KWS-900 Fiber Optic Turbidity Sensor

Introduction

Kacise applies fiber technology to the turbidity sensor to make the sensor has better repeatability and stability, not susceptible to ambient light coordination. The sensor's automatic cleaning brush effectively eliminates air bubbles and reduces the effects of contamination on the measurement. Long-term online use, longer maintenance intervals and better stability.

Feature

- Digital sensor, RS-485 output, support MODBUS
- With automatic cleaning brush, prevent pollution, eliminate air bubbles
- Strong anti-interference ability, no ambient light and chromaticity
- 90° scattered light principle, better fiber technology repeat-ability.

Technical Specifications

Item	Fiber turbidity sensor	Self-cleaning turbidity sensor
Picture		
Model	KWS-900A	KWS-900B
Principle	90° scattered light	
Measuring Range	0.1-1000NTU	
Resolution	0.1NTU	
Accuracy	<5% or 0.3NTU	
Protection Rate	IP68	
Max. Pressure	6 bar	
Temperature Range	0 ~ 50℃	
Output	Support RS-485, MODBUS protocol	
Power Supply	DC 5~24V, current <50mA	DC 12~24V, current <100mA
Installation	Input type	Input type
Size	Φ22mm*175.5mm	Φ36mm*198.2mm
Material	ss316 / Titanium	
Self-Cleaning System	No	Yes
Optical Window	optical fiber	

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Wiring

Red—Power (VCC)
White—485B
Green—485A
Black—Ground (GND)
Bare wire—shield

Installation

Wiring and power supply

1. Do not use the sensor cable to pull the sensor! It is required to install sensor in a secure and stable mounting bracket.
2. The female and male connector of sensor cable should be screwed tightly to avoid moisture incursion.
3. Make sure power supply voltage is correct before power on.

Sensor installation

1. It is recommended to install the sensor vertically with electrodes facing down.
2. In consideration of the fluctuation of water level, install the sensor below water level of 30cm, and try to install it in the position where there are no bubbles in the water;
3. Considering the basic principles of optics, please keep the end of the light window no less than 10cm from the bottom of the container/related device.

Calibration

Calibration Solution Preparation

The raw materials required for preparing turbidity standard solution are considered as controlled drugs. Users are not qualified to configure themselves. It is recommended to purchase 4000NTU turbidity standard solution.

Low concentration standard liquid calculation formula ： Amount of mother liquor absorbed （mL）=Total configuration quantity（mL）×Concentration of solution required/4000；

For example: Shake the mother liquor well. Measure 100mL of mother liquor(4000NTU). Dissolve in zero turbidity water (deionized water). Constant volume to 1L. Get 400NTU turbidity standard solution.

Precautions for using save:

1. Mother liquor standard solution（4000NTU）need to be refrigerated（4-8℃）,keep in dark place.
2. The standard solution above 400NTU can be refrigerated（4-8℃）.keep in dark place. The standard solution below 400NTU should be used immediately.
3. During the use period, the change of standard liquid value cannot exceed 3% of the configured value.
4. When in use, all test instruments must be wiped clean.

Communication Protocols

The RS485 communication protocol uses MODBUS communication protocol, and the sensors are used as slaves.

Baud rate	9600
Starting position	1
Data bits	8
Stop bit	1
Check digit	N

Read and write data (standard MODBUS protocol).

The default address is 0x01, the address can be modified by register

Reading data

Host call (hexadecimal)

01 03 00 00 00 01 84 0A

Code	Function Definition	Remarks
01	Device Address	
03	Function Code	
00 00	Start Address	See register table for details
00 01	Number of registers	Length of registers (2 bytes for 1 register)
84 0A	CRC checksum, front low and back high	

Slave answer (hexadecimal)

01 03 02 00 xx xx xx xx

Code	Function Definition	Remarks
01	Device Address	
03	Function Code	
02	Number of bytes read	
XX XX	Data (front low and back high DCBA)	See register table for details
XX XX	CRC checksum, front low and back high	

Writing data

Host call (hexadecimal)

01 10 1B 00 00 01 02 01 00 0C C1

Code	Function Definition	Remarks
01	Device Address	
10	Function Code	
1B 00	Register Address	See register table for details
00 01	Number of registers	Number of read registers
02	Number of bytes	Number of read registersx2
01 00	Data (front low and back high DCBA)	
0C C1	CRC checksum, front low and back high	

Slave answer (hexadecimal)

01 10 1B 00 00 01 07 2D

Code	Function Definition	Remarks
01	Device Address	
10	Function Code	
1B 00	Register Address	See register table for details
00 01	Returns the number of registers written	
7D 2D	CRC checksum (front low and back high)	

Calculating CRC Checksum

(1) Preset one 16-bit register as hexadecimal FFFF (i.e., all 1s) and call this register the CRC register.

(2) Iso-oring the first 8-bit binary data (both the first byte of the communication information frame) with the lower 8 bits of the 16-bit CRC register and placing the result in the CRC register, leaving the upper 8 bits of data unchanged.

(3) Shift the contents of the CRC register one bit to the right (toward the low side) to fill the highest bit with a 0, and check the shifted-out bit after the right shift.

(4) If the shifted out bit is 0: repeat step 3 (shift right one bit again); if the shifted out bit is 1, CRC register and polynomial A001 (1010 0000 0000 0001) for the iso-or.

(5) Repeat steps 3 and 4 until the right shift is made 8 times so that the entire 8-bit data is processed in its entirety.

(6) Repeat steps 2 through 5 for the next byte of the communication information frame.

(7) Exchange the high and low bytes of the 16-bit CRC register obtained after all bytes of this communication information frame have been calculated according to the above steps.

(8) The final CRC register content is obtained as follows: CRC code.

Register Table

Start address	Command Description	Number of registers	Data format (hexadecimal)
0x1100H	User calibration K/B (read/write)	4	Total 8 bytes 00~03: K 04~07: B To read K for example, read out as 4 bytes of data (low bit in front, DCBA format, need to convert this data to floating point, see below for conversion method) To write k, for example, we need to convert k to 32-bit floating point and write it in (DCBA format)
0x1B00H	Brush power-on startup settings	1	2 bytes in total 00~01: 0x0000 does not start on power 0x0100 Power on and self-start
0x2600H	Temperature value/turbidity value acquisition	4	8 bytes in total 00~03: Temperature value 04~07: Turbidity value The reading temperature value/water turbidity value is 4 bytes of data. (The low position is in the front, DCBA format, and this data needs to be converted to a change floating point number. The conversion method is shown below)
0x3000H	Device address (read and write)	1	2 bytes in total 00~01: Device address The range can be set from 1~254 For example, the data obtained is 02 00 (If the low position is in the front, it means that the address is 2) Take address 15 as an example, then 0F 00 Write the corresponding address (low in front) When the current device address is unknown, you can use FF as a common device address to ask for the current
0x3100H	Brush startup (write only)	0	Send a write command with a write length of 0
0x3200H	Brush repeated start time setting (read and write)	1	2 bytes in total 00~01: Time Take the reading value 1E 00 (default) as an example, the actual value is 0x001E, that is, 30 minutes. For example, if you need to write for 60 minutes, convert it to 3C 00 for writing.

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