Radar Flow Meter Operating Instruction

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Warning

- Read this entire manual carefully before initial operation of the radar flow meter.
- This product is not explosion-proof and must not be used in hazardous or flammable atmospheres. An explosion-proof model is required for such environments.
- Incorrect installation may lead to significant measurement inaccuracies. Ensure all installation steps are followed precisely.
- Electromagnetic interference in complex or enclosed environments can affect the measurement accuracy of non-contact radar products.

Caution

- Operate the instrument strictly in accordance with the procedures outlined in this manual. Retain this manual for future reference.
- Do not attempt to repair the instrument. Any malfunction must be referred to our authorized after-sales service.

Notice

The company reserves the right to make technical and editorial changes to this manual without prior notice. These changes will be incorporated into future editions. For the most current version of this document, please contact us.

I Product overview

The Radar Flow Meter is a radar flow meter that integrates liquid level and flow rate measurement using microwave technology. It is primarily used for measuring flow rates, water levels, or flow in rivers, lakes, tidal areas, reservoir gates, groundwater pipelines, irrigation canals, and channels. Additionally, it assists in water treatment operations, such as urban water supply, sewage monitoring, flow calculation, and non-contact flow measurement for water intake and discharge. The meter calculates flow based on cross-sectional parameters, unaffected by factors such as wind, temperature, smog, sediment, and floating objects on the water surface. It is suitable for various measurement conditions and can provide real-time data on flow rate, water level, and flow. The product features low power consumption, compact size, high reliability, and easy maintenance.

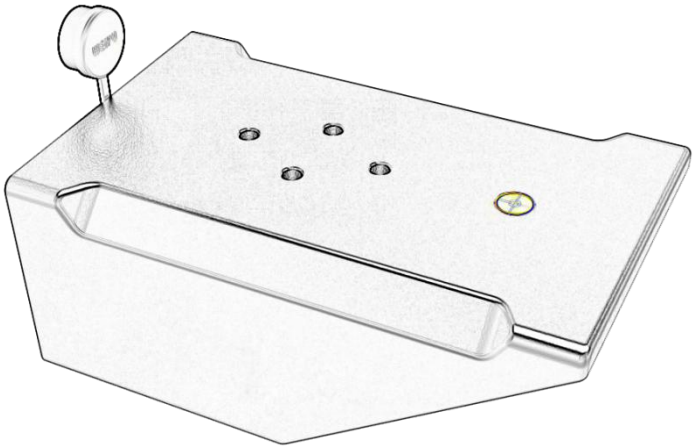
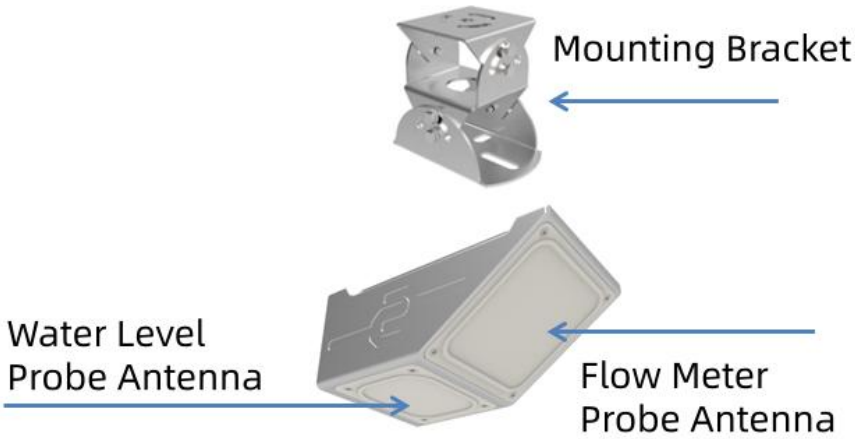


Figure 1-Product effect

II Product composition

The radar flow meter consists of a radar flow sensor, a radar water level (liquid level) sensor and a flow accumulation module. The measurement results can be transmitted in digital (485) mode.



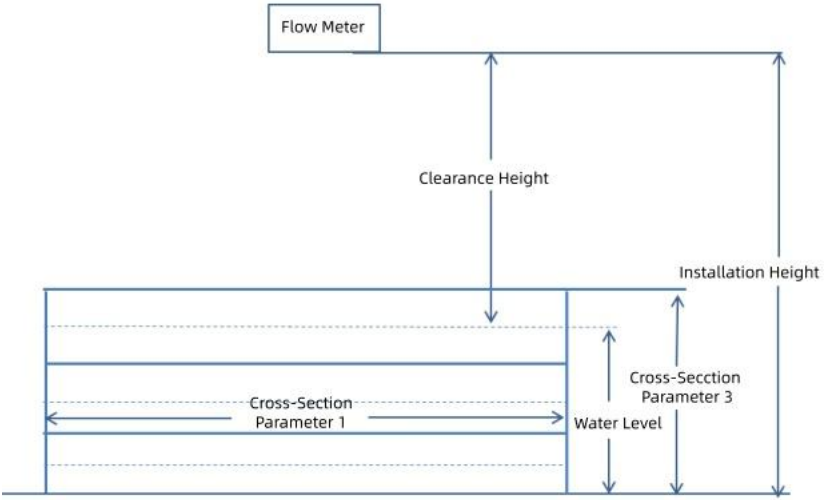
III Product parameters

Supply Electricity					
	Minimum	**Typical case**	**Maximum**	**Unit**	**Test Condition**
Working Voltage	9	12	24	V	
Working Current	100	140	160	mA	12V
Working Temperature	-45		85	℃	
Baud rate		9600		bps	It can be set
Communication Transmission Mode	RS485				
Flow velocity radar sensor					
Measuring Range	0.05-20			m/s	
Certainty of Measurement	±0.01			m/s	
Resolution Ratio	0.01			m/s	
Antenna Angle	12			deg	
Emission Frequency	24			GHz	
Identification of Flow Direction	Two-way automatic identification				Filters can be configured
Water level radar sensor					
Measuring range	0.15-40			m	
Certainty of Measurement	±5			mm	
Resolution Ratio	1			mm	
Antenna Angle	14			deg	
Emission Frequency	80			GHz	
Overall weight	0.8			kg	

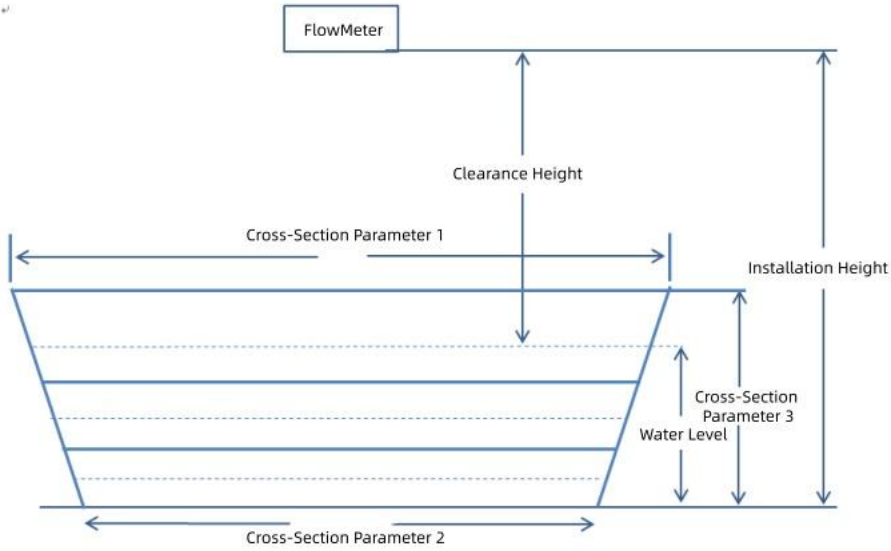
IV Flow Meter Configuration

The average flow velocity can be obtained using a radar flow velocity probe, while the air height (the distance from the radar to the water surface) or water depth (depending on the radar installation height) can be measured using a radar water level probe. In open channels within irrigation districts, common cross-sectional shapes include rectangular, trapezoidal, and circular. The slopes of dry and branch canals are typically used for slopes. The two most commonly used roughness values are for concrete and rubble stone channel walls. For these common open channels, the bottom slope and roughness are fixed. In the velocity distribution across the cross-section, the velocity exhibits strong symmetry. Additionally, the straight sections upstream and downstream of the irrigation district cross-section are relatively long, and the cross-section is symmetrical on both sides, which contributes to the good symmetry of the velocity distribution. The velocity field distribution is adjusted based on the cross-sectional shape, bottom (or longitudinal) slope, and roughness. Currently, the most commonly used turbulent flow mathematical model is the RNG (Renewed Gaussian Kinetic Equilibrium) κ-ε model, known for its high calculation accuracy, good numerical stability, and moderate computational load. The installation settings for flow meters in common cross-sectional types are shown in the following figure:

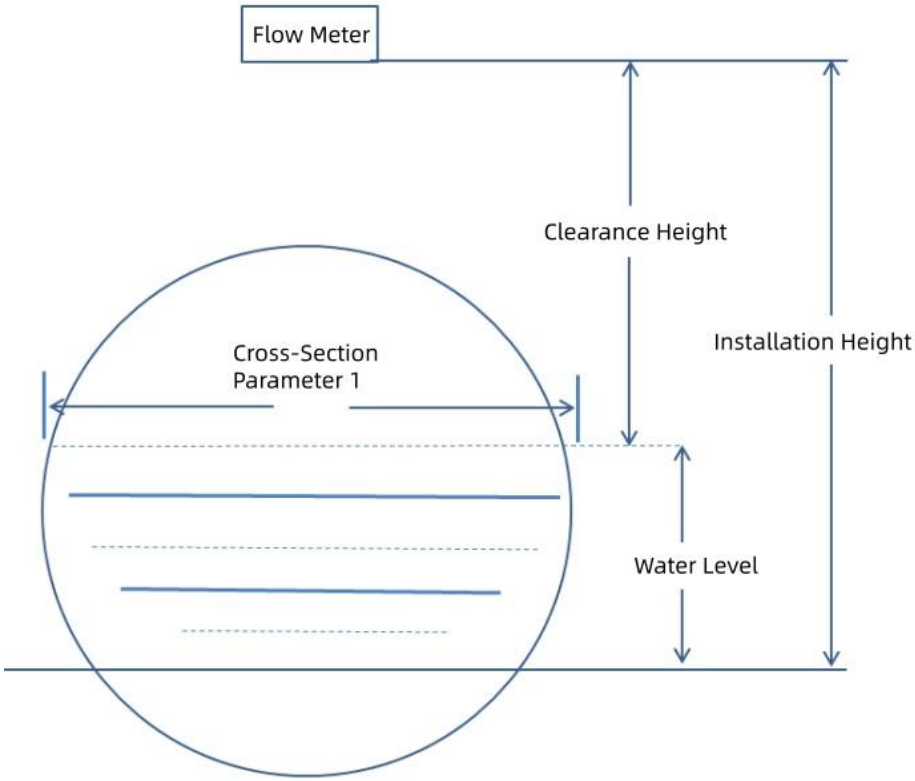
1. Rectangle



2. Ladder-shaped



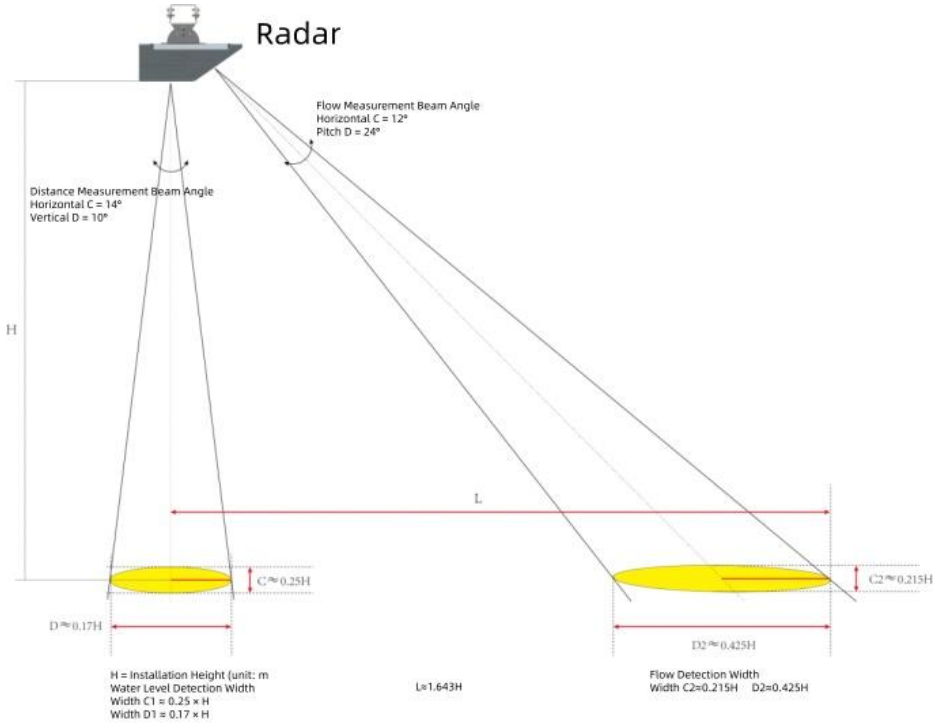
3. Circular



Note: The flow rate is obtained by integrating the measured flow velocity according to the set rectangular, trapezoidal and circular section parameters.

V Flow Meter Irradiation Area Calculation

Due to the emission beam angle in radar water level and flow velocity measurements, the illumination area is roughly elliptical. To avoid the impact of the channel bank on water level measurements (due to the signal beam being too wide, some radar signals may be reflected onto the banks), it is crucial to carefully consider the channel width when selecting installation points. For actual installation, please refer to the formula for calculating the illumination area of the radar integrated flowmeter.



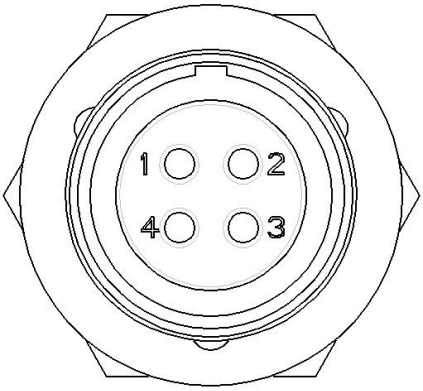
VI Product installation

1. Interface plug installation

As shown in the figure, when the aviation plug is inserted, the red dots of the two parts should be aligned, as indicated by "3" in the figure. At the same time, hold "1" and insert it hard. When you hear a snap, it is plugged in. When disassembling, hold "2" and pull it out.

2. Serial port wiring

As shown in the following table, the red line is the positive input of the power supply, the black line is the negative output of the power supply, and the green line and yellow line are 485A and 485B respectively.

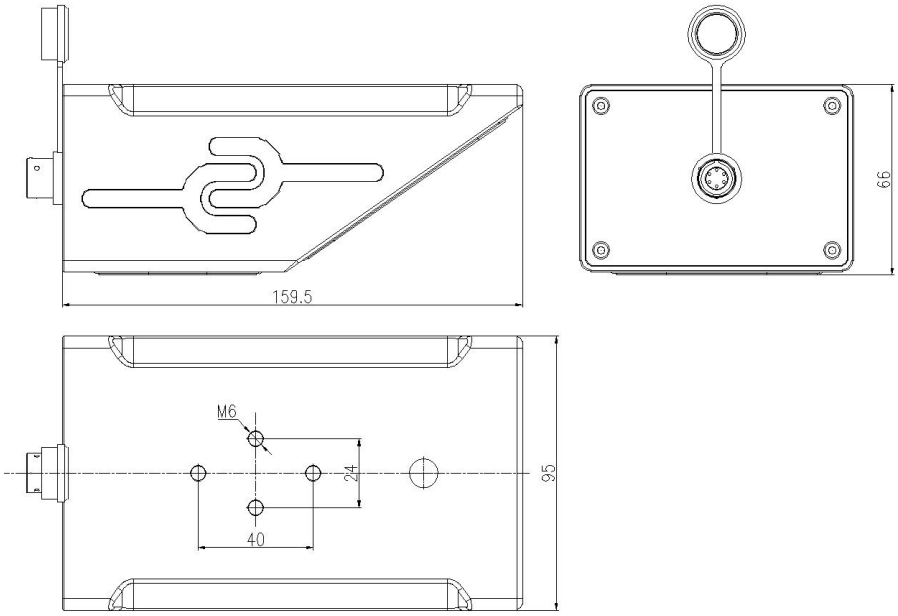


pin	name	explain
Red 1	Vcc	(9~24V) DC power supply
2 black	GND	Negative DC power supply
3 green	485A	Flow meter 485 communication
Yellow 4	485B	

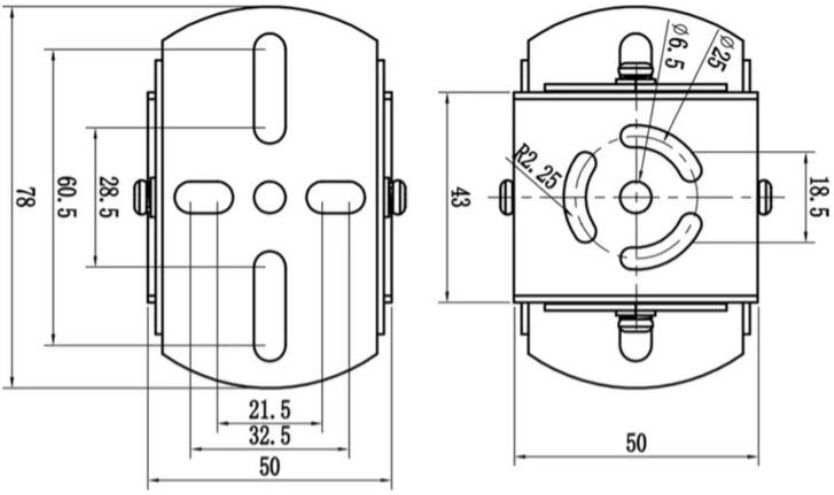
Table-Interface pin function description

3. Product accessories and size diagram

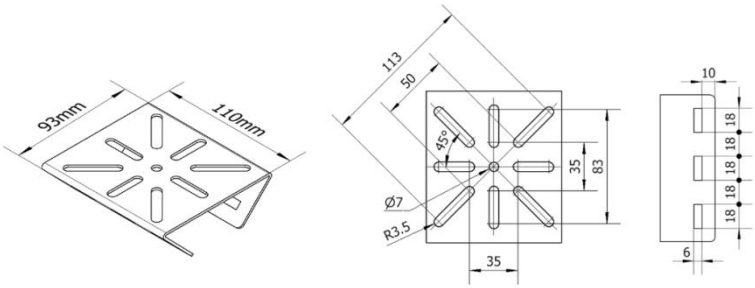
Flow Meter as a whole



Duckbill bracket



Transfer board



Buckles