Ultrasonic Open Channel Flow Meter

PROCESSATION

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Overview

This PAL/W Ultrasonic open channel flow meter is a professional economic and practical instrument during agriculture, industry research and development. It is a non-contact measurement and can be applied in even harsh environments. It measures level, flow rate and total volume of water flowing through weirs and flumes.

It consists of two parts, the ultrasonic level sensor and wall mounted flow monitor/controller. The ultrasonic level sensor uses the sound wave reflection principle to detect the liquid level in the weir, and then the microprocessor calculates the corresponding flow value automatically using the related formula and characteristics of the channel.

It is well suited for applications such as groundwater system flow monitoring, industrial sewage discharge monitoring, flow into water treatment plants, effluent from water resource recovery, and agriculture irrigation channels.

Advantage

01
Non-contact measurement, long service life and simple maintenance.

02
High level detection accuracy. The accuracy of change in level is 1mm. For every 1mm change in the liquid level, the open channel flow rate changes accordingly. So the flow measurement is more accurate.

03
Adapt to a variety of weirs/flumes and simple setup for Parshall flumes, triangular weirs (30* /45*/60* /90°/120*) and rectangular weirs etc.

04
Large screen with backlight LCD display. Displays flow rate in L/S or M3/h

05
Simple programming and easy operation. A hand operator is available for easy operation. (If you need)

06
Excellent anti-interference capability, low blind area and high sensitivity; The cable length between sensor and transmitter up to 1000m.

07
Rugged IP67 powder coated aluminum enclosure, Sensor protection class IP68.

08
Chemically resistant probe materials for maximum application flexibility;

09
Provided programmable 6 relays at most for alarms;

10
Provided 4-20mA output and RS485 serial communication (Modbus RTU) .

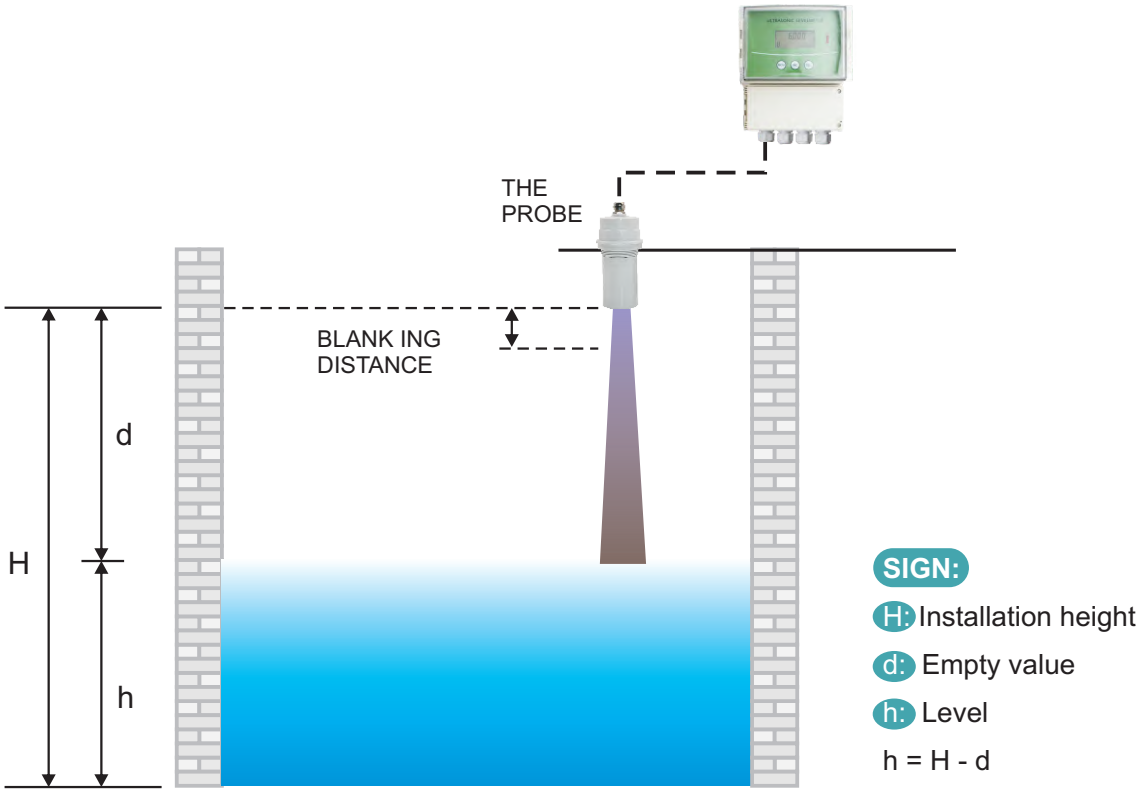
11
Customize solar power supply. Available at remote and non-powered site applications. Low power consumption, customer can choose optional 12V operating voltage Transmitter, power consumption only 2 watts.

Application

This PAL/W ultrasonic open channel flow meter with a primary device (such as a flume or weir) are a cost effective solution for managing varying flow rates in unpressurized systems. **Typical applications are as below:**

Measuring Principle

- Using ultrasonic level technology, Open channel flow meters include a non-contacting sensor mounted above the flume or weir. By measuring the time from transmission of an ultrasonic pulse to receipt of an echo, the water level or “Head” is accurately measured.
- As the electronic flow transmitter knows the installation height H from parameters setting, it can calculate the level as follows: h = H – d .
- Since the speed of sound through air is affected by changes in temperature, the PAL/W O.C.M. has integrated a temperature senor to improve accuracy.
- For determined flumes, there is a fixed functional relationship between the instantaneous flow and liquid level. The formula is Q=h (x). Q means instantaneous flow, h means liquid level in flumes. So the electronic flow transmitter can calculate the flow rate through determined flumes and the level value.



Blind Zone: The ultrasonic sensor cannot detect echoes at the same time when transmitting ultrasonic waves. When the probe is very close to the liquid surface, the emitted wave and the echo will overlap and cannot be distinguished. Within this area there is no explicit/ reliable measurement possible. This is blind zone (Blanking distance).

During installation, the probe should be a certain distance higher than the maximum liquid level to prevent the liquid level from entering the blind zone.

Technical Data

The Electronic Flow Transmitter

Type	PAL/W
Power Supply	DC24V (±5%) 0.2A; AC220V (±20%) 0.1A; Optional DC 12V
Display	2 lines 14 digit backlight LCD
Flow Rate Range	0.0000~99999L/S or m3/h
The Maximum of Accumulative Flow	9999999.9 m3
Accuracy of Change in Level	1 mm or 0.2% of full span (Which is greater)

Resolution	1mm
Analogue output	One 4-20mA, corresponding to instant flow.
Output Load Resistance	0~500Ω
Relay Output	Standard 2 relay outputs (optional up to 6 relays); Upper/lower limit alarm and failure alarm corresponding to instantaneous flow or level.
Serial Communication	RS485, Modbus RTU standard protocol
Ambient Temperature	-40℃~70℃
Temperature Compensation	Integral in probe
Measure Cycle	1 second (Selectable 2 seconds)
Parameter Setting	3 induction buttons / remote control
Cable Gland	PG9 /PG11/ PG13.5
Housing Material	ABS
Protection Class	IP67
Fix	Wall mounted
Dimensions	248H*184W*122D(mm)

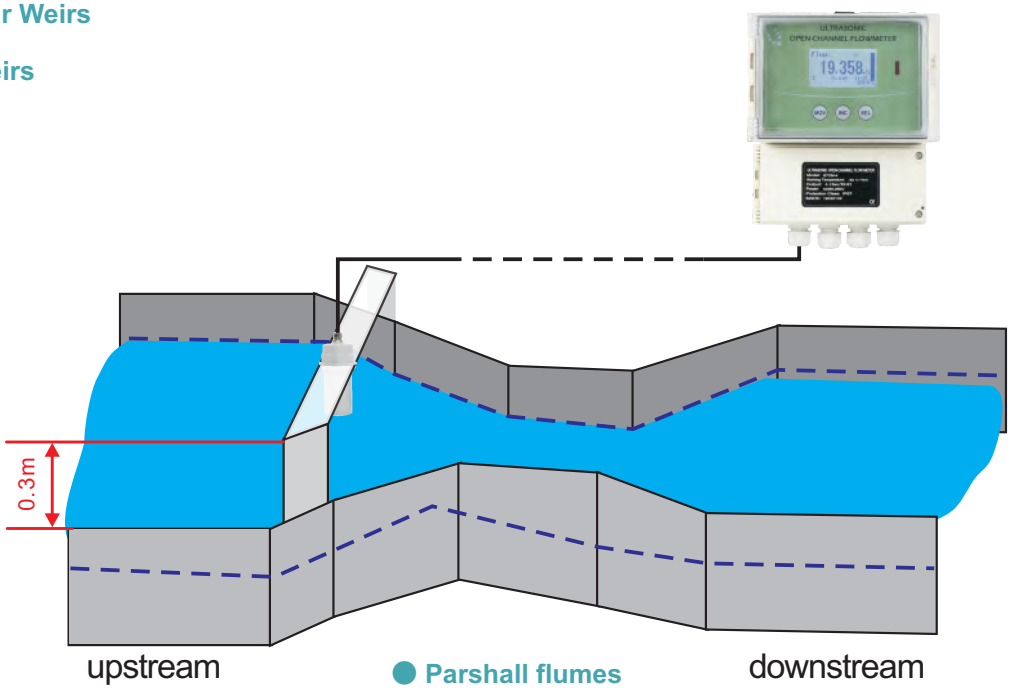
Sensors Specification

Type	LB-4 (probe)
Range	0.00-4.00m (other range is also available)
Blind Zone	0.20m
Ambient Temperature	-40℃~70℃
Temperature Compensation	Integral in probe
Pressure Rating	0.2 MPa
Beam Angle	8° (3db)
Cable Length	10m standard (can be extended to 1000m)
Material	ABS, PVC or PTFE (optional)
Protect Class	IP68
Connection	Screw (G2) or flange (DN65/DN80/etc.)

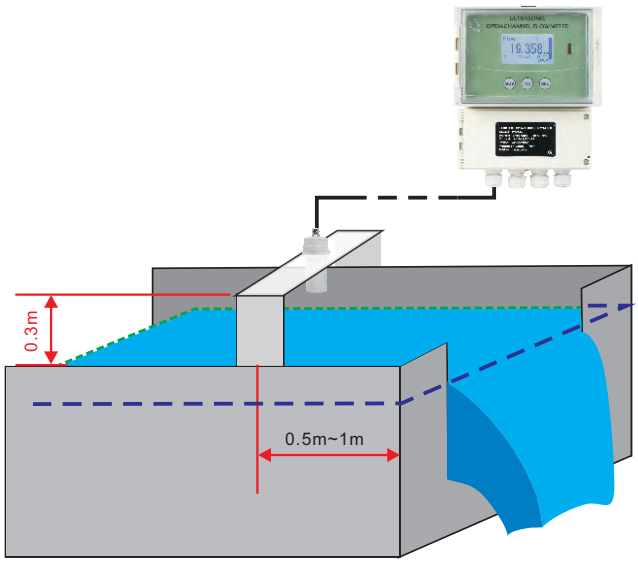
Operation

The open channel flowmeter is used together with various types of weirs/flumes to measure or monitor the total amount of water. The PAL/W meter includes a selection of primary devices with preprogrammed tables to simplify the setup, including:

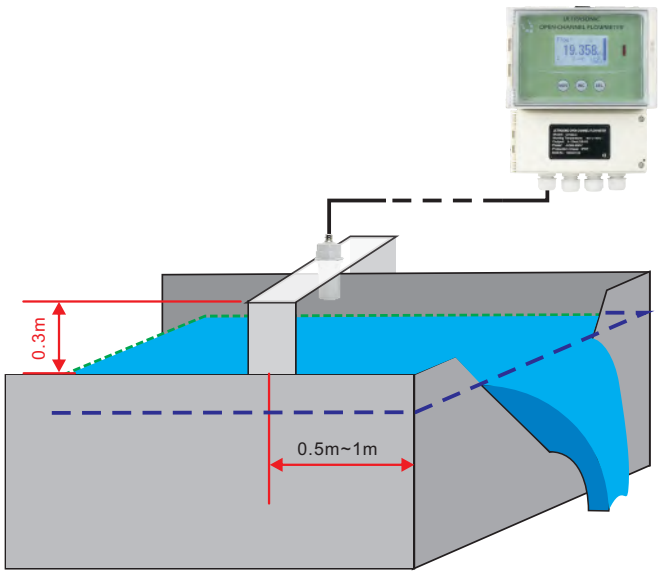
- Parshall flumes
- Rectangular Weirs
- V-notch Weirs



● Parshall flumes



● Rectangular Weirs



● V-notch Weirs

The Display Module

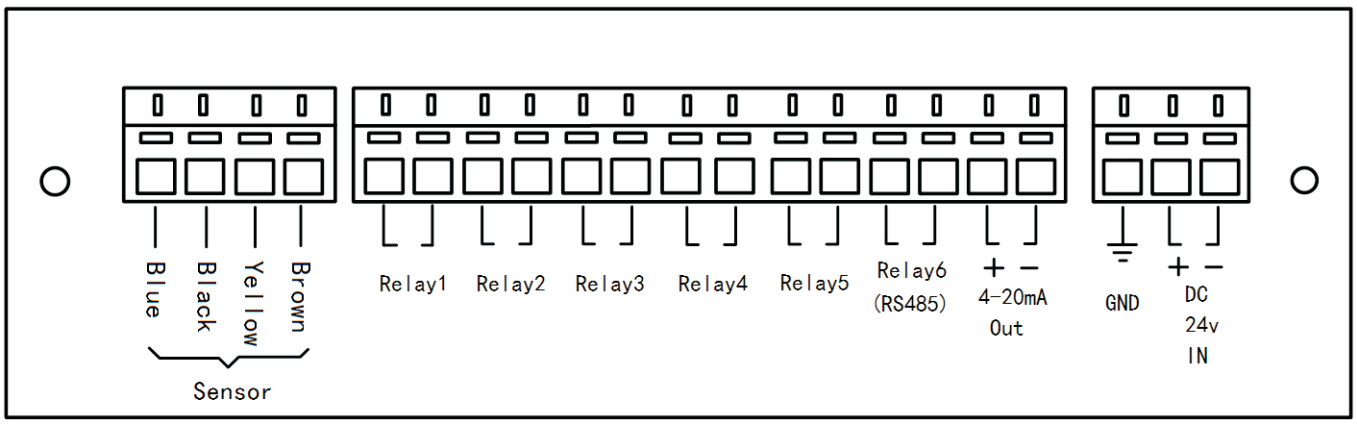
The upper part is the LCD display, integrated keypad for programming, and the receiving window of the remote control (small red window). The lower part is the junction box, and the terminal blocks are visible after opening.

Wiring

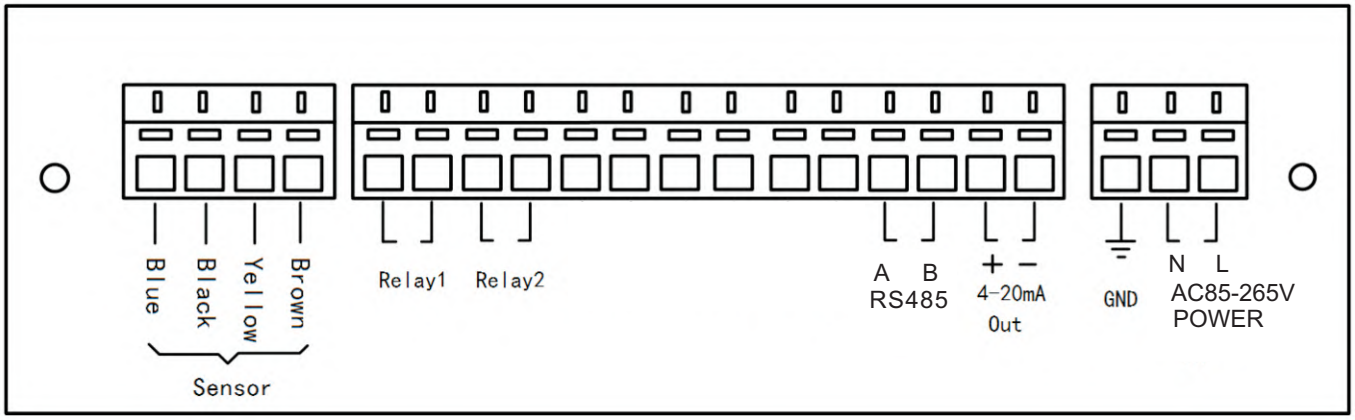
Depending on the power supply and signal output function, the wiring diagram of the instrument is different.

When the MODBUS communication function is provide, the terminal Relay 6 is used for RS485 output.

● **DC24V Power Supply**



● **AC220V Power Supply**

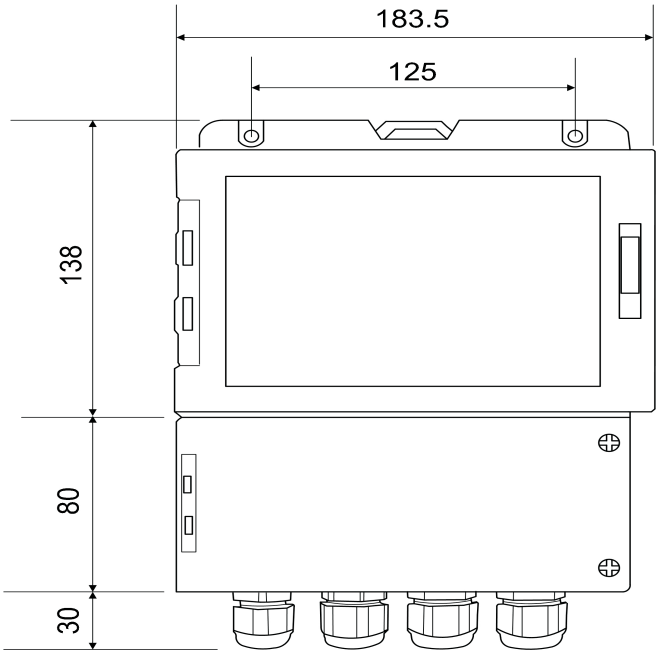


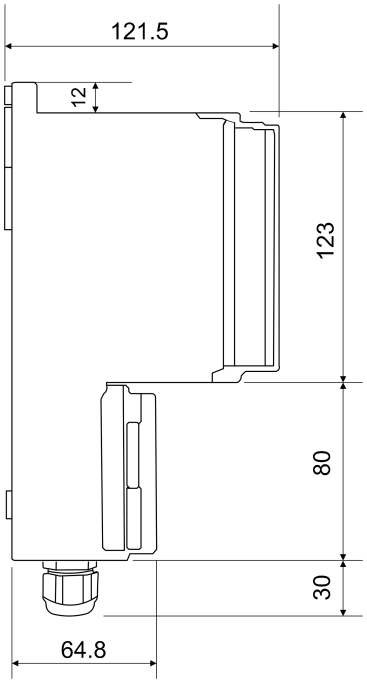
The Cable

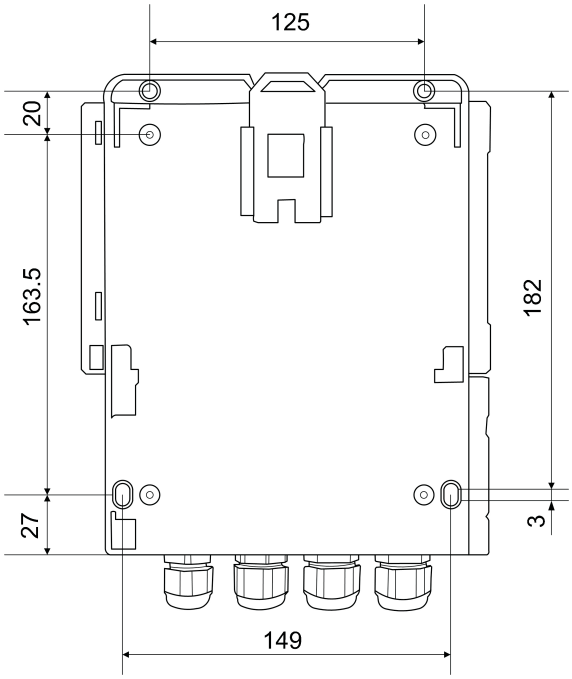
The cable between sensor and transmitter is 10m standard. Users can extend the cable if needed, the cable length can be up to 1000 meters.

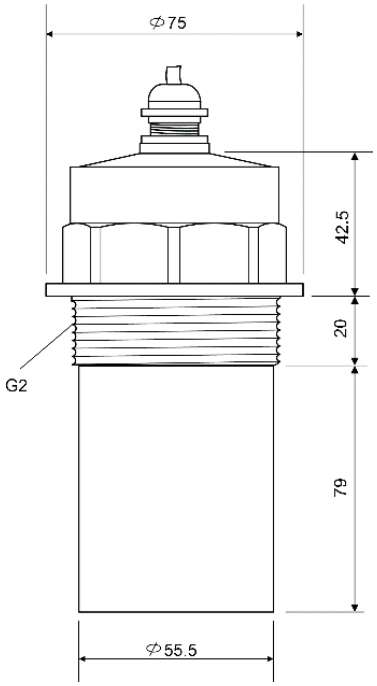
The lead cable of the ultrasonic probe is a 4-core shielded cable.

Mounting Dimensions









Model Selection Table

PAL/W		X	X	X	X	X	X	X	X	X
Measure range	QTCM 4 (standard 4 m level range)									
Power Supply	DC 24V 0.2 A		D							
	DC 12V 0.2A		D(2)							
	AC 85~265V 0.1A		A							
Sensor Material /Process Temperature /Protection Class	ABS/(-40-75)℃/IP68			A						
	PVC/(-40-75)℃/IP68			B						
	PTFE/(-40-75)℃/IP68			C						
Process Connection /Material	Thread				G					
	Flange /PP				D					
Electronic Unit	Output 4~20mA ; Four Wire					C0				
	Output 4~20mA and RS485 (Modbus RTU); Four Wire					C1				
Relay Output	Standard Two Relay						R2			
	Max 6 relay (if with RS485, max 5 relay)						Rx			
Housing Material / Protection Class	Aluminum / IP67							L		
Cable Entry	M20*1.5								M	
	1/2"NPT								N	
Cable Length	10 m (standard)									L10
	X cable length (Up to 1000m)									LX

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