

Model LC Ultrasonic Flowmeter



Model LC ultrasonic flowmeter is an instrument for measuring liquid flow in pipe based on the principle of "velocity difference method". It adopts advanced multi-pulse technology, digital signal processing technology and error correction technology to make flow meter more suitable for the environment of industrial field, and more convenient, economical and accurate measurement. The products can be widely used in petroleum, chemical industry, metallurgy, electric power, water supply and drainage and other fields.

There are three main types of ultrasonic flowmeter: wall-mounted ultrasonic flowmeter, hand-held ultrasonic flowmeter and portable ultrasonic flowmeter.

Measurement Principle

When the ultrasonic beam propagates in the liquid, the flow of the liquid will cause a slight change in the propagation time, and the change of the propagation time is proportional to the velocity of the liquid. The relationship is in accordance with the following expressions:

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

Among them, θ is the angle between the sound beam and the direction of liquid flow, M is the number of linear propagation of the sound beam in the liquid, D is the inner diameter of the pipeline, T_{up} is the propagation time of the sound beam in the positive direction, and T_{down} is the propagation time of the sound beam in the reverse direction, $\Delta T = T_{up} - T_{down}$.

The velocity of sound in stationary fluid be C , the velocity of fluid flow be U , and the propagation distance be L . When the direction of sound wave is the same as that of fluid flow (i.e. the direction of downstream flow), the propagation velocity is $C+U$. Conversely, the propagation speed is $C-U$. Two groups of ultrasonic generators and receivers (T_1, R_1) and (T_2, R_2) were placed at two locations with L distance from each other. When T_1 emits ultrasound along the direction, T_2 emits ultrasound in the opposite direction. The time required for ultrasound to reach receivers R_1 and R_2 is t_1 and t_2 , respectively, $t_1 = L / (c+u)$ $t_2 = L / (c-u)$.

Because the velocity of fluid in industrial pipeline is much smaller than that of sound, i.e. $C > u$, the time difference between them is $t = t_2 - t_1 = 2Lu / cc$. It can be seen that when the velocity C of sound wave in fluid is known, the velocity u can be calculated by measuring the time difference t , and then the flow Q can be obtained. The method of flow measurement based on this principle is

called time difference method. In addition, phase difference method and frequency difference method can also be used.

The ultrasonic flowmeter is composed of three parts: ultrasonic transducer, electronic circuit, flow display and accumulation system. The ultrasonic transmitting transducer converts electric energy into ultrasonic energy, and transmits it to the fluid under test. The ultrasonic signal received by the receiver is amplified by electronic circuit and converted into an electrical signal representing the flow for display and integration. In this way, the flow detection and display are realized.

Features

Non-contact measurement, no pressure loss.

No mechanical transmission parts, maintenance-free, long service life.

Suitable for flow measurement of any liquid, especially those with high viscosity, strong corrosion, non-conductivity and other properties. It can also measure the flow of gas.

For the flow measurement of large diameter pipeline, the cost will not be increased because of the increase of pipe diameter.

Wide range ratio, up to 5:1.

Product Classification

(1) Wall-mounted ultrasonic flowmeter (LCSG type)

High precision measurement: linearity is better than 0.5%, repeatability is better than 0.2%, and measurement accuracy is better than (+1%).

Wide measurement range: different types of sensors can be used to measure the flow of DN15-DN6000mm pipeline; support Chinese and English menus: different versions of flowmeters can support Chinese or English menus, convenient and fast.


High reliability: Using low voltage and multi-pulse transmitting circuit, the measurement accuracy, service life and reliability are greatly improved.

Strong anti-jamming ability: Double balanced signal differential transmitting and receiving circuit is used to effectively resist strong interference sources such as frequency converter, TV tower and high voltage line.




Powerful memory function: automatic memory of the accumulated flow of 512 days, 128 months and 10 years before, automatic memory of the first 64 times of power and power outage time and flow, automatic memory of the first 32 days of flowmeter working status is normal.



Basic Parameters:

Optional Sensors		Range	Fluid Temp	Accuracy
	LCS-J1 (S)	DN15-100mm	-30°C~90°C	Better than±1%
	LCS-J2 (M)	DN50-1000mm		

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Standard Clamping Type	LCS-J3 (L)	DN300-6000mm		
 Clamping Type For High Temp	LCS-GJ1 (S)	DN15-100mm	-30°C~160°C	
	LCS-GJ2 (L)	DN50-1000mm		
 Insertion Type	LCS-C1 (Standard insertion)	DN80-6000mm	-40°C~160°C	
	LCS-C1 (Lengthened insertion)			
 Standard Pipe section type	Standard Pipe section type	DN50-1000mm	-40°C~160°C	Better than ±0.5%
Power Supply	Primary table DC8-36V, secondary table AC220V or DC24V			
Input	3-way 4-20 mA analog input, 2-way 3-wire PT100 resistance signal input			
Output	Isolation of RS232/RS485 output, 2 isolation of OCT output, 1 isolation of 4-20mA output (passive)			
Communication Protocol	MODBUS Protocol, METER-BUS Protocol, Fuji Extension Protocol, Simple Watermeter Protocol			

(2) Handheld ultrasonic flowmeter (LCSC type)

Small volume and light weight: Volume: 210 x 90 x 30 mm, weight is only 0.5 kg;

High precision measurement: linearity is better than 0.5%, repeatability is better than 0.2%, and measurement accuracy is better than ($\pm 1\%$).

Small size and light weight;

Non-contact measurement: The flow measurement can be completed by adsorbing the magnetic ultrasonic flowmeter sensor to the outer wall of the pipeline.

The measurement range is large: the flow measurement of DN15-DN6000mm pipeline can be realized by selecting different types of sensors.

Charging power supply: built-in large capacity nickel-hydrogen rechargeable battery, can support flowmeter to work continuously for more than 12 hours;

Large screen LCD display: It can display instantaneous flow, cumulative flow, flow rate, working state and so on at the same time.

Built-in data recorder: It can store 2000 rows of recorded data.



Parameters

Item	Performance Parameter
Linearity	0.5%
Repeatability	0.2%
Accuracy	Better than $\pm 1\%$, Velocity of flow $> 0.03\text{m/s}$
Response Time	0~999 S, User optional
Velocity range	$\pm 32\text{m/s}$
Pipe size	15mm~6000mm
Unit of measurement	Meters, feet, cubic meters, cubic feet, American gallons, British gallons, oil drums, American liquid drums, British liquid drums, American megagallons, user optional
Totalizer	7-digit display, positive and negative Totalizer
Fluid Type	Single homogeneous liquids capable of conducting ultrasound
Safety	Locking of set values, changing data needs to be unlocked
Display	4*16 English display
Communication Interface	RS-232, Baud rate 75-57600, Compatible with Fuji Ultrasound Flowmeter and other brand products
Sensor	Standard M1 type, the other four optional
Sensor Cable	5m*2, can be lengthened to 10m*2
Power Supply	Built-in NI-H battery, Each full charge can last 12 hours. Adapter: AC100V-240V
Data Recording	Built-in data recorder can record 2000 data
Manual Totalizer	7-digit display, which can be used for calibration by key-press operation
Housing Material	ABS
Overall Dimension	210*90*30mm
Weight	500g(1.2lbs) Battery included

(3) Portable ultrasonic flowmeter (LCSB type)

High precision measurement: linearity is better than 0.5%, repeatability is better than 0.2%, and measurement accuracy is better than (+1%).

Non-contact measurement: The flow measurement can be completed by adsorbing the magnetic ultrasonic flowmeter sensor to the outer wall of the pipeline.

Wide measurement range: The flow measurement of DN15-DN6000mm pipeline can be realized by selecting different types of sensors.

Charging power supply: built-in large capacity nickel-hydrogen rechargeable battery, which can support flowmeter to work continuously for more than 20 hours.

Support Chinese and English menu, convenient and fast.

Built-in printer can realize screen printing, and can also print the measurement results of up to 20 items in advance.

Built-in data recorder: It can upload the measured results of up to 20 items set in advance to the computer or network communication.



体积: 225×180×67mm

Parameters

Item	Performance, Parameters
Mainframe	2*20 dot matrix backlight LCD, operating temperature (-20-60 °C)
	Printer Output 24-Column Character Miniature Thermal Printer
	4*4+2 keyboard
	Data is connected to RS-485
Sensor	TS-2, Applicable to pipe diameter:DN15~DN100mm, ≤110°C
	TM-1, Applicable to pipe diameter:DN50~DN1000mm, ≤110°C
	TL-1, Applicable to pipe diameter:DN30~DN6000mm, ≤110°C
Measuring medium	Water, seawater, industrial sewage, acid and alkali liquids, various oils and other liquids that can transmit sound waves
Velocity range	0~±30m/s
Accuracy	Be better than ±1%
Power Supply	Ni-MH batteries can work continuously for more than 20 hours, or 200VAC
Power Dissipation	1.5W
Charge	Intelligent charging mode, direct access to AC220V, automatic stop after charging, display green light
Weight	2.5kg (Mainframe, N.W)
Note	Equipped with one-piece high-strength protective box, it can be used in harsh environment in the field.

Optional Transducers for Ultrasonic Flowmeters



Small-sized Sensor
DN15~DN100mm
-40°C~110°C



Medium-sized sensor
DN50~DN1000mm
-40°C~110°C



Large-sized Sensor
DN300~DN6000mm
-40°C~110°C



High Temperature small-sized Sensor
DN15~DN100mm
-40°C~160°C



High Temperature medium-sized Sensor
DN50~DN1000mm
-40°C~160°C