

HDR-PTEC Integrated Three-parameter Water Level Meter



HDR-PTEC integrated three-parameter water level sensor is a new type of hydrological measurement sensor. Its shell is made of 316L stainless steel or titanium alloy. It can be exposed to harsher measurement media, which greatly improves the reliability and long-term stability. The internal integrates pressure, temperature, electrode sensors, it can measure water depth, water temperature and conductivity parameters at the same time. HDR-PTEC can be widely used in groundwater monitoring, pollutant discharge monitoring, as well as aquifer storage and land restoration projects, marine science experiments and other fields .

1. Main features

- High-quality and high-stability sensing elements
- Integrated measurement of water depth, water temperature and conductivity
- Conductivity measurement adopts four-electrode technology, with stable measurement and long service life
- Automatic temperature compensation for pressure and conductivity
- RS485 interface and MODBUS-RTU standard communication protocol
- Power reverse connection protection, over-voltage protection
- Anti-surge and anti electromagnetic interference
- All stainless steel or titanium alloy shell with IP68 protection

2. Technical parameter

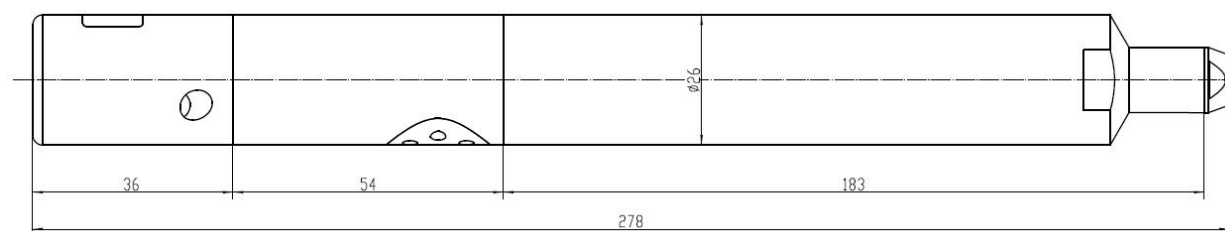
Water level sensor	
Water level accuracy	$< \pm 0.05\% \text{ F}\cdot\text{S}$
Water level range	0~10 mH ₂ O...300 mH ₂ O
Long-term stability	$< 0.05\% \text{ F}\cdot\text{S}/\text{year}$
Overload capacity	2X F·S
Water temperature sensor	
Temperature accuracy	$\pm 0.2 \text{ }^{\circ}\text{C}$ (0~70 $^{\circ}\text{C}$), higher accuracy on request
Temperature range	-40~85 $^{\circ}\text{C}$
Resolution	0.01 $^{\circ}\text{C}$
Conductivity sensor	
Conductivity range	0~100mS/cm, others on request
Conductivity accuracy	1.5%F·S
Conductivity resolution	0.001mS
Temperature characteristics	
Compensation temperature	0~50 $^{\circ}\text{C}$
Operating temperature	-20~85 $^{\circ}\text{C}$

Storage temperature	-40~125℃
Electrical characteristics	
Supply voltage	External power supply:5~30Vdc
	Internal battery:2.7~3.6Vdc
Battery Life	10 Year (work once per hour)
Power protection	Anti-reverse connection, over-voltage protection
Output	RS485/MODBUS-RTU protocol Load capacity: 128 nodes
Data storage	
Storage	8Mbit
Number of records	> 30000pcs
Storage method	Timing drive, linear storage
Structure	
Measuring medium	Compatible with stainless steel and fluorine rubber
Shell material	Stainless steel 316L or titanium alloy
Cable material	Polyvinyl chloride, polyurethane, Teflon
Cable specifications	Φ7.6mm, with air hole, shielding layer and steel wire, length customized
Environment	
IP rating	IP68

3. Definition of Power Supply and RS485Wiring

S/N	Wire color	Definition
1	Red	24V+
2	Blue	RS485+
3	Green	RS485-
4	Yellow	GND

4. Dimensions (Unit,mm)



5. Instructions

5.1 Power

The external power supply of the water level sensor can be as low as 5Vdc, and the highest is 30Vdc. It has reverse connection protection function; supporting intermittent power supply; it is equipped with 3.6V high-density lithium-thionyl chloride battery. When there is no external power supply, it is powered by the battery. Measure and record at the set time interval.

5.2 Communication Interface

The instrument uses an industrial-grade RS485 communication interface, half-duplex master-slave mode, the transmission distance can reach 1200 meters, and the baud rate supports 9600, 19200, 38400, 57600;

Serial port number: the serial port number of the communication serial port, the default is COM1, set according to the serial port number actually connected on the computer when using it.

- Baud rate: The baud rate of the communication serial port, 9600, 19200, 38400, 57600 (Bit/s) are optional, and the default is 9600.
- Check bit: the check mode of the communication serial port, no check, even check, post check, the default is no check.
- Stop bit: The stop bit of the communication serial port, the value is 1, 2, and the default is 1 bit.
- Data bit: The data bit of the communication serial port is fixed at 8bit.

The supported communication protocol is the MODBUS-RTU protocol; after the instrument is connected to the external power supply, the instrument can be operated by sending commands through the computer software or MODBUS host (for example, a RTU device), such as collecting water level and temperature values.

5.3 Installation and Fixing

The water level sensor is an integrated submersible structure with shielded air conducting cables. The cables are equipped with steel wires to increase the tensile strength and improve reliability. After the water level sensor is placed in to the well, the probe is mainly hung at the well mouth through the cable. When fixing, the steel wire should be fastened firmly, and the gravity should mainly act on the steel wire;

The well mouth should be equipped with a protective cover to protect one side of the cable joint to prevent the air duct from being blocked (absolute pressure type has no air duct), and connect the shielded wire.

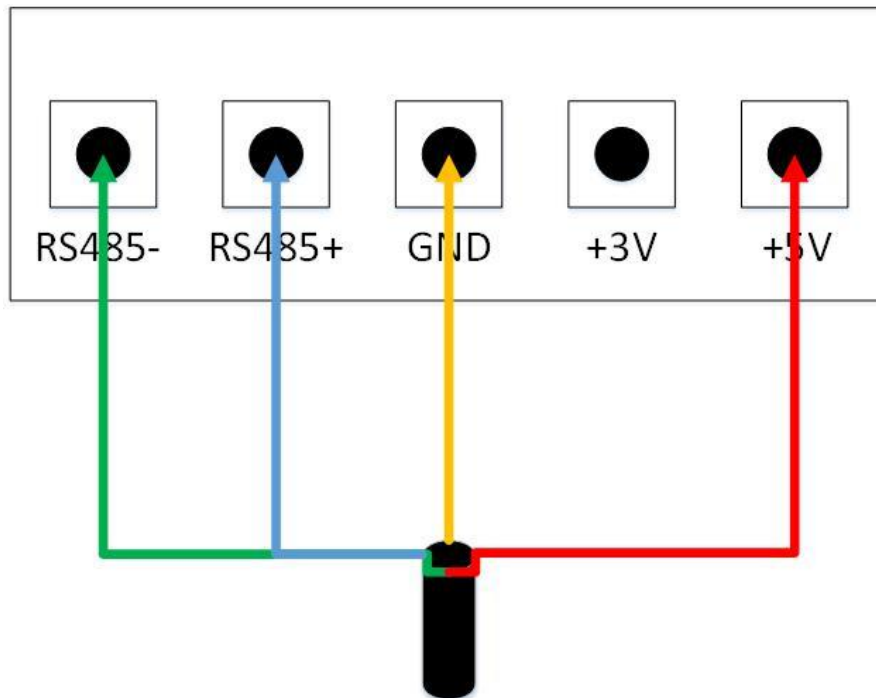
6. Wiring

6.1 Wiring of Water Level Sensor

The power supply and communication of the water level sensor share a four-core cable. The wires are red, yellow, blue, and green. Red and yellow are power positive and negative, blue and green are RS485 signal positive and negative.

Wire color	Red	Yellow	Blue	Green
Definition	Power+	Power -	RS485-A	RS485-B

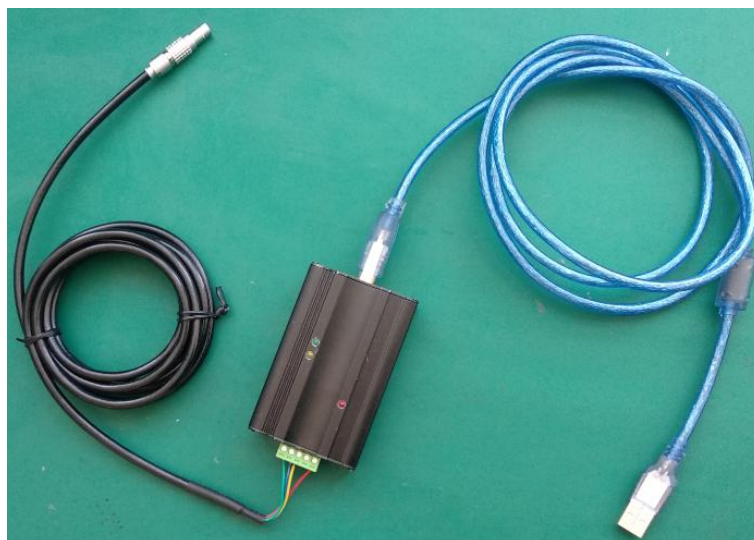
The 4-core cable (red, yellow, blue, green) of the sensor is connected to the terminal of the adapter:



Wiring diagram with our company's communication adapter

6.2 Computer Connection

To connect to the computer, a USB-RS485 converter is required as a communication adapter, and the communication adapter accessories produced by our company can be used, as shown in the figure:



Connection method: The blue cable (RS485-A) is connected to the converter's RS485+ (T+); the green cable (RS485-B) is connected to the converter's RS485- (T-); the USB cable is directly plugged into the USB port of the computer. Check the corresponding serial port number in the device manager, and use this serial port number in the computer software.

7. Setting

7.1 Communication Settings

When using the instrument for the first time, pay attention to whether the communication parameters are correct. It mainly refers to whether the serial port setting of the computer or MODBUS host is consistent with that of the instrument. The default serial port parameters when leaving the factory are: 9600, 8, n, 1; the default communication address is "1".

The communication parameters of the instrument take effect immediately after being changed (no need to cut off the power). At the same time, the communication parameters of the computer software must be changed to be consistent with the instrument.

7.2 User's Calibration

The user can adjust the zero point and density of the water level to adapt to the on-site measurement environment and medium. The instrument has been accurately calibrated before leaving the factory and generally does not need to be adjusted. If you need to calibrate, please do it under the guidance of a technician.

7.3 Internal Timing Record Setting

When using for the first time, set the measurement interval reasonably according to the needs of the test, the minimum interval is one minute, and 99 hours max; after the interval time (ΔT) is set, the current time inside the water level sensor is the starting point, and data is collected and recorded every interval ΔT , including water depth, water temperature, pressure, conductivity, acquisition time and battery power; the default interval time for the water level sensor is 60 minutes.

8. Collect Data

After connecting to a computer or RTU and other equipment, use the 03H function code in the MODBUS-RTU protocol to collect in the software; or directly use our company's sensor test tool.

串口信息: RS485端口→COM2:9600bps		串口设置	存储间隔: 60 分	设定间隔时间
通信地址: 2	红线: V+ 黄线: V- 蓝线: RS485+ 绿线: RS485-			校时
水位: 0		开始测试		读取时间
水压: 0		停止测试		退出
水温: 0				
电导率:				
电量: 0				
				清空提示信息

The sensor's collection elements include water level, water temperature, water pressure, conductivity, internal battery power, and collection time in the case of internal timing collection and self-recording.

9. How to use MODBUS protocol

9.1 Users who connect to the instrument through software or special equipment programming

For detailed descriptions of MODBUS-RTU protocol, register read and write operation commands, and register definitions, please refer to *Modbus Communication Protocol for Water Level sensor*.

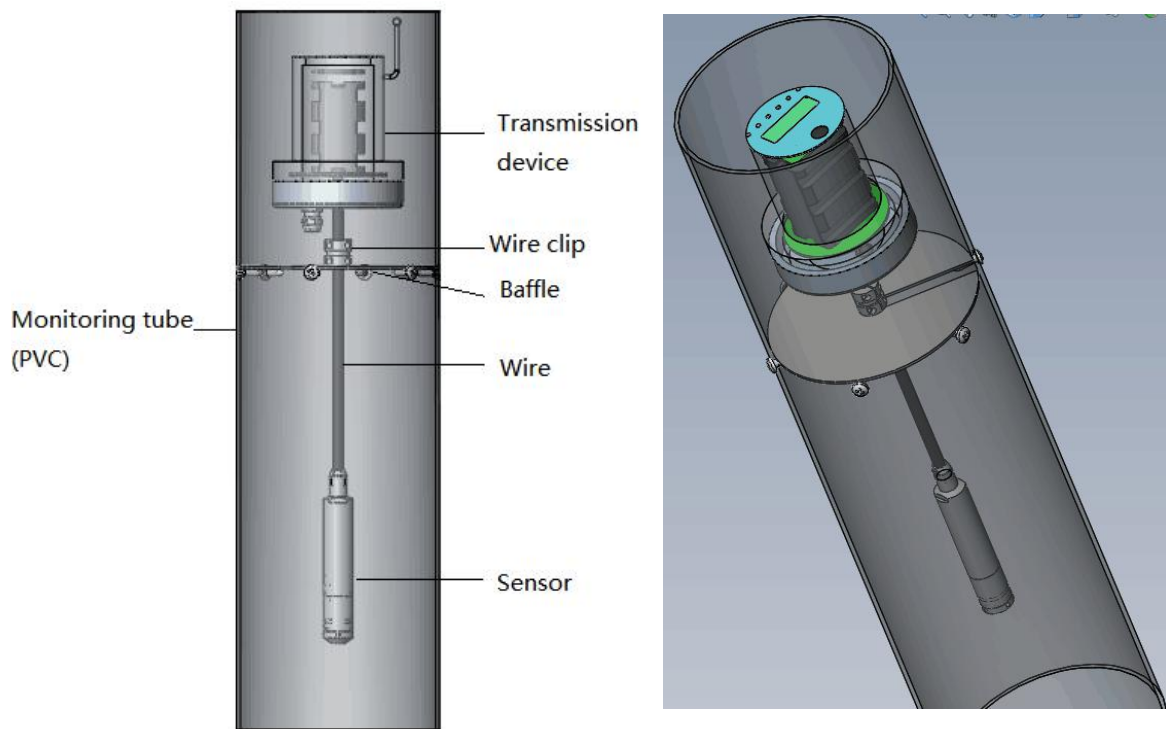
9.2 Users who use a computer to connect to the instrument

9.2.1 The serial port debugging software can be used to operate the water level sensor. Refer to the method in *Communication Protocol*;

9.2.2 The debugging software of the instrument manufacturer can be used for simple operation;

9.2.3 Users develop their own special operating software.

10. Typical application



Installation Diagram of Monitoring Well