultrasonic flow measurement technologies. It does not have moving parts for wear and tear and thus requires literally no maintenance. It is also very cost-effective. This means both commercial and residential installations can profit from the advantages of the wear-and-tear free heat measurement, namely, precision, operation security and long service life.

### Specifications

<table>
<thead>
<tr>
<th>Size* (mm)</th>
<th>Flowrate m³/h</th>
<th>Dimension</th>
<th>Weight**</th>
<th>Pipe Join***</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>qₙ</td>
<td>qₘᵢₙ</td>
<td>qₘₐₓ</td>
<td>L (mm)</td>
</tr>
<tr>
<td>15</td>
<td>1.5</td>
<td>0.03</td>
<td>3.0</td>
<td>130</td>
</tr>
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<td>20</td>
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</tr>
<tr>
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<td>3.5</td>
<td>0.07</td>
<td>7.0</td>
<td>130</td>
</tr>
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<td>20</td>
<td>180</td>
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<tr>
<td>80</td>
<td>40</td>
<td>1.6</td>
<td>80</td>
<td>225</td>
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<tr>
<td>300</td>
<td>600</td>
<td>24.0</td>
<td>1200</td>
<td>450</td>
</tr>
</tbody>
</table>

Note: * Larger size BTU meters are available upon request. ** Weight may differ depending on accessories. *** Pipe joint could be NPT / ANSI flange upon request

### Model Selection

**STUF-280T-DNx-y-z-w or STUF-280T-INx-y-z-w**

where x is the pipe size in mm, y is the output option (0: pulse, 1: M-Bus, 2: RS485), z is the pipe joint option (0: BSP, 1: NPT, 2: Metric Flange, 3: ANSI Flange), w is the thermal-well option (0: without, 1: with).

**Example 1:** STUF-280T-DN25-1-0-1 stands for the STUF-280T heat meter for pipe DN25mm with M-Bus, BSP joint and thermal well.

**Example 2:** STUF-280T-IN1-2-1-1 stands for the STUF-280T heat meter for pipe 1” with RS485, NPT joint and thermal well. **Example 3:** STUF-280T-DN100-1-2-0 stands for the STUF-280T heat meter for pipe DN100 with M-Bus and metric flange joint. No thermal well.
The STUF-280W water meter is similar to the STUF-280T heat meter. The only difference is that STUF-280T has RTD temperature sensors and STUF-280W does not. Therefore, please refer to the previous pages for the specifications.

Model Number: STUF-280W-DNx-y-z or STUF-280W-INx-y-z

where \( x \) is the pipe size in mm, \( y \) is the output option (0: pulse, 1: M-Bus, 2: RS485), \( z \) is the pipe joint option (0: BSP, 1: NPT, 2: Metric Flange, 3: ANSI Flange).


Automatic Meter Reading (AMR) System

A typical automatic meter reading system (AMR) is consisted of a number of STUF-280T/W heat/water meters and one or several M-BUS concentrators (BACnet bus not explained here.) Each concentrator can be connected to a data center computer directly or through a GPRS transceiver wirelessly.

STUF-280T/W uses M-BUS to communicate with the concentrator. M-BUS simply uses two non-polarized wires to achieve a variety of options for reliable meter reading, remote diagnosis, remote control, incremental pricing, time-based pricing, batch service, prepaid billing, etc. This BUS system is also simple and economical to wire and construct.

Based on many years’ meter reading experience, we have established a hierarchical heat management system architecture that is flexible, scalable, reliable and robust. This architecture has been fully implemented in our Data Center Manager software.

There are four layers in this software topology. The top layer is for the DTU management, upper middle layer for the area management, lower middle layer for the building management, and bottom layer for the client management. A DTU region could have several Areas, an Area could have many buildings, and a building could have many clients.

Hardware System Minimum Requirements

- CPU: Pentium 166 200MHz
- Memory: 64MB
- Hard Drive: 500MB
- Display: Resolution 1024x768, Color 256

Software System Minimum Requirements

- OS: Windows 2000 or above
- Database: Microsoft SQL Server 2000 or above
- Application software: Shenitech Data Center Manager
Today's cut-throat competition demands ever lower development cost and faster product development cycles. Outsourcing your product development to our design house, and you can shorten your development time and beat your competitors to the market.

**High-performance flow transmitter – STUF-1000Ex:**
Based-on high-speed digital signal processor (DSP) and sophisticated cross-correlation algorithms, STUF-1000Ex flowmeters can conduct flow measurement reliably and accurately in difficult applications, such as slurry, very small pipe, etc., or applications which need high robustness.

**Multi-path liquid flowmeter – PipeMaster PM1000:**
This system can support up to 8 paths for accuracy flow measurement. The transducer could be insertion, flow-cell or clamp-on.
PM1000 can be used for large pipe liquid flow measurement. It does not require 15D straight pipe run.

**OEM module:**
Shenitech provides a variety of OEM modules for industrial applications, such as process control, semiconductor manufacturing, medical metering, etc.

**Turn-key solutions:**
Shenitech has a long history of providing ultrasonic flow measurement solutions for a wide variety of customers. We have highly experienced engineering resources with in-depth know-how on ultrasonic flow measurement technologies, transducer design, advanced digital signal processing algorithms, DSP processors and hardware as well as software designs. Please contact Shenitech for details.

**Applications by Industry:**

**Water & Wastewater**
- Water distribution
- Water & wastewater treatment plants
- Cold/hot water flows in large building complexes, hospitals, schools, factories and offices to monitor & control usage
- Revenue metering
- Irrigation
- Sewage / Sludge
- Pipe leakage detection

**Oil**
- Oil, fuel / diesel Oil transfer
- Oil leakage detection
- Crude oil after first stage separator, crude oil offloading, water injection, etc.
- Vehicle/Ship engine efficiency monitoring
- Furnace efficiency monitoring
- Hydraulic/ Lubricant monitoring

**Chemicals**
- Chemical plants
- Process monitoring and control
- Additive dosing
- Corrosive/Abrasive liquid monitoring

**HVAC**
- Glycol or other liquids for HVAC
- Hydronic balancing
- Cooling / heating

**Industrial Automation**
- Process monitoring and control

**Building Automation**
- Building energy management, automatic remote metering and billing. Service facility management

**Food & Beverage**
- Sanitary flow monitoring
- Liquid food and drink processing, blending, batching, etc.

**Energy Production/Transfer**
- Solar/Geo-thermal system
- District heating / cooling
- Power plants (hydraulic, thermal, etc.)

**Pharmaceutical & Semiconductor**
- Dosing/Volumetric filling
- High purity flow monitoring
- Slurry
- Aggressive liquids flow measurement

**Paper & Pulp**
- Additives, bleaches, etc.
- Pulp

**Others**
- Steel plants
- Dredging, mining
- Plant and machinery construction