

KWS-990 Digital Suspended Solid Sensor (With Wiper) Manual



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1.Introduction

The water contains mud, silt, fine organic matter and other microorganisms and colloids that can make the water appear turbid. This product is to detect the suspended solid value in the water body by using the degree of obstruction of the suspended matter in the water to the light passing through. The infrared light wave sent by the transmitter on the sensor is received by the detector at a certain angle after being absorbed, reflected and scattered by the measured object during transmission. The internal calculation unit of the sensor uses a specific algorithm to calculate the value of the measured solution through the light intensity received by the detector. It is widely used in the monitoring of TSS in solutions of chemical industry, electroplating, papermaking, environmental protection water treatment engineering, pharmacy, food, etc. Especially suitable for use in the field and on-site.

2.Feature

- This digital submerged TSS sensor support RS485 signal and 4~20mA signal;
- The shell is made of 304 stainless steel + ABS material with certain corrosion resistance.
- The stable invisible near-monochromatic infrared light source is used to avoid the interference of the chromaticity in the liquid and the external visible light on the sensor measurement; and the built-in luminosity compensation improves the measurement accuracy.
- With automatic wiper cleaning function to reduce maintenance costs, the cleaning interval can be set for 1-30000 minutes.
- Using the latest detection technology to avoid the interference of external light, with strong anti-interference ability.
- Using quartz glass lens with extremely high light transmittance on the optical path, the transmission and reception of infrared light waves are more stable.
- Wide range, stable measurement, high precision, good reproducibility, not affected by sample flow rate and pressure.
- Communication function: Two-channel photoelectric isolation signal output, namely RS-485 communication interface (MODBUS-RTU protocol part compatible), the fastest communication interval time is 200ms; and 4-20 mA current output, 4-20 mA can be output in reverse; No meter is required, and it can be directly connected to computers, PLCs and other equipment with RS485/4-20mA signal interface for data collection. It is convenient for users to integrate sensors into industrial control environments such as host computer systems and IoT systems.
- Relevant settings for the sensor can be made through RS485 communication, slave address and baud rate, online calibration, factory restoration, 4-20mA output corresponding range, range modification, scale factor and incremental compensation settings.
- Using five-point correction method.
- Watchdog function: to ensure that the meter will not crash.
- Power-off protection >10 years.

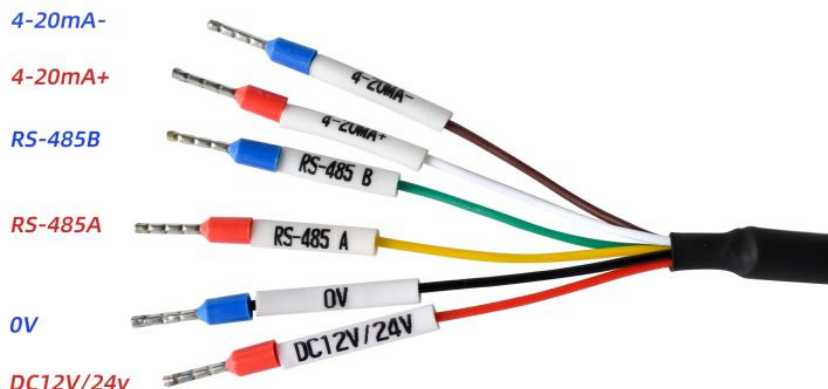
3. Technical Specifications

Model	KWS-990
Measuring Range	0 ~ 10000mg/L(range can be customized)
Accuracy	±2.0%FS
Repeatability	±1.0%
Output	4 ~ 20mA RS485 communication (partially compatible with MODBUS-RTU protocol), magnetic isolation protection
Ambient Temperature	0~60°C
Work Pressure	≤0.6MP
Temp Range	0- 50°C
Output load	<500Ω (4-20mA)
Power Supply	DC 12V ± 10% or DC 24V ± 10%
Power Consumption	0.3W (suggest 12~24VDC, ≥1A)
Wetted Part Material	Stainless Steel
Installation	Immersion mounting
Cable Length	5 m, customizable
IP Grade	IP68
Connection	G 3/4" thread
Dimension	Length 205mm, maximum outer diameter 50mm
Weight	1.5kg

4. Dimension

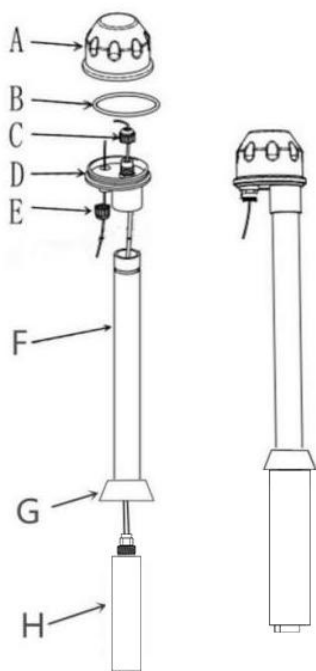


5.Wiring



6.Installation

- The sensor is required to be installed indoors or out of the sun, because the strong infrared rays in the sun will seriously affect the sensor's measurement results.
- For submerged installation, since the infrared rays emitted from the sensor will be reflected on the wall and the bottom of the pool, which will affect the measurement result, the sensor is required to be installed at least 20cm away from the wall and the ground, as shown in the figure below.



A--The top lid of Junction box

B--O-rings

C--Fastener of wire of sensor

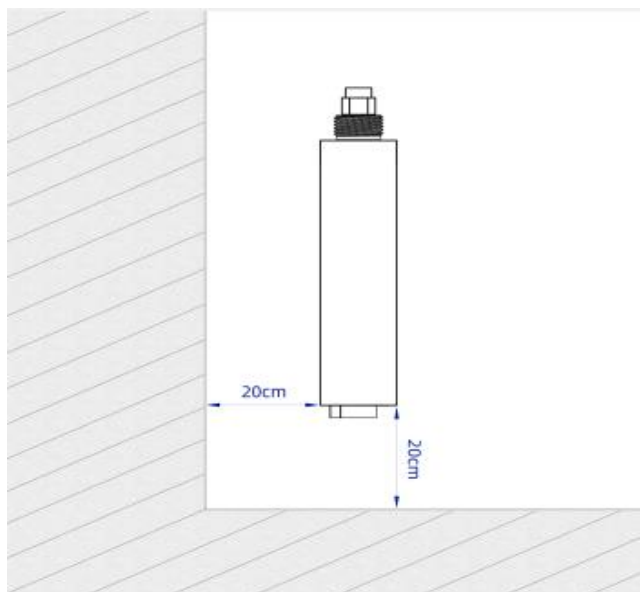
D--Bottom lid of Junction box

E--Guard tube of wire of sensor

F--Electrode wire fastener

G--Sensor thread connection

H--TSS Sensor

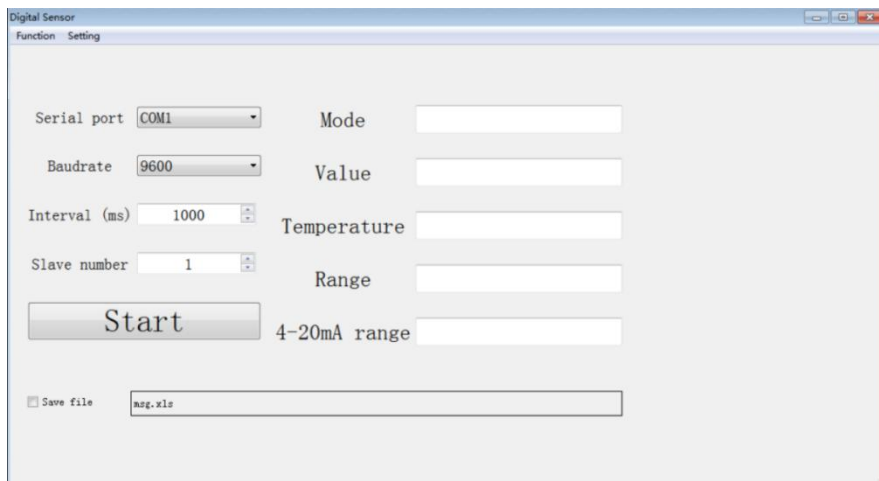


Installation position diagram

7. Use of debugging software

7.1. Communication connection

Open the debugging software as following:



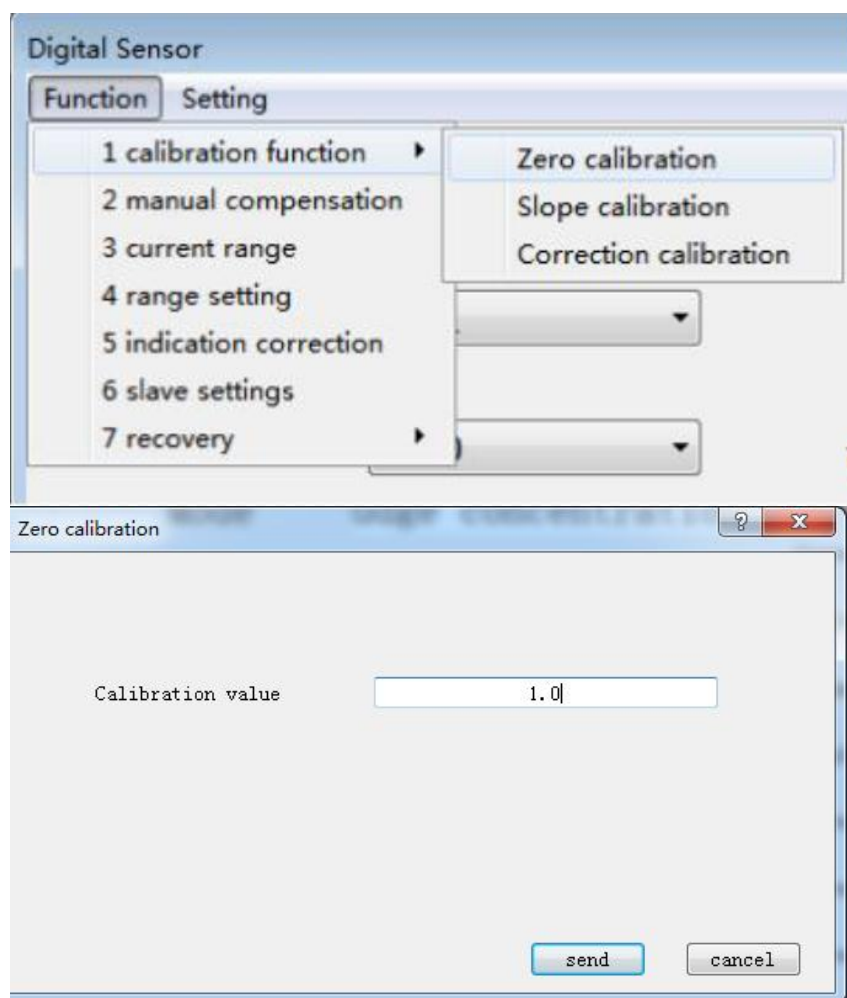
Select the correct serial port, baud rate, communication interval time, slave number, and click start to communicate.

7.2. Use of functions

7.2.1. Calibration Function

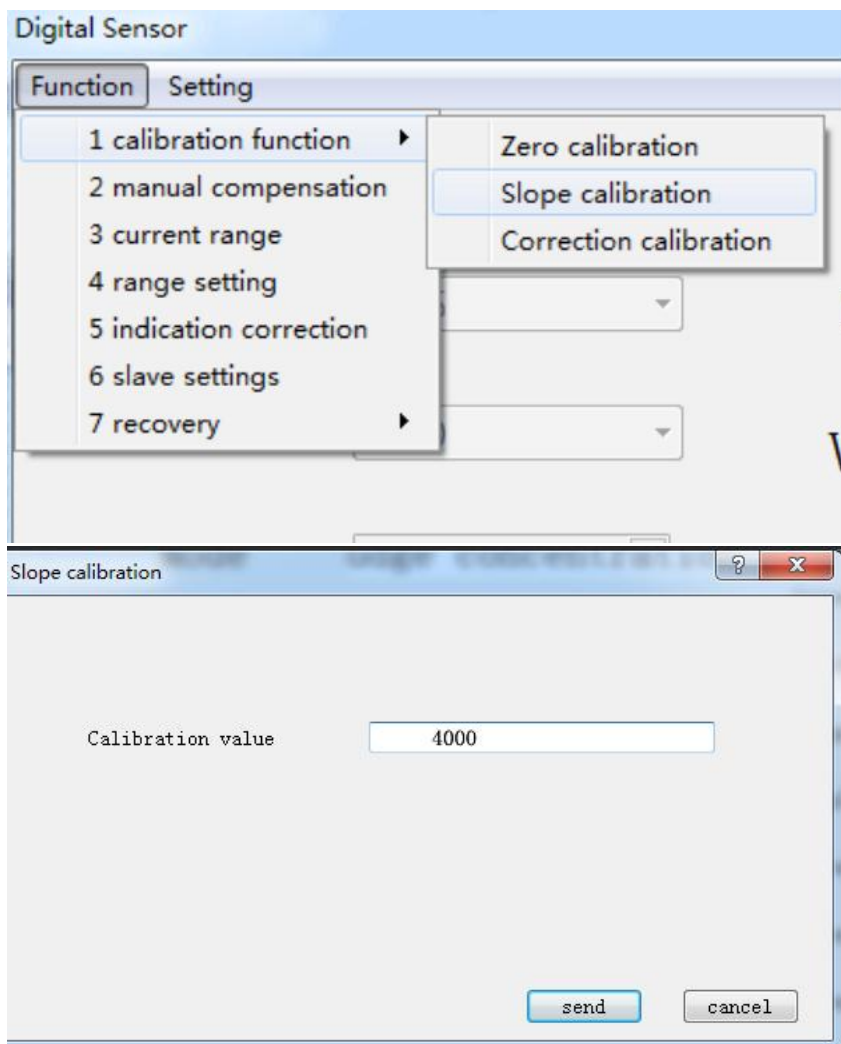
Zero calibration

Zero calibration generally uses low-concentration standard solutions (such as distilled water, purified water, etc.) to calibrate the sensor. Select the "calibration function" in the "function" menu in the upper left corner, and click the "zero calibration" sub-menu. Enter the TSS value of the standard solution in the pop-up dialog box, and click "Send".



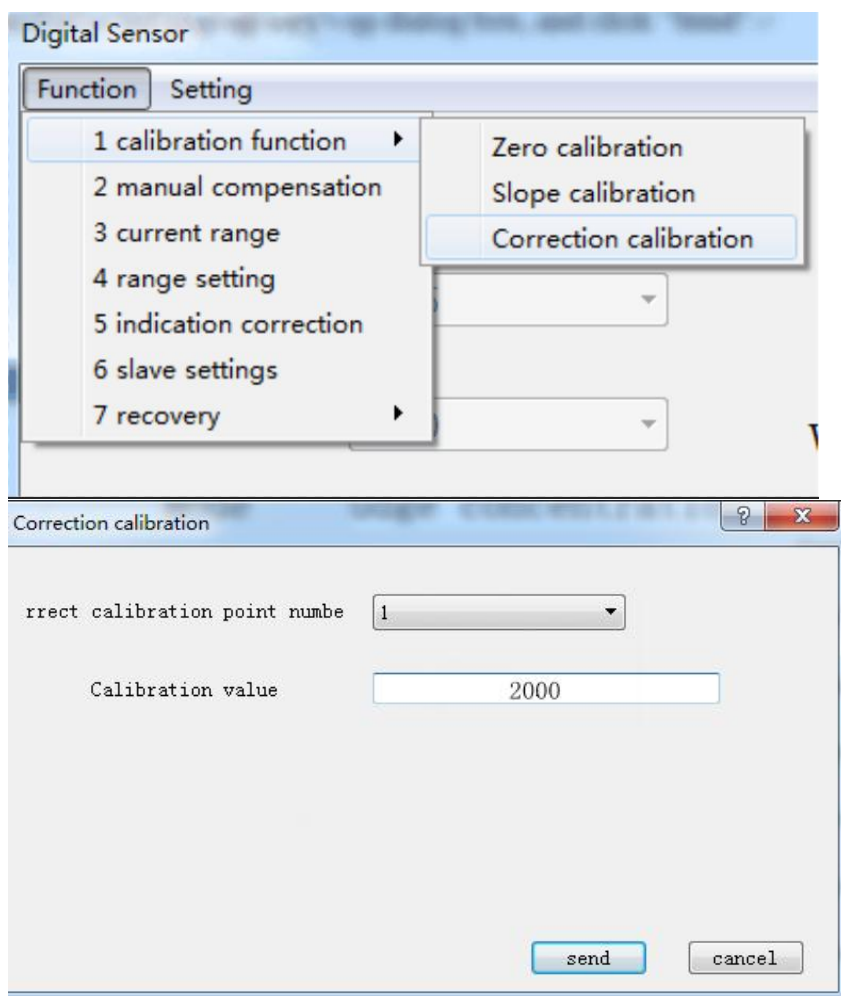
Slope calibration

The slope calibration generally uses the range value or a standard solution close to the range value to calibrate the sensor. Select the "calibration function" in the "function call" menu in the upper left corner, and click the "slope calibration" sub-menu. Enter the TSS value of the standard solution in the pop-up dialog box, and click "Send".



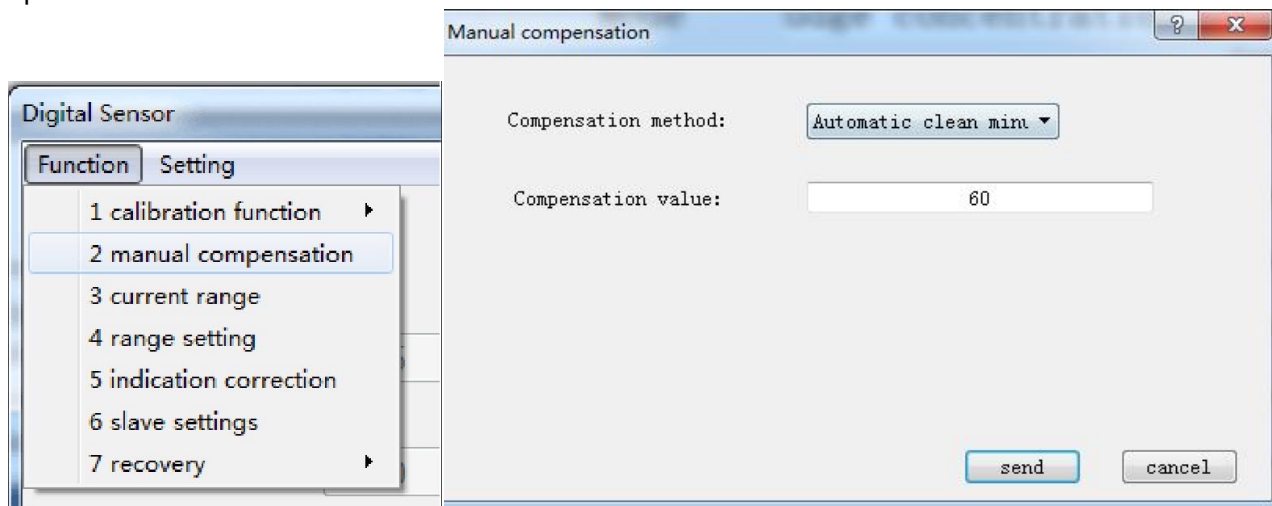
Correction calibration

After performing zero calibration and slope calibration, when the middle value between the two points measured by the sensor is inaccurate, correction calibration can be performed. Correction calibration can be calibrated to 3 points, but it is not necessary to calibrate all 3 points. Generally, the low range does not need to be calibrated. Select the "calibration function" in the "function " menu in the upper left corner, and click the "zero calibration" sub-menu. In the pop-up dialog box, select the correction calibration point number, enter the TSS value of the standard solution, and click "Send".



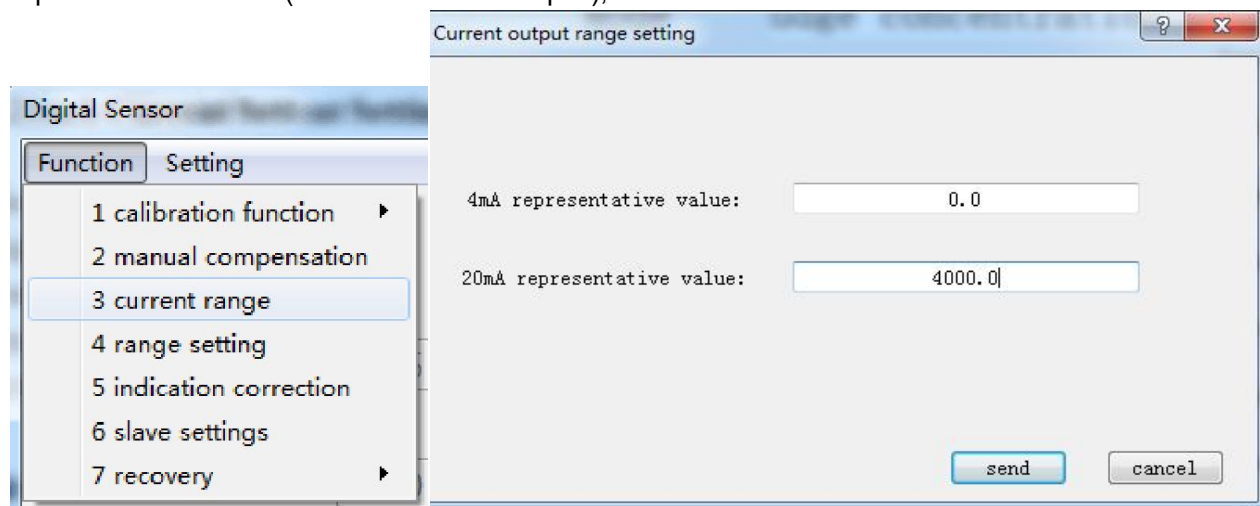
7.2.2. Automatic cleaning function Settings

This function sets the automatic cleaning interval of the sensor. The factory default is 1440 minutes (1 day). Click the "Manual Compensation" sub-menu in the "Function" menu in the upper left corner. In the pop-up dialog box, select the "automatic cleaning" compensation method, enter the minute value that needs to be set, and click "Send". After the setting is successful, the sensor will perform a cleaning operation and recalculate the time.



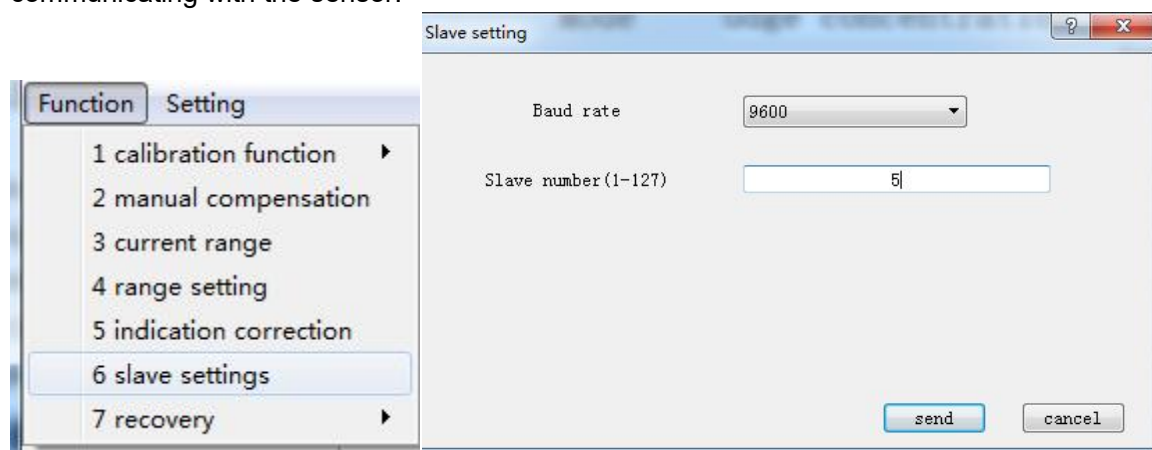
7.2.3. 4~20mA Current Settings

The sensor has set 4-20mA value corresponds to the measure range before shipment, and the user can set any value to meet the needs of industrial control. Click the "Current Range" sub-menu in the "Function " menu in the upper left corner. In the pop-up dialog box, enter the 4mA and 20mA representative values (the two cannot be equal), and click "Send".



7.2.4. Slave Setting

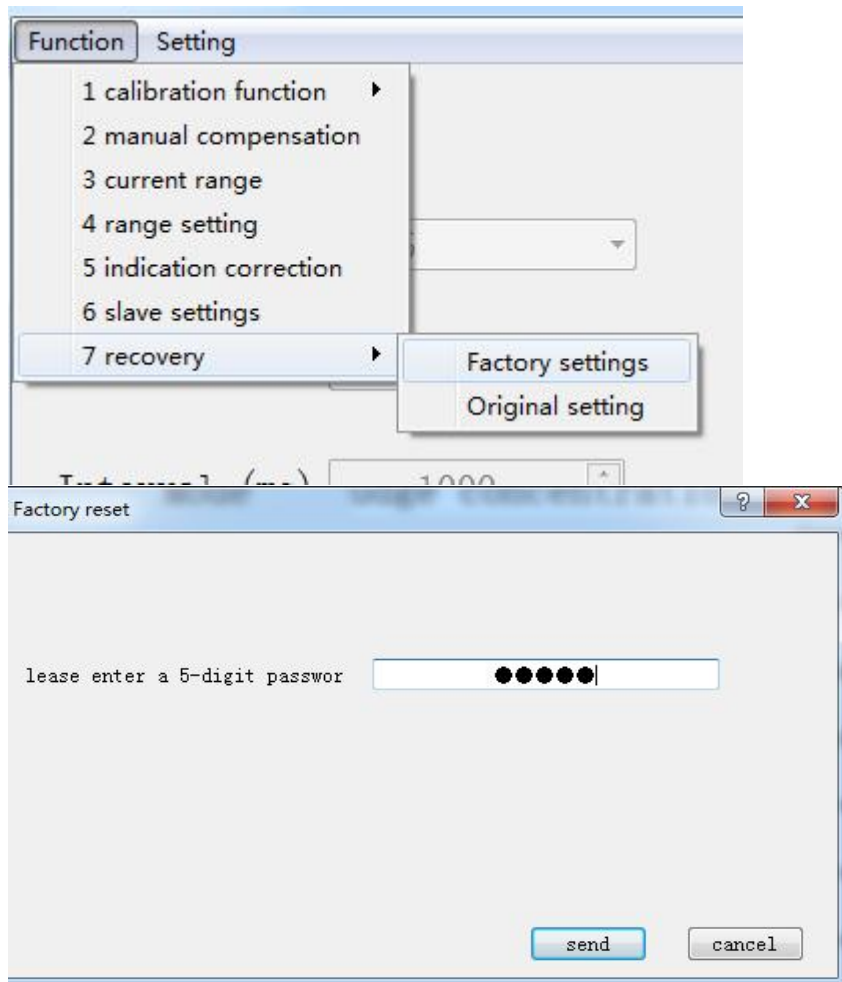
When the sensors used in a network, the slave ID and baud rate of the sensor may need to be modified. Click the "Slave Settings" sub-menu in the "Function" menu in the upper left corner. In the pop-up dialog box, select the required baud rate, enter the slave number to be set, and click "Send". After successfully modifying the slave ID and baud rate, the debugging software can no longer communicate with the sensor. Now need click the "Stop" button to change the slave ID and baud rate accordingly before communicating with the sensor.



7.2.5. Factory Reset

If the measured value of the sensor is inaccurate due to misoperation and it is inconvenient to re-calibrate, the sensor can be restored to the status before shipment by reset the factory settings.

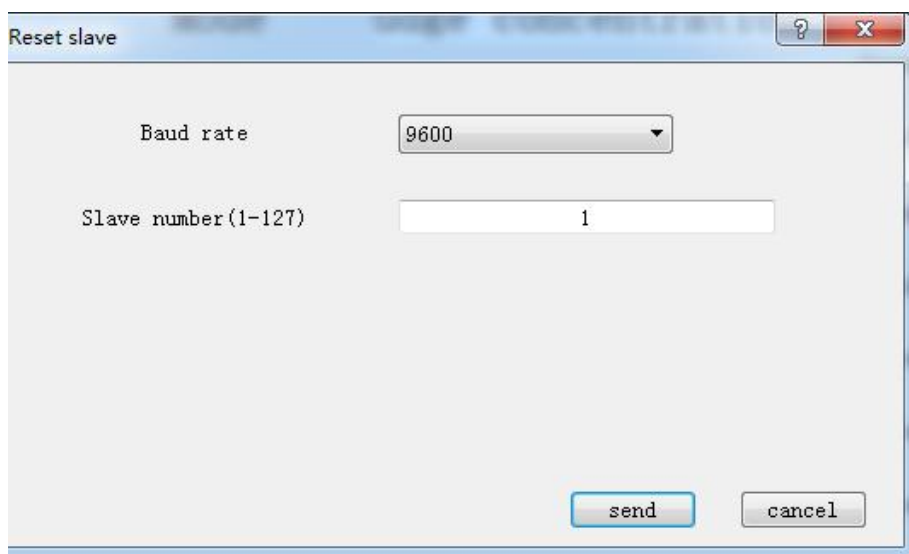
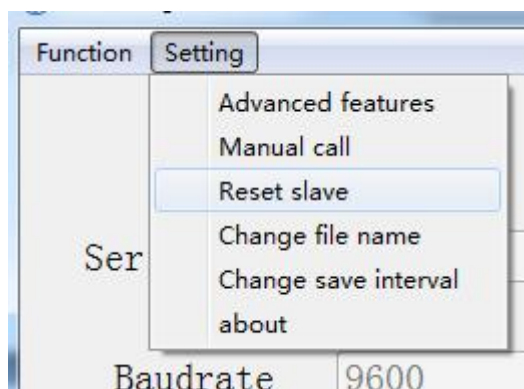
Select "Recovery" in the "Function" menu in the upper left corner, and click the "Factory Settings" sub-menu. Enter the 5-digit password "20034" in the pop-up dialog box, and click "Send". This function will not restore the automatic cleaning interval time, 4-20mA corresponding value, slave number and baudrate.



7.2.6. Reset address

When the user forgets the slave ID and baud rate of the sensor, because the debugging software cannot communicate with the sensor, the functions on the "function " menu cannot be used. At this time, the sensor can be set to slave 1 and 9600 baud rate by resetting the address. This function sends broadcast commands by using the baud rate set in the main interface to achieve the effect of modifying the slave number and baud rate.

1. Select 9600 baud rate and slave number 1 in the main interface, and click "Start".
2. Select the "Reset Address" sub-menu in the "Settings" menu in the upper left corner. In the pop-up dialog box, select 9600 baud rate, enter the slave number 1, and click "Send". Follow the pop-up dialog box to check the wiring and confirm.
3. Still unable to communicate, change the baud rate of the main interface and follow steps 1-2. If all baud rates have been tried, consider troubleshooting the power supply, wiring, and 485 module problems.



8.Maintenance

The sensor is generally calibrated before leaving the factory, and the user can directly put it into use; the failure rate of the general instrument is relatively low.

1. The sensor is required to be installed indoors or out of sunlight, because the strong infrared rays in the sunlight will seriously affect the sensor's measurement results.
2. Since the sensor shell is made of stainless steel, it has a certain weight; when installing the sensor, a mounting bracket is required.
3. When using the instrument for the first time, please test it after 24 hours.
4. After the sensor runs normally, the output 4-20mA corresponds to the range.
5. After the instrument has been used for a period of time, if the automatic cleaning interval is too long, the optical path lens of the sensor will be stained, which will cause a large measurement error. At this time, you can set a shorter interval time according to the situation, or set the interval time again to perform immediate cleaning and re-timing.
6. If the attached stains cannot be cleaned by the automatic cleaning wiper, after the sensor is powered off, use tweezers to clamp the alcohol cotton ball to clean the sediment on the optical path lens until it is clean.
7. Do not disassemble the instrument, so as not to affect or damage the performance of the instrument.