

## General:

TF1100 Transit-time Ultrasonic Flowmeter works on the transit-time method.

The **clamp-on ultrasonic transducers** (sensors) are mounted on the external surface of the pipe for non-invasive and non-intrusive flow measurement of liquid in fully filled pipe. Two pairs of transducers are sufficient to cover the most common pipe diameter ranges. In addition, its optional thermal energy measurement capability makes it possible to carry out a complete analysis of thermal energy usage in any facility.

The **Insertion ultrasonic transducers** (sensors) is hot-tapped mounting, there is no ultrasonic compound and coupling problem; Even though the transducers are inserted into pipe wall, they do not intrude into the flow, thus, do not generate disturbance or pressure drop to the flow. The insertion (wetted) type has the advantage of long-term stability and better accuracy.

This flexible and easy to use flow meter is the ideal tool for the support of service and maintenance activities. It can also be used for the control or even for the temporary replacement of permanently installed meters.

## Applications:

### General

- Service and maintenance
- Replacement of defective devices
- Support of commissioning process and installation
- Performance and efficiency measurement
- Evaluation and assessments
- Capacity measurement of pumps
- Monitoring of regulating valves
- Energy efficiency audits

**Water and waste water industry** – hot water, cooling water, potable water, sea water, etc

**Petrochemical industry**

**Chemical industry** –chlorine, alcohol, acids, thermal oils, etc

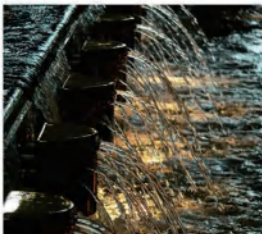
**Refrigeration and air conditioning systems**

**Food, beverage and pharmaceutical industry**

**Power supply**– nuclear power plants, thermal & hydro-power plants, heat energy boiler feed water, etc

**Metallurgy & mining applications**

**Mechanical engineering and plant engineering**– pipeline leak detection, inspection, tracking and collection.



Water & Waste Water



HVAC



Building



Petrochemical Industry

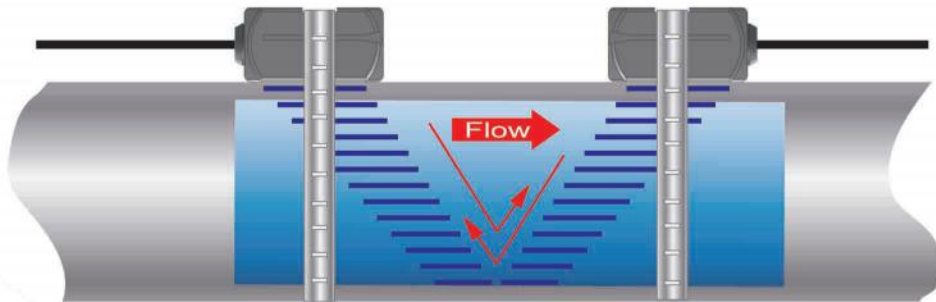


Metallurgy & Mining

## Principle of Measurement:

The Transit Time Difference Correlation Principle makes use of the fact that the time-of-flight of an ultrasonic signal is affected by the flow velocity of the carrier medium. Like a swimmer working his way across a flowing river, an ultrasonic signal travels slower upstream than downstream.

Our TF1100 ultrasonic flow meters work according to this transit-time principle:



$$V_f = K dt / TL$$

Where:

$V_f$ : Flow velocity

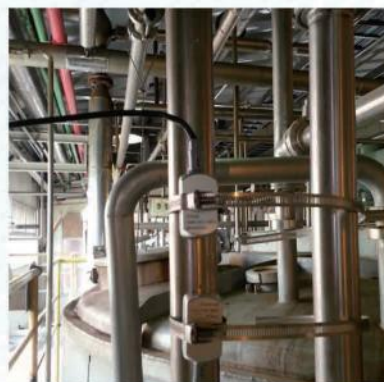
$K$ : Constant

$dt$ : Difference in time of flight

$TL$ : Average Transit Time

When the flow meter works, the two transducers transmit and receive ultrasonic signals amplified by multi beam which travels firstly downstream and then upstream. Because ultrasonic sound travels faster downstream than upstream, there will be a difference of time of flight ( $dt$ ). When the flow is still, the time difference ( $dt$ ) is zero. Therefore, as long as we know the time of flight both downstream and upstream, we can work out the time difference, and then the flow velocity ( $V_f$ ) via the following formula.

## Application Pictures:



# Portable Transit-Time Ultrasonic Flowmeter TF1100-EP



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## Features:

- 50-hour battery (rechargeable), color LCD display all integrated into a rugged, watertight enclosure.
- Data logger function.
- The heat measurement function by configuring with paired temperature sensors.
- Non-invasive transducers.
- Wide bi-directional flow range of 0.01 m/s to 12 m/s. Wide liquid temperature range:  $-35^{\circ}\text{C}$ ~ $200^{\circ}\text{C}$ .
- Works reliably in both clean and somewhat dirty liquids with turbidity $<10000\text{ppm}$ .
- Lightweight and easily transportable in box.

## Specifications:

### Transmitter:

|                            |   |
|----------------------------|---|
| Measurement principle      | Ultrasonic transit-time difference correlation principle                  |
| Flow velocity range        | 0.01 to 12 m/s, bi-directional  |
| Resolution                 | 0.25mm/s  |
| Repeatability              | 0.2% of reading   |
| Accuracy                   | ±1.0% of reading at rates >0.3 m/s;±0.003 m/s of reading at rates<0.3 m/s |
| Response time              | 0.5s  |
| Sensitivity                | 0.003m/s  |
| Damping of displayed value | 0-99s(selectable by user)   |
| Liquid Types Supported     | Both clean and somewhat dirty liquids with turbidity <10000 ppm           |
| Power Supply               | AC: 85-265V Up to 50 hours with fully charged internal batteries          |
| Enclosure type             | Portable  |
| Degree of protection       | IP66  |
| Operating temperature      | -20°C to +60°C  |
| Housing material           | ABS   |
| Display                    | 4.3" color LCD display, 16 keys   |
| Units                      | User Configured (English and Metric)                                      |
| Rate                       | Rate and Velocity Display   |
| Totalized                  | gallons, ft³, barrels, lbs, liters, m³,kg                                 |
| Thermal energy             | unit GJ, KWh can be optional  |
| Communication              | 4~20mA,OCT, RS232, RS485 (Modbus),Data Logger, GPRS                       |
| Size                       | 270X215X175mm   |
| Weight                     | 3kg   |

### Transducer:

|                           |  |
|---------------------------|--|
| Degree of protection      | IP65 according to EN60529.(IP67 or IP68 Upon request)    |
| Suited Liquid Temperature | -35°C~200°C  |
| Pipe diameter range       | 20–50mm for type B, 40–5000mm for type A                 |
| Transducer Size           | Type B 40(h)*24(w)*22(d)mm<br>Type A 46(h)*31(w)*28(d)mm |
| Material of transducer    | Aluminum + Peek  |
| Cable Length              | Std: 5m  |
| Temperature Sensor        | PT1000 clamp-on Accuracy: ±0.1%                          |

## Configuration Code:

### TF1100-EP Portable Transit-time Ultrasonic Flowmeter

#### Power supply

A 85-265VAC

#### Output Selection 1

N N/A

1 4-20mA (accuracy 0.1%)

2 OCT

3 RS232 Output

4 RS485 Output (ModBus-RTU Protocol)

5 Data storage function

6 GPRS

#### Output Selection 2

Same as above

#### Output Selection 3

#### Transducer Type

B DN20-50 -35~200°C

A DN40-5000 -35~200°C

#### Temperature Input Sensor

N None

T Clamp-on PT1000(DN20-1000) (0~200°C)

#### Pipeline Diameter

DNX e.g.DN20—20mm, DN5000—5000mm

#### Cable length

5m 5m (standard 5m)

Xm Common cable Max 300m(standard 5m)

XmH High temp. cable Max 300m

TF1100-EP -A -1 -2 -5 / LTP -A -N - DN100 - 5m (example configuration)

#### Description:

Power supply: 85-265VAC; output: 4-20mA, OCT & Data storage function; transducer type: A for DN40-5000 -35-200°C; Without PT1000 temperature sensor; DN100 application; 5m transducer cables.