

aobo

instrument

**2024
PRODUCT
INTRODUCTION**

Clamp-on Ultrasonic Flowmeter



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Company Profile

Weifang AOBO Instrument Technology Development Co., Ltd., founded in 2002, with registration capital of 10 million RMB, is a "High-Tech" and "Double-Software Certification" enterprise specialized in "flow measurement and intelligent measurement & control" industry, integrating R&D, production, sales and service.

The company has a core R&D team for computer software and technology, automatic intelligent control, HVAC engineering design and flow measurement. It has the ability to provide customers with specific solutions and complete sets of products according to their different needs, based on years of practical experience. Especially in the heating industry, by the customer's recognition, has a high reputation in the industry.

The products are mainly used in the measurement and control of "steam, liquid, gas, sewage and tap water"; and especially suitable for energy monitoring and energy-saving control in many industries, such as thermal power plants, thermal companies, residential heating, petroleum, chemical industry, papermaking, food, coating, printing & dyeing and HVAC.

Since its foundation, based on self-developed and leading technology, reliable quality, high-quality service and good reputation, our company has been warmly accepted by customers, and become a designated supplier for many central enterprises and listed companies.

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All of the catalogue and company information can be found at:

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I. Product Overview

The ultrasonic flowmeter main board is suitable for any kinds of transducers, including clamp-on type, insertion type, portable and the same kinds of transducers from other manufacturers. The pipe parameters and calibration parameters of water meter and in-line pipe are input by manufacturer, users do not need to input any parameter, only need to connect with flowmeter to work.



Applied to on-line measure and system monitor for nearly all liquids from petrol chemical, metallurgy, electric power plant, irrigation, city water company, energy monitor fields, realize the functions of measuring and checking of flow velocity, flow rate, accumulation and heat quantity of different liquids, and flow rate on/off, liquids distinguish.

II. Operational Principle

When the ultrasonic beam is transmitted through the flowing liquid, there will be a difference between the upstream and downstream transit time (travel time or time of flight), which is proportional to flow velocity, when fluid is flowing, counterflow transit time is more than direct flow transit time. the formula as below.

$$V = \frac{MD}{\sin 2\theta} \times \frac{\Delta T}{T_{up} + T_{down}}$$

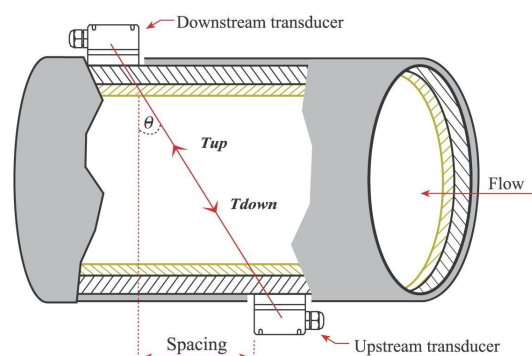
Remarks:

θ The angle between the ultrasonic beam and the flow

M Transit times of the ultrasonic beam

D The internal diameter of the pipe

T_{up} Transit time in the forward direction



T_{down} Transit time in the reverse direction

$$\Delta T = T_{up} - T_{down}$$

$$F = 900 \times \pi \times D^2 \times V$$

F is instant flow rate(unit:m³/hour)

D is inside pipe diameter(unit:m)

V is flow velocity(unit:m/s)

III. Technical Parameter(s)

- Power supply:AC(85~264)V or isolation DC(8-36)V

- Repeatability:better than 0.2%.

- Accuracy:better than 1%

- Signal output :

 - One channel standard isolation RS485 output;

 - One channel isolation 4-20mA or 0-20mA active output;

 - One channel OCT output (programmed between the pulse width(6-1000ms),default before leaving factory (200ms);

 - One channel isolation relay output,with positive, negative, net accumulation pulses and different alarm signals.

- Signal input:

 - Two channel three wire system PT100 platinum resistor input loop,to make heat meter has the function of displaying heat quantity.

 - Three channel 4-20mA input optional,accuracy:0.1%,has the ability to input the signals of pressure, liquid level, temperature and so on.

- Display:2*20 backlight LCD(Chinese and English optional)

- Operating:4*4 tactile keypad

- Other functions:automatic memory the positive,negative,net cumulative flow rate and heat quantity of the last 512 days,128 months,10years.

Automatic memory the time of power on/off and flow rate of the last 30 times, realize to

replenish by hand or automatically, read the data through Modbus communication protocol.

- Protection level: mainframe IP65, Transducer: IP68;
- Transducer: clamp-on type.

IV. Clamp on Type Transducer

Before installation, choose density pipe to install transducers, and clean the installation area, clear away rust, paint, anti-rust layer, it is the best to use angle grinder to polish, use cleaning cloth with alcohol or acetone to clear oil and dust, coat enough couplant around the center of installation area, attach the transducers on the pipe and fix it without air bubbles or sand between transducers and pipe wall.



S2-type transducer M2-type transducer L2-type transducer

Transducer	S2 type	M2 type	L2 type
Work frequency	1MHz		
Suitable pipe diameter(mm)	DN15-DN100	DN50-DN700	DN300-DN6000
Outer size	50*30*29mm	100*40*35mm	120*55*45mm
quality	175g	259g	535g

V. Installation Condition

The following steps are generally followed for installing the flow sensor:

1. choosing measurement point;
2. Select the appropriate installation method according to the site conditions or the type

of sensor purchased;

- Type selection of insertion type flow sensor: insertion type B; Installation method: Z method

- External clamp flow sensor: the sensor type has been set before delivery, and other parameters such as "outer diameter, wall thickness and installation mode" are set according to the site conditions.

3.Enter the pipe parameters and calculate the installation distance between the two flow sensors;

4.Field mounted sensors;

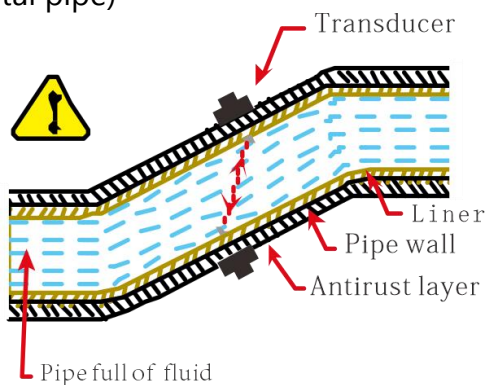
5.Signal check.

Choosing measurement point:

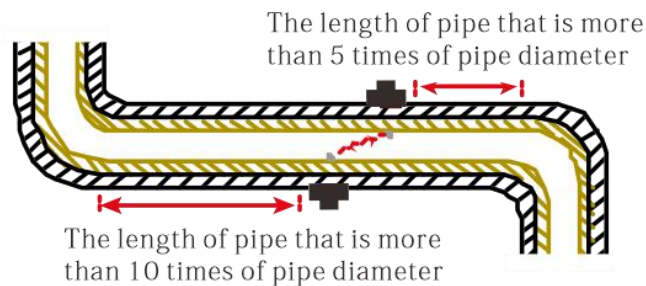
To ensure measurement accuracy and stability,the installation point of transducers should be on the straight pipe full of well distributed fluid(when installing,the pipe must be full of liquid).

Following principle:

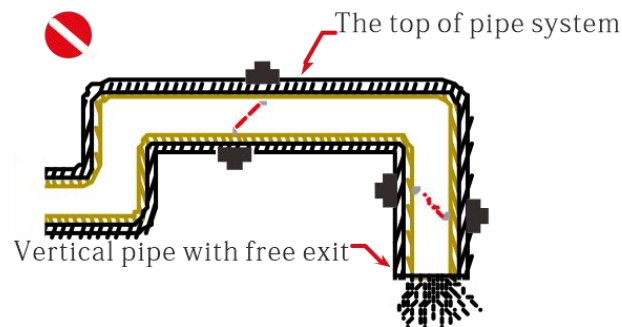
1.Pipe must be full of liquid that is uniform and easy to travel the ultrasonic beam(vertical pipe or horizontal pipe)



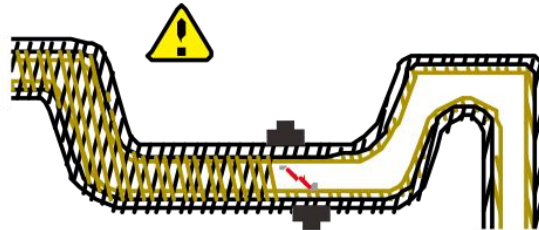
2.Upstream transducer should be installed at the place where the upstream length of the straight pipe is at least 10D and the downstream length is at least 5D where install the downstream transducer,so the pipe length should be straight without any valve,pump,angle head, D stands for pipe outside diameter. The installation point should stay away from valves,pump,high pressure current,transformers interference source etc.



3. Avoid to install on the highest point of pipe system or vertical pipe with free exit (flow down)



4. For the opened pipe or half full pipe, the transducers should be installed on U type pipe.



5. The two transducers must be installed in horizontal direction to pipe axis plane, within $\pm 45^\circ$ of axis line horizontal plane, to prevent bubbles or not full in upper pipe or sediment in down side of pipe to influence transducer measurement normally. If there is space limit of installation that could not install horizontal symmetry, then install the transducers vertically or dip angle under the condition of no bubbles in upper parts of pipe.

Clamp on type transducer installation method

Before installation, choose density pipe to install transducers, and clean the installation area, clear away rust, paint, anti-rust layer, it is the best to use angle grinder to polish, use cleaning cloth with alcohol or acetone to clear oil and dust, coat enough couplant around the center of installation area, attach the transducers on the pipe and fix it without air bubbles or sand between transducers and pipe wall.



Remarks: users input transducers parameters by yourself.

1. Installation space

Installation space of clamp on type transducer is inner edge distance of the two

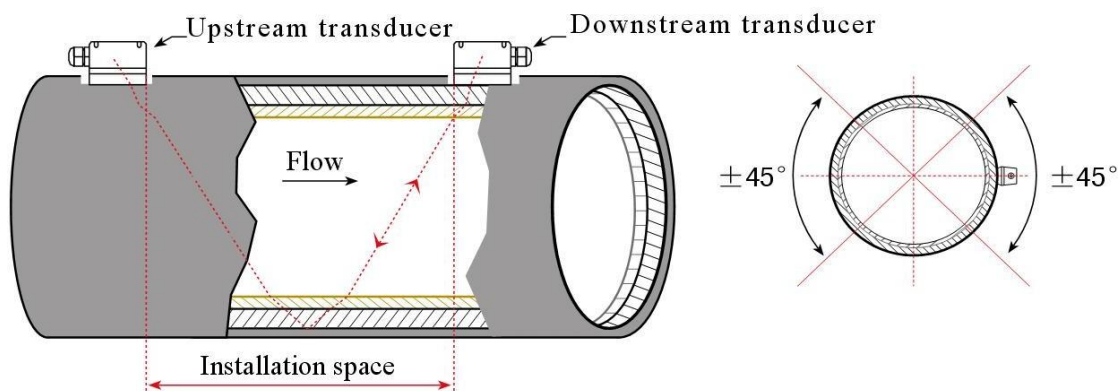
transducers(face to face),after inputting the required parameters in Menu,check the display on M25,that is the installation space.

2. Installation method

The method has 4 kinds: V method,Z method, N method and W methods.

V method(suitable to the pipe diameters within the range DN15-DN200mm)

Normally, V method is standard installation method, convenient to use with precise measurement,when installation,the two transducers horizontally align,its centre line is horizontal with pipe axis line.



Z method (the most commonly used method)

When the pipe diameter is wide,or there are suspended matters in fluid,too thick scaling or liner inside pipe inner wall,that can make the flow meter can not work normally and signal poor by using V method installation,so need to use Z method to install,its features are direct transferring without reflection(called single sound path),little signal attenuation.

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