SL61-A(FC) Low Range Self-cleaning Turbidity Sensor Manual Instruction

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1. Specification

Table 1 SL61-A Low Range Turbidity Sensor

Specification	Details
Size	ϕ48mm*195mm (length)
Weight	0.32KG
Main Material	316 Stainless Steel + POM
	O ring: viton ring+ rubber ring
	Cable: PVC
Waterproof Rate	IP68
Measuring Range	0~10NTU
	Temperature: 0~50℃
Measuring Accuracy	±0.1NTU
	Temperature: ±0.5℃
Resolution	0.01NTU
	Temperature: 0.1℃
Data Output	RS 485, Modbus
Power	DC 12~24V, average current < 30mA
Storage Temperature	-20℃~+60℃
Working Temperature	0~50℃
Pressure Range	≤1Mpa
Calibration Way	One point or two point calibration
Cable Length	5m standard cable, other length can be optional;
Guarantee Period	12 months

2. Brief Introduction

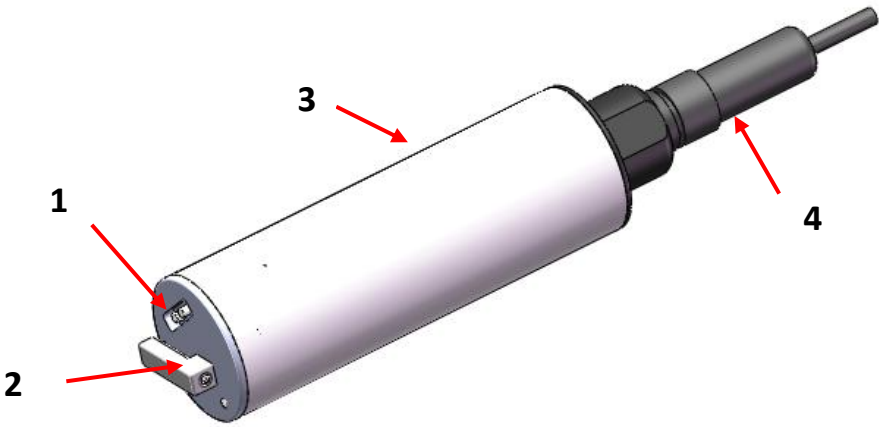
2.1 Product Information

Turbidity Sensor adopts 90°scattering light principle, RS485 and standard Modbus, with a good advantage of wide range, self-cleaning and free maintenance; It can be used to measure turbidity value of backwash water in filter tank, raw water and sedimentation tank in waterworks, monitoring the water quality in industrial production and regular water monitoring for surface water, groundwater and pipe network.

Characteristics:

- Self-cleaning window film coated to reduce microbial contamination;
- Self-cleaning wiper can secondary clean window surface;
- Emits 880nm near-infrared light, can compensate for the influence of sample color;
- Continuous measurement, fast response, suitable for continuous monitoring;
- Many ranges for choice, can meet different accuracy requirements;
- Flexible installation and easy for operation

Turbidity Sensor picture is as below:



Picture 2.1 SL61-A Turbidity sensor (low range)

1. Optical measuring window
2. Cleaning wiper
3. Body shelf Stainless steel
4. Waterproof connector

2.2 Safety Information

Please read this manual instruction first before open or installation or use the sensor.

Upon receipt of the instrument, pls carefully open the package and inspect the instrument and accessories for any damaged caused by transport. If any damaged is found, please inform the manufacturer and distributor immediately and keep the package for disposal.

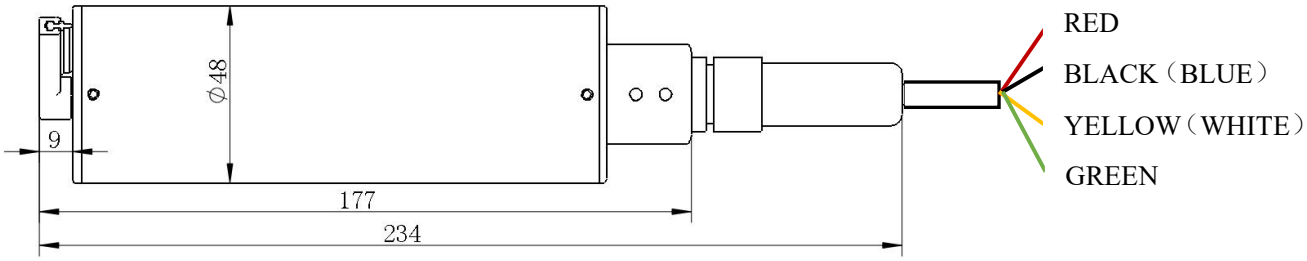
When the instrument breaks down, please contact the after-sales department of the manufacturer directly.

Do not disassemble by yourself.

3. Connection and Installation

3.1 Sensors Connection

Turbidity Sensor Overall size is as below:



Picture 3.1 Turbidity sensor Low Range Dimension

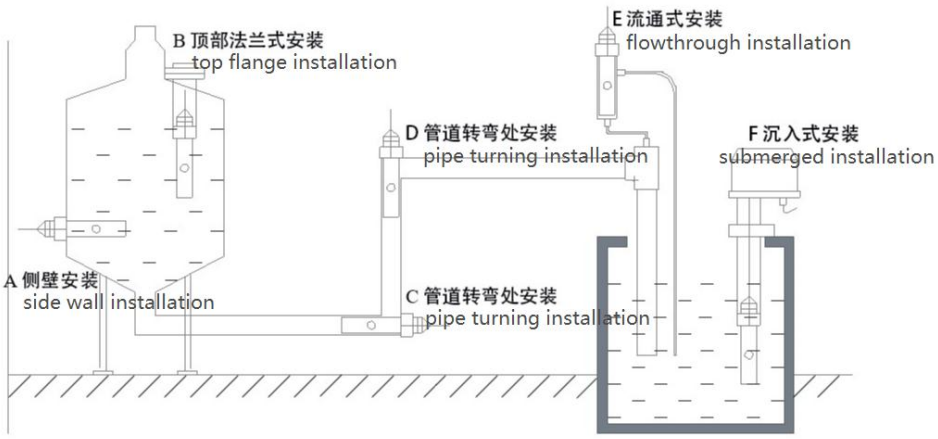
1. Red-- Power(Vcc)	2. Black(Blue)-- GND
3. Yellow(White) -- 485B	4. Green-- 485A

Notice： Sensors can be only installed in safety places.

3.2 Installation Methods

3.2.1 Sensor Installation

When install the sensor, it is necessary to carefully select the installation site and evaluate the installation method, so as not to cause distortion of the measurement data.



Picture 3.2.1 Sensor Installation

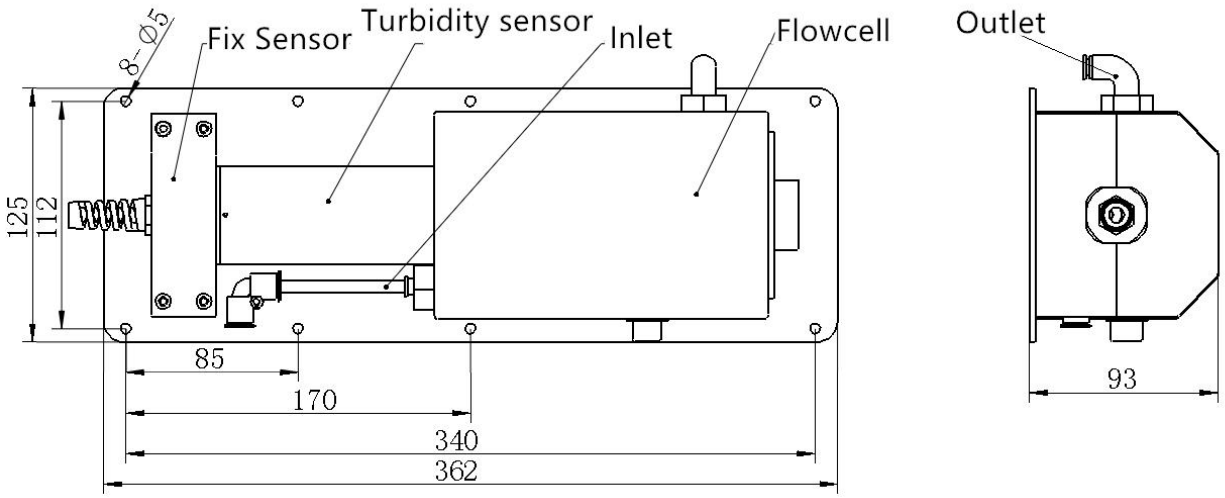
3.2.2 Flowcell Installation

1. ①~⑧ are the mounting hole for the fixing plate of the flowcell. Its diameter is 5mm. It is recommended to use M4*10 screws to fix it.

2. The installation direction of the flowcell is shown in Picture 3.2.2. The inlet is below and the outlet is above. The inlet and outlet are quick-plug joints, PC hose (6*4mm) is used as the water connection.

3. The hose on the quick-plug joints must be plugged tightly. Water leakage will cause air bubbles to enter the flowcell, affecting the turbidity measurement.

Notice: It is recommended that the water pressure of the flowcell ranges from 0.1Mpa to 0.4 Mpa, or the flow rate ranges from 300mL/min to 800 mL/min.



Picture 3.2.2 Flowcell Structure

Common Attentions

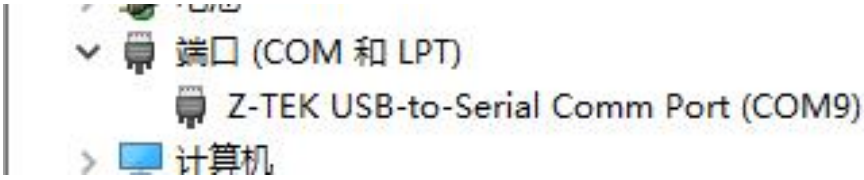
1) Sensor electrode should be installed in the pipeline which flow rate is stable and not easy to produce bubbles, side flow installation is acceptable, to avoid inaccurate measurement;
2) External light may affect the measurement of the sensor. Therefore, avoid the interference from external light sources when installing the sensor.
3) Please keep the measuring part of the electrode clean during installation. DO not touch the surface directly with your hands or unclean objects. Once touched by oil, grease and glue objects, accurate value cannot be measured for a long time.
4) Sensor electrode is a precision measuring part. Any strong acid and alkali cleaning, soaking and mechanical scraping should be avoided, all these operations will lead to changes in the electrode constant and affect the measuring accuracy of the sensor.
5) Measurement signal is weak electrical signal, the cable should not be connected with the power or control line to avoid interference to the measurement;
6) The cable is a special, if need to be extended, please make an agreement with the manufacturer in advance to avoid any error measurement.

4. Software Introduction

4.1 Installation

The software runs on Windows XP or above. The operating environment above.NET Framework 4.6.1 is usually provided by the system. If there is no environment, please download the installation file from the network or obtain the installation file from the manufacturer, and run the test software again after the installation is complete (or choose network installation, customers can update the latest version online when using it.

Then ensure that the RS485 serial port driver is properly installed, select the device manager, check that the driver is properly installed, and assign the serial port number.

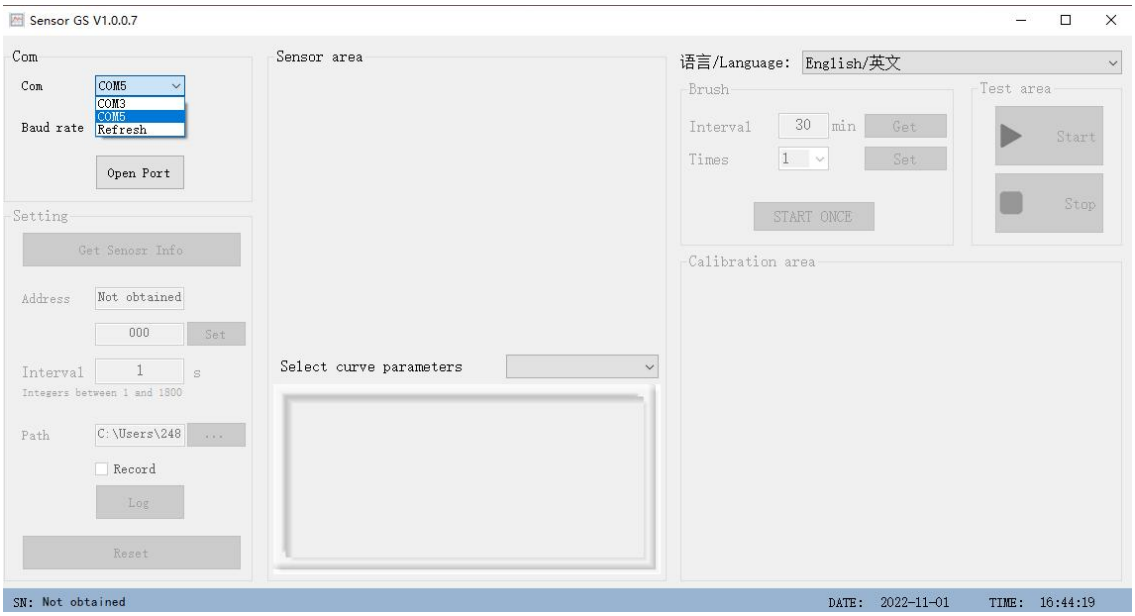


Picture 4.1 Serial port Check

4.2 Software Usage

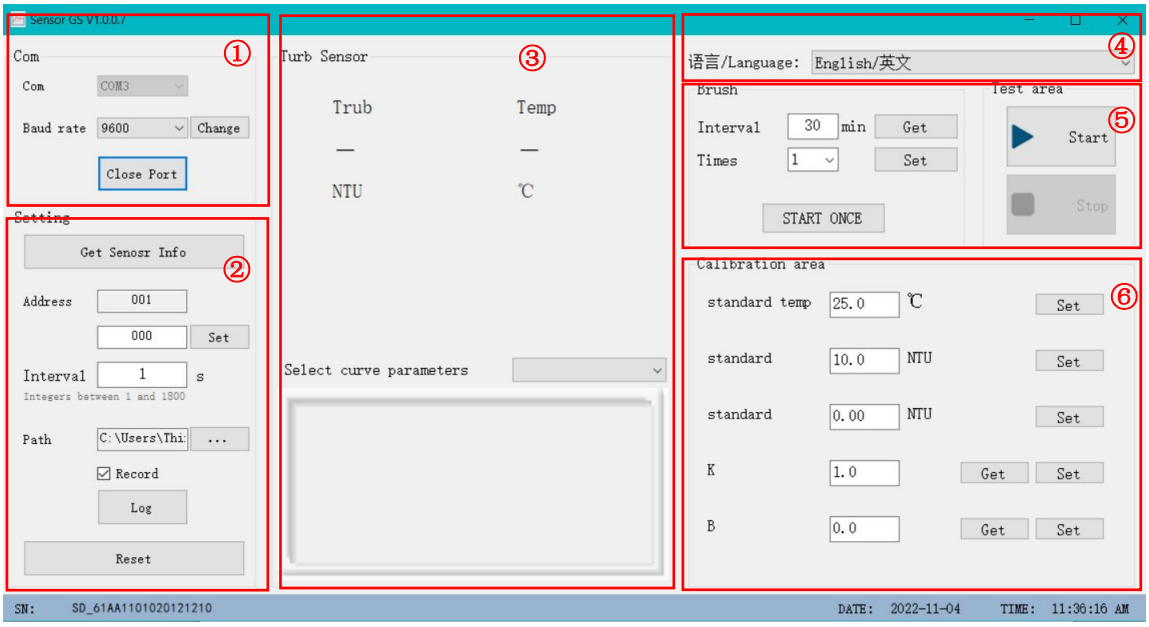
4.2.1 Measurement Main Interface

Open the “Sensor GS”, interface is shown in Picture 4.2, you can check that COM ports are normally connected. If no COM port is available, please go back to the previous step of software installation to ensure that the serial port is correctly driven, and then select “Refresh” in the COM port drop-down to refresh the serial port list or open the software again to select the serial port.



Picture 4.2 Start Interface

Select the baud rate of the serial port (the default baud rate of the sensor is 9600) and click " Open Serial Port" to start the software. The interface is shown in Picture 4.3.



Picture 4.3 Measurement main Interface

① Port area: select port number, set baud rate and control the opening and closing of the serial port.

②Setting area: you can set the device address, data collection interval, and data saving path of the sensor. You can restore the sensor to factory defaults if necessary.

③ Data display area: display real-time measured data and drawn curves (select parameters to draw curves for curve display)

④ Language selection area: select the software language, supporting Chinese and English

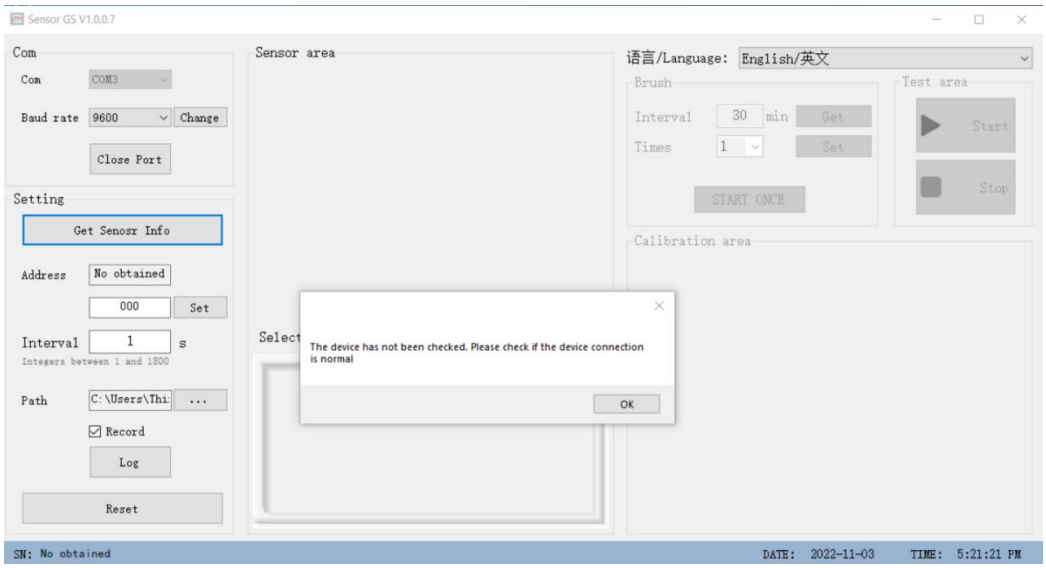
⑤ Test area: controls the start and stop of the measurements. For the sensor with a cleaning brush, the cleaning interval and cleaning times of the brush can be set during use.

⑥ Calibration area: used to calibrate the sensor.

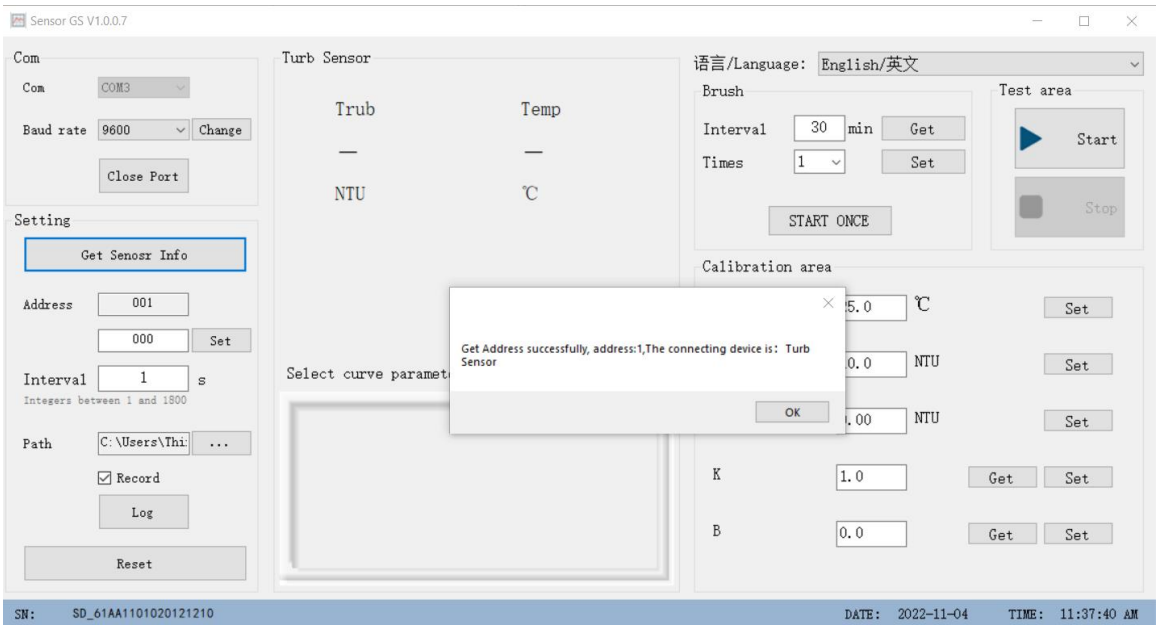
4.2.2 Function Setting

4.2.2.1 Get sensor information

After the serial port is opened, the system automatically tries to obtain sensor information. If there is no response within 10s, the system displays “No device is found, please check whether the device is properly connected”, as shown in picture 4.4. Or click “Obtain Device Information” when the serial port is open, the function is the same. If the sensor is correctly connected, the device address, sensor type, and SN are obtained, as shown in Picture 4.5.



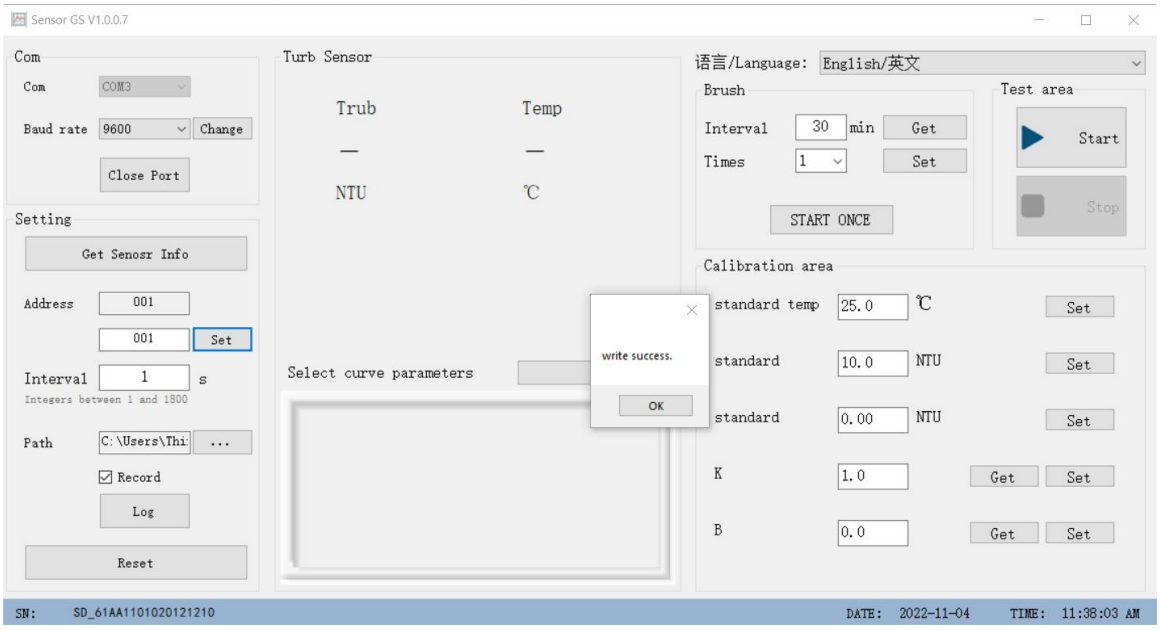
Picture 4.4 Sensor connection is failed



Picture 4.5 Sensor connection is succeed

4.2.2.2 Modify Sensor Address

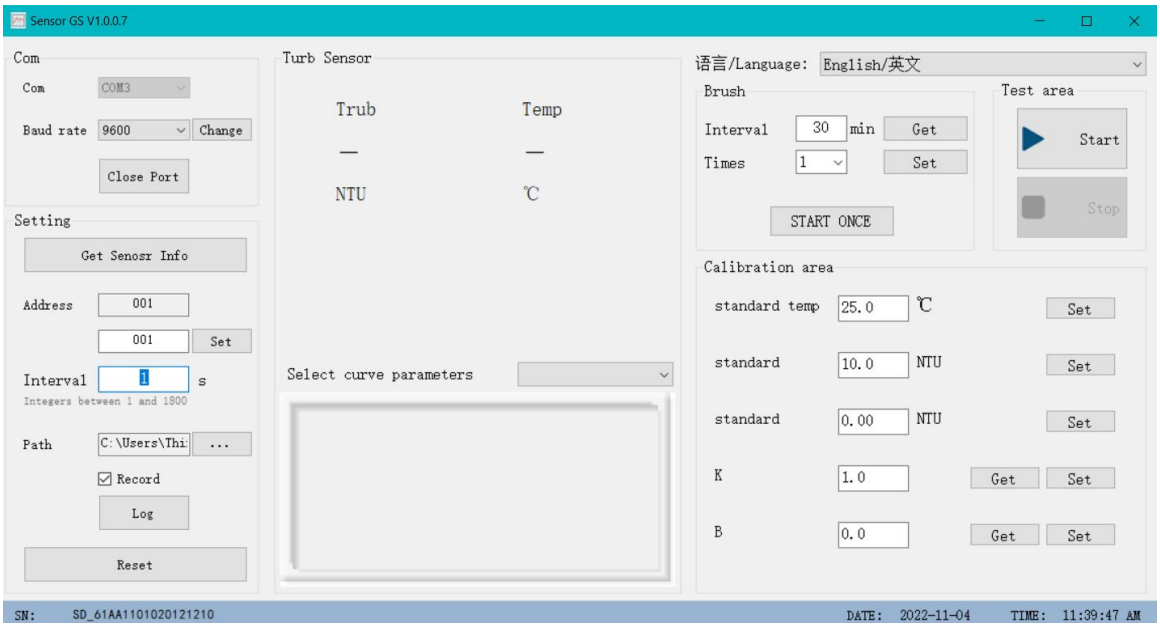
To modify sensor address, first to obtain correct sensor information, enter the address to be modified, and click Set. If the modification succeeds, the message “Write succeed” is displayed. (Address is a decimal value, the sensor address ranges from 1 to 254).



Picture 4.6 Modify device address

4.2.2.3 Modify Collection Interval

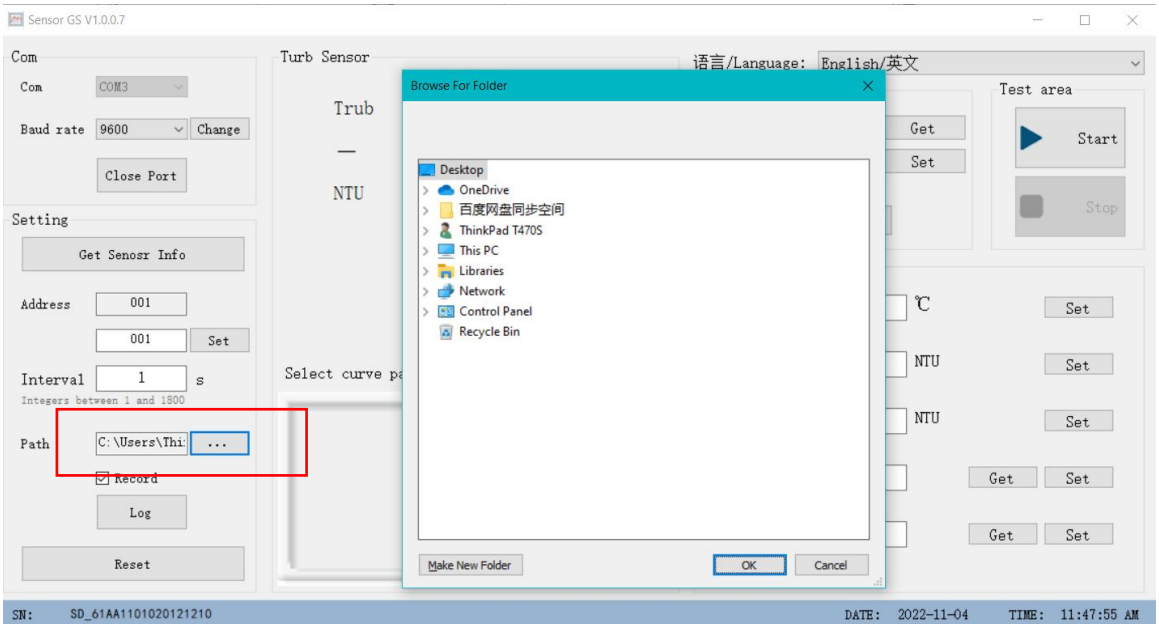
Sensor collection interval can be modified as required. The value is an integer ranging from 1 to 1800, unit is second (s).



Picture 4.7 Modify collection interval

4.2.2.4 Data Store

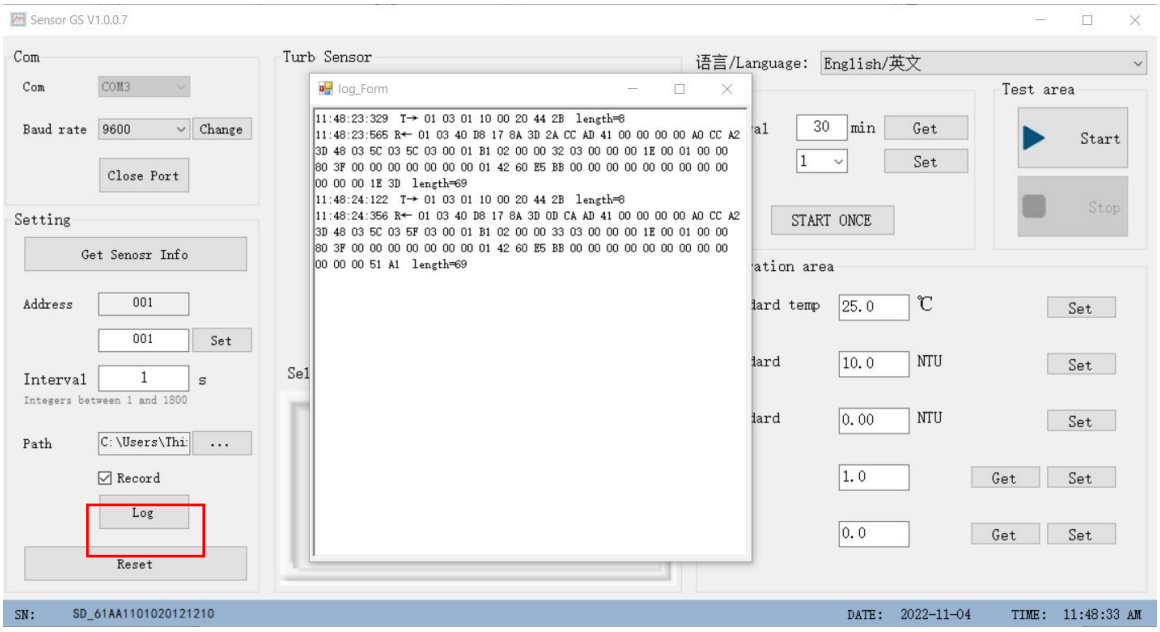
Select " Data Store" check box, during the test, the measured values are stored in the "Sensor type"+Sensor SN"+current date.txt file in the specified folder. The storage location can be changed, when the configuration file is generated for the first time, the default address is the folder where the software resides.



Picture 4.8 File Store Path

4.2.2.5 Log window

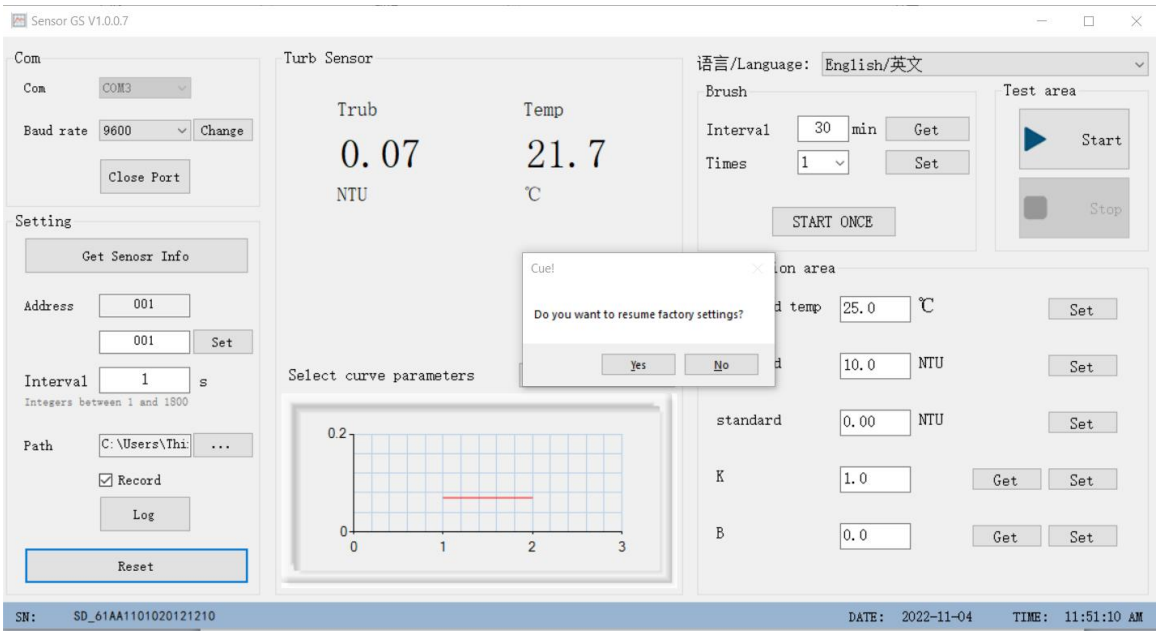
Click “Log Window” to view real-time communication data between the software and the sensor.



Picture 4.9 Check log window

4.2.2.6 Factory Reset

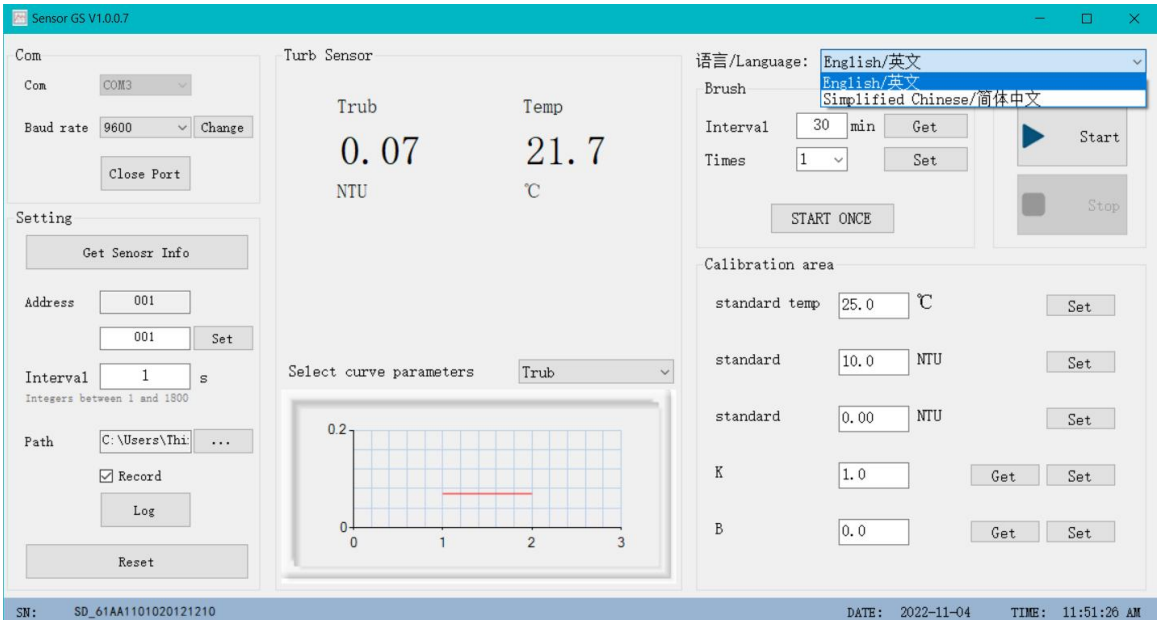
Click “ Factory Reset”, a pop-up window will appear : “ Factory Reset”, click “ Yes” to confirm, “Write successfully” will appear, the sensor will be restored to factory defaults.



Picture 4.10 Factory Reset

4.2.2.7 Language Settings

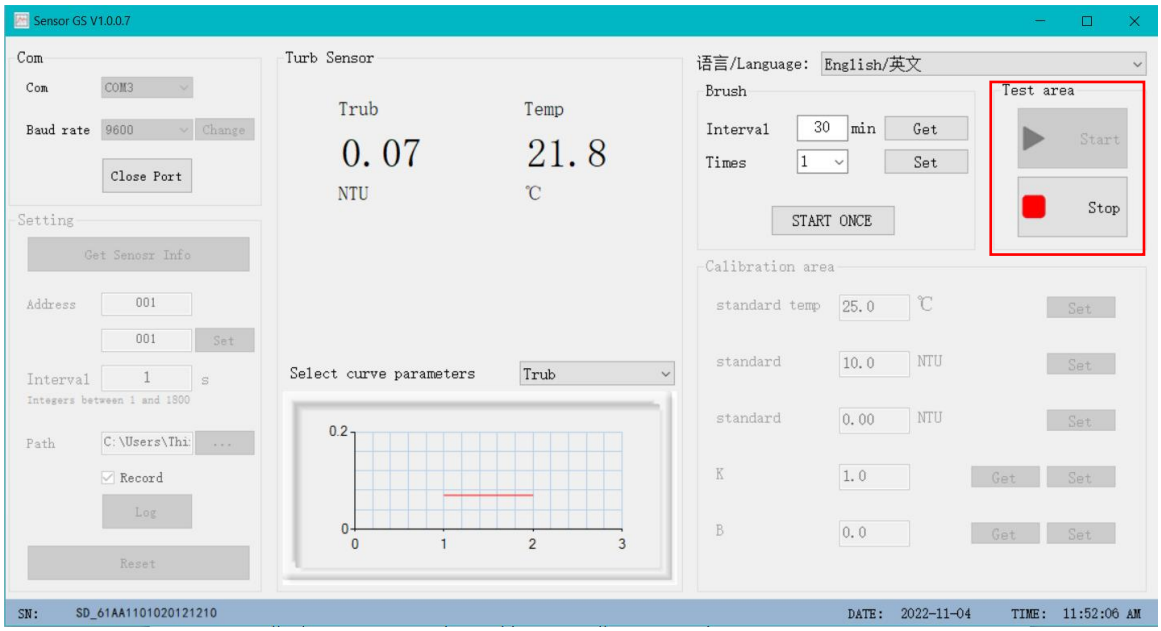
Click the drop-down box in the language selection area to select Chinese or English. After the selection is successful, the software automatically restarts and displays the corresponding language version. (Open the default Chinese interface for the first time).



Picture 4.11 Language Selection Area

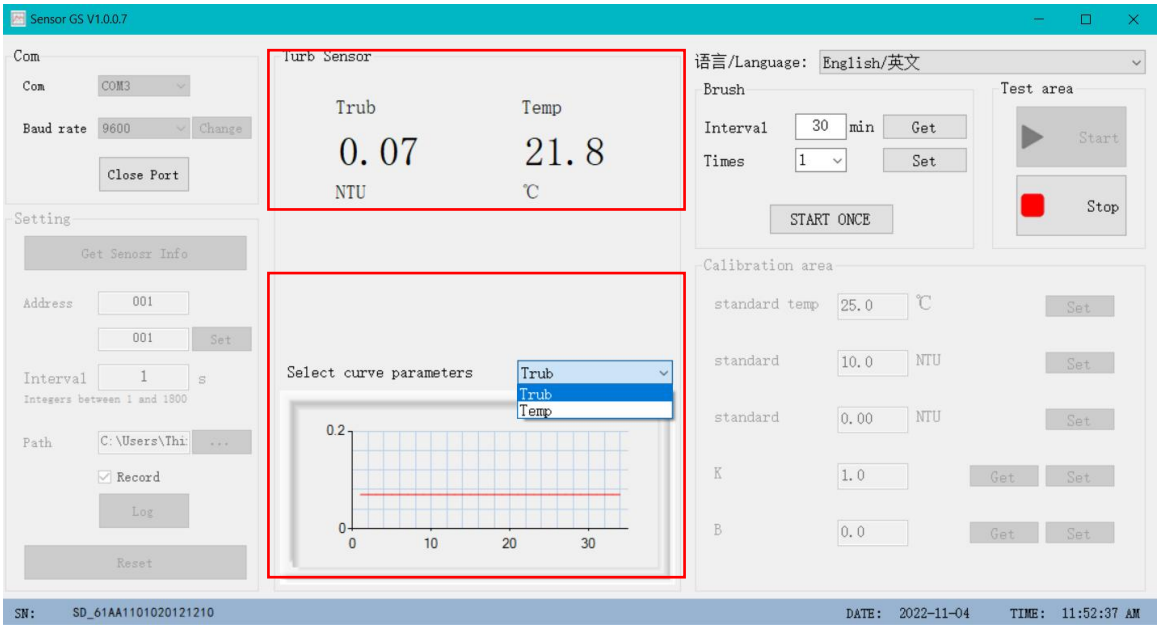
4.2.2.8 Measurement Interface

After the software is successfully connected with the sensor, click the “Start” button in the test area, and the sensor software begins to collect, display and store data in real time. Click the “End” button to terminate this collection.



Picture 4.12 Testing Area

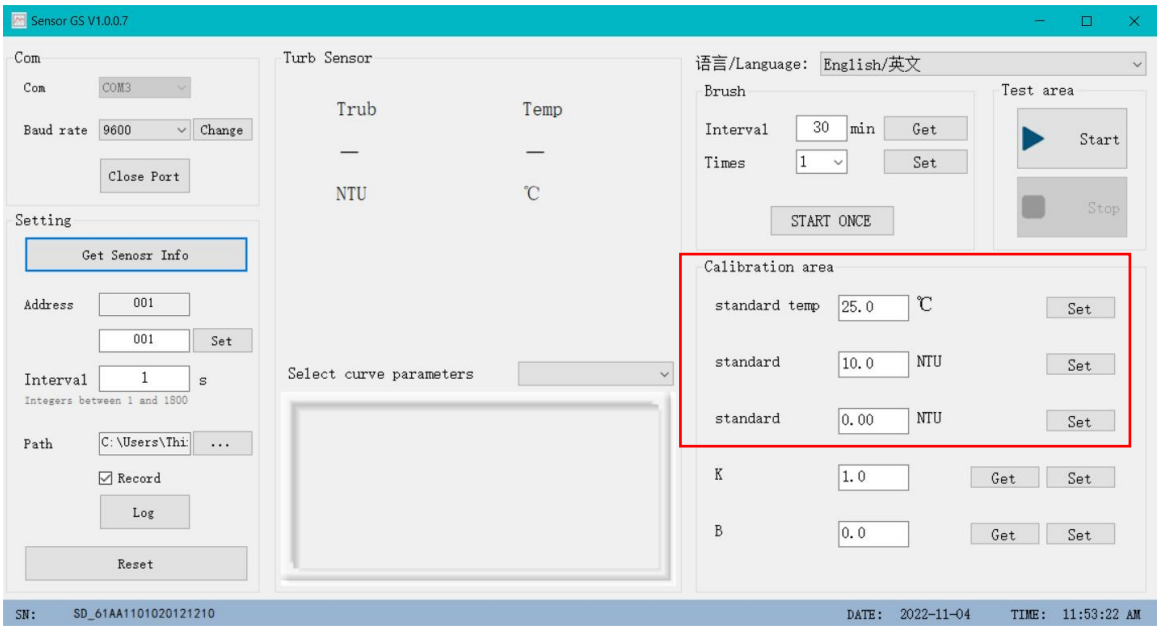
The software will collect and display data according to the set acquisition interval, and select a measurement parameter for curve drawing, which is convenient to watch the real-time trend of data change. The maximum display of 5000 groups of data automatically cleared, you can also right-click manually cleared.



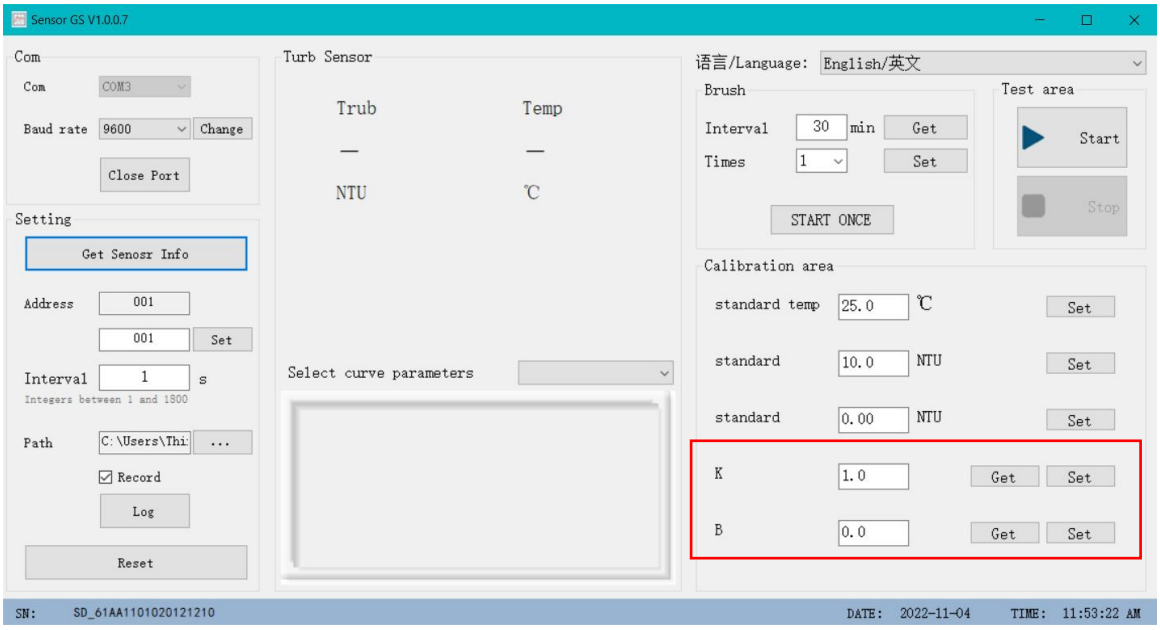
Picture 4.13 Display Area

4.2.3 Calibration Settings

Enter the value to be calibrated in the corresponding box of the parameter to be calibrated. When the sensor data is stable, click the corresponding “Setting”. the “Write Succeed” dialog box appears, indicating that that calibration is successful. The detailed operation of the calibration below in “5.2 Sensor Calibration”.



Picture 4.14 Calibration Area



In the calibration area of the software, there are the acquisition and setting of K and B. Click "Acquisition" to get the K and B of the sensor at the factory or the K and B previously setting. Input the corresponding K and B, and then click "Setting" , then you may set the K and B according to the needed . The K and B set here are applied to the measured value according to the formula Y=KX+B.

5. Maintenance and Serving

In order to obtain the best measurement results, the sensors need to be maintained regularly. The maintenance mainly includes the cleaning of the sensor, checking whether the sensor is damaged and regular calculation. You can also check the relevant status of the sensors during the maintenance and testing.

5.1 Sensor Maintenance

1. When the sensor is not in use, ensure that a protective cap is installed at the measuring window.

2. The sensor is equipped with an automatic cleaning brush, which can be cleaned automatically. The cleaning brush should be checked regularly for damage.

3. After the sensor is used for a period of time, clean and maintain the sensor regularly (generally 3 months, depending on the field environment) to ensure the accuracy of measurement. When cleaning, rinse the whole probe with clean water, use non-woven cloth dipped in alcohol or other detergent to remove grease, oil or microbial contaminants on the surface of the measuring window (pay attention to avoid scratching the measuring window), and then clean with distilled water, and then carry out the calibration operation.

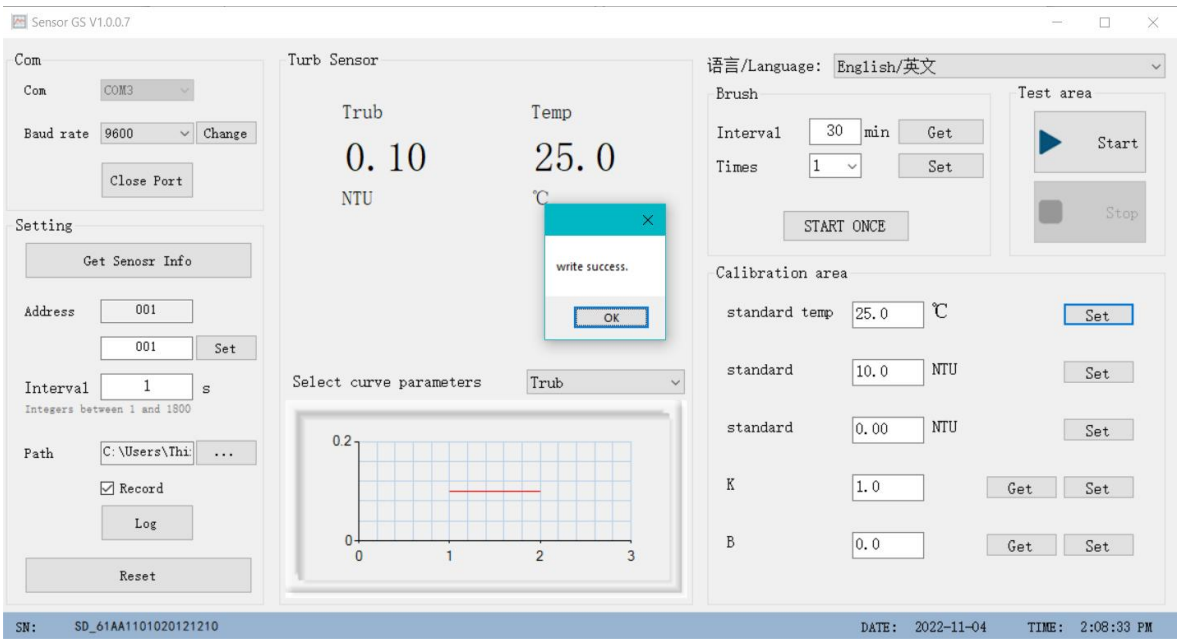
4. The measuring window of the sensor should be checked regularly for attachment of contaminants.

5. The service life of the sensor is generally 2 years, if the time is beyond, it is recommend to return to the factory for replacement in time.

5.2 Sensor Calibration

5.2.1 Temperature Calibration:

Temperature sensors have completed internal calibration before delivery, usually no need calibration further. However, the temperature can be calibrated by “Sensor GS” software. Input the temperature value during calibration, click “Set”, and the “Write Succeed” window appears, indicating that the calibration is successful.

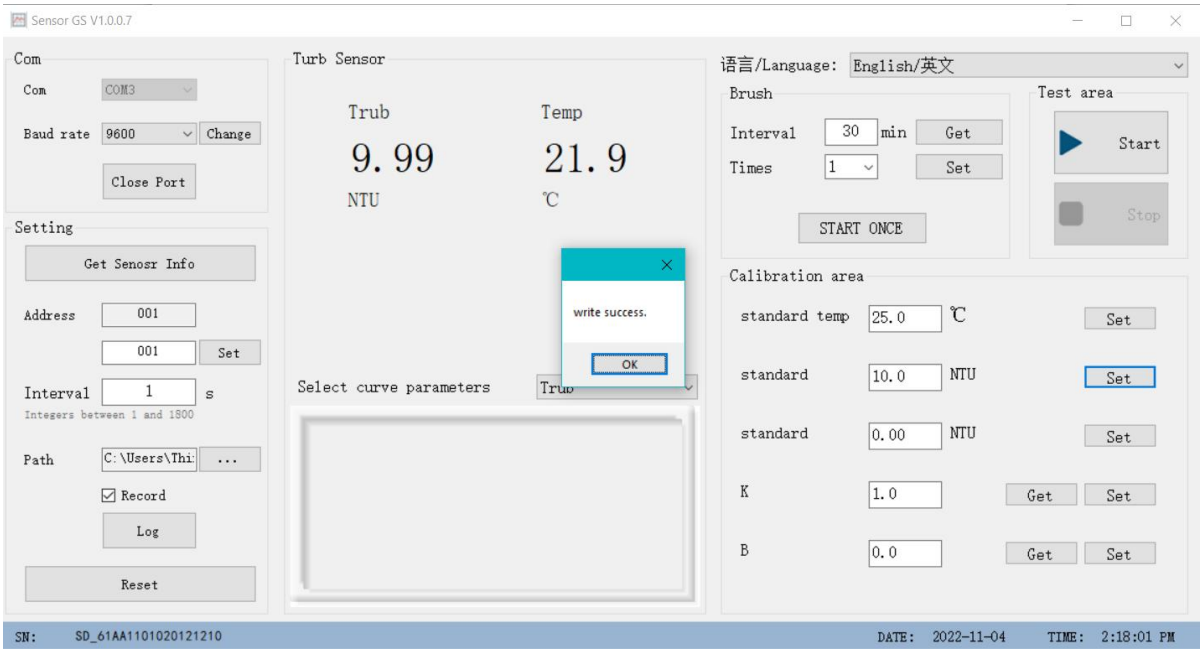


5.2.2 Two points Calibration

Ⅰ) Standard Solution (high) (factor standard K)

(1) Rinse the probe with water and wipe it clean;

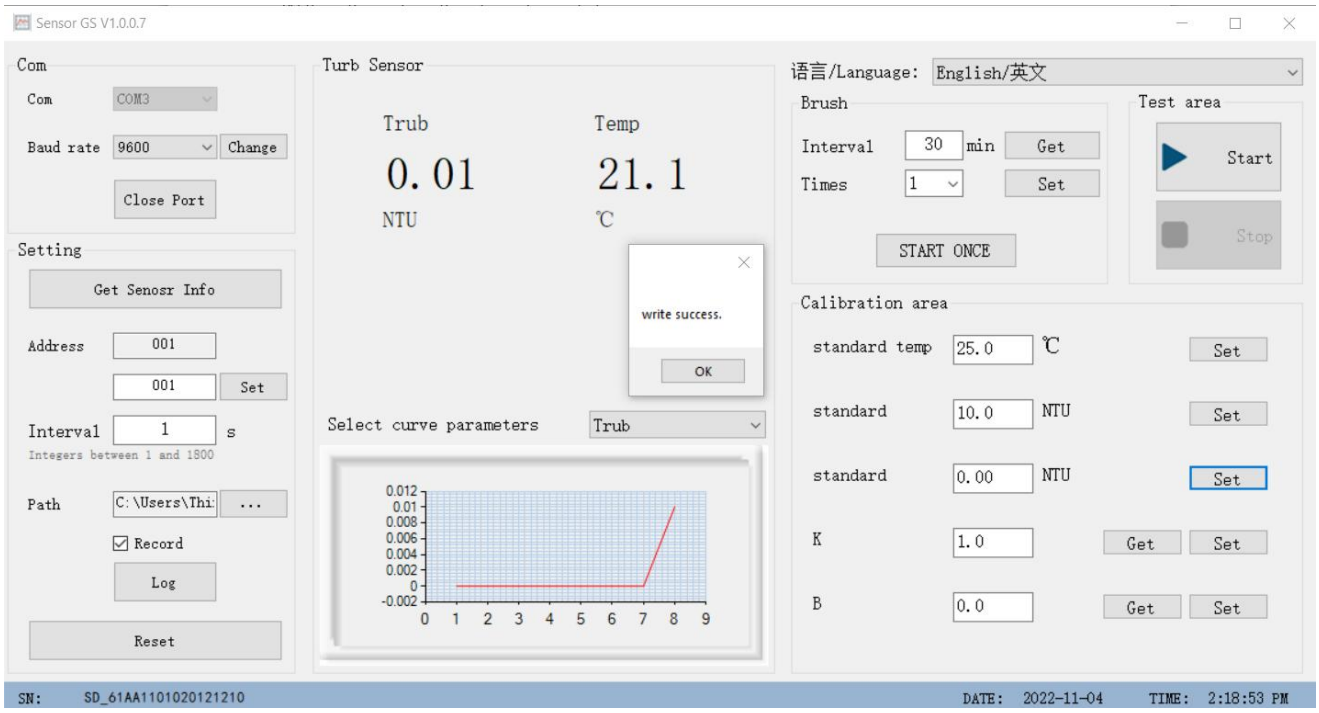
(2) Pour the high concentration standard solution into a black opaque container with a diameter of more than 10cm and a height of more than 15cm. Ensure that the solution exceeds the measuring window at least 1cm and 10cm from the bottom of the container. After the data of the sensor is stable, click the “Setting” of the standard solution (high). when “Write Succeed” appears on the interface, the calibration is successful.



Ⅱ) Standard Solution (low) (Deviation value calibration, B)

(1) Rinse the probe with water and wipe it clean;

(2) Pour the low concentration standard solution into a black opaque container with a diameter of more than 10cm and a height of more than 15cm. Ensure that the solution exceeds the measuring window at least 1cm and 10cm from the bottom of the container. After the data of the sensor is stable, click the “Setting” of the standard solution (low). when “Write Succeed” appears on the interface, the calibration is successful.



Note:

1. The digital sensor of turbidity has been calibrated before delivery. If it needs to be calibrated, standard solution can be used for calibration.
2. Standard solution (high) and standard solution (low) depends on the situation. The high point of 10NTU and the low point of 0NTU given in the manual are for reference only.
3. User can choose one point calibration or two point calibration according to the use situation.

6. Fault Analysis and Troubleshooting

1) **Measurement data is unstable and pulsating**
   Answer: check the surroundings for electromagnetic interference, and take care to stay away or to be better shielded.
2) **Sensor communication is not working**
   Answer: check and make sure cables are plugged in and reconnected;
3) **After calibration, the test is still inaccurate**
   Answer: check if the standard solution is contaminated, if so, replace the standard solution and re-calibrate;
4) **Slow response to measurement**
   Answer: check the electrode for contamination

Appendix I Product List

Sensors	Principle	Range	Accuracy	Resolution	Picture
pH S14-A	Electro chemistry	0.00~14.00	±0.1	0.01	
Turbidity S11-A	Scattered light	0.01~4000NTU;	0~10NTU：±0.1NTU 10~100NTU：reading value±2% or±0.1NTU take the bigger one 100~4000NTU：reading value±5%	0-10NTU：0.01NTU； 10-100NTU：0.1NTU； 100-4000NTU：1NTU	
Turbidity SL61-A	Scattered light	0~10NTU	±0.1NTU	0.01NTU	
Conductivity S16-A	Four electrode conductance cell	0-200mS/cm	0 -100 mS/cm：±0.5%； 100-200 mS/cm：±1%	1μS/cm-100μS/cm (according to the range)	
NH4+ S200-C	Ion electrode	0~1000mg/L (0~10mg/L, 0~100 mg/L for optional)	±3% standard solution	0.01mg/L	
TSS S20-A	Scattered light	0.01~5000mg/L	0～10mg/L：±0.1 mg/L 10～100 mg/L：reading value ±2% or ±0.1 mg/L 100～5000 mg/L：reading value±5%	0.01 mg/L	
Chlorophyll S19-A	fluorescence	0~400ug/L or 0~100RFU	Degree of linearity：R^2>0.999	0.01ug/L	
Blue-green algae S21-A	fluorescence	0~100ug/L or 0~100RFU	Degree of linearity：R^2>0.999	0.01ug/L	
COD S33-B	Non-spectral UV absorption	0.1~200mg/L (equiv. KHP)	±2% or0.5 mg/L take the bigger one(equiv. KHP)	0.1mg/L (equiv. KHP)	

ORP S15-A	Electro chemistry	-1999~+1999mV	±20mV standard solution	0.1mV	
DO S12-A	fluorescence	0-200% saturability 0-20mg/L	<±3%	0.001mg/L-0.01 mg/L(according to the range)	
Salinity S25-A	Four electrode conductance cell	Temp: 0~50℃ EC: 0~200mS/cm; salinity: 0~70ppt; total dissolved solids: 0~100g/L (the value is calculated from the conductivity, the default value is 0.65)	Temp: ±0.2℃; conductivity: 0~100 mS/cm, ±1%; 100-200 mS/cm, ±2%; salinity: ±1%	Temp: 0.1℃; conductivity: 1μS/cm-100μS/cm(according to the rang); Salinity: 0.1ppt	
Residual chlorine S18-A	Electro chemistry	0~2ppm 0~20ppm	0.01	±0.01mg/L	
Multi-sensor S600-C	(Standard): Temp, EC, pH, ORP, Turbidity, DO. Optional: Depth, Chlorophyll, BGA, NH4+, NO3-, K+,TSS, Salinity.	The same with above	The same with above	The same with above	