

# Quick-Start Guide

## VWQS-TU01 Verge turbidity sensor

The Verge digital turbidity sensor has Modbus output and is IP68 waterproof. The sensor has long-term stability, reliability, and accuracy.

The sensor uses 90 degree scattered light measurement, detecting light reflected off suspended particles, comparing it with the internal calibration value. The system deploys infrared light, eliminating ambient light interference through infrared light and filter, output signal is stable after linearization processing, high precision. It is simple to calibrate and is part of the Verge Sonde system, allowing for lens cleaning. It is small, low power consumption, affordable, high performance and durable. It is simple to calibrate and is part of the Verge Sonde system, allowing for periodic automatic sensor cleaning. Sensor could be utilized alone or part of Sonde

### Specifications

<b>Parameter</b>	<b>Turbidity</b>
<b>Units</b>	<b>NTU</b>
<b>Range</b>	<b>0-600 (with 0.01 Resolution) 0-1000 with 1 resolution</b>
<b>Resolution</b>	<b>0.01</b>
<b>Accuracy</b>	<b>+/-0.5%</b>
<b>Protocol</b>	<b>RS485 Modbus</b>
<b>Temperature Limits</b>	<b>+5 to 50 degC</b>
<b>Voltage supply</b>	<b>9-24 VDC</b>
<b>Housing Materials</b>	<b>Acetyl</b>
<b>Cable Materials</b>	<b>Rubber</b>
<b>Cable Length</b>	<b>5m</b>
<b>Modbus Address (Adjustable)</b>	<b>14(DEC)</b>
<b>Wire colours</b>	<b>Red: V+, Black: V-, Yellow Modbus A, Green: Modbus B</b>

### Modbus details

**Waketime – needs to be equal to setting of the sensor with the longest waketime. Register (reg) for 0-1000NTU is 1 and change scaling to 1.000**

```
        "waketime": 6000
    },
    "serial": {
        "log_en": true,
        "parity": "8N1",
        "baud": "9600",
        "type": "RS485",
        "device_type": "MODBUS_RTU",
        "mb": {
            "r1": {
                "addr": 14,
                "byte_order": "DCBA",
                "data_type": "UINT16",
                "funct": "HOLDING_REG",
                "name": "Turbidity",
                "offset": 0.000,
                "reg": 0,
                "scaling": 0.010,
                "units": "NTU"
            }
        }
    }
},
```

## Sensor Size



## Wiring

Wire color	Interface
Red	Power positive ( 12-24VDC)
Black	Power negative
Yellow	RS485A
Green	RS485B

## RS485 Communication protocol

Standard Modbus-RTU protocol

Baud rate: 2400bps / 4800bps / 9600bps can be set, factory default is 9600bps; Check digit: none;

Data bit: 8;

Stop bit: 1

### Communication protocol examples and explanations

Modify the address, for example: change the address of the transmitter with address 1 to 2,  
host → slave

Original address	Function code	Reserved 1	Reserved 2	Reserved 3	New address	CRC16 low	CRC16 high
0X01	0X06	0X00	0X00	0X00	0X02	0X08	0X0B

**Note:** If you forget the original address of the sensor, you can use the broadcast address 0XFE instead. When using 0XFE, the host can only receive one slave, and the return address is still the original address, which can be used as a method of address query.

Read the Turbidity value at device address 0x01

### (1) Inquiry frame

Address code	Function code	Register start address	Register length	Low check bit	Check code high
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0X01	0X03	0X00 0X1E	0X00 0X01	0XE4	0X0C
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**(2) Response frame**

Address code	Function code	Number of valid bytes	Turbidity content	Low check bit	High Check bit
0X01	0X03	0X02	0x1A 0x0A	0x33	0x23

Data representation method: convert data to decimal ÷ 100

The above data shows that the turbidity: 66.66NTU

**Make the calibration**

Put the sensor in the standard water turbidity solution

For example, put it in the water turbidity = 100 NTU and read the AD value by the following

instruction:

Address code	Function code	Register start address	Modify value	Low check bit	Check code high
0X01	0X03	0X00 0X02	0X00 0X01	0X25	0XCA

For example, it will feedback:

Address code	Function code	Number of valid bytes	AD Value	Low check bit	High Check bit
0X01	0X03	0X02	0x1A 0x0A	0x33	0x23

The AD value is : 1A 0A

(1) Write the AD value in the sensor by the following instruction

Original address	Function code	Reserved 1	Reserved 2	AD value		CRC16 low	CRC16 high
0X01	0X06	0X00	0X5D	0X1A	0X0A	0X93	0X7F

If success, it will feedback: 01 06 00 5D 1A 0A 93 7F

Above is for the example for the 100 NTU, for the others, please check the following:

Standard solution	Send instruction ( XX XX is the AD value in the correspond solution)
0 NTU	01 06 00 5A XX XX CRC16
20 NTU	01 06 00 5B XX XX CRC16
60 NTU	01 06 00 5C XX XX CRC16
100 NTU	01 06 00 5D XX XX CRC16
400 NTU	01 06 00 5E XX XX CRC16
800 NTU	01 06 00 5F XX XX CRC16

Make the offset of the Turbidity value at device address 0x01, add 1 NTU,

**a. Inquiry frame**

Address code	Function code	Register start address	Modify value	Low check bit	Check code high
0X01	0X06	0X00 0X09	0X00 0X64	0X58	0X23

**b. Response frame**

01 06 00 09 00 64 58 23

Data representation method: convert data to decimal  $\div 100$

The above data shows that add the turbidity in 1 NTU.

Negative numbers are represented by complement