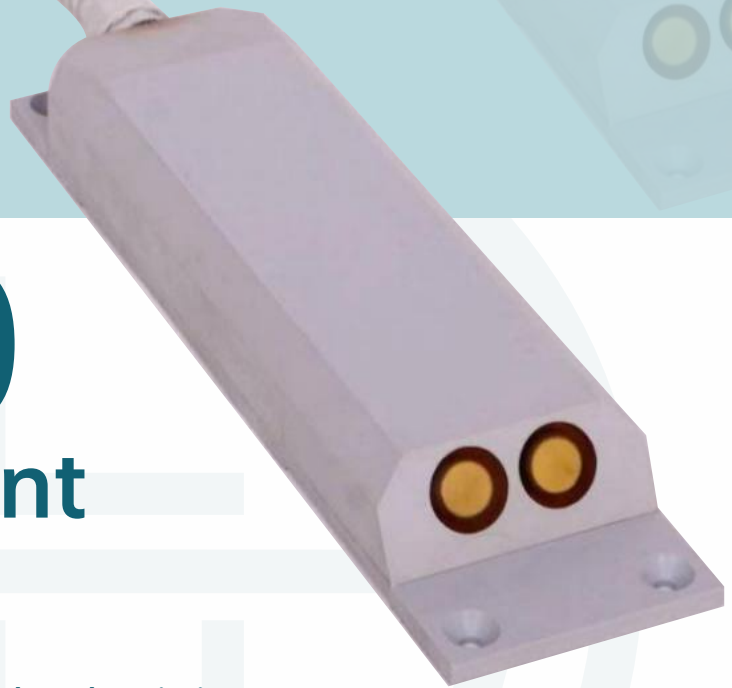


The selection is detailed on page 7

FD80

Doppler Point Flowmeter



Working principle

When the ultrasonic source and the observer are in relative motion, the frequency received by the observer will be different from the ultrasonic source frequency. Therefore, relative to the ultrasonic transducer, the small particles and small bubbles moving with the water will also make the transducer receive frequency change, and increase with the increase of the floating movement speed in the water, thus measuring the Doppler frequency shift, and also measuring the flow rate of the water where the Doppler current meter is located. Then multiplied by the cross section product of the channel, the flow information is obtained. Because Doppler flow rate measurement uses the speed of sound propagation in water, and the speed of sound propagation in water is closely related to the water temperature, the device has a built-in temperature sensor for temperature measurement, and then correct the sound speed. A pressure sensor is used to measure the depth of the liquid level, and the distance between the velocity sensor and the liquid surface is measured.

Product description

The product measures the flow rate according to the principle of ultrasonic Doppler effect, and can measure the water level through the pressure sensor and the temperature sensor to measure the water temperature. The shell is made of PVC plastic, which can effectively waterproof and seal.

According to the different application scenarios, Doppler flowmeter can also be called river flowmeter, sewer flowmeter, channel flowmeter, farmland irrigation flowmeter, non-full pipe flowmeter and so on. It does not require the installation of pipe segment sensors like electromagnetic flow meters, nor does it require the use of intercepting devices, let alone the installation of fixed weir slots to control the flow of water from fixed outlets. The Doppler flowmeter can measure both clear and muddy water, and can also measure the reverse flow rate.

Functional characteristics

- Modbus communication protocol is adopted, RS485 bus is used to communicate with the handheld computer.
- Easy installation of underwater sensor equipment, with metal base fixing device, easy installation.
- All equipment adopts electronic design, wide voltage power supply, low power consumption, no mechanical parts. It has the advantages of accurate measurement, stability, high reliability and strong anti-interference.
- Wide range of applications, can be applied in a variety of water environment from pure water to Yellow River water.

Product application

industry
Water conservancy
irrigate
River, open channel,
pipeline, etc

Technical parameter

Measurement index

content	Radius	precision
Flow rate range (m/s)	0.021 m/s ~ 6.00 m/s (~ 12.00 m/s can be customized)	±1.0%±1cm/s
Water Temperature measurement (°C)	-10°C to 60°C	±1 (°C)
Depth measurement range (m)	0.05 m ~ 10 m (~ 100 m can be customized)	0.5%±0.5cm
Instantaneous flow range	1 L/s ~ 99.99 m ³ / s	-
Cumulative flow	0.1 cubic meters ~ 999,999 cubic meters	-

Performance parameter

Electrical specification	Radius	Remark
Operating voltage (V)	7.2V ~ 24V	DC
Power consumption (mA)	≤65 MA (instant of launch)	12V power supply
Working water depth (m)	0.1 m ~ 10 m	-
Data update cycle (s)	Six seconds. -60 seconds	-

Other parameters

Technical specification	Technical content
Type of measurement	Point flow rate, liquid level, temperature, flow rate
Class of protection	IP68
Measurement mode	Online
Measurement principle	Acoustic Doppler method
Power supply mode	Battery, solar energy, mains power
Output signal	Modbus RS485
Output signal content:	Point flow rate, instantaneous flow rate, cumulative flow rate, water level, temperature
Output signal	4-20mA
4 to 20mA output signal content	Instantaneous flow rate
Liquid pH requirements	PH value 6-8
Liquid pressure requirement	Under natural environmental conditions, 1 standard atmospheric pressure
Continuous power consumption	12V*65mA=12V*0.065A≈0.8W

Installation instructions

Installation conditions and location within the channel

1. Due to the significant influence of factors such as bubbles in the fluid on Doppler velocity measurement, the installation position of the sensor needs to meet the condition of stable fluid flow at the peak velocity. For natural waterways, the minimum requirement for channels is to be located 5 times the width of the waterway or channel upstream, and 3 times the width of the waterway or channel downstream, corresponding to a position of 20 times or 5 times the width.
2. When measuring on rivers and channels, the minimum liquid level only needs to be 10 centimeters above the sensor to measure.
3. The standard model has a pressure resistance of 10 meters and can be customized to meet the maximum pressure requirement of 100 meters.
4. The requirement for the content of solid impurities in the convective body of the Doppler flow meter is less than 20kg/m³.
5. The standard model can measure a maximum flow rate of 5.0 meters per second, and can be customized to meet the demand of 10.0 meters per second.
6. If the turbulence phenomenon at the installation location is severe, it may cause significant errors in the measurement results in the absence of calibration data support. It is recommended to select a location for stable fluid flow (considering factors such as peak flow rate and solid impurities in the fluid) to deploy sensors.
7. The vertical installation position of the sensor shall be as close to the bottom of the channel as possible under the principle of avoiding the burial of sediment at the bottom of the channel, the entanglement of Aquatic plant and the collision of rocks, and the liquid level height shall be considered. It is recommended to be 10 centimeters to 25 centimeters from the bottom of the canal.
8. The sensor needs to be installed horizontally.
9. The sensor should be parallel to the direction of the water flow, and the direction of the probe should be opposite to the direction of the water flow



02 400-860-9760

For more product information, please visit www.ludwig-schneider.com.cn

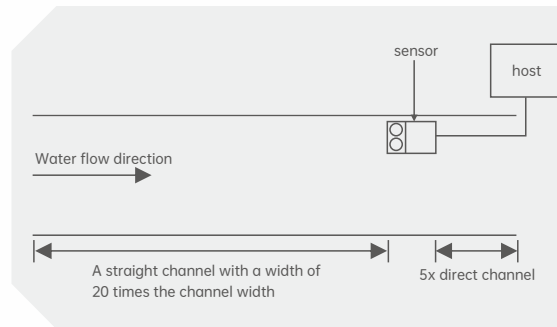


LUDWIG
INSTRUMENT

Installation instructions

Requirements for upstream and downstream direct channels of sensor installation points

A channel with smooth water flow



The installation location of the ultrasonic Doppler flow meter should have a straight channel with a width of 20 times upstream and a straight channel with a width of 5 times downstream.

Due to actual channel conditions, some sites may not have up to 20 times the direct channel upstream and 5 times the direct channel downstream of the installation site. The minimum requirement is 5 times the direct channel upstream and 3 times the direct channel downstream.

Installation instructions

Example of incorrect installation



Water flow situation at the gate site



The upstream direct channel of the sensor installation point cannot meet the requirement of 20 times

If installed downstream of the gate (with a minimum of 30 times or more straight channels), special attention should be paid to observing the water surface for stability.

If the distance between the sensor installation site and the gate is already 30 times the width of the channel, but the water surface is still uneven, it is necessary to increase the distance between the sensor and the gate until the water flow stabilizes. There is no limit to this distance, which may be 60 times the width of the channel, 80 times the width of the channel, until the water flow stabilizes.

The gate is installed on-site at a position 50 times the width of the downstream channel

Determine installation height

The ideal height of the probe from the bottom of the channel is 100mm to 250mm, which should be determined based on the lowest water level of the channel. Sensors should be installed as close to the channel as possible

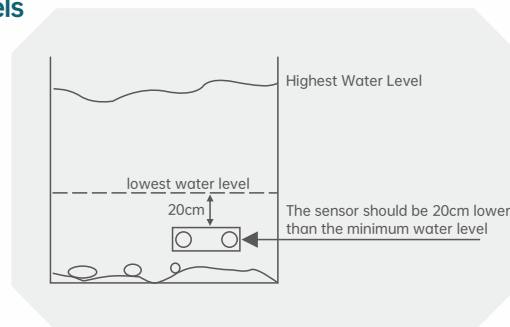
At the bottom, if there is a lot of sediment, mud, water plants, or stones rolling at the bottom of the channel, the installation position can be raised to avoid being covered by sediment and water plants, or being impacted by stones, causing damage to the probe.

Requirements for installation position of rectangular channels

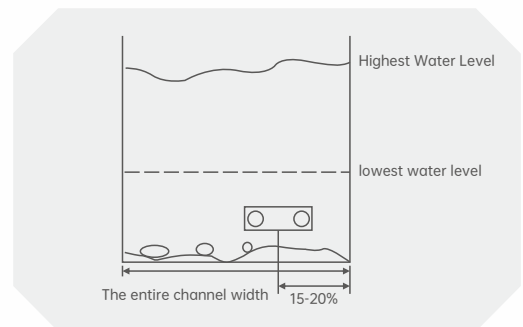
Selection of horizontal installation position

Channels with a width of less than 20 meters, if rectangular, are installed at 15-20% of the entire channel width. Because it is installed at this location, it is closest to the average flow velocity in the horizontal direction of the entire channel.

The lowest water level is more than 10 centimeters higher than the sensor

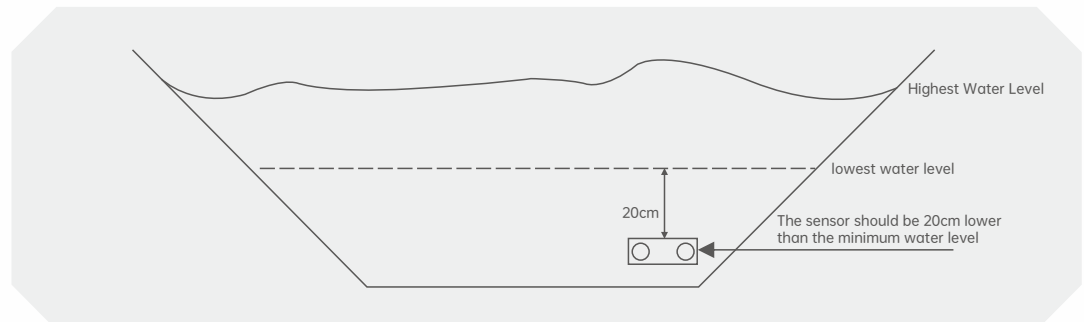


Selection of horizontal installation position



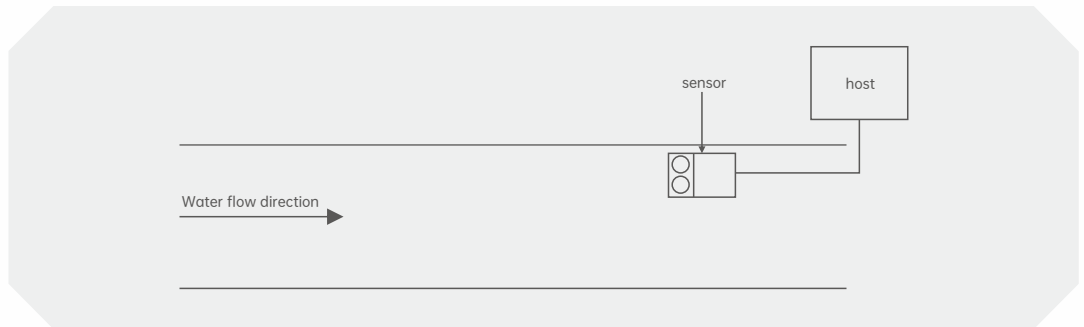
Requirements for installation position of trapezoidal channels

Trapezoidal channel installation: The sensor is installed at the junction of the slope and bottom edge, also known as the "foot of the slope". At the same time, it is necessary to meet the requirement that the sensor is 10 centimeters below the minimum water level.

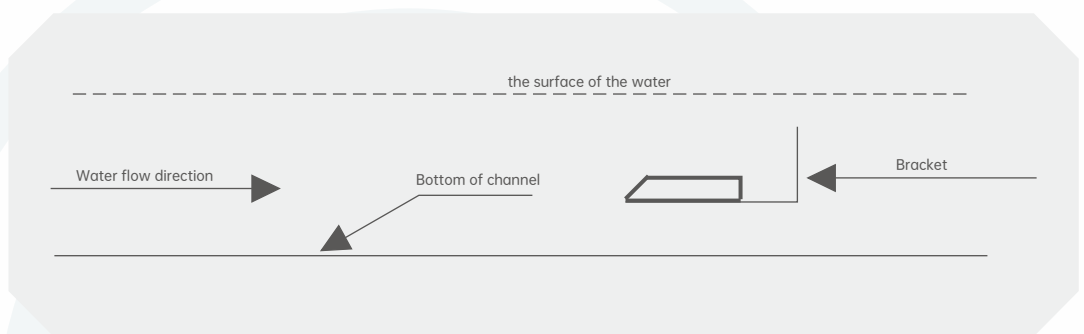


Horizontal installation requirements for sensors

The sensor should be facing the direction of the water flow and parallel to the surface of the water



The sensor should be parallel to the water surface



Installation instructions

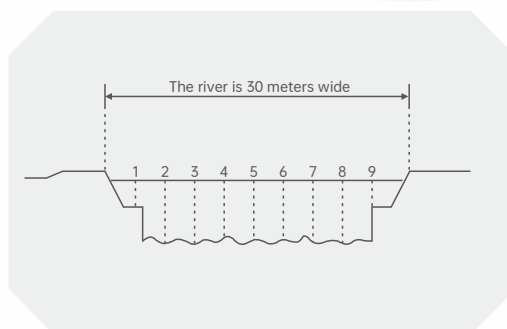
Installation conditions and locations within pipelines or culverts

- ① Installed inside the pipeline, as long as the minimum water level exceeds 10 centimeters above the sensor and the inner diameter of the pipeline is greater than 300 millimeters, it can be measured. It is not required to have a full tube, and measurements can also be made in a non full tube state. It is also necessary to choose a place with stable water flow for installation. The upstream of the installation location should have a straight channel with a pipe inner diameter of 20 times, and the downstream should have a straight channel with a pipe inner diameter of 5 times.
- ② Choose a place with stable water flow for installation. Areas with unstable water flow and unstable measurements can result in significant errors. There are two situations: firstly, the data fluctuates greatly up and down; Secondly, the measured data is smaller than the actual value;
- ③ Consider the situation of sediment and sludge in the pipeline. If there is sludge, the sensor should avoid it. For upstream garbage or floating objects, a grid should be installed on the upstream channel to filter, and the distance between the grid and the sensor should be more than 5 times the inner diameter of the pipeline.

Installation conditions and locations within the river channel

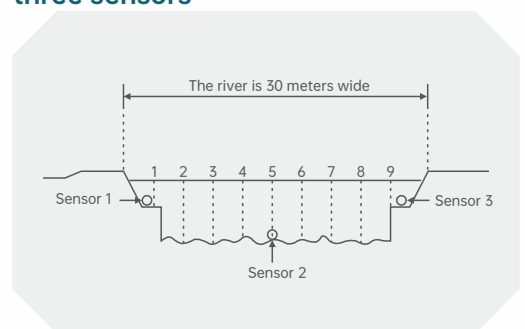
- ① For wider river channels, such as natural rivers, flood discharge channels of large reservoirs, ship channels under dams, and Flood control channel of hydropower stations, the flow velocity from the two banks to the middle varies greatly. It is more complicated to measure the flow, because the flow velocity at different locations is different, and the flow volume is also different.
- In this case, in addition to meeting the conditions for installation in the channel, it is generally necessary to collect flow velocity data from multiple points, and at least three sensors are required, one on both sides and one in the middle of the river bank.
- For example, dividing a 30 meter river into 10 equal parts on average.

Divide the river channel into equal widths



Install a sensor on both sides and in the middle of the river channel, and then connect them all to the same host computer

Schematic diagram for installing three sensors

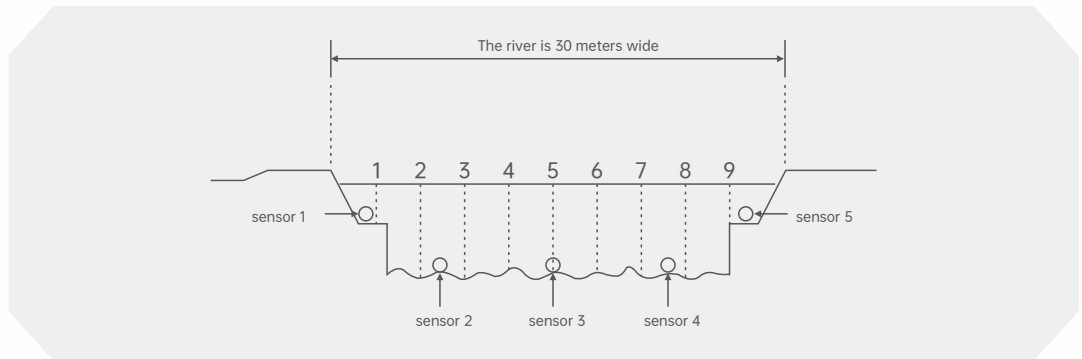


Installation instructions

Ensure that the minimum water level at the installation point during the dry season is 10 centimeters higher than the sensor. To determine whether the on-site measurement points are suitable for installation, there are many natural rivers, and it is difficult to install them with supports. In order to install sensors, Excavator are even used as dikes to block the water flow and form a convenient construction site. In this case, it is necessary to consider the use of non-contact river flowmeter for measurement.

Note: Channels with shallow water levels and stones flowing through them can easily damage the sensor.

Schematic diagram for installing 5 sensors



Install brackets and wiring on site within the channel

Special reminder: With a flow rate of 0.20 meters/second as the standard, every time the water flow speed increases, the destructive force on surrounding objects will increase by 50-64 times! The sensor should be installed in a fixed manner within the channel, and the outgoing lines behind the sensor must be protected with PVC, PE, or galvanized pipes. The cable should not be subjected to force due to water flow impact, nor should it be hung with floating objects such as garbage. On the premise that water can be cut off, fix the sensor at the bottom of the channel.

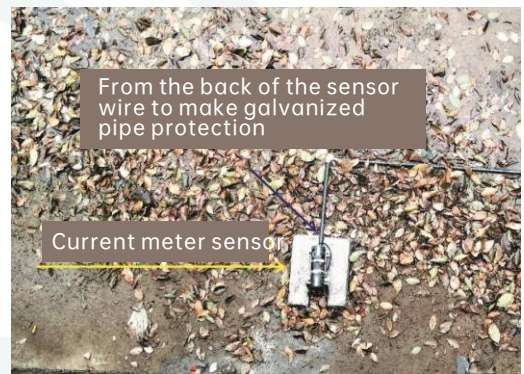
Installation requirements for silt settling channels

In channels with silt and debris, the installed cement platform should be raised so that the sensor can be higher than 19 debris and not easily covered by debris

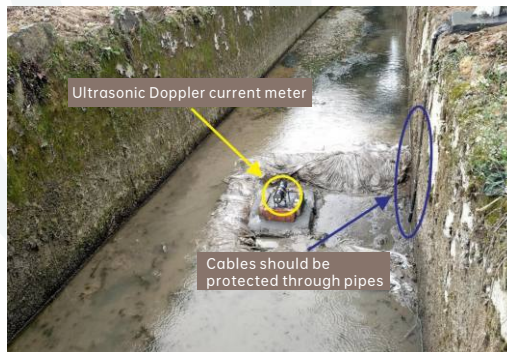
Installation of channels that can cut off water



Installed at the bottom of the channel



Installation of silt settling channels



Installation through stainless steel brackets



On site installation brackets and wiring

The picture is installed in a sewage discharge pipeline with a diameter of 1000mm, and the sensor cable leads to the host from a vertical galvanized pipe

Installation of 1000mm sewage discharge pipeline



If it is installed inside the pipeline, it can be fixed by placing a bracket from the top of the pipeline without cutting off water. The general pipeline is within 2000mm and can be installed in the center. The sensor is fixed at the bottom of the pipeline with a bracket. The bracket should be made into an "L" shape, and the sensor should be fixed at the bottom of the "L" shaped bracket, deep into the pipeline, and facing the direction of the water flow.

On site installation brackets and wiring

Installed in the river channel, also through side brackets

The picture shows installation in the river channel



Installation precautions

- The outgoing line of the sensor must be protected with PVC, PE, PR, galvanized pipes, etc. to avoid long-term impact of water flow causing cable cracking, detachment, or being scratched or cut by foreign objects after collision. Under the protection of the protective tube, the cable leads out of the water surface downstream of the sensor along the bottom or inner wall of the channel.
- At the outlet behind the sensor, it is necessary to install a protective tube and fix it because it will be impacted by water flow for a long time when in water. The protective tube is used to withstand the impact of water flow. If the cable is directly impacted by water flow, it may cause wire breakage, abrasion of the cable sheath, and other situations.
- There is a ventilation duct inside the communication cable that comes with the sensor, so be careful not to bend it. When the communication cable is led out of the water surface, it can be connected to an ordinary cable. At this time, the opening direction of the vent pipe should be downward to prevent water and foreign matters from entering the Submarine snorkel or blocking the Submarine snorkel. The cable connecting the 485 or 12VDC power supply on the sensor must be separated and connected with two 2-core shielded cables.
- Do not artificially pull or shake the cable, nor hit the sensor housing. Do not use connecting cables as load-bearing wires, use connecting cables to hang heavy objects. The cable must be fixed on the cement wall of the channel and cannot be shaken.
- Power can only be supplied by batteries or solar energy. If using a 220VAC or other mains power supply, a linear power supply should be used to convert it into 12VDC direct current, and a switching power supply cannot be used.
- For sites with a flow rate greater than 1.0 meters per second, the strength of the installation bracket should be strengthened to more than three times the strength of the existing bracket to ensure that the torrent does not wash away or damage the bracket. And slant support shall be made in the horizontal direction to support the sensor from moving, shaking and drifting caused by the impact of water flow.
- In the case of the need to extend the cable, the air conducting cable should only ensure that it does not enter water, bend, or be blocked, taking into account high humidity and low temperature condensation. The 12VDC power supply cable can be extended to 200 meters and requires the use of a 0.75 square millimeter two core cable. The 485 output cable can be extended to 200 meters, using a 0.75 square millimeter two core shielded cable.

Installation steps

- Install a fixed bracket to ensure stable and reliable fixation at a maximum flow rate of 2 times.
- The sensor is fixed to the mounting base.
- Sensor cables should be routed through pipes, and all protective pipes should be fixed properly. Protective pipes in water should have at least one clip fixed every 0.5 meters. The outlet behind the sensor should be specially protected and fixed to ensure that the impact of water flow is received by the protection tube and the sensor outlet will not be subjected to force. Otherwise, if the time is too long, the sensor wire will definitely break!!!
- Sending instructions through a laptop to view measurement data
- If it is close to the actual flow rate, the 485 cable can be connected to the on-site RTU or other receiving devices.
- Clean the garbage upstream of the sensor.



FD80-Selection composition

 Selection examples **FD80** **A** **H** **N** **V** **S**

1.measuring range	A	0.05m~10m
	T()	Other measurement ranges
2.Measurement type	G	point velocity
	H	level
	I	temperature
	J	flow
3.Power supply mode	N	battery
	O	solar energy
	P	electric supply
4.working voltage	V	7.2V~24V DC
5.output signal	S	4-20mA (External power supply)
	U	Modbus RS485

Explanation:

The measurement range of the FD80 Doppler flowmeter is 1m, the measurement type is liquid level, the power supply method is battery, the working voltage is 24V DC, and the output signal is 4-20mA.

Product Certification

Compliance and approval; Rodwig flow meters meet key standards and certifications for process measurement technology; To ensure the highest reliability in such settings;

