Datasheet

Wall-Mounted Ultrasonic Flowmeter

AI-U40

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The ultrasonic flow meter is suitable for continuously measuring the flow rate of most single, homogeneous liquids that do not contain high concentrations of suspended particles or bubbles in industrial environments. It supports heat integration functionality, which is achieved by adding a pair of temperature sensors to the ultrasonic flow meter to enable heat metering. This product can be widely applied in the petroleum, chemical, power, food, and other industrial sectors.

Applications

- Petroleum
- Chemical
- Power
- Food
- Other industries

Wall-mounted ultrasonic flow meter

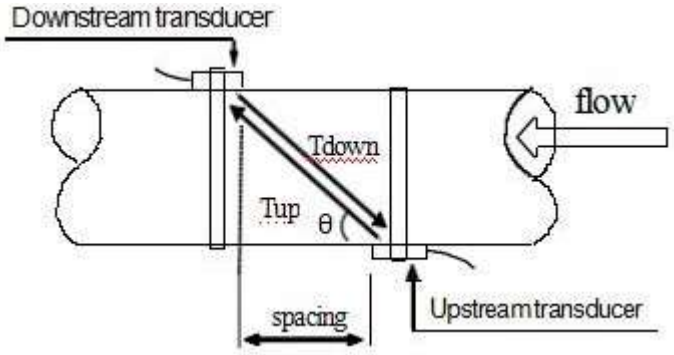
Features

- Measurement Precision: Accurate flow measurement for a wide range of homogeneous liquids.
- Heat Integration: Supports heat metering with additional temperature sensors.
- Versatile Applications: Suitable for various industrial sectors.
- Simple Installation: Clamp-on and insertion methods for easy and non-intrusive installation.
- Material Independence: Measurement unaffected by pipe wall or lining materials (for insertion type)

Principle

The wall-mounted ultrasonic flow meter utilizes two transducers that function as both ultrasonic transmitters and receivers. The transducers are clamped on the outside of a closed pipe at a specific distance from each other. The transducers can be mounted in V-method where the sound transverses the pipe twice, or W-method where the sound transverses the pipe four times, or in Z-method where the transducers are mounted on opposite sides of the pipe and the sound crosses the pipe once. This selection of the mounting method depends on pipe and liquid characteristics. The flow meter operates by alternately transmitting and receiving a frequency modulated burst of sound energy between the two transducers and measuring the transit time that it takes for sound to travel between the two transducers. The difference in the transit time measured is directly and exactly related to the velocity of the liquid in the pipe, show as follows:

$$V = \frac{MD}{\sin 29} \times \frac{\Delta T}{T_{up} . T_{down}}$$



Where:

θ is the include angle to the flow direction
M is the travel times of the ultrasonic beam
D is the pipe diameter
T_{up} is the time for the beam from upstream transducer to the downstream one
T_{down} is the time for the beam from downstream transducer to the upstream one
ΔT=Tup –Tdown

Parameters

Parameters	
measured variable	Directly Measured Variable: Flow Velocity Calculated Measurement Variable: Volumetric Flow Rate
Typical Flow Rate Range	0.3m/s~10m/s
Nominal Diameter	external clamp：DN50~DN700 inserted：DN50-DN6000
Accuracy	±1%
Resolution	0.001m/s
Repeatability	0.2%
Operating Frequency	100Hz
Response Time	0.2s

output		
Transmitter Output	Output Type: (4~20)mA Output Accuracy: 0.1%FS Output Load: <500Ω	Output Type: (4~20)mA Output Accuracy: 0.1%FS Output Load: <500Ω
Communication Output	Output Type: RS485 Communication Protocol: MODBUS	Output Type: RS485 Communication Protocol: MODBUS
Frequency/Pulse Output	Pulse Width: Adaptive Pulse Coefficient: Configurable	Pulse Width: Adaptive Pulse Coefficient: Configurable

Electrical Specifications	
Power Supply	AC: (85-265)VAC DC: (10~30)VDC
Power Consumption	1.5W
Electrical Interface	M20*1.5

Process Conditions	
Medium Temperature	-30℃-90℃

Environmental Conditions	
Ambient Temperature	-20℃-60℃
Storage Temperature	-40℃-80℃
Protection Level	IP65

Wiring

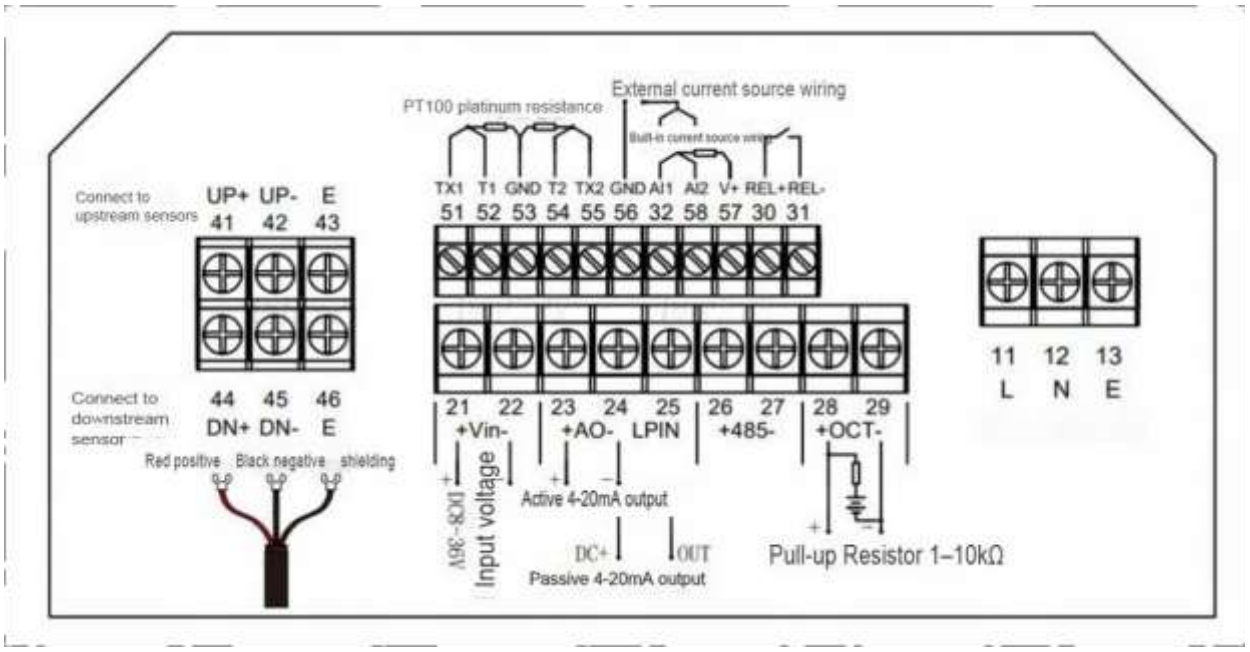


Fig.1 Two terminal diagram

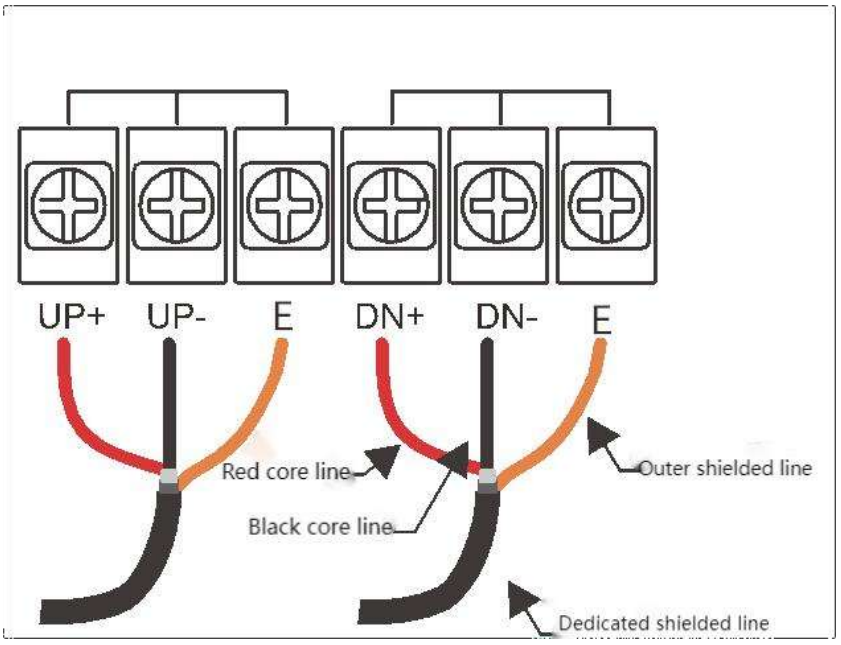


Fig.2 Sensor Connection Host

Dimensions

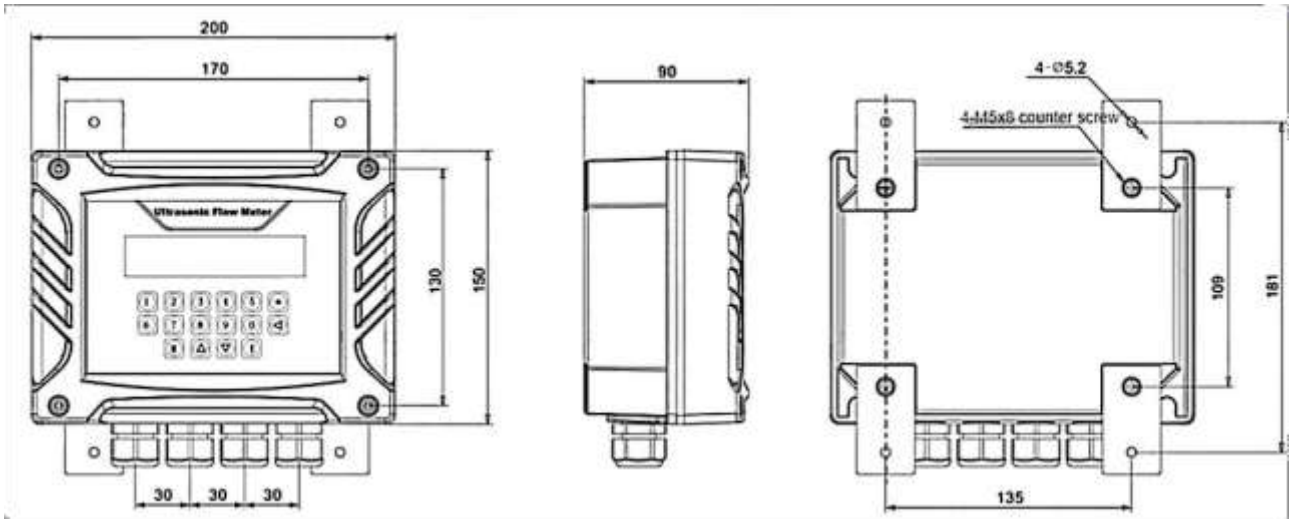


Fig.3 Host size (unit:mm）

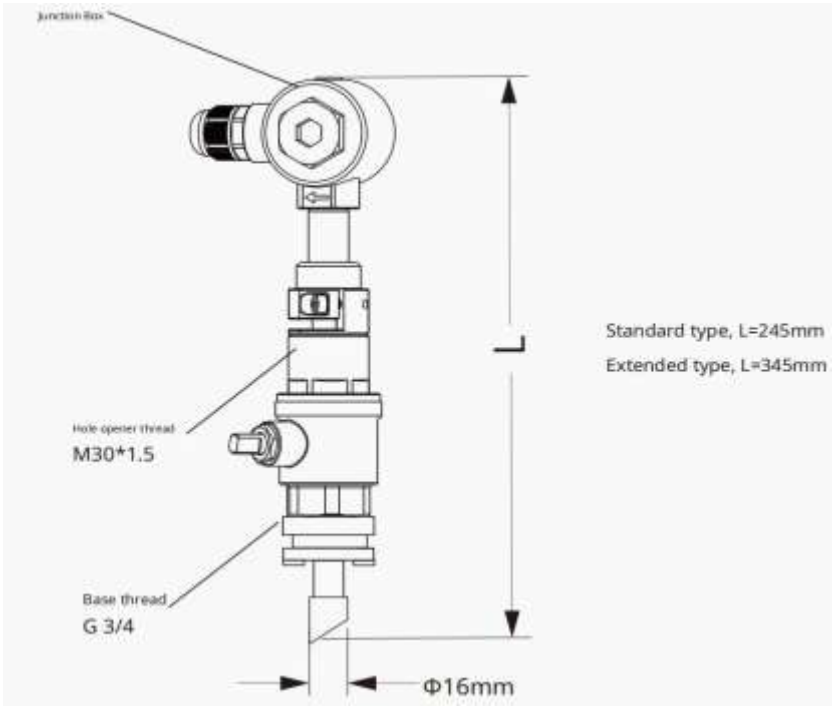


Fig.4 Insertion sensor dimensions

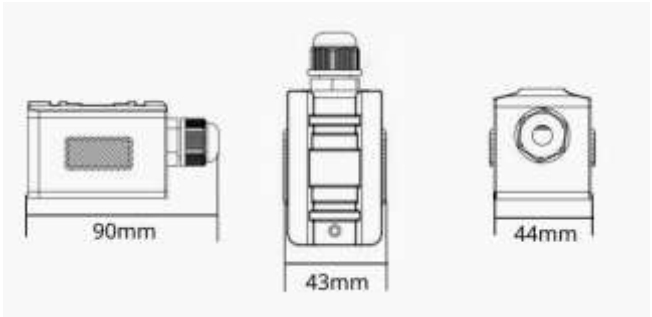


Fig.5 Clamp-on sensor dimensions

Installation

(1) V Method

For pipelines ranging from DN50mm to DN300mm, the V method can be selected. During installation, ensure that the two sensors are horizontally aligned and their centerlines are parallel to the pipeline axis. Also, note that the transmitting directions must be opposite each other.

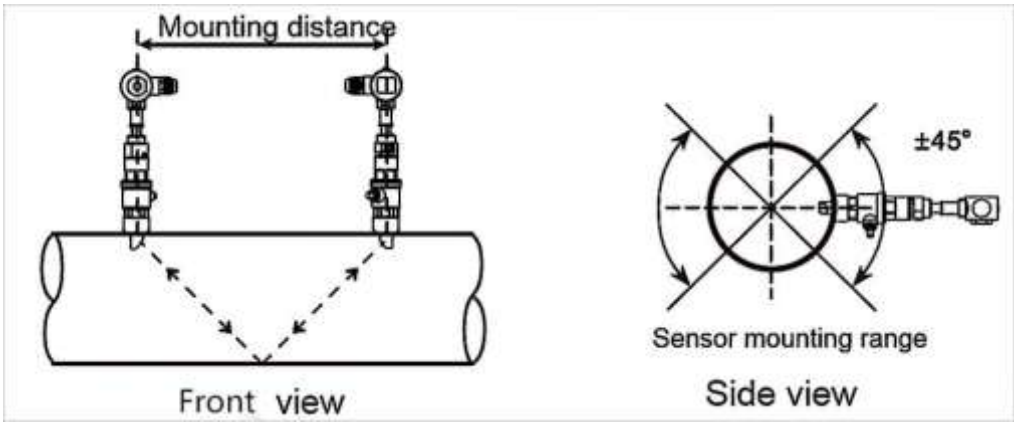


Fig.6 Installation Diagram for V Method

(2) Z Method

The Z method can be used for pipelines larger than DN50mm. During installation, the vertical distance between the two sensors along the pipeline axis should equal the installation distance, and ensure that both sensors are on the same axial plane. Additionally, the transmitting directions must be opposite each other.

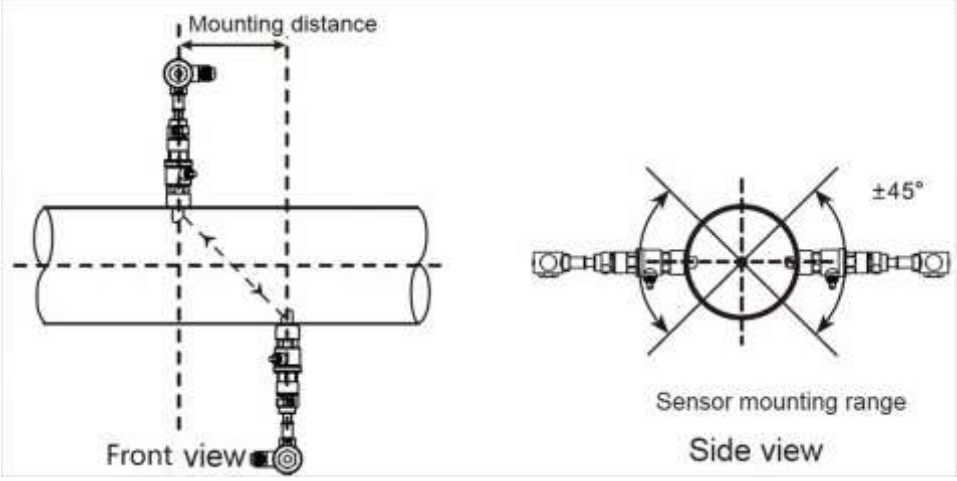


Fig.7 Installation Diagram for Z Method

(3) Parallel Insertion

When installation space is limited or installation can only be performed from the top of the pipeline, a parallel insertion sensor can be used for pipe diameters of DN300 or larger.

To properly position the parallel insertion sensors, ensure the following three points:

1. Installation Distance: The vertical distance between the two sensors along the pipeline axis.
2. Horizontal Alignment: Both sensors should be on the same horizontal line, with an insertion depth of one-third of the pipe's inner diameter.
3. Distance Between Sensors: User-definable, but it is recommended to be between 300mm and 5000mm.

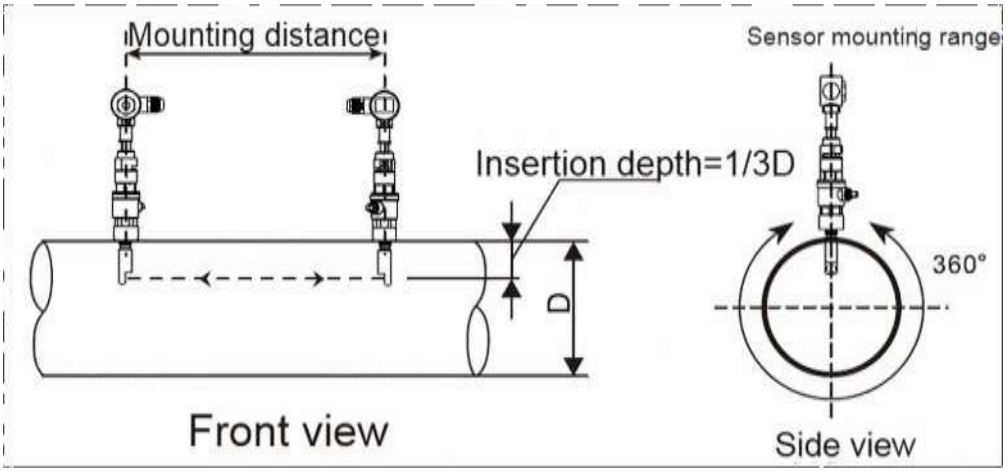


Fig.8 Installation Diagram for parallel insertion

Ordering Code

AI-U40 -W3-T7-L-AD-WY-05-PG								Description
AI-U40	-	-	-	-	-	-	-	
Sensor type	W3							Medium external clip type(DN50-DN700)
	C1							Standard plug-in(DN50-DN6000)
	C2							Extended plug-in(DN50-DN6000)
	XX							Other
heat-resistance temperature		T7						-30-90℃
		XX						Other
Accuracy			L					1.0 Class
Output and Power Supply				AD				Pulse+4-20mA+RS485+SPST，24VDC/220VAC
Electrical Interface, Housing Material, and Ingress Protection					WY			M20*1.5 Cable Gland，plastic ABS，IP65
					WZ			M20*1.5 Cable Gland，plastic ABS，IP68
Cable Length						05		5m
						10		10m
						20		20m
						XX		Other
Accessories							PG	Coupling agent 120g pack
							PH	Hole opener + drill

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