



## AYVAZ ULTRASONIC FLOWMETER

### GENERAL FEATURES

Clamp-on sensors, capable of transmitting ultrasonic sound, are mounted on the outer surface of any type of pipe that contains clean liquids such as chemicals, oils, and water without any air bubbles. The installation of clamp-on sensors is done without interrupting the flow. This prevents pressure drops and blockages in the pipeline, resulting in savings in labor and time.

The measurement system consists of a pair of acoustically coupled ultrasonic sensors mounted on the outside of the pipe. The server unit analyzes the signals transmitted and received by the sensors. This unit sends signals to control and process systems through an interface.

### TECHNICAL SPECIFICATIONS

**Operation:** Suitable for fully filled pipes containing clean liquids with less than 1% solid particles and gas bubbles.

**Configuration:** Internal keypad

#### Transmitter

**Accuracy:** Better than  $\pm 1\%$  Linearity:  $\pm 0.5\%$  Stability:  $\pm 0.2\%$

**Power Supply:** 24 VDC

**Outputs:** 4-20 mA, Pulse, Relay

**Inputs:** 3 channels of 4-20 mA Analog, 2 channels of 3-wire resistance (PT100)

**Communication:** RS485, MODBUS, M-BUS

**Operating Temperature:**  $-20 \dots 110$  °C

**Protection:** IP 20

**Dimensions:** 90x90x36 mm

### Sensors

**Pipe Diameter:** Suitable for pipes with internal diameters ranging from DN 15 to DN 6000 mm.

**Pipe Materials:** Compatible with various pipe materials made of metal or plastic that can transmit ultrasonic sound, including carbon steel, stainless steel, cast iron, ductile iron, PVC, PVDF, fiberglass, copper, brass, aluminum, and internally coated pipes (such as epoxy, rubber, Teflon, asbestos).

**Operating Temperature:** For standard sensors:  $-30 \dots +90$  °C (TL-1, TM-1, TS-2). For high-temperature sensors:  $-30 \dots +160$  °C (HTM-1, HTM-1).

**Sensor Mounting Kit:** Includes stainless steel mounting clamps and acoustic coupling gel.

**Sensor Cable:** Standard 5 meters in length.

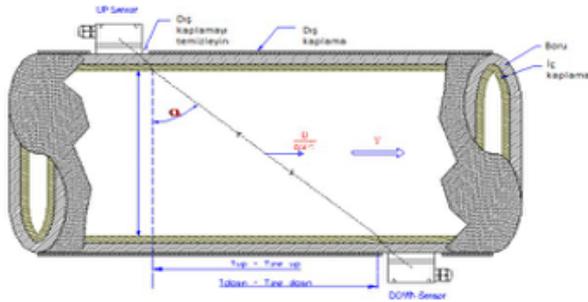
**Measurement Range:** 0.01...30 m/s

**Accuracy:** Better than 0.5%

**Measurement Period:** 500 ms

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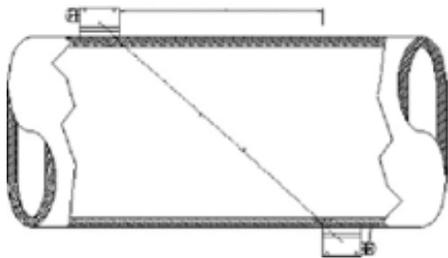
Ultrasonic waves propagate through the liquid, and the propagation time changes depending on whether the flow is in the forward or reverse direction. If the ultrasonic wave propagates in the same direction as the flow, the propagation speed increases. If it propagates in the opposite direction, the propagation speed decreases. By accurately measuring the difference between the two propagation times, it is possible to calculate the flow velocity. (Refer to the image below.)



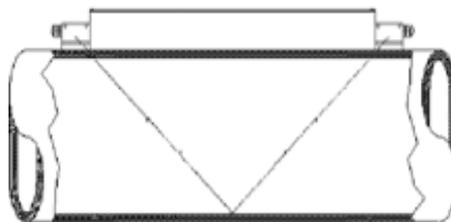
## Sensor Mounting Methods

Sensors can be mounted on vertical (upward flow) or horizontal pipes. The pipe must be completely filled with liquid. The selection of the V, Z, or W mounting types depends on the application and pipe diameter. The "V" type is the most common, while the "Z" mounting is used for larger diameter pipes or weak signal applications. The "W" type is used for smaller diameter pipes.

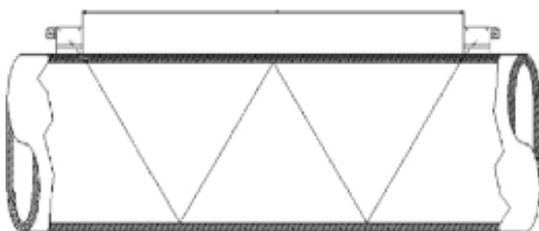
"Z" INSTALLATION



"V" INSTALLATION



"W" METHOD





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