



Portable Type



Wall Mount Type



Panel Mount Type



Hand Held Type

### Introduction

MUF series ultrasonic Flow Meter adopts a state-of-the-art Single-board technology featuring high precision, high reliability, high performance, low price, etc. that make it the ultrasonic flow meter of choice by many customers from all over the world.

### Features

- The sensors being clamp-on type, there's no pressure loss. The sensors are easily mounted on the surface of the pipe without interrupting the flow for installation or maintenance.
- Advanced intelligent display, computation and printing to suit user's diversified requirements. The flow is displayed in all pertinent engineering units. It runs out of regular power (110V/220V), built-in batter or DC power.
- Using the most advanced direct-time-measuring method, the meter offers a signal resolution of 0.2ns. In addition, advanced data processing functions ensure UFM series of high linearity.
- Signal outputs including current signal, frequency signal, serial data, switch outputs (1 OCT and 1 relay output). All the outputs displayed on the unit can be transmitted to a PC via RS-232C for further processing or storage.

### Description

When an ultrasonic wave travels in a liquid, the flow of the liquid will cause its speed to change. When it travels in the flow direction, its speed increases and against it, decreases. By measuring the difference in travel times between both directions, one can measure the flow speed.

As shown in Chart 1, a pair of sensors is mounted upstream and downstream on the surface of the pipe. The mounting configuration can be 'Z' or 'V'. The time-difference of ultrasonic signals transmitted and received across upstream and downstream are calculated as below;

$$TUP = \frac{MD}{C_0 + V \sin \theta} \quad (1) \quad TDOWN = \frac{MD}{C_0 - V \sin \theta} \quad (2)$$

M - travel time, D - inner diameter,  $\theta$  - transmit angle,  
C0 - fluid static sound velocity

TUP – travel time of upstream signal

TDOWN – travel time of downstream signal

$\Delta T$ - time difference as per equations (1) and (2),

Using these, we can get the average velocity across the pipe diameter :

$$V = \frac{MD}{\sin 2\theta} * \frac{\Delta T}{Tup * Tdown}$$

## Technical Specifications

### Liquids Measured

Water and other clean liquids with a content of suspended solids less than 10000ppm (mg/l) without a high content of air bubbles. The fluid temperature between -20 and +150(without ice at low temperature).

### Pipe Materials Measured

Steel, stainless steel, cast iron, plastics etc.  
(20 ~ 6000mm)

### Up & Down Stream Straight Runs

In the upstream, it must be 10D and in the downstream 5D.

If there's a pump in the upstream, the upstream straight run should be increased to at least 30D from the pump.

**Flow Velocity:** 16m/s ~ 0 ~ +16m/s

**Measurement Accuracy:**  $\pm 0.5 \sim 1\%$  of rate

**Repeatability:**  $\pm 0.2 \sim 0.5\%$  at 0.3 ~ 16 m/s

**Linearity:**  $\pm 0.5\%$

**Pipe size:** 20mm ~ 6000mm (ID)

**Display:** Alphanumeric 2x20 digit backlight LCD  
Total, flow velocity and instant flow rate

4x4 keyboard

**Output:** 0/4 ~ 20mA(precision 0.1%)

**Frequency output:** 12 ~ 9999Hz

Relay Output

RS-232 serial output (Optional RS-485)

### Power Requirement

**Wall mount type:** 110V/220VAC & 24VDC

**Portable type:** 220VAC

**Panel type:** 110V/220VAC or 24VDC

**Hand-held type:** 100V-240VAC

**Printer output:** Via RS-232C, Total flow, flow velocity, instant flow, etc.

### Operating Condition:

#### Host:

Temperature: -20 ~ +40

Humidity: 85% RH max.

#### Sensor:

Temperature : -30 ~ +150 .

Humidity: 98% RH max

(Can work up to 2mtr. under water)

## Weight

Wall mount Type - 3.1kg

Portable Type - 6.5kg

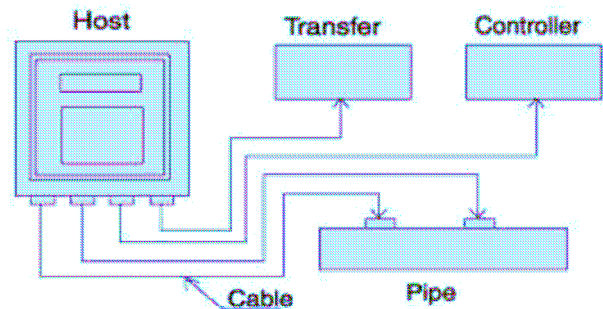
Panel Type - 2kg

Hand-held Type - 4.5kg

## Sensor Distance

The distance between front edges of the sensors. When the required parameters are entered, the meter calculates the distance automatically(M25 window).

## SYSTEM SCHEMATIC



## Transducer Type

### Clamp on:

Standard - M ( 50 ~ 1000 mm range )

Standard - S ( 20 ~ 150 mm range )

Standard - L ( 300 ~ 6000 mm range )

### Insertion:

Insert Sensor1(apply to straight insert)

Insert Sensor2(apply to insert in angle)

Insert Sensor3(apply to cement pipe)

### Frame Sensor for hand-held:

S(20 ~ 150 mm range)

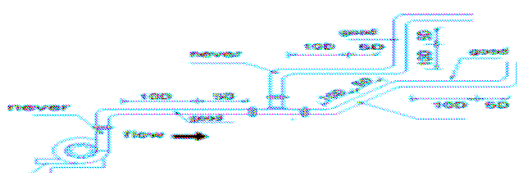
M ( 50 ~ 1000 mm range )

## Applications

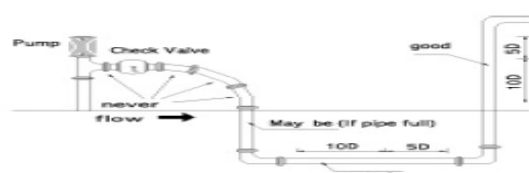
- Water supply, the processor of filthy water
- Oil field, petroleum chemical engineer system
- Power plant (heat power, water power, fire power)
- Steel factory, mining industry.
- Food, Medicine, paper-made
- Automobile making and check-up
- Semi-conductor (Pure water)
- Heat net balance of heat supply system

## Sensor Location

### Site Selection



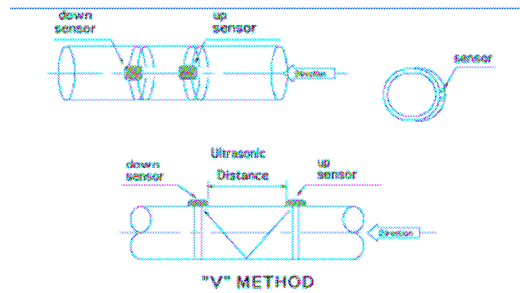
### Sensor Location



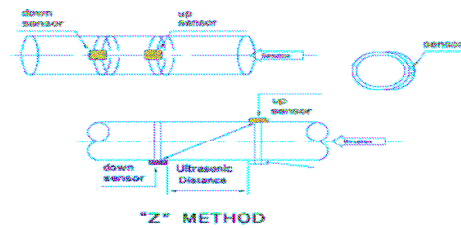
## Mounting method of sensor

There are two mounting methods, 'V' method and 'Z' method:

'V' method : Usually "V" method is the standard method. It's easier to install and offers high degree of accuracy. The of pipe diameter that "V" method can measure is 25~6000mm; while mounting, two sensors should be horizontal aligned(their axes and center lines should be aligned). At the some time, on the horizontal pipe, sensors must be horizontally and symmetrically to prevent air bubble on the upper part of the pipe, this will negatively affect measurement accuracy. (Note: Pay attention to the positions of sensors (UP or DOWN) relative to the flow direction.).



'Z' method: When the signal can be attenuated or interfered by scale built up inside pipe, by a thick liner, suspended solids in the fluid, etc., use 'Z' method instead. Using 'Z' method ultrasonic wave spreads in the pipe directly without diffraction (straight sound signal path).



## Transducer

### Clamp on:

Standard – L ( 300 ~ 6000 mm range )

Standard – M ( 50 ~ 1000 mm range )

Standard – S ( 20 ~ 150 mm range )



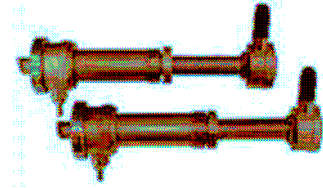
### Insert Sensor



Insert Sensor1  
(apply to straight insert)



Insert Sensor2  
(apply to insert in angle)



Insert Sensor3  
(apply to cement pipe)

### Frame Sensor for Hand-held:

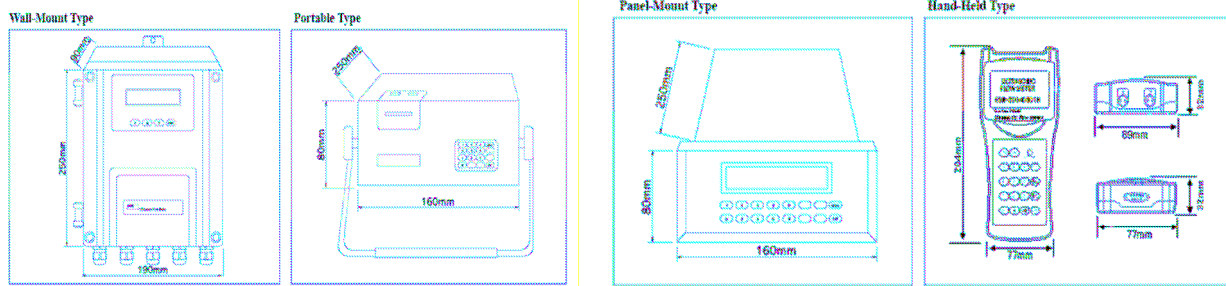


S (20 ~ 150 mm range)

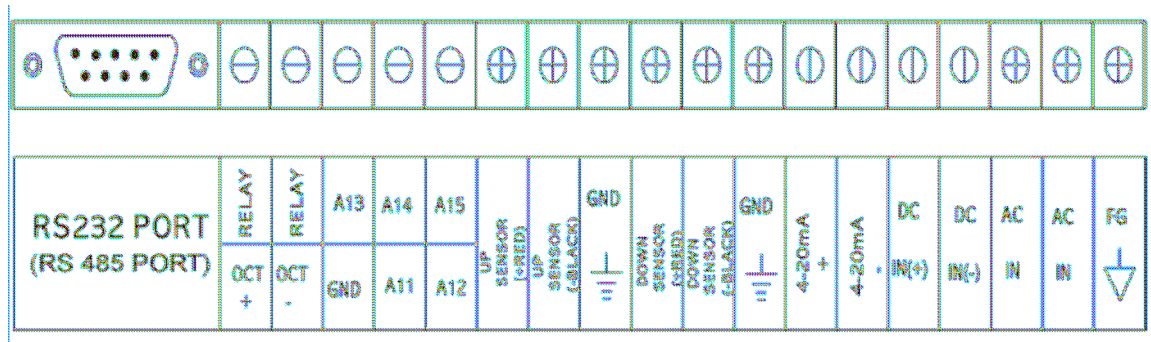


M (50 ~ 1000 mm range)

## Host Dimension



## Wiring Connection



## Ordering Information

MUF	I	II	III	IV	V	(VI)	(VII)
<b>I</b>	Main Set	<b>WM</b> Wall-mount	<b>PM</b> Panel-mount	<b>N</b> Net Wall-mount	<b>F</b> Flameproof	<b>P</b> Portable	<b>H</b> Hand-held
<b>II</b>	Power	<b>A</b> ACC220		<b>B</b> Battery	<b>C</b> Electricity circle		<b>D</b> DC24-36
<b>III</b>	Sensor	<b>C</b>	Clamp-on Sensor	<b>S</b>	Standard S Sensor(apply to DN15-DN150mm)		
				<b>M</b>	Standard M Sensor(apply to DN50-DN1000mm)		
				<b>L</b>	Standard L Sensor(apply to DN300-DN6000mm)		
		<b>I</b>	Insert Sensor	<b>1</b>	Insert Sensor(apply to straight insert)		
				<b>2</b>	Insert Sensor(apply to insert in angle)		
<b>3</b>	Insert Sensor(apply to cement pipe)						
<b>P</b>	Pipe Sensor						
<b>IV</b>	Pipe Diameter (DN)						
<b>V</b>	Cable Length						
<b>UHM-H Ultrasonic Heat Meter</b>							
<b>VI</b>	Temperature scope (Ultrasonic Heat Meter)						
<b>VII</b>	Size of Temperature				Pt100.pt1000.Si ect.		
Example: MUF 612 -WM-A-M-300mm-10M							
Explain: Wall-mount,220V power, standard M sensor, pipe DN300mm,10M cable.							

Continuous product development may cause changes in the above information without notice.



[www.mikamachiinc.com](http://www.mikamachiinc.com)

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