

# Turbidity/TSS/MLSS Controller

## **Supmea**

### **Headquarters**

5th floor,Building 4,Singapore Hangzhou Science Technology Park,No. 6 street,  
Hangzhou Economic Development Area,Hangzhou 310018,China

### **Singapore**

2 Venture Drive #11-30 Vision Exchange Singapore

### **Philippines**

Majestic Subdivision, Lot 1, 1800 Rainbow St, Marikina, 1811 Metro Manila, Philippines

✉ [info@supmea.com](mailto:info@supmea.com)

🌐 [www.supmea.com](http://www.supmea.com)

Supmea Automation Co.,Ltd.

## **Preface**

Thank you for purchasing turbidity online analyzer. Please read this manual carefully before operating and using it correctly to avoid unnecessary losses caused by false operation.

### **Note**

- Modification of this manual's contents will not be notified as a result of some factors, such as function upgrading.
- We try our best to guarantee that the manual content is accurate, if you find something wrong or incorrect, please contact us.
- This product is forbidden to use in explosion-proof occasions.

### **Version**

U-PTU300-MYEN1

## **Safety Precautions**

In order to use this product safely, be sure to follow the safety precautions described.

### **About this manual**

- Please submit this manual to the operator for reading.
- Please read the operation manual carefully before applying the instrument. On the precondition of full understanding.
- This manual only describes the functions of the product. The company does not guarantee that the product will be suitable for a particular use by the user.

### **Precautions for protection, safety and modification of this product**

- To ensure safe use of this product and the systems it controls, Please read carefully the operation manual and understand the correct application methods before putting into operation, to avoid unnecessary losses due to operation mistakes. If the instrument is operated in other ways not described in the manual, the protections that the instrument give may be destroyed, and the failures and accidents incurred due to violation of precautions shall not be borne by our company.
- When installing lightning protection devices for this product and its control system, or designing and installing separate safety protection circuits for this product and its control system, it needs to be implemented by other devices.
- If you need to replace parts of the product, please use the model specifications specified by the company.
- This product is not intended for use in systems that are directly related to personal safety. Such as nuclear power equipment, equipment using radioactivity, railway systems, aviation equipment, marine equipment, aviation equipment and medical equipment. If applied, it is the responsibility of the user to use additional equipment or systems to ensure personal safety.

- Do not modify this product.
- The following safety signs are used in this manual:



Hazard, if not taken with appropriate precautions, will result in serious personal injury, product damage or major property damage.



Warning: Pay special attention to the important information linked to product or particular part in the operation manual.



- Confirm if the supply voltage is consistent with the rated voltage before operation.
- Don't use the instrument in a flammable and combustible or steam area.
- To prevent from electric shock, operation mistake, a good grounding protection must be made.
- Thunder prevention engineering facilities must be well managed: the shared grounding network shall be grounded at is-electric level, shielded, wires shall be located rationally, SPD surge protector shall be applied properly.
- Some inner parts may carry high voltage. Do not open the square panel in the front except our company personnel or maintenance personnel acknowledged by our company, to avoid electric shock.
- Cut off electric powers before making any checks, to avoid electric shock.
- Check the condition of the terminal screws regularly. If it is loose, please tighten it before use.
- It is not allowed to disassemble, process, modify or repair the product without authorization, otherwise it may cause abnormal operation, electric shock or fire accident.
- Wipe the product with a dry cotton cloth. Do not use alcohol, benzene or other organic solvents. Prevent all kinds of liquid from splashing on the product. If the product falls into the water, please cut off the power

immediately, otherwise there will be leakage, electric shock or even a fire accident.

- Please check the grounding protection status regularly. Do not operate if you think that the protection measures such as grounding protection and fuses are not perfect.
- Ventilation holes on the product housing must be kept clear to avoid malfunctions due to high temperatures, abnormal operation, shortened life and fire.
- Please strictly follow the instructions in this manual, otherwise the product's protective device may be damaged.



- Don't use the instrument if it is found damaged or deformed at opening of package.
- Prevent dust, wire end, iron fines or other objects from entering the instrument during installation, otherwise, it will cause abnormal movement or failure.
- During operation, to modify configuration, signal output, startup, stop, operation safety shall be fully considered. Operation mistakes may lead to failure and even destruction of the instrument and controlled equipment.
- Each part of the instrument has a certain lifetime, which must be maintained and repaired on a regular basis for long-time use.
- The product shall be scrapped as industrial wastes, to prevent environment pollution.
- When not using this product, be sure to turn off the power switch.
- If you find smoke from the product, smell odor, abnormal noise, etc., please turn off the power switch immediately and contact the company in time.

**Disclaimer**

- The company does not make any guarantees for the terms outside the scope of this product warranty.
- This company is not responsible for damage to the instrument or loss of parts or unpredictable damage caused directly or indirectly by improper operation of the user.

No.	Name	Quantity	Note
1	Turbidity analyzer	1	
2	Manual	1	
3	Certificate	1	

After opening the box, please confirm the package contents before starting the operation. If you find that the model and quantity are incorrect or there is physical damage in appearance, please contact us.

**Statement**

**Copyright Declaration:**

all the contents contained in this instruction manual are protected by copyright law. without the written authorization of the company, no organization or individual may reproduce and reproduce the entire specification and part of the content in any form or means and shall not disseminate it in any form.

this specification is applicable to SUP-PTU300 turbidity online analyzer products.

**Note:**

The contents of this document will be updated periodically due to product version upgrade or other reasons. Unless otherwise agreed, this document serves only as guidance for use and all statements, information and recommendations in this document do not constitute any express or implied warranty.



Caution,danger

This product sensor light source has certain harm to the eye, do not aim the sensor light source to the eye!

## Content

Chapter 1 Product information.....	- 8 -
1.1 Product Overview.....	- 8 -
1.2 Product appearance.....	- 8 -
1.3 Product characteristics.....	- 9 -
1.4 Working principle.....	- 9 -
1.5 Technical parameters.....	- 10 -
Chapter 2 Installation.....	- 11 -
2.1 Overview.....	- 11 -
2.2 Open.....	- 11 -
2.3 Fixed.....	- 12 -
2.4 Water supply.....	- 13 -
2.5 Power supply.....	- 14 -
Chapter 3 Data interface.....	- 15 -
3.1 Overview.....	- 15 -
3.2 485Modbus interface.....	- 15 -
3.2.1 Wiring mode.....	- 15 -
3.2.2 485 baud rate.....	- 15 -
3.2.3 Modbus Agreement.....	- 15 -
3.3 4-20 mA Interface (optional)485Modbus interface.....	- 17 -
Chapter 4 Operation maintenance.....	- 18 -
4.1. Operating Panel.....	- 18 -
The operation panel function definition is shown below.....	- 18 -
4.2 Fault analysis.....	- 18 -
Table 5 Causes of failure.....	- 19 -
4.3 Maintenance.....	- 19 -
4.4.Field calibration.....	- 19 -
4.5.After-sales service.....	- 20 -



## Chapter 1 Product information

### 1.1 Product Overview

The SUP-PTU300 online turbidity analyzer is a patent product with independent intellectual property rights for on-line monitoring of drinking water quality. It has the characteristics of ultra-low turbidity detection limit, high precision measurement, long time maintenance-free equipment, water saving and digital output. It supports remote monitoring of cloud platform and mobile phone data, and RS485-modbus communication.

### 1.2 Product appearance

The appearance of the product is shown below:



Figure 1 Product appearance diagram

### 1.3 Product characteristics

- Laser light source, with ultra-high noise ratio, high monitoring accuracy, still maintain high accuracy in the low range, can be applied to the membrane clean water after drinking water turbidity measurement.
- Small size, easy system integration
- water consumption is small, saving daily operation cost
- It can be applied to the turbidity measurement of drinking water after membrane-type clean water.
- Automatic discharge, long time maintenance-free operation, save daily operation and maintenance costs
- Optional Internet of things module support cloud platform and mobile phone data remote monitoring.

### 1.4 Working principle

SUP-PTU300 turbidity meter adopts 90° scattering detection principle, and designs unique photoelectric receiving structure, as well as automatic temperature and light compensation method, which greatly improves the accuracy and accuracy of turbidity detection. The sensor ARM7 built-in data processor, and adopts efficient digital filtering algorithm to avoid noise interference. At the same time, it adopts standard Modbus digital signal output and 4-20 mA analog output, which is convenient for users to access the computer monitoring system.

**1.5 Technical parameters**

Range	0-20 NTU (31),0-1 NTU (30)
Operating voltage	DC 24V (19-30V voltage range)
Measurement	90° scattering
Working mode	Continuous monitoring of drainage, intermittent automatic discharge
Zero drift	$\leq \pm 0.015$ NTU
Value error	$\leq \pm 2\%$ or $\pm 0.015$ NTU larger
Discharge mode	Automatic discharge
Calibration	Formalhydrazine standard liquid calibration (factory calibrated)
Water pressure	0.1 Kg/cm <sup>3</sup> -8Kg/cm <sup>3</sup> , flow not exceeding 300 mL /min
Digital output	RS485Modbus protocol (baud rate 9600,8, N 、 1)
Analog output	4-20 mA
Storage temperature	-20°C -60°C
Working temperature	0-50°C
Sensor material	Composite
Maintenance cycle	6-12 months recommended (depending on site water quality environment)

## Chapter 2 Installation

### 2.1 Overview

SUP-PTU300 turbidity meter must be installed correctly to achieve the design function, usually the installation of equipment must be under the guidance of the company's approved qualified engineers.

**considerations:**

**Do not install turbidity on-line meter when charged and running water!**

### 2.2 Open

For safe transportation, the turbidity on-line instrument usually needs reasonable packing, please keep the number packing material when you open the box, so that it can be used when transshipment is needed in the future.

The turbidity in-line instrument standard includes the following components:

1 set of turbidity on-line

Product Description 1

Optional accessories:

- 4 points adapter
- Water mains
- Power adapter (optional)

**Considerations:**

**After unpacking please count the accessories, specific accessories according to the user order contract distribution.**

### 2.3 Fixed

There are four fixed hole positions on the back plate of the SUP-PTU300 turbidity meter, see the position indicated by the arrow below. The front panel should be removed when fixing the turbidity in-line instrument. Turbidity on-line instrument front panel through both sides of a total of four locks and back plate fixed, take off only four locks can be opened.

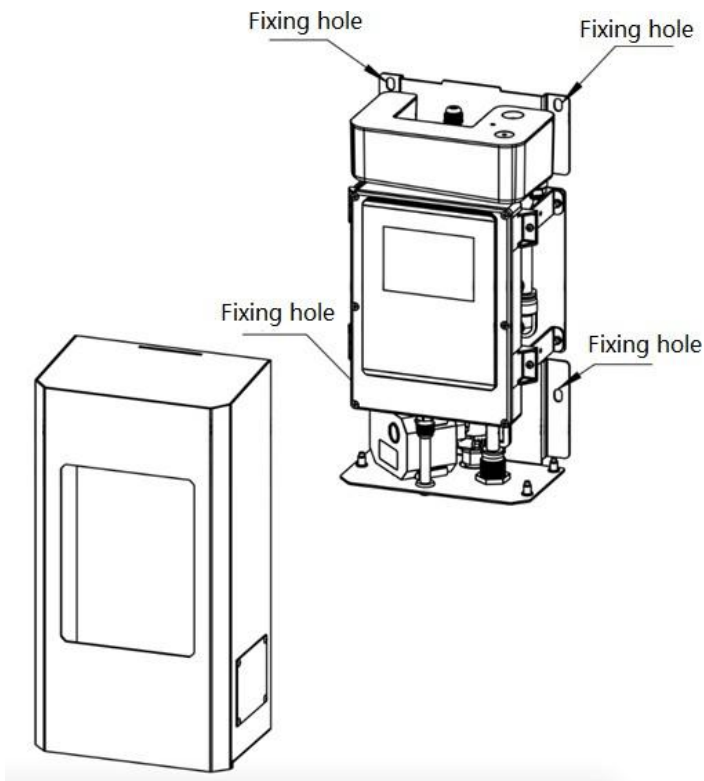


Figure 2 Fixed hole position

The turbidity in-line instrument fixed dimensions are shown in the following figure.

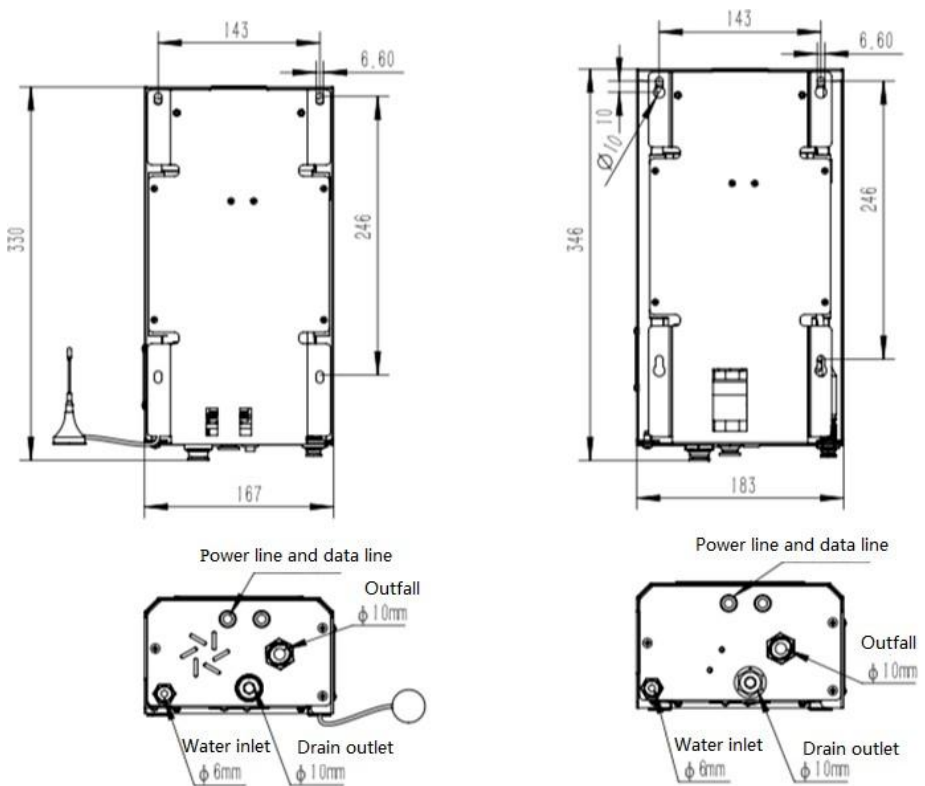


Figure 3 Installation Dimensions (left: A, right B)

## 2.4 Water supply

The water pipe joint of the turbidity online meter is at the bottom of the equipment, as shown in the following figure.

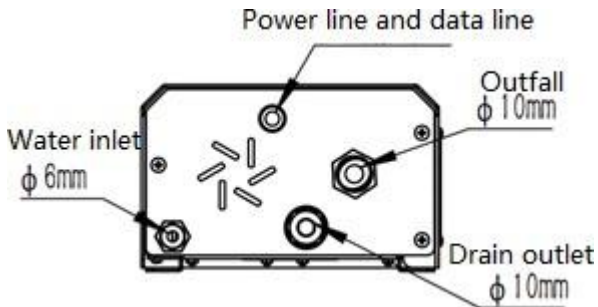


Fig .4 Function diagram of bottom water pipe quick-plug interface

**Considerations:**

**Feed water pressure should be controlled kg/cm 32less than 300 mL /min of Type O2 flow Water intake should be guaranteed to always have a state of water, not intermittent water supply.**

**2.5 Power supply**

Turbidity meter connection as shown below. the working voltage is DC24V, daily working current is between 0.05 A and 0.5 A.

Cable colour	Connection
Red	+24 V
Black	GND
Green	485A
Yellow	485B

## Chapter 3 Data interface

### 3.1 Overview

SUP-PTU300 turbidity meter supports two standard data interfaces simultaneously :485 Modbus interface and 4-20 mA interface. Users can choose any kind of use according to their own needs.

### 3.2 485Modbus interface

#### 3.2.1 Wiring mode

485Modbus interface wiring mode as below table.

Color	Function
Green	485A
Yellow	485B

#### 3.2.2 485 baud rate

485Modbus interface baud rate is 9600, data bit 8, no check, stop bit :1.

#### 3.2.3 Modbus Agreement

1.Host call format:

host sends a read command to the turbidity sensor in 8 bytes in the following format (MSB first):

MSB							LSB
byte 1	byte 2	byte 3	byte 4	byte 5	byte 6	byte 7	byte 8

Meaning:

byte 1: turbidity sensor ID number with value range 0 x01-0xFF, default value 0 x03;

byte 2: Modbus the function code in the protocol, should fill in 0 x03( read);

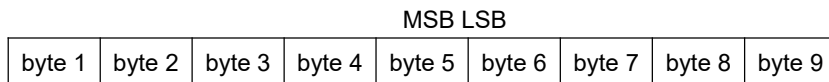
byte 3, byte 4: register start address, high byte in byte 3, low byte in byte 4;



byte 5, byte 6: number of registers, high byte in byte 5, low byte in byte 6;  
 byte 7, byte 8:16 bit CRC check, low byte in byte 7, high byte in byte 8;

2.Sensor response format:

If the number of host call registers is 1, the data length of the reply is 2 bytes and the response length is 7 bytes; if the number of host call registers is 2, the data length of the reply is 4, the response length is 9, and so on;



Meaning:

byte 1: turbidity sensor ID number with value range 0 x01-0xFF, default value 0 x03;

byte 2: Modbus the function code in the protocol, should fill in 0 x03( read);

byte 3: reply data length;

byte 4, byte 5, byte 6, byte 7: data;

byte 8, byte 9:16 bit CRC check, low byte in byte 8, high byte in byte 9;

[Example]

(1)Read turbidity values (register address 0 x 0013, length 2) Hex sent :03 03 00 13 00 02 34 2C

Hexadecimal reception ;03 03 04 00 00 00 76 58 15

Note :00 00 00 Turbidity value (integer, unit mNTU, value 118 mNTU or 0.118 NTU ),58 15 is the check value.

(2)Modify device ID (register address 0 x 0001, length 1).

For example, the current ID of the device is 03 and 04: Hex sent :03 10 00 01 00 01 02 00 04BF 22

Hexadecimal reception ;03 10 00 01 00 01 51EB

The sensor:can be modified using the modbus broadcast address if the device is only connected to the 485 bus

Hex :00 10 00 01 00 01 02 00 04AB 02

Hexadecimal reception ;03 10 00 01 00 01 51EB

---

### 3.3 4-20 mA Interface (optional)485Modbus interface

4-20mA interface wiring is shown in the table below.

Color	Function
Brown brown	4-20 mA positive
White	4-20 mA negative

If the equipment line mark is different from the 4-20 mA wiring table, the equipment line mark shall prevail.

The corresponding relationship between the output current value and the turbidity value is shown in the following table.

Relationship between current and turbidity values (type 31)

Current value	Turbidity values
4 mA	0NTU
X mA	$[(x - 4)/1.6]$ NTU
20 mA	20NTU

Relationship between current and turbidity values (type 30)

Current value	Turbidity values
4 mA	0NTU
x mA	$[(x - 4)/16]$ NTU
20 mA	1NTU

## Chapter 4 Operation maintenance

### 4.1. Operating Panel

The operation panel function definition is shown below.

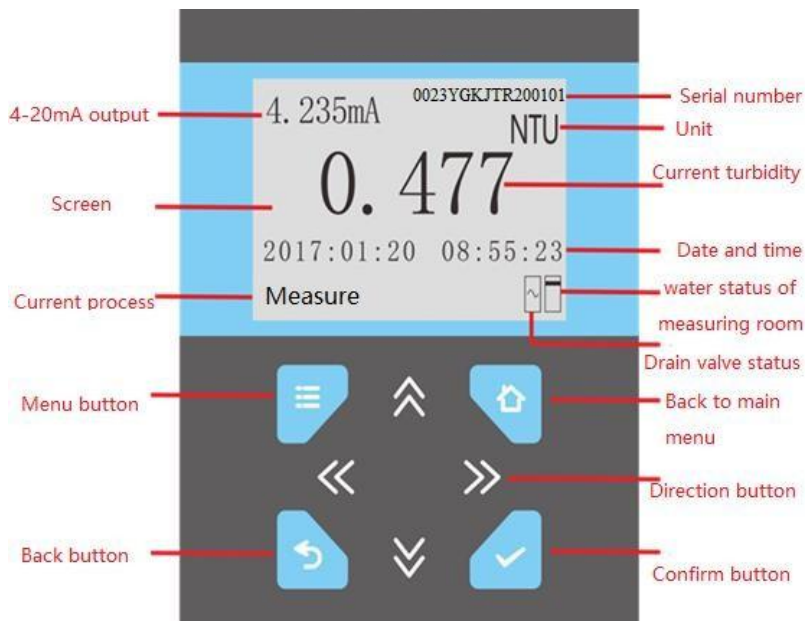


Figure 5 Description of equipment panel

### 4.2 Fault analysis

Turbidity sensor can run for a long time, and easy to maintain. If you have a fault, try the methods listed in the table below.

**Table: Causes of failure**

Fault phenomena	Possible Cause Analysis	Exclusion methods
RS485 can not communicate	1.The signal line is not connected 2.sensor damage	Reconnect signal lines 1. power off 2. contact us
Abnormal increase in turbidity (removal of water source)	Improper installation of leads to contamination of light holes in the sensor 2. sensor internal contamination	cleaning sensor light hole glass cleaning sensor(Operators must undergo relevant operational training)
Low turbidity	Light source damage	contact us

### 4.3 Maintenance

In order to make the turbidity sensor have a good running state, please do the following basic maintenance as needed:

- It is recommended that sensors be calibrated, tested or inspected every 3 months;
- It is recommended that every 6 months clean the sensor and circulation pool, the poor water quality environment can appropriately increase the number of cleaning;
- Keep all maintenance, calibration operation records.

### 4.4.Field calibration

Turbidity sensors generally recommend users to send products back to manufacturers using standard liquid for accurate calibration.

At the same time, in order to meet the needs of some users on-site calibration requirements, this product also provides on-site calibration function, the operation process is as follows:

Step 1: Press menu key; Step 2: Enter calibration;

Step 3: Enter two-point calibration;

Step 4: Enter the auto-correction calibration table;

Step 5: Enter the current turbidity calibration value, press confirm.

Note:

a) Because the calibration point is the slope determination point, it is suggested that the turbidity of the field comparison water is not less than 0.5 NTU or not less than 80% of the average turbidity value of the normal operation. The average turbidity at field level is

0.4 NTU, not less than  $0.4 \times 80\% = 0.32$  NTU;.

b) The turbidity change of water quality should not be too large in the calibration process, and the change should be kept within 2%.

c) Hash 2100 Q portable turbidimeter is recommended for calibration.

d) The accuracy of calibration depends on the change of water turbidity, the accuracy of using calibration equipment, and the standard degree of operator's operation comparison equipment.

#### **4.5. After-sales service**

One year warranty (man-made damage and damage caused by failure to operate according to this specification is not covered by this warranty)

Lifetime Maintenance (Please send back the product to the manufacturer)