

## Ultrasonic Flowmeter UF5000X

The UF5000X is a liquid ultrasonic flowmeter designed for accurate and reliable measurement of flow rate and total flow in full pipe applications. It can be supplied for measuring flow of water, oil and virtually every liquid in Water and Waste water , Oil , Chemical, Petrochemical and other industries.

The UF5000X operates based on transit-time technique. After proper installation, an accuracy of 1% is achievable in most applications, matching the performance of factory calibrated meters or meters using expensive spoolpieces.

Using clamp-on transducers , the UF5000X measures flow through metal, plastic and asbestos pipes, the electronic system is micro-processor based, enabling to process the signals rapidly and accurately with no drift. Measurement is noncontaminating , obstructionless and causes no pressure drop. With no moving parts to wear out or orifices to clog, the UF5000X never needs regular maintenance.

High accuracy, fast response, easy installation and operation, programming facilities for signaling the control unit and alarms, and many other useful features of the UF5000X make it ideal for use wherever accurate, reliable and economical long-term flow measurement is critical to process and product quality.

### Advantages

- Minimal installation effort and costs
- Reliable and long term service with no mechanical wear
- Free from pressure loss, choking and corrosion and leakage
- No cutting of pipes necessary, no interruption of process, no plant shut down
- Measurement is independent of fluid conductivity and pressure
- Clamp-on sensors that are simply fitted to the outside wall of the pipeline
- Suitable for both laminar and turbulent flow
- Cost advantages when used with large diameter pipes, high pressure systems, etc.
- Low stocking costs, nearly all pipe sizes are covered with only 1 type of sensor
- Hygienic measurement, no risk of contamination, suitable for ultra clean liquids

### Applications

- **Water Service and Sewage Treatment**  
Locate water leaks or determine flow direction in service pipes.
- **Chemical Plants**



Measure chemical liquids which is corrosive and high viscous

- **Power Plants**  
Monitor flow of boiler feed water supply, condensate, turbine oil, etc.
- **Processing Plants**  
Measure cooling water or corrosive liquids.
- **Food and Beverage Processors**  
Use with products for sanitary condition or washing and process water.
- **Semiconductor Manufacturing**  
Install on pure water feed lines.
- **Office and Large Residential Environments**  
Applicable to fresh water supplies
- **Plating and Finishing Operations**  
Applications include process water and petroleum based fluids.
- **Pumping Efficiency**
- **Leakage Detection**

### Technical Data

#### Measuring

|                      |                                |
|----------------------|--------------------------------|
| Measuring principle: | Ultrasonic transit-time method |
| Flow velocity:       | 0.01 to 25 m/s                 |
| Resolution:          | 0.0015 m/s                     |
| Repeatability:       | 0.25%                          |
| Accuracy:            | ±1% to ±3% (Volume flow)       |

#### Fluid Conditions

|                 |  |
|-----------------|--|
| Type of liquid: | Water, sewage, Industrial water, sea water, oil, petrol, gasoline, etc. (Any liquid through which ultrasonic signal can pass.) |
|-----------------|--|

|                      |   |
|----------------------|---|
| Solid concentration: | Depends on the pipe size:               |
| Diameter             | 3"    6"    12"    20"    36" and above |
|                      | 10%   7%    3%    2%    1% of volume    |

|                |  |
|----------------|--|
| State of flow: | Axis-symmetric flow in full (pressurized) pipe |
|----------------|--|

#### Piping conditions

|                |                               |
|----------------|-------------------------------|
| Pipe material: | All kinds of metals, plastics |
|----------------|-------------------------------|

|                       |   |
|-----------------------|---|
|                       | ceramics, asbestos, etc. (with the exception of normal concrete.) |
| Lining material:      | None, epoxy, mortar, rubber, etc.                                 |
| Pipe size:            | 3 to 120 inches nominal diameter                                  |
| Straight pipe length: | At least 10D at upstream and 5D at downstream                     |

## Transmitter

|                        |   |
|------------------------|---|
| Functions:             | indication of flow rate, total flow, status, self test, calibration, re-scale |
| Enclosure:             |   |
| - Deg. Of protection:  | IP 65   |
| - Material:            | Aluminum  |
| - Dimensions:          | 340×250×80 mm (without hinges)  |
| Power supply:          | 220 VAC, 12 VDC   |
| Battery (option):      | Ni-Cd, 6 hours continuous operation times                                     |
| Power consumption:     | 5W or less  |
| Display:               | 24 character, 2 lines alphanumeric display                                    |
| Key pad:               | Front panel mounted, 6 keys   |
| Operating temperature: | -10 to 55 °C  |
| Ambient humidity:      | Up to 90% RH  |
| Response time:         | 1 sec or less   |

## Principle

With the Transit-Time Ultrasonic Flowmeter the time for the sound to travel between a transmitter and a receiver is measured.

Two transmitters / receivers (transceivers) are located on each side of the pipe. The transmitters send pulsating ultrasonic waves in a predefined frequency from one side to the other. The difference in frequency is proportional to the average fluid velocity.

Downstream pulse transmit time can be expressed as:

$$t_{12} = L / (c + v \cos \Phi) \quad (1)$$

Upstream pulse transmit time can be expressed as:

$$t_{21} = L / (c - v \cos \Phi) \quad (2)$$

From (1) and (2) c can be eliminated and so v is equal to:

$$v = [(L / 2 \cos \Phi) \times (t_{21} - t_{12})] / (t_{21} \cdot t_{12})$$

To obtain the average axial flow velocity, some order of correction to the measured flow velocity is required. One way to utilize this correction, K, is to use the Reynolds number as a measure of the flow profile, and adjust the measured axial flow velocity according to a function based on the Reynolds number estimated. The volume flow rate at reference conditions is calculated from Equation below:

$$Q = A \cdot (K v)$$

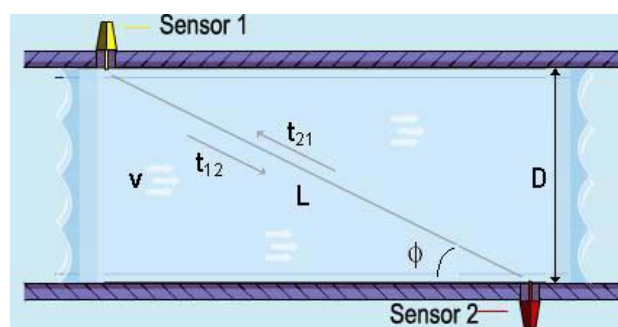
|                       |  |
|-----------------------|--|
| Output signal:        | 4-20 mA DC isolated, 1 point, 1000 ohms max.   |
| Input signal:         | 4-20 mA DC (not isolated), 1 point             |
| Serial communication: | RS-232, 1 point, 15m max transmission distance |
| Relays:               | Four programmable relays, SPDT, 1 A at 24 VDC  |

## Software

|                   |  |
|-------------------|--|
| Functions:        | Assigning system parameters or downloading of parameters set |
| Operating system: | Windows 95, 98, ME, NT, 2000, XP                             |

## Transducer

|                        |                                   |
|------------------------|-----------------------------------|
| Diameter range:        | 3 to 120 inches                   |
| Frequency:             | 320-1280 kHz                      |
| Mounting method:       | Clamp-on outside wall of the pipe |
| Enclosure:             | Immersion proof type              |
| Protection:            | IP 65                             |
| Operating temperature: | -20 to 60 °C                      |
| Ambient humidity:      | Up to 100% RH                     |
| Cable:                 | Special type triax cable          |
| Dimensions:            | 30 × 60 × 60 mm                   |



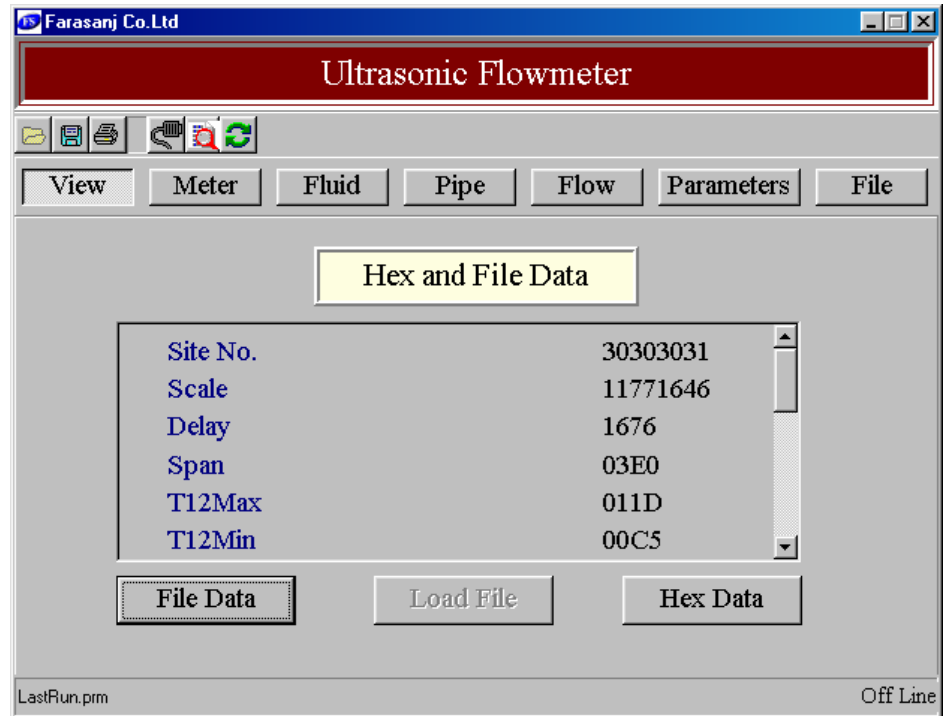
As can be seen from these equations, the flow velocity measured along the ultrasonic cord does not depend on pressure, temperature or any other process parameter.

This is a very important characteristic of an ultrasonic flow meter, as it implies that no adjustment due to changes in e.g. liquid composition is required.

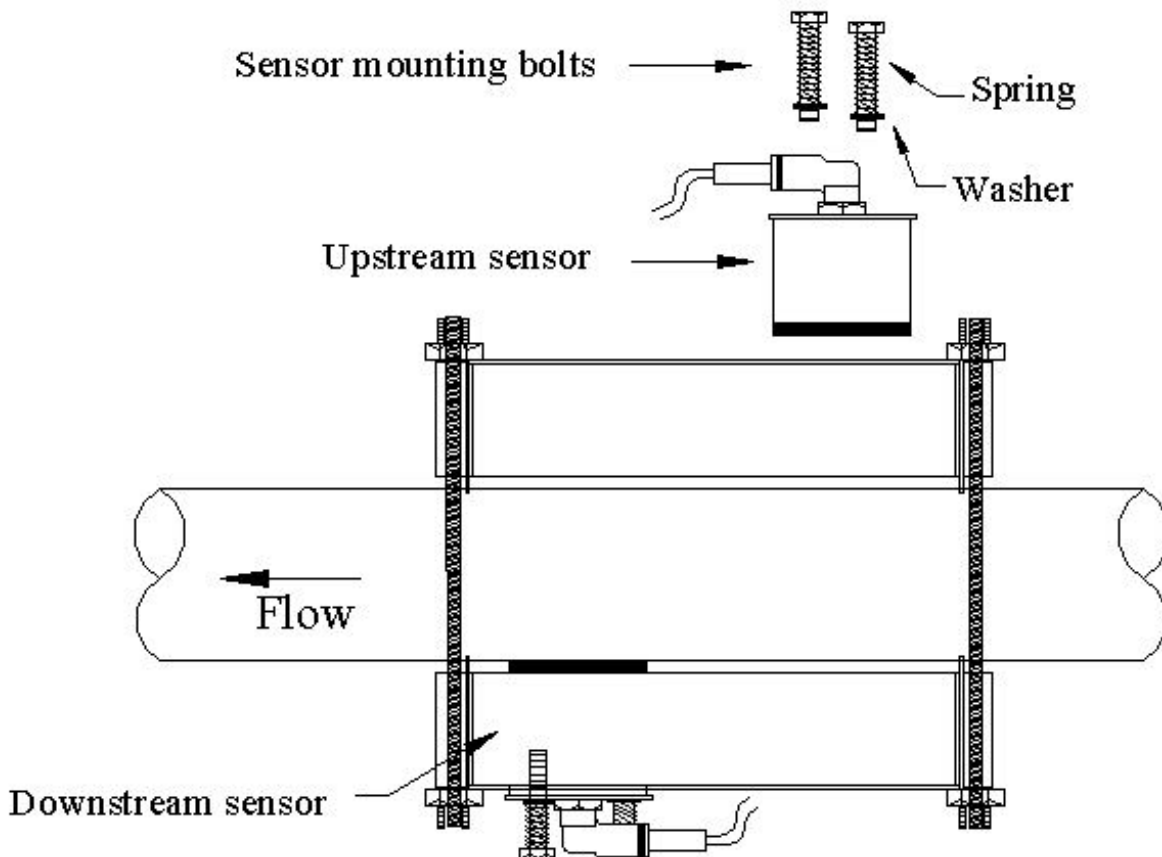
Accordingly, an ultrasonic flow meter should present valid measurements independent of the process conditions. That is, within the flow, pressure and temperature range specified for the meter in question.

## Software

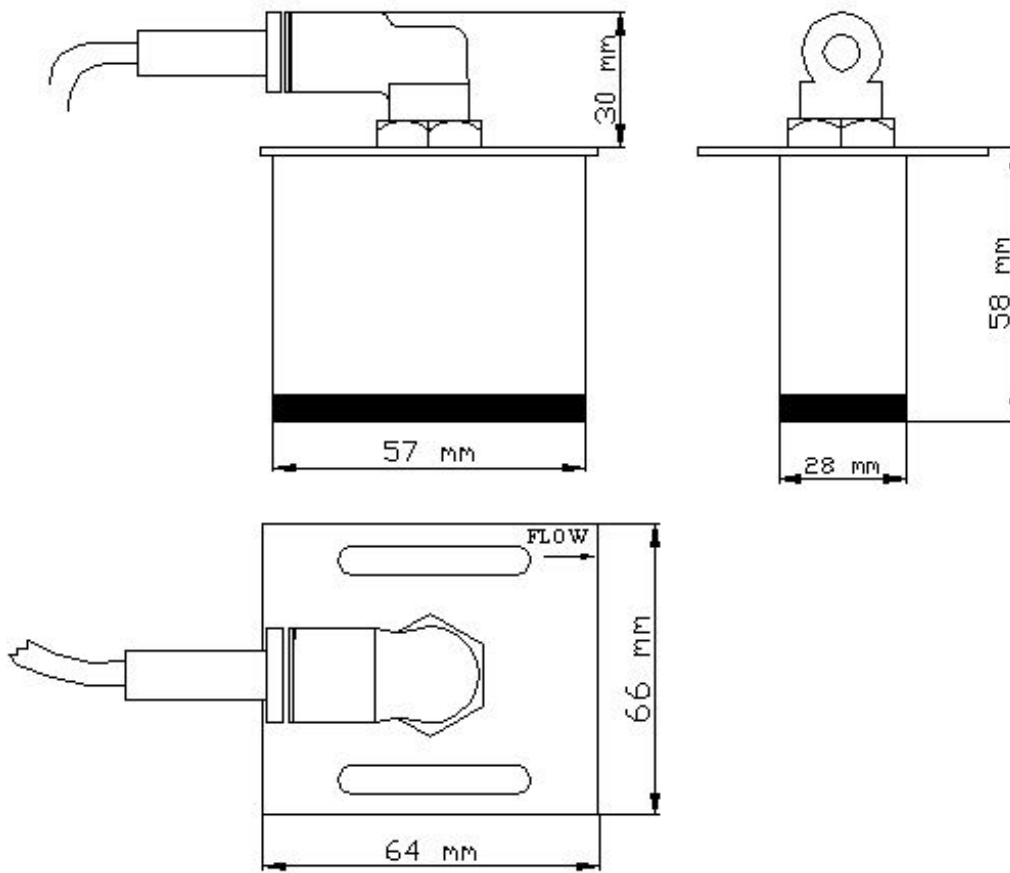
The UF5000X system enjoys a comprehensive, fully interactive and user friendly windows based software. This software is used to program the system, and introduce the specification of the fluid and pipe line and reveals the mounting configuration of the sensors. It transfers the required data to the electronics enclosure of the system, via RS232 serial port.



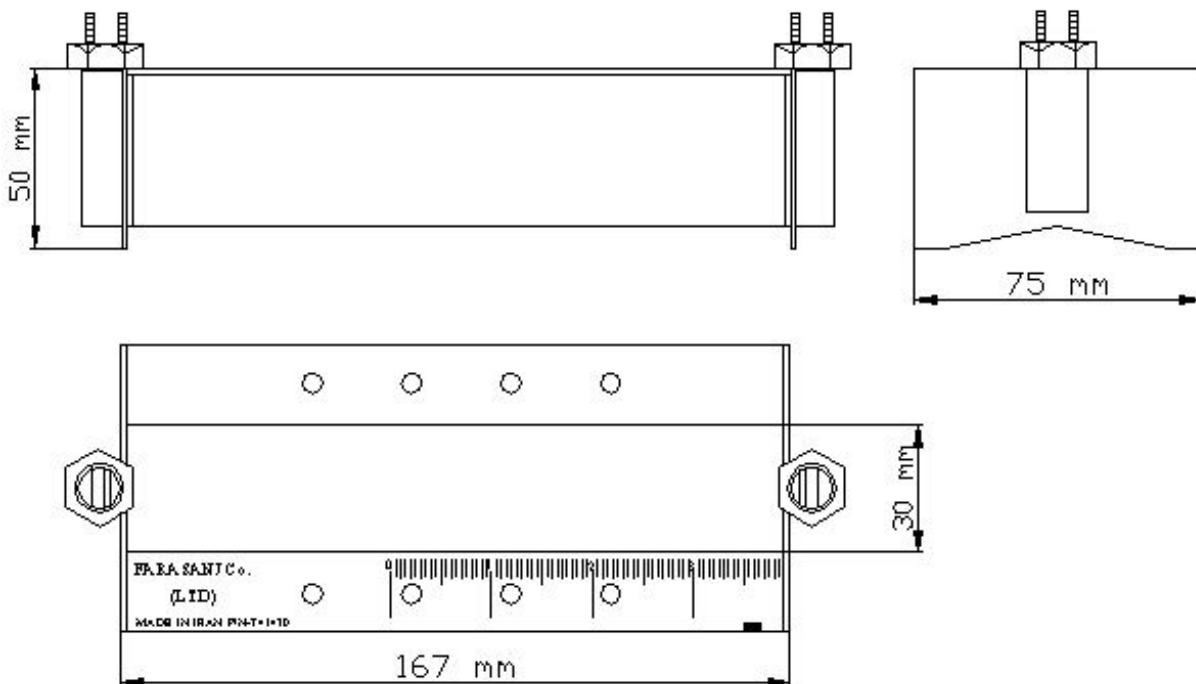
## Typical Sensor Mounting Configuration



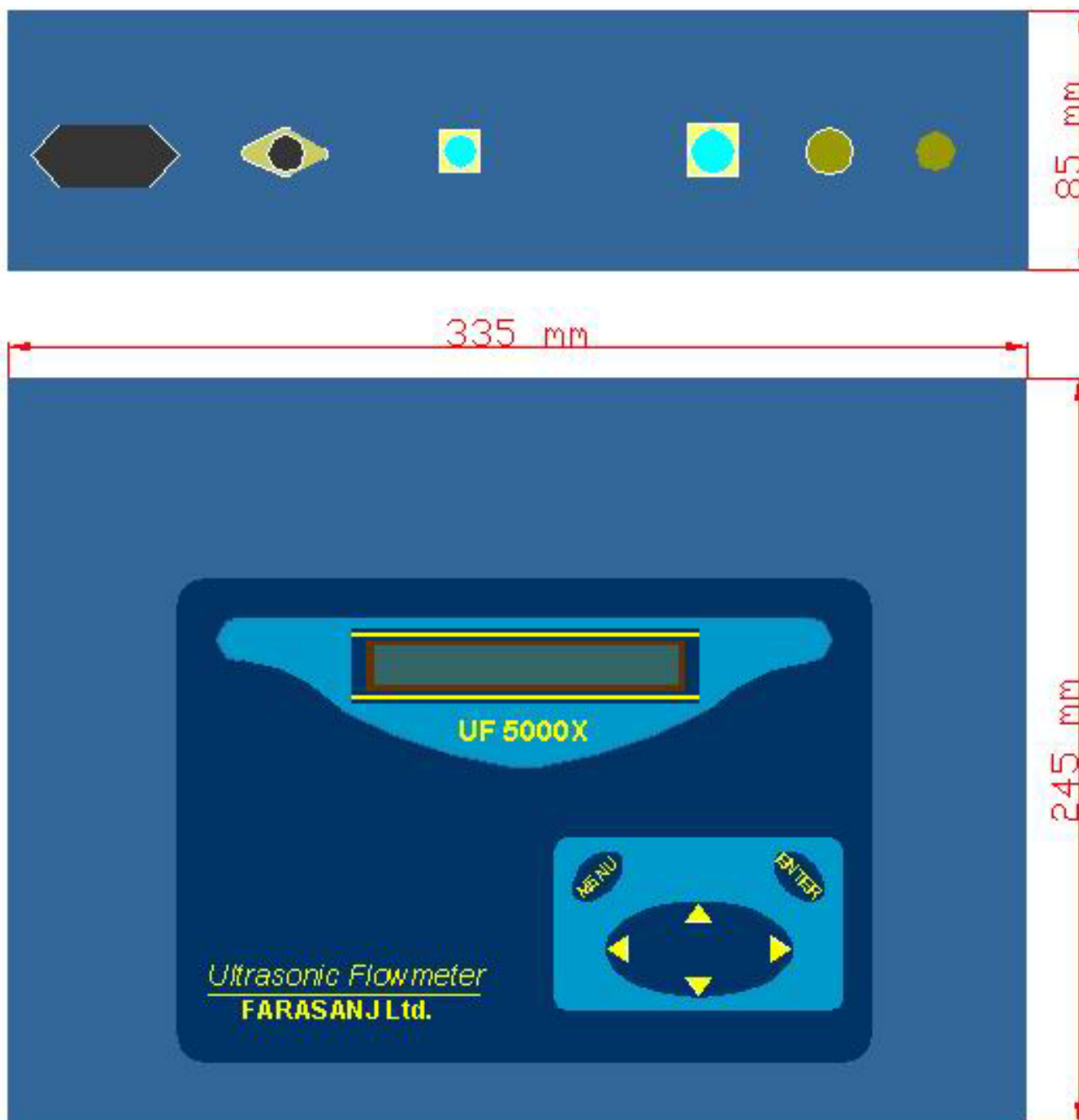
## Dimensions of the Sensor



## Dimensions of the Sensor Holder



## Dimensions of the Housing



## FARASAN ABAZR Co., Ltd.

No. 32, Delara Street,

Vali Asr- Beheshti Cross, Tehran, Iran

Postal code : 15969

Te l : +98-21-8729692

Fax : +98-21-8726549

Internet : [www.farasanj.com](http://www.farasanj.com)  
E-mail : [Info@farasanj.com](mailto:Info@farasanj.com)

Information in this catalogue is subject to change without notice.