

ICON ProCon TB550 Series Turbidity Sensor



ICON ProCon TB550 Series Turbidity Sensor User Manual

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ICON ProCon TB550 Series Turbidity Sensor



Product Introduction



The turbidity sensor is based on infrared scattered light technology. The infrared light emitted by the light source will be scattered when it passes through the sample under test during transmission. The intensity of the scattered light is directly proportional to the turbidity.

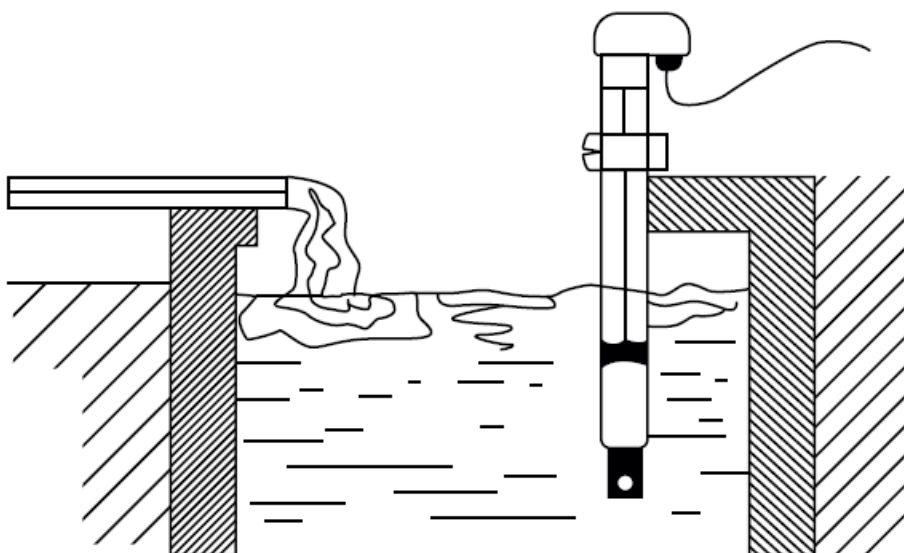
The turbidity sensor is equipped with a scattered light receiver in a 90° direction. The turbidity value is obtained by analyzing the intensity of the scattered light. It can be widely used for turbidity monitoring in sewage plants, water plants, water stations, surface water and other industrial applications.

Technical Specifications

Sensor Model No.	TB550
Power Supply	9-36VDC
Accuracy	±5% of Measured Value
Pressure Range	≤43.5Psi
Working Temperature	32 – 113oF 0 – 45oC
Measurement Range	0.01-4000NTU
Output	MODBUS RS485
Resolution	0.001 0.01 0.1 1 , When Matching the Controller
Response Time	6s < 90s < 300s (Adjustable)
Waterproof Grade	IP68 NEMA6P
Housing Material	SS316L, POM
Connection	3/4" NPT
Cable Length	10m
Installation	Immersed

Installation

Immerse the sensor into the sample and ensure that the tip is fully installed so as to avoid the sensor head being affected by air bubbles.



Calibration

The turbidity sensor has been calibrated before leaving the factory. Self-calibration is rarely required. If calibration is necessary, please see the standard liquid that is required for suspension concentration calibration. The specific configuration is as follows.

Preparation Method (Turbidity Standard Liquid 200mL 4000NTU) :

Serial No.	Material	Ammonium Chloride
A	Hydrazine Sulfate, $\text{N}_2\text{H}_6\text{SO}_4$ (GR)	5.00g
B	Methenamine, $\text{C}_6\text{H}_{12}\text{N}_4$ (AR)	50.00g

1. Accurately weigh 5.000g of Hydrazine Sulfate (GR) and dissolve it in zero turbidity water. The solution is then transferred to a 500ml volumetric flask, diluted to scale, shaken and filtered (filtered with 0.2 μm aperture, same below).
2. Accurately weigh 50.000g of Methenamine (AR), dissolve it in zero turbidity water and transfer it into a 500ml volumetric flask, dilute to scale, shake well.
3. Preparation of 4000NTU Formazine Standard Solution: Transfer 100ml of each of the above two solutions into a 200ml volumetric flask which is placed in a $25 \pm 1^\circ\text{C}$ incubator or constant temperature water bath. Let stand for 24 hours to make 4000NTU standard solution.

Turbidity Standard Solution

The total preparation volume was 200ml.

No.	Concentration (NTU)	400NTU Absorb Quantity (ml)	4000NTU Absorb Quantity (ml)
1	10	2.5	–
2	100	2.5	2.5
3	400	–	10
4	700	–	17.5
5	1000	–	25

Formulation Formula: $A=K*B/C$

- A: Absorb quantity (ml)
- B: Concentration of the solution required to be formulated (NTU)
- C: Proto-standard liquid concentration (NTU)
- K: Total amount of preparation (ml)

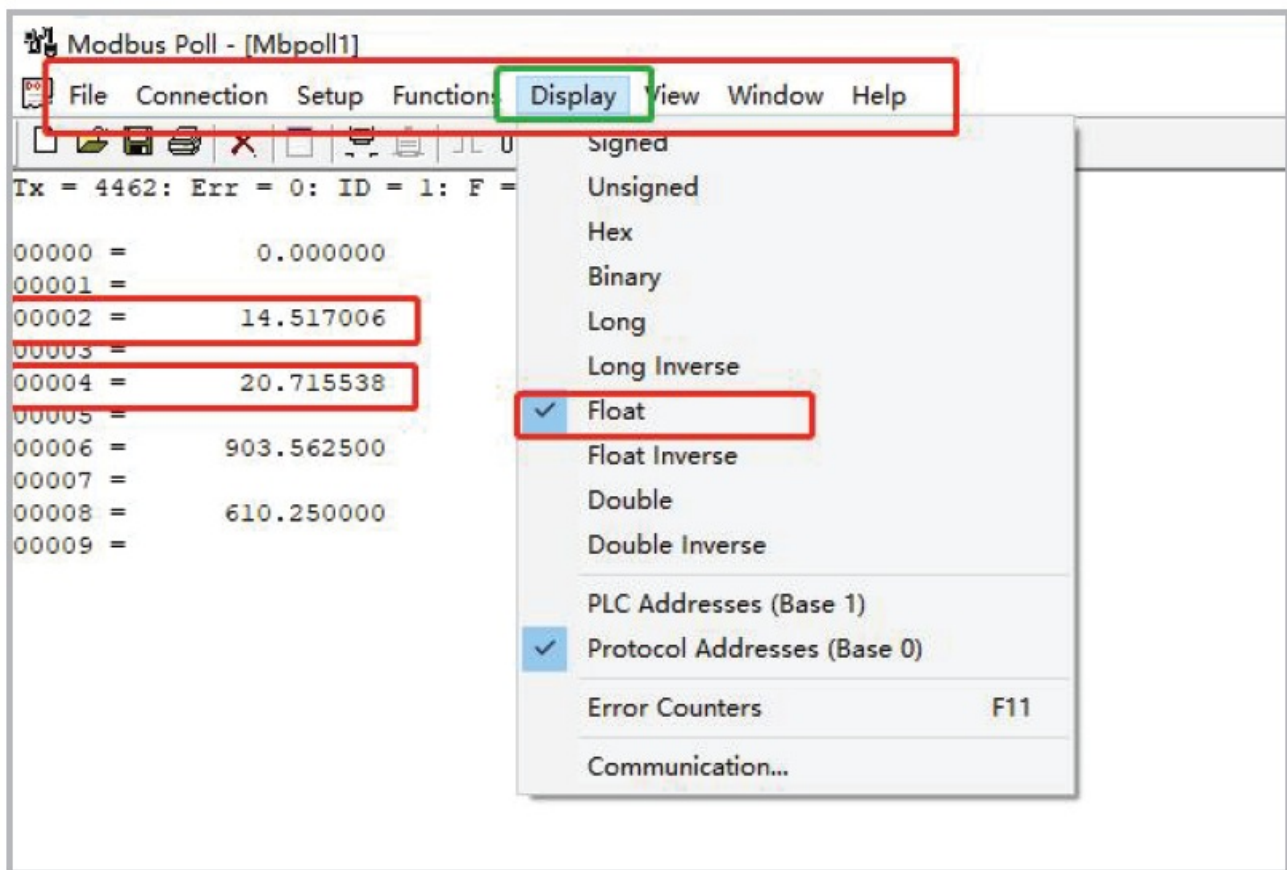
Example: 10 NTU turbidity standard solution configuration method

Dissolve 2.5ml (The concentration was 400 NTU) solution transfer to a 100ml volumetric flask, add deionized water or distilled water and dilute to a 100ml scale line, shake well and use to measure.

Sensor Calibration

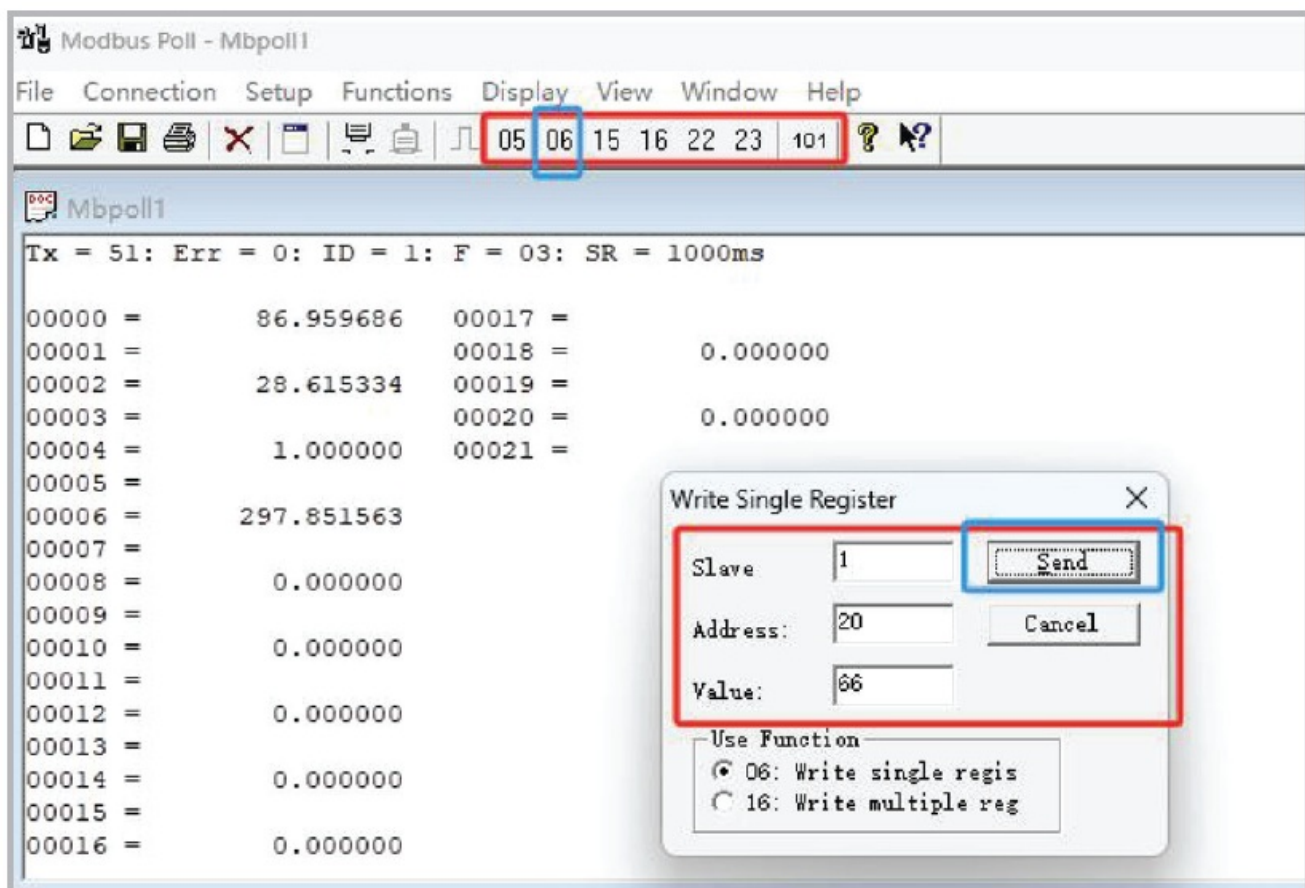
Sensor Read

Connect the digital turbidity sensor to the computer through the Modbus RS 485, and open the Modbus debugging software: mbpoll.exe, Set the address 1,9600, N, 8,1, then select “Float” at “Display”, as shown in the figure below; where 00002 shows the temperature value, that is, the ambient temperature of the turbidity sensor is 14.5oC, 00004 shows the turbidity value, where the aqueous solution in which the turbidity sensor is located is 20.7 NTU.



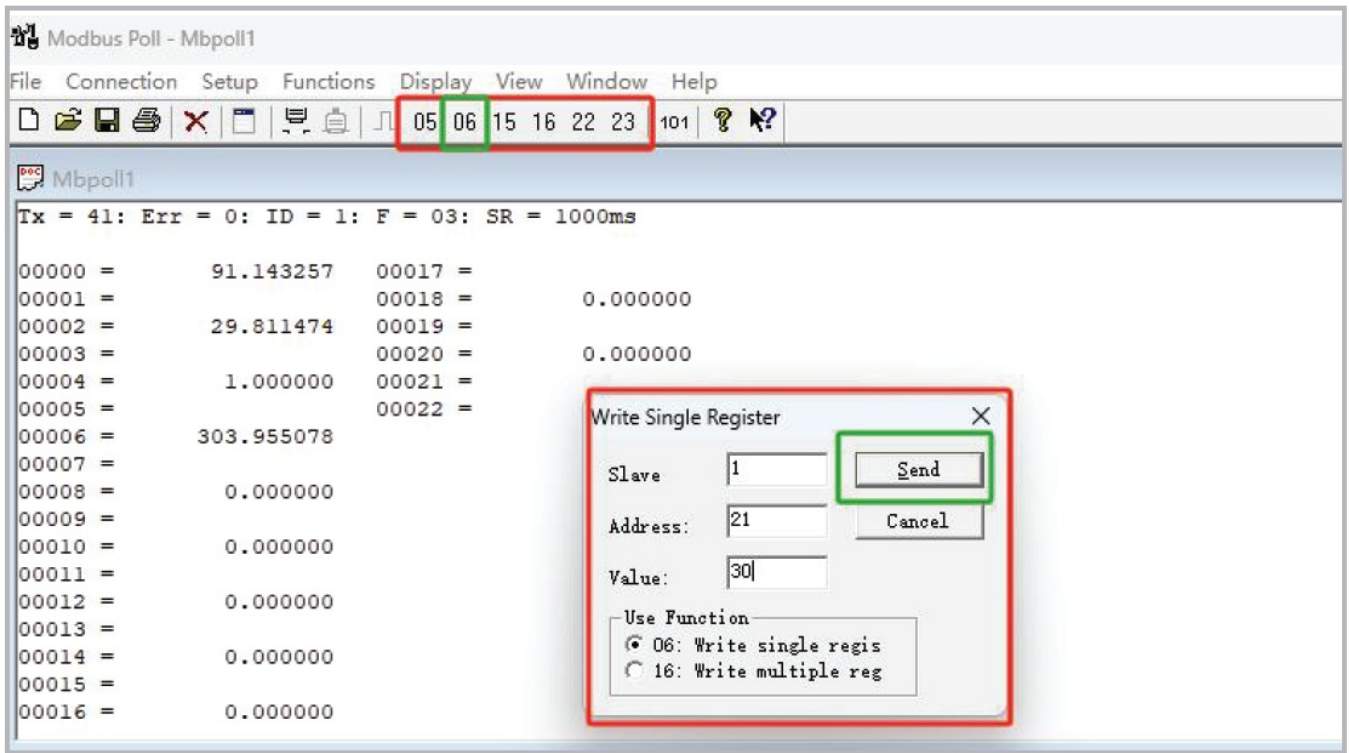
Manual Start Brush

As shown in the figure below, after connecting the turbidity sensor, select 06 function code in the communication software, Address input: 20, Value input 66, click Send, to observe the sensor brush start.



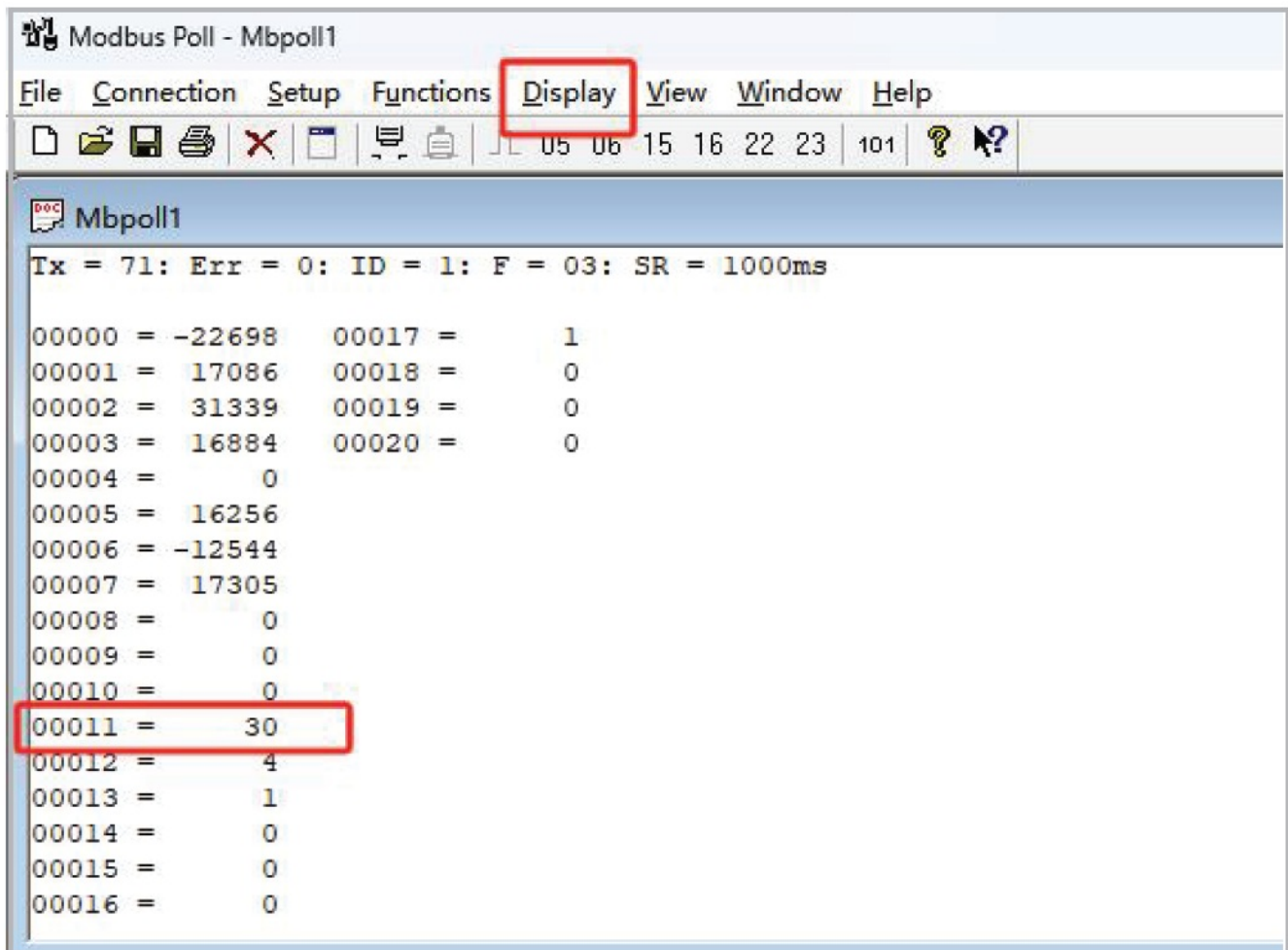
Set Up Brush Time

As shown in the figure below, after connecting the turbidity sensor, select 06 function code in the communication software, Address input: 21, Value input 30, click Send, and the wiper of the sensor will start every 30 minutes. If you do not require the wiper, an input of 0 needs to be entered in the Value line.



Read the Automatic Brush Time

As shown in the figure below, after connecting the turbidity sensor, select Display in the communication software and select Signed (integer), and the communication address 11 displays 30, indicating that the sensor starts the scraping every 30 minutes.



Sensor Calibration

Connect the turbidity sensor to the computer. Select "Setup- -Poll Definition", then select 03 function code, Address: 100, Length: 60. Prepare the known concentration of the standard solution, stir well,. Place the turbidity sensor and double-click the calibration point address on the computer to view the dialog box. Input the standard liquid value. After confirming the sensor will begin to automatically calibrate, the calibration result is the corresponding voltage address bit data. The calibration is complete after 10s voltage stabilization.

Example: To calibrate the turbidity sensor of range 0-400 NTU, the calibration solution prepared is 250 NTU. Select the 06 function code, Address input is 00138, that is, the 9th calibration point, then enter 250 in the Value. After the voltage value of the 00150 is stable, the calibration is completed.

Modbus Poll - [Mbpoll1]

File Connection Setup Functions Display View Window Help

Tx = 10: Err = 0: ID = 1: F = 03: SR = 1000ms

00100 =	0.300000	00137 =	
00101 =		00138 =	1000.000000
00102 =	50.000000	00139 =	
00103 =		00140 =	0.000000
00104 =	500.000000	00141 =	
00105 =		00142 =	0.000000
00106 =	2000.000000	00143 =	
00107 =		00144 =	0.000000
00108 =	233.000000	00145 =	
00109 =		00146 =	169.000000
00110 =	1349.000000	00147 =	
00111 =		00148 =	0.000000
00112 =	88.000000	00149 =	
00113 =		00150 =	0.000000
00114 =	922.000000	00151 =	
00115 =		00152 =	0.000000
00116 =	464.000000	00153 =	
00117 =		00154 =	0.000000
00118 =	1506.000000	00155 =	
00119 =		00156 =	0.000000
00120 =	0.000000	00157 =	
00121 =		00158 =	0.000000
00122 =	1.000000	00159 =	
00123 =			
00124 =	0.000000		
00125 =			
00126 =	25.000000		
00127 =			
00128 =	5.000000		
00129 =			
00130 =	20.000000		
00131 =			
00132 =	30.000000		
00133 =			
00134 =	100.000000		
00135 =			
00136 =	300.000000		

Poll Definition

Slave: 1

Function: 03 Read Holding Register

Address: 100

Length: 60

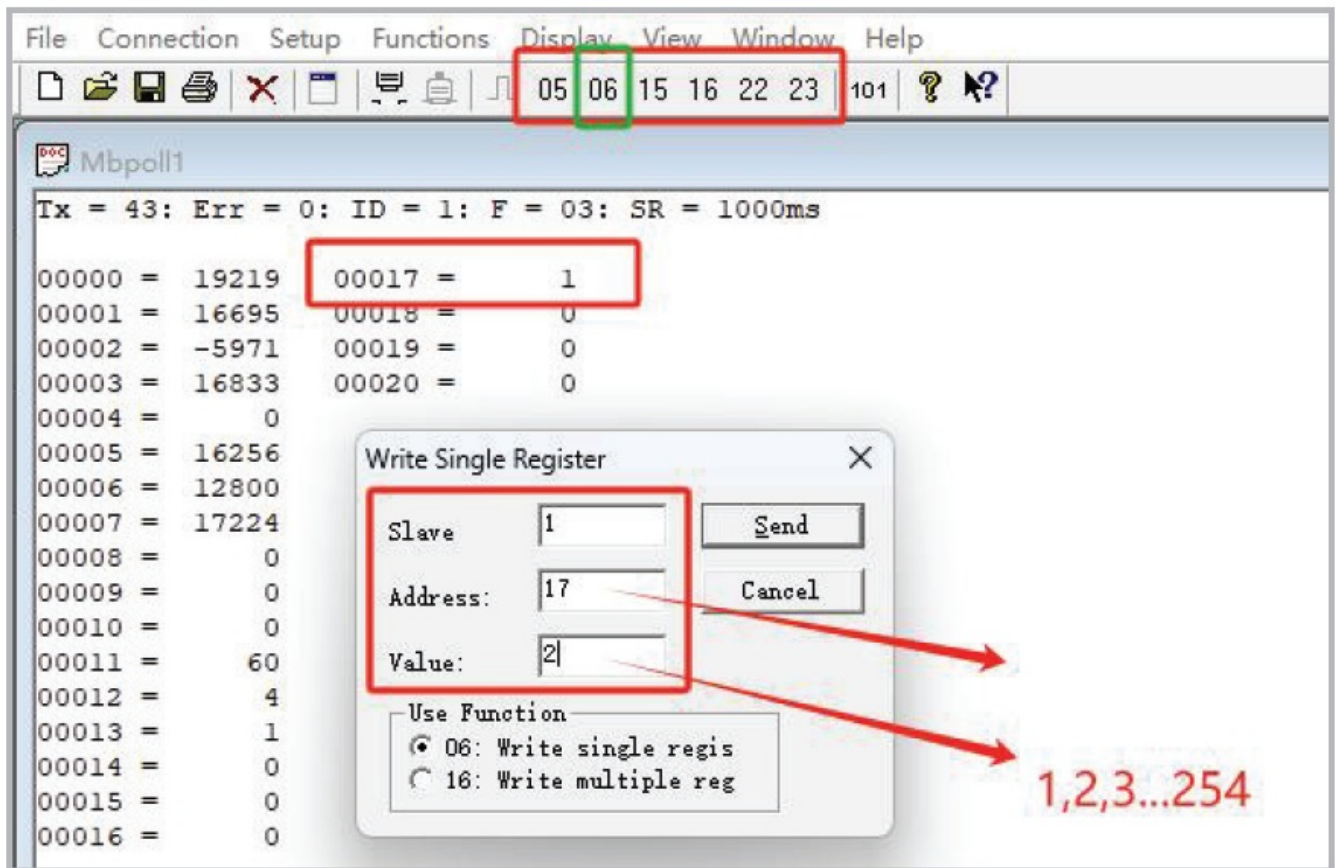
Scan Rate: 1000 ms

☒ Enable Polling

OK Cancel Apply Poll Once

Change Sensor Address

After connecting the sensor and MODBUS software, select "06" function code, enter "17" in "Address", "Value" in "2" or the mailing address to be modified, click "Send", a popup shows "Response OK", indicating the sensor address modification is completed. Without knowing the sensor communication address, the sensor can be read using the broadcast address 255.



Read Instruction Parsing

The communication protocol adopts MODBUS (RTU) protocol. The communication content and address can be changed according to the customer's needs.

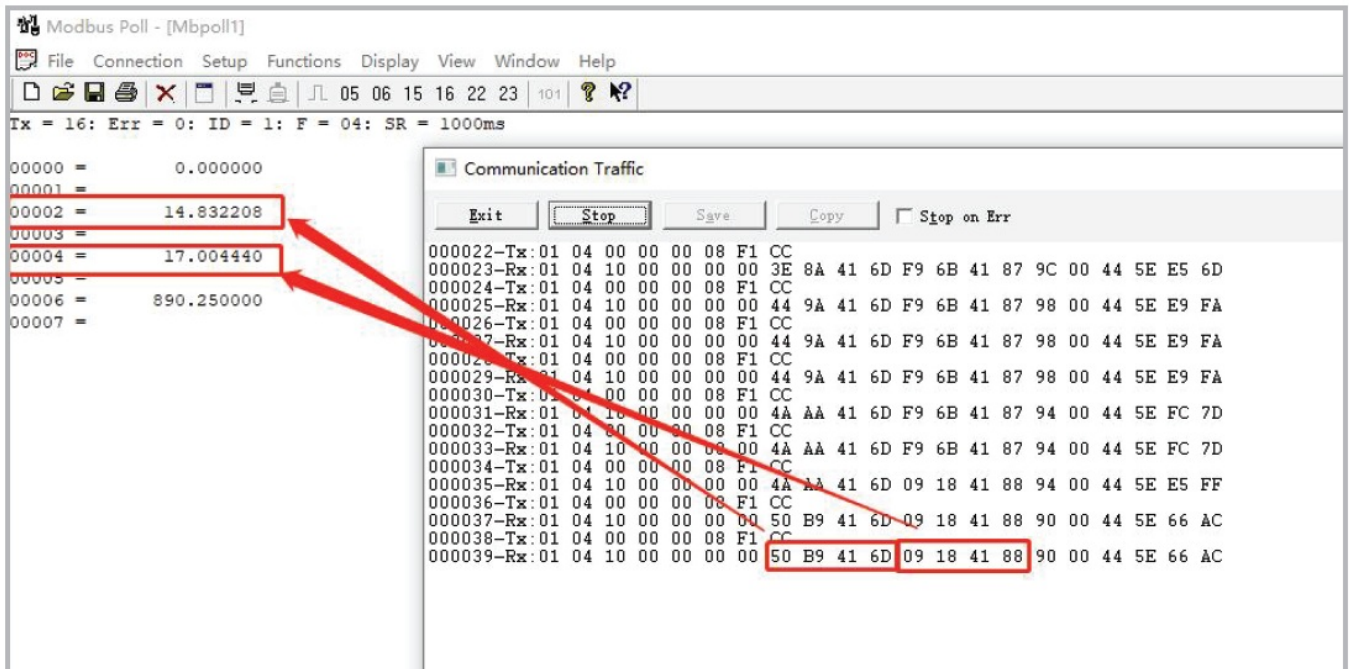
The default configuration is network address 01, port rate 9600, no check, a stop bit. Users can set the change;

Function code 04 instruction for example:

- Temperature value =14.8°C, Turbidity value=17.0NTU;
- Host sent: FF 04 00 00 00 08 XX XX
- Slave reply: FF 04 10 00 00 00 00 3E 8A 41 6D F9 6B 41 87 9C 00 44 5E XX XX

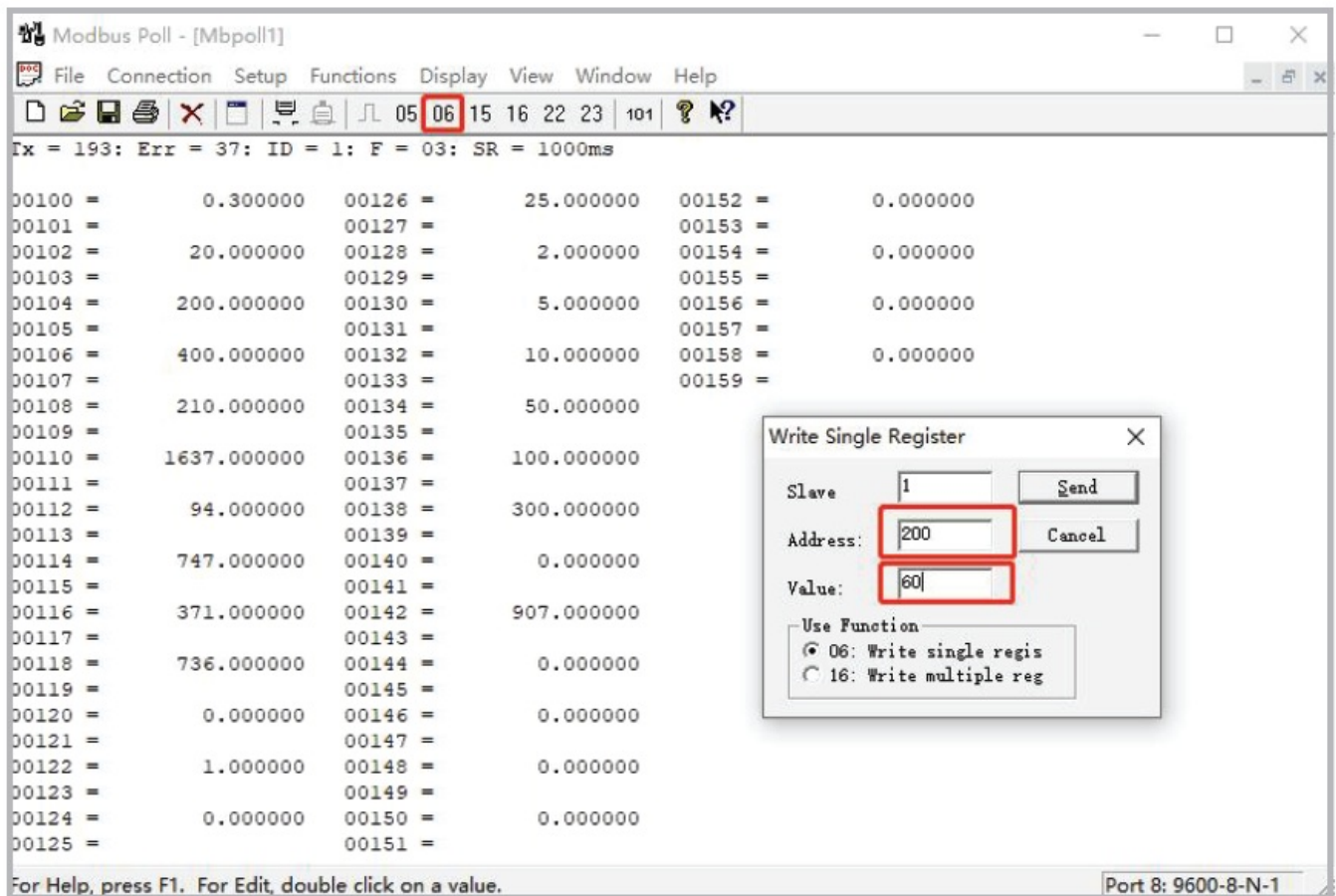
Explanation

- [FF] Represents the sensor address address
- [04] Represents function code 04
- [10] Represents have 16 bytes of data
- [3E 8A 41 6D]=14.8; | Temp. value; parsing order:41 6D 3E 8A
- [09 18 41 88]=17.0; | Turbidity value; parsing order:41 88 09 18
- [XX XX] Represents the CRC 16 check code.



Restore Factory Calibration

If the digital turbidity sensor calibration is wrong during the calibration process, select "06" function code, enter "200" in "Address", "60" in "Value", click "Send". A pop-up display "Response OK" appears.



Sensor Wiring

Color	Description
Red	+VDC
Black	-VDC
Green	RS485A
White	RS485B

Maintenance

In order to obtain the best measurement results, regular maintenance is required. Maintenance mainly includes the sensor cleaning, check whether the sensor is damaged. The associated state of the sensor can also be viewed during maintenance and detection.

Sensor Cleaning

The two lenses on the sensor need to be cleaned. Please make regular cleaning and maintenance according to the actual use situation to ensure the accuracy of measurement. When cleaning, first rinse with clean water, and then use detergent & cloth to wipe in order to remove stubborn stains.

Inspection of Sensor Damage

Check the appearance of the sensor. If there is any damage, contact ICON at [905-469-7283](tel:905-469-7283) to replace it in time to prevent the fault caused by water filling of the sensor due to damage.

Communication Protocol

The sensor is equipped with MODBUS RS485 communication function.

Sensor Read Address Function Code 04 Communication Configuration: 9600 N 8 1					
Add	Items	Value	Authority	Type	Description
0	Reserved				
2	Temperature		Read-Only	Single Float	
4	Turbidity		Read-Only	Single Float	
Sensor Calibration Address Function Code 03					
Add	Items	Value	Authority	Type	Range
11	Brush Time	0	Read-Write	Integer	1 – 10080 Unit : Min
17	Address	1	Read-Write	Integer	1 – 254
20	Manual Brush	0	Write-Only	Signed	Send 66
21	Automatic Brush	0	Write-Only	Signed	1 – 10080 Unit : Min

Sensor Calibration Address Function Code 0x03 Read Function code 0x10 Fix					
Add	Items	Range	Authority	Type	
100	First Calibration Point	According to the Range	Read-Write	Single Float	
102	Fifth Calibration Point		Read-Write	Single Float	
104	Eighth Calibration Point		Read-Write	Single Float	
106	Tenth Calibration Point		Read-Write	Single Float	
108	First Voltage		Read-Write	Single Float	
110	Fifth Voltage A		Read-Write	Single Float	
112	Fifth Voltage B		Read-Write	Single Float	
114	Eighth Voltage A		Read-Write	Single Float	
116	Eighth Voltage B		Read-Write	Single Float	
118	The Tenth Voltage		Read-Write	Single Float	
120	Dynamic Correction	0.000	Read-Write	Single Float	
122	Linear Compensation	1.000	Read-Write	Single Float	
124	Temperature Correction	0.000	Read-Write	Single Float	
126	Temperature Setting	25.0	Read-Write	Single Float	
128	Second Calibration Point		Read-Write	Single Float	
130	Third Calibration Point		Read-Write	Single Float	
132	Fourth Calibration Point		Read-Write	Single Float	
134	Sixth Calibration Point		Read-Write	Single Float	
136	Seventh Calibration Point		Read-Write	Single Float	
138	Ninth Calibration Point		Read-Write	Single Float	
140	Second Voltage		Read-Write	Single Float	
142	Third Voltage		Read-Write	Single Float	
144	Fourth Voltage		Read-Write	Single Float	
146	Sixth Voltage		Read-Write	Single Float	
148	Seventh Voltage		Read-Write	Single Float	
150	Ninth Voltage		Read-Write	Single Float	
200	Factory Calibration	60	Write-Only	Integer	Only Calibration Values are Restored

Warranty, Returns and Limitations

Warranty

Icon Process Controls Ltd warrants to the original purchaser of its products that such products will be free from defects in material and workmanship under normal use and service in accordance with instructions furnished by Icon Process Controls Ltd for a period of one year from the date of sale of such products. Icon Process Controls Ltd obligation under this warranty is solely and exclusively limited to the repair or replacement, at Icon Process Controls Ltd option, of the products or components, which Icon Process Controls Ltd examination determines to its satisfaction to be defective in material or workmanship within the warranty period. Icon Process Controls Ltd must be notified pursuant to the instructions below of any claim under this warranty within thirty (30) days of any claimed lack of conformity of the product. Any product repaired under this warranty will be warranted only for the remainder of the original warranty period. Any product provided as a replacement under this warranty will be warranted for the one year from the date of replacement.

Returns

Products cannot be returned to Icon Process Controls Ltd without prior authorization. To return a product that is thought to be defective, go to www.iconprocon.com, and submit a customer return (MRA) request form and follow the instructions therein. All warranty and non-warranty product returns to Icon Process Controls Ltd must be shipped prepaid and insured. Icon Process Controls Ltd will not be responsible for any products lost or damaged in shipment.

Limitations

This warranty does not apply to products which: 1) are beyond the warranty period or are products for which the original purchaser does not follow the warranty procedures outlined above; 2) have been subjected to electrical, mechanical or chemical damage due to improper, accidental or negligent use; 3) have been modified or altered; 4) anyone other than service personnel authorized by Icon Process Controls Ltd have attempted to repair; 5) have been involved in accidents or natural disasters; or 6) are damaged during return shipment to Icon Process Controls Ltd reserves the right to unilaterally waive this warranty and dispose of any product returned to Icon Process Controls Ltd where: 1) there is evidence of a potentially hazardous material present with the product; or 2) the product has remained unclaimed at Icon Process Controls Ltd for more than 30 days after Icon Process Controls Ltd has dutifully requested disposition. This warranty contains the sole express warranty made by Icon Process Controls Ltd in connection with its products. ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY DISCLAIMED. The remedies of repair or replacement as stated above are the exclusive remedies for the breach of this warranty. IN NO EVENT SHALL Icon Process Controls Ltd BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING PERSONAL OR REAL PROPERTY OR FOR INJURY TO ANY PERSON. THIS WARRANTY CONSTITUTES THE FINAL, COMPLETE AND EXCLUSIVE STATEMENT OF WARRANTY TERMS AND NO PERSON IS AUTHORIZED TO MAKE ANY OTHER WARRANTIES OR REPRESENTATIONS ON BEHALF OF Icon Process Controls Ltd. This warranty will be interpreted pursuant to the laws of the province of Ontario, Canada.

If any portion of this warranty is held to be invalid or unenforceable for any reason, such finding will not invalidate any other provision of this warranty.

For additional product documentation and technical support visit:

www.iconprocon.com | e-mail: sales@iconprocon.com or support@iconprocon.com | Ph: 905.469.9283

Documents / Resources



[ICON ProCon TB550 Series Turbidity Sensor](#) [pdf] User Manual
ProCon TB550 Series Turbidity Sensor, ProCon TB550 Series, Turbidity Sensor, Sensor

References

- [User Manual](#)

[Manuals+](#), [Privacy Policy](#)

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