ACDP200 Acoustic Doppler Current Profiler

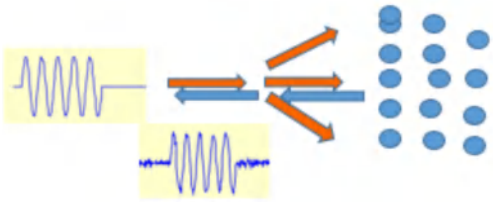
OVERVIEW

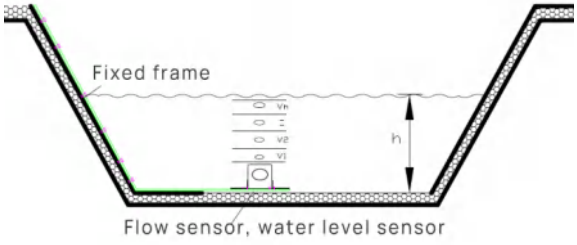
ACDP200 Acoustic Doppler Current Profiler (ADCP) is an acoustic current meter used to measure water velocity. Its principle is similar to sonar: the ADCP emits sound waves into the water, which are scattered by scattering bodies; the ADCP receives the echo signals returned by the scattering bodies and calculates the flow velocity by analyzing the Doppler effect frequency shift.

WORKING PRINCIPLE

Acoustic Doppler current meters measure flow using the acoustic Doppler effect. A pulse of a certain frequency is emitted from the transducer of the device. When this pulse encounters a emitting object (such as suspended matter) in the water, it generates an echo signal, which is received by the acoustic Doppler current meter. The suspended matter drifts with the water flow, thus producing the Doppler effect (i.e., a frequency difference between the echo signal frequency and the transmitted signal frequency). The flow velocity at the corresponding point can be obtained by measuring the Doppler frequency shift.

An acoustic Doppler current meter is equipped with one transducer, which acts as both a transmitter and a receiver. The sound waves emitted by the transducer are concentrated within a narrow range, also known as a sound beam. Assuming the velocity of the suspended matter is the same as the water flow velocity, when the suspended matter moves towards the transducer, the frequency of the echo received by the transducer is higher than the frequency of the transmitted wave; when the suspended matter moves away from the transducer, the frequency of the echo received by the transducer is lower than the frequency of the transmitted wave. Acoustic Doppler shift, which is the difference between the frequency of the emitted sound wave and the frequency of the echo:



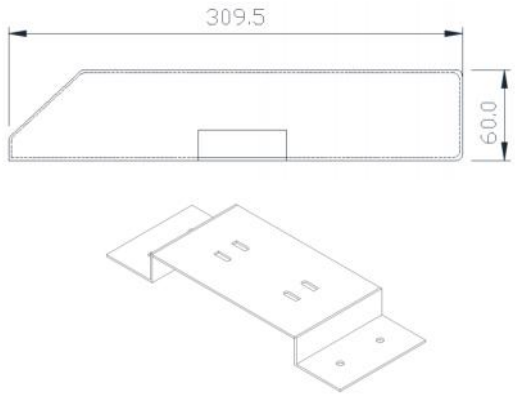


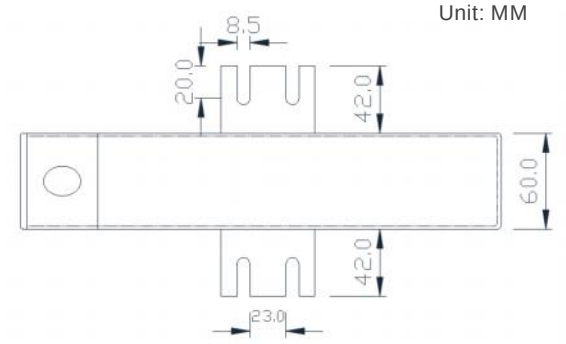
Fshift/n= 2 * cosθ* Fsource * (Vn/C)
V= f(V1,V2,……,Vn);
VC= f(V，h);
S= f(H，W);
Q = VC * S;
Fs: Frequency of emitted ultrasonic waves (Hz);
Fshift/n: Change in return frequency at the nth profile (Hz)
C: Velocity of pulsed sound wave in water (m/s)

θ: Angle between the sensor and the direction of water flow
Vn: Layer velocity at the installation point (m/s)
V: Average flow velocity at the ADCP location (m/s)
Vc: Average flow velocity in the river channel (m/s)
h: Height of the river water above the profiler (m)
W1: Width of the river (m)
S: Cross-sectional area of the river channel
Q: Total flow rate of the river channel (m^3/s)

DIEMNSION

Unit: MM





SPECIFICATION

Operating Frequency	2000KHZ
Acoustic Path	Planar array single beam
Acoustic Measurement Range	0.06m～25m
Blind Zone	0.03m
Number of Unit Layers	Maximum 256 layers
Unit Size	0.25m～25m (dynamically adjustable)
Measurement Accuracy	±0.5%±1.0mm/s
Flow Velocity Resolution	0.001m/s
Flow Velocity Measurement Range	±10m/s
Temperature Sensor Measurement Range	－25°C～75°C
Temperature Accuracy	±0.4°C
Water Level Measurement	0～20m±0.1%FS
Measurement Time Interval	1～60min adjustable
Data Output	Water level, stratified flow velocity, average flow velocity, area, flow rate, etc.
Operating temperature	-10°C～60°C
Storage temperature	-20°C～70°C
Explosion-proof rating	Explosion-proof Ex ib
Protection rating	IP68
Operating voltage	DC 7～15V
Power consumption	<1.0W
Communication protocol	RS485 (standard Modbus protocol), SDI-12, RS-232, RS-422;
Housing material	Stainless steel
Sensor size	295*60*60mm
Air mass	1.5Kg
Water quality	0.3Kg
Reliability	MTBF>25000h

APPLICATION

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