

KH.WTU-V Telemetry Terminal

# WTU-300 Telemetry Terminal Product Introduction



Shenzhen KEHAO Information Technology Co., LTD

- **Description:** *WTU-300 V5 product adopts national standard hydrological protocol , built-in DTU module with LCD display, keyboard input function, supporting data display and parameter setting.*

## **1 Product Introduction**

### **1.1 Overview**

WTU-300 V5 telemetry terminal is a product with data acquisition and transmission function. It can be directly connected to the sensor and send the data such as rainfall, water level, image, etc. on site to the remote monitoring centre via SMS/GPRS/digital transmission. The product is suitable for a variety of distributed data acquisition system applications, such as: water conservancy, rain, industrial monitoring, water resources monitoring and management, urban drainage pumping station monitoring and tailing pond monitoring and other fields.

### **1.2 Functional features**

1. With digital, analogue and switching interfaces, it can be connected to many types of sensors and data acquisition units;
2. Supporting the functions of data self-reporting, incremental reporting and call and response;
3. Optional built-in 14-bit Gray code input module;
4. With serial port camera access function;
5. With LCD display and operation keyboard, support manual setting function;
6. Support on-site and remote upgrade;
7. Support on-site and remote setting and querying of working parameters;
8. With network detection, power detection and abnormal alarm function;
9. Support automatic/manual time setting;

10. Built-in non-loss solid-state memory for storing various setting parameters and working condition information;
11. Maximum support for 8GB capacity SD card, can be used as mass data storage, can also be used for programme upgrading;
12. Built-in solar charge controller, can automatically charge the external battery;
13. Wide voltage design, with reverse connection protection, over-voltage and over-current protection and anti-lightning surge absorption function.

### **1.3 Technical parameters**

1. Power supply voltage: 10-30VDC
2. Static power consumption: <6.5mA
3. Analogue input: 2-way (4-20mA)
4. Analogue acquisition accuracy: 0.1%FS
5. Switch input: 2-way (low-level valid)
6. Gray code input: 14 bits
7. Switching output: 2-way (SO1 driving capacity of 1A, SO2 driving capacity of 2.6A, SO1 and SO2 total driving capacity of 3A, can be used to power external sensors or alarms)
8. RS485 interface: 3-way (can be connected to digital interface sensors and other data acquisition modules)
9. RS232 interface: 2-way
10. Ambient temperature: -20-65°C
11. Ambient humidity: <95%

## 2 Product Function Description



**Figure1. Appearance**

### 2.1 Panel indicator

**COM** ——communication indicator, flash red when sending data, flash green when receiving data.

**CHG** —— Solar charging indicator, green means the battery is full

or floating, red means charging.

**RUN** — flashing light every 2 seconds, flashing red means the battery is undervoltage, flashing green means the voltage is normal.

## 2.2 Keypad

### 2.2.1 Keypad Interface



**Figure2. Key interface diagram**

### 2.2.2 Key Function

- SET KEY: Setting function key

Default display state:

Short press——set number(to realise manual number setting function)

Long press - password input interface (long press time needs more than 1.5s)

Long press - password input interface (long press time needs more than 1.5s)

Under the state of password, parameter menu selection and parameter setting:

Long press - return to the default display state

Under the state of numerical value input:

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Short press - switch numerical and alphabetic input state

- CLR key: Clear key

Under password input, number setting and parameter setting status:

Short press - clear one data bit

Long press - clear the whole data

- OK key: Confirmation key

Default display state:

Short press - performs one sensor data acquisition

Parameter setting menu selection state:

Short press - to enter the corresponding parameter setting menu items

In the counting state:

Short press -- send the set number data and return to the default display interface.

Password input interface:

Short press -- the correct password enters the parameter menu interface, and the wrong password returns to the default display interface.

In parameter setting status:

Short press -- confirm the input data is valid and return to the non-setting state of the data item.

- ↑ key: press up key

Default display state:

Short press - page up

Under parameter setting state:

Short press - up to select the data item

- ↓ key: Downward key press

Under default display state:

Short press - page down

Under the parameter setting state:

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Short press - down to select data item

- \* key: decimal point key

Under the state of setting number and parameter setting:

Short press - input decimal point (.)

- 0~9 keys: Numeric keys

Under the state of setting number and parameter setting:

Short press - input 0~9 digits.

### 2.3 Wiring Terminal Description



Figure3. Lower Panel

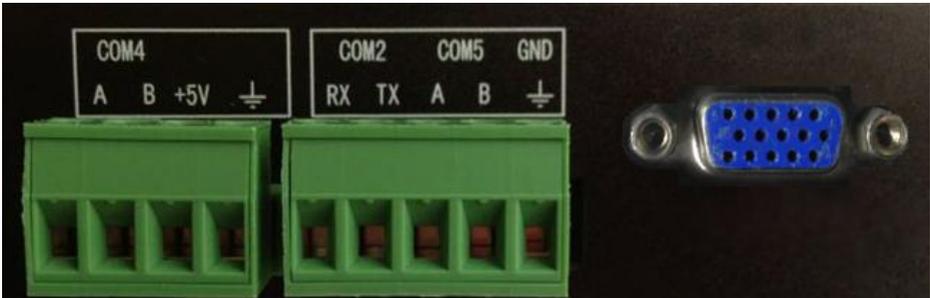


Figure4. Upper Panel

**COM1 TX、RX** —— connect to RX and TX of RS232 interface of DTU, Beidou, UHF or industrial control machine

respectively.

**COM2 TX、RX** — connect to RX and TX of RS232 interface of DTU, Beidou, UHF or industrial control machine, etc., or can be configured to connect to sensor equipment of RS232 interface.

**COM3 A、B** — connect to A and B terminals of RS485 interface sensor respectively.

**COM4 A、B** — connect to RS485 interface serial camera respectively, also can be configured to connect to other sensor devices with RS485 interface.

**COM5 A、B** — Connect to A and B terminals of RS485 interface sensor respectively.

**GND** — reference ground.

**Switch input S1, S2** — connect to the switching sensor, see 'Wiring Diagram' later.

**Analogue input A1, A2** — connect to the positive pole of 4~20mA analogue sensor, see 'Wiring Diagram' later.

**GND** — reference ground.

**Control output SO1、SO2** — Supply power to external devices or connect to alarm devices.

**GND** —reference ground.

**DC12V positive, negative** — connect to external power supply or battery positive and negative poles.

### 3 Installation Steps

➤ **Note: Please strictly follow the following steps in order, otherwise the device may not work properly.**

1. Fix the WTU-300 V5 in a suitable position inside the data box, the specific dimensions of which are shown in the "Outline Dimension Diagram".
2. Connect the sensor, DTU, antenna and other accessories according to the "Wiring Diagram".

3. Connect the solar panel, pay attention to the positive and negative poles.
4. Connect the battery wires on the WTU-300 V5 terminal, pay attention to the positive and negative polarity.
5. Finally, connect the battery terminals as shown below: Schematic diagram of the battery.



**Figure5. Battery Schematic**

6. Check the status of WTU-300 V5 after powering up, when the RUN light starts to flash once in 2 seconds, the device will enter the normal working state.

## **4 Parameter setting description**

### **4.1 RTU parameter setting**

- **Description:** Press the following operation to enter the 'RTU Parameter Configuration' interface:
  1. Under the default display page, long press 'SET' key to enter the password input page, input the parameter configuration password, the default parameter configuration password is '000000'.

2. Press 'OK' key to enter the parameter setting page after correctly inputting the password. Press '↑', '↓' key, select the parameter you need to set, press 'OK' key to enter the corresponding setting page or setting state.
3. If you need to input numbers or letters of the parameter items, press 'CLR' key briefly under the parameter setting state to clear one character of the data or one character of the string.
4. For the parameter items that can be selected directly, use the '↑' and '↓' keys to select in the parameter setting state.

#### **4.1.1 RTU address setting**

1. Select 'RTU address' item, press 'OK' key to enter the modification state.
2. Delete the original RTU number and enter the new RTU address.
  - **Note:** RTU address can be up to 10 decimal digits.
3. Press 'OK' key to exit the modification state after inputting, the RTU address will be saved automatically.

#### **4.1.2 Rain Gauge Setting**

Select 'Rain Gauge Setting', press 'OK' to enter the setting page.

##### **4.1.2.1 Sensor Model**

1. Select 'Sensor Model', press 'OK' to enter the setting status.
2. Use the '↑' and '↓' keys to select the rain gauge sensor, and press the 'OK' key to exit the setting status.

##### **4.1.2.2 Resolution**

1. Select 'Resolution' and press 'OK' to enter the setting status

2. Input the correct resolution and press 'OK' to exit the setting status.

#### **4.1.2.3 Save and Exit**

Select this item and press 'OK', the set parameters will be saved and return to the upper page.

#### **4.1.2.4 Exit without saving**

Select this item and press 'OK', the set parameters will not be saved and return to the previous page.

### **4.1.3 Water Level Meter Setting**

Select the item 'Water level meter setting' and press 'OK' to enter the setting page.

#### **4.1.3.1 Sensor type**

1. Select 'Selector Model', press 'OK' to enter the setting status.
2. Use '↑' and '↓' keys to select the water level sensor, and press 'OK' key to exit the setting status.

#### **4.1.3.2 485 address**

1. Select '485 Address' and press 'OK' key to enter the modification status
2. Input the correct 485 address and then press 'OK' to exit the setting status.

#### **4.1.3.3 Resolution**

1. Select 'Resolution' and press 'OK' to enter the modification status
2. Input the correct resolution and press 'OK' to exit the setting status.

#### **4.1.3.4 Reference Value**

1. Select 'Reference Value', press 'OK' to enter the modification status
2. Input the correct reference value and press 'OK' to exit the setting status.

#### **4.1.3.5 Save and Exit**

Select the item and press 'OK' key, the set parameters will be saved and return to the upper page.

#### **4.1.3.6 Exit without saving**

Selecting this item and pressing OK will not save the setup parameters and will return you to the previous page.

### **4.1.4 Camera Settings(Multiple 'Camera Settings' will be displayed if more than one camera is configured)**

Select 'Camera Settings' and press 'OK' to enter the setting page.

#### **4.1.4.1 Sensor type**

1. Select 'Sensor Model' item, press 'OK' to enter the setting status

2. Use the '↑' and '↓' keys to select the camera sensor and press the 'OK' key to exit the setting status.

#### **4.1.4.2 485 address**

1. Select '485 Address' and press 'OK' to enter the modification status

2. Input the correct 485 address and press 'OK' to exit the setting status.

#### **4.1.4.3 Save Exit**

Select the item and press 'OK' key, the set parameters will be saved and return to the upper page.

#### **4.1.4.4 Exit without saving**

Select this item and press 'OK', the set parameters will not be saved and return to the upper page.

### **4.1.5 DTU Type**

1. Select 'DTU Type' and press 'OK' to enter setting status.

2. Press '↑' and '↓' to select DTU type. Press 'OK' key to exit the modification state.

➤ **Description:**

1. *The DTU type options are 'Built-in DTU', 'External DTU-RDP', 'External DTU-KH' and 'External DTU Transmission'. 'DTU Transmission', "External DTU-RDP", "External DTU-KH" and "External DTU Transmission".*
2. *'Built-in DTU' is built-in KOHO DTU module, no need to connect other communication devices; 'External DTU-RDP' is external DTU device with RDP protocol; 'External DTU-KH' is external DTU device with RDP protocol; 'External DTU-RDP' is external DTU module with RDP protocol; 'External DTU-KH' is external DTU module with KOHO protocol; 'External DTU-KH' is external DTU module with RDP protocol. 'External DTU-KH' is the DTU device with RDP protocol connected to HTC; "External DTU-KH" is the DTU device customised by KH; "External DTU-KH" is the communication device connected to KH.*

#### **4.1.6 DTU Parameter Setting**

When 'DTU Type' selects 'Built-in DTU' or 'External DTU-RDP', the setting item will be displayed automatically; when it is set to other options, the setting item will be hidden automatically. For details of DTU parameter setting, please refer to '4.2 DTU Parameter Setting'.

#### **4.1.7 Modify Configuration Password**

1. Select 'Modify Configuration Password' and press 'OK' to enter the setting page.

2. Input the password you want to modify directly in the setting page, the password must be 6-digit number, otherwise the modification is invalid.
3. Press 'OK' key to exit the setting page after inputting.

#### **4.1.8 Date and Time Setting**

1. Select 'Modify Configuration Password' and press 'OK' to enter the setting page.
2. The setting page will display the current date and time, then you can directly input the corresponding digits or adjust the date and time by '↑' and '↓' keys.
3. When adjusting the data by '↑' and '↓' keys, press 'SET' key to switch back one setting bit.
4. Press 'OK' key to exit the setting page after adjustment, the new date and time will take effect.

#### **4.1.9 Send Test Message**

1. Select 'Send Test Message' and press 'OK' to enter the setting page.
2. Press 'OK' to send test message and return to the upper directory; press 'CLR' to return to the upper directory directly.

#### **4.1.10 Restore Factory Settings**

1. Select 'Restore Factory Settings' and press 'OK' to enter the setting page.
2. Press 'OK' to restore factory settings and the device will restart automatically after about 3s; press 'CLR' to return to the upper directory.

### **4.2 DTU parameter setting**

➤ ***description:***

1. When 'DTU Type' is 'Built-in DTU' or 'External DTU-RDP', 'DTU Parameter Setting' will appear automatically. When 'DTU Parameter Setting' is selected as 'Built-in DTU' or 'External DTU-RDP', 'DTU Parameter Setting' will appear automatically. Select this item and press 'OK' to enter the DTU parameter setting catalogue.
2. Press '↑' and '↓' to select the corresponding setting catalogue and press 'OK' to enter the setting page.

## **4.2.1 Mobile Service Parameters**

### **4.2.1.1 Access Point**

1. Select 'Access Point' and press 'OK' to enter the modification status.
2. Use 'CLR' key to clear the original data, then directly input the corresponding access point code, and press 'OK' key to exit the setting status.

➤ Description:

1. The default 'Access Point' is CMNET.

### **4.2.1.2 User Name**

1. Select 'User Name' and press 'OK' to enter the modification status.
2. Use the 'CLR' key to clear the original data and enter the corresponding user name code directly, and press the 'OK' key to exit the setting status.

➤ Description:

1. The default 'User Point' is cmnet.

### **4.2.1.3 Password**

1. Select 'Password' and press 'OK' to enter the modification status.

2. Use the 'CLR' key to clear the original data, then enter the corresponding password directly and press 'OK' to exit the setting status.

➤ **Description:**

1. The default 'User Point' is cmnet.

**4.2.1.4 IP**

1. Select 'IP' and press 'OK' to enter the modification status.

2. Use the 'CLR' key to clear the original IP, then directly input the corresponding IP and press 'OK' to exit the modification status.

➤ **Description:**

1. The default 'IP' is '0.0.0.0'.

**4.2.1.5 Service Code**

1. Select 'Service Code' and press 'OK' to enter the modification status.

2. Use the 'CLR' key to clear the original data and input the corresponding service code directly, and press 'OK' to exit the setting status.

➤ **Description:**

1. The default 'User Point' is \*99\*\*\*1#.

**4.2.2 Operation Parameters**

**4.2.1.1 Operation Mode**

1. Select 'Operation Mode' and press 'OK' to enter the modification status.

2. Use '↑' and '↓' keys to select 'Multi-Channel' or 'Master-Backup Channel', and press 'OK' key. Press 'OK' key to exit the setting status.

➤ **Description:**

1. The default 'Operation Mode' is 'Multi-Channel'.

**4.2.1.2 Baud Rate**

1. Select 'Baud Rate' and press 'OK' to enter the modification status.
2. Use '↑' and '↓' keys to select the desired baud rate, and press 'OK' to exit the setting status.

➤ **Description:**

1. *The default 'baud rate' is '57600 bps'.*

#### **4.2.1.3 Maximum Packets**

1. Select 'Maximum Packet' and press 'OK' to enter the modification status.
2. Use 'CLR' key to clear the original data and input the maximum data length per frame that DTU can support, and press 'OK' key to exit the setting status.

➤ **Description:**

1. *Maximum Data Packet' is '1024' by default, the input range is 0~1024.*

### **4.2.3 SMS Parameters**

#### **4.2.2.1 Centre Number**

1. Select 'Centre Number' and press 'OK' to enter the modification status
2. Use 'CLR' key to clear the original data and input the corresponding SMS centre number directly, and press 'OK' key to exit the setting status. Currently, it supports one 11-digit centre number.

➤ **Description:**

1. *'Centre Number' is empty by default.*

#### **4.2.2.2 Compilation Method**

1. Select 'Compile Method' and press 'OK' to enter the modification status.
2. Use '↑' and '↓' to select the desired compilation method and press 'OK' to exit the modification status.

➤ **Description.:**

1. 'Compile mode' is '8BIT' by default, there are '7BIT', '8BIT' and 'UCS2'. There are three options: '7BIT', '8BIT' and 'UCS2'.

#### 4.2.4 Channel 1 to Channel 4 Parameter Setting

There are four communication channels in the built-in DTU module, and their parameter settings correspond to the parameter settings of channel 1 to channel 4 respectively. The setting content items of these four channels are the same, as follows:

##### 4.2.3.1 Communication mode

1. Select 'Communication mode' and press 'OK' to enter the modification state.
2. Use '↑' and '↓' to select the desired communication mode and press 'OK' to exit the modification status.

➤ **Description:**

1. 'Communication mode' is 'TCP' by default, there are 'UDP' and 'TCP, UDP', "TCP", "UDP+DDP", "TCP+DDP", "SMS" and "TCP SER". six options.

##### 4.2.3.2 IP

1. Select 'IP' and press 'OK' to enter the modification status.
2. Use the 'CLR' key to clear the original IP, then directly input the corresponding IP and press 'OK' to exit the modification status.

➤ **Description:**

1. The default 'IP' is '0.0.0.0'.

##### 4.2.3.3 Domain Name

1. Select 'Domain Name' and press 'OK' to enter the modification status.
2. Use the 'CLR' key to clear the original domain name and input the corresponding domain name directly, and press 'OK' to exit the

modification state. During the process of entering domain name, pressing 'SET' key will switch between numeric and alphabetic keys.

➤ **Description:**

1. 'Domain Name' defaults to 'khdtu.com'.

#### 4.2.3.4 DSC Port

1. Select 'DSC Port' and press 'OK' to enter the modification status.

2. Use 'CLR' key to clear the original port data and input the corresponding port directly, and press 'OK' key to exit the modification status.

➤ **Description:**

1. The default 'DSC terminal' of channel 1 to channel 4 is 8001~8004 respectively.

#### 4.2.3.5 Service Number

1. Select 'Service Number' and press 'OK' to enter the modification status

2. Use 'CLR' key to clear the original service number and input the new service number directly, currently it supports one 11-digit service number.

➤ **Description:**

1. 'Service Number' is empty by default, only when 'SMS' is selected as 'Communication Mode', you need to set this number.

#### 4.2.5 Restart DTU

When this option is selected, the DTU module inside RTU will be restarted.

#### 4.2.6 Save

After confirming that all parameters of DTU are entered or selected correctly, select 'Save', RTU will automatically set the set

parameters to DTU module and restart DTU module to make the parameters take effect.

## **5 External devices to read RTU sensor data**

The real-time sensor data collected by RTU can be read by external devices, which is convenient for external devices to obtain the real-time data inside RTU for other control in the field, such as PLC reading the data for motor control or display.

The COM2 and COM5 ports of RTU can be configured to enable this function through the configuration tool, and the external device communicates with RTU through the 0x03 function code of Modbus protocol. please refer to Appendix I to III for the Modbus protocol, parameter address allocation table and CRC16 calculation method.

- **Description:** *The Modbus protocol address of the current RTU is fixed to 1.*

## **6 Common fault checking and solution**

1. All lights do not flash when switching on: :
  - Use a multimeter to measure whether the 'DC 12V' power supply is between 10-30V.
2. No charging current:
  - Use a multimeter to measure the solar power supply voltage should be between 13-22V (no voltage at night), if it is not normal, please check whether the connection circuit of the solar panel is correct.
3. Built-in DTU can not be online:
  - Check whether the parameter setting of the built-in DTU module is correct, if the parameter setting is not correct, please modify the parameter; ;
  - Check whether the DPC service of the data receiving centre is properly installed and running, if there is no data receiving service, please install and run the

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background service;

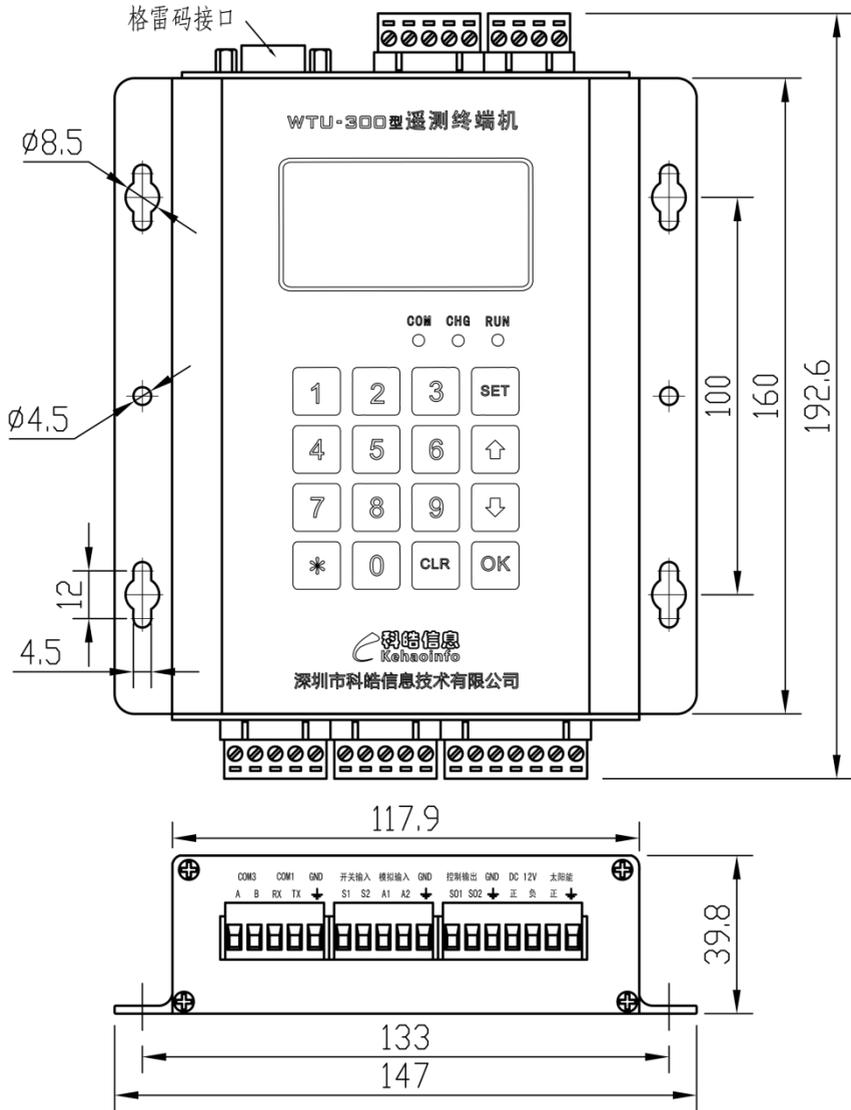
- Check whether the SIM card is down due to arrears, if arrears, please recharge;
- Power off, re-plug the SIM card, check whether it is not online due to poor contact of SIM card;
- If all the above are OK but the device is still not online, please replace the device and send the device back to the manufacturer for analysis;

### **7 Accessories**

- Copy of the user manual;
- Copy of warranty certificate;
- Certificate of Product Conformity;

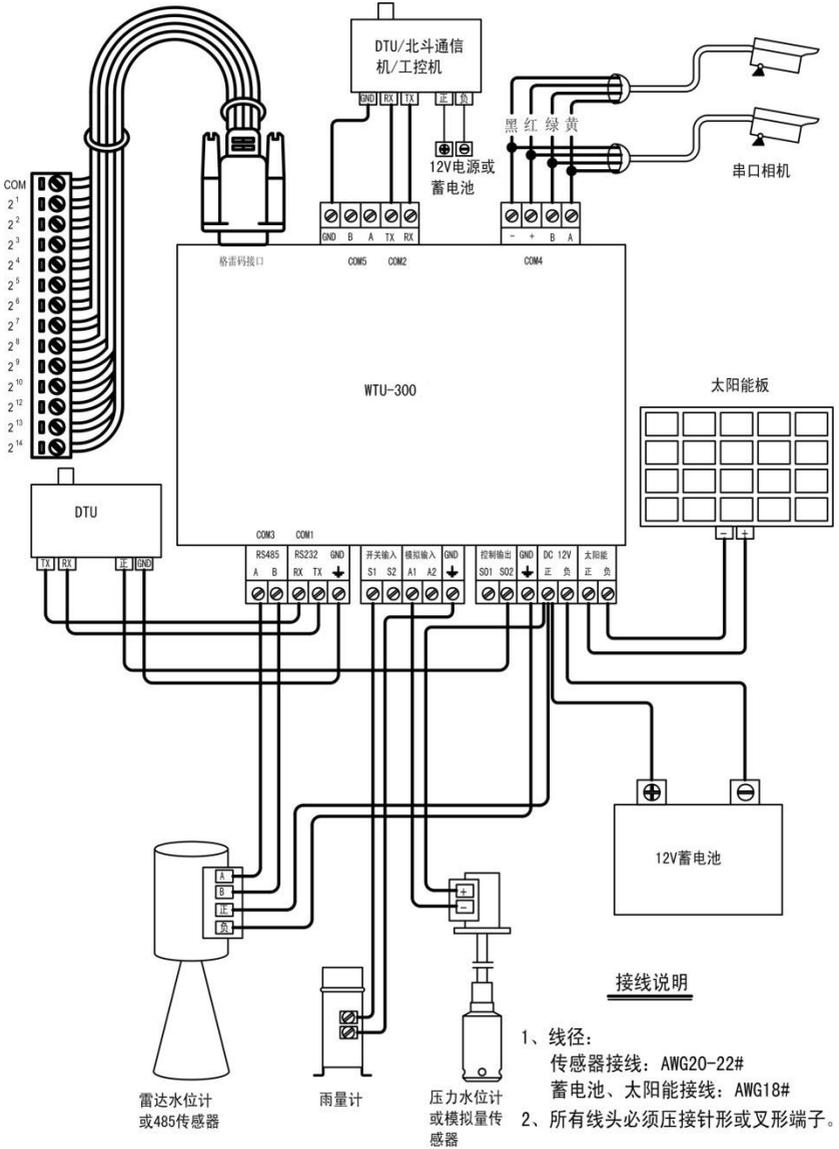
### **8 External Dimensions**

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**Figure6. Dimensions**

9 wiring diagram



**Figure7. Wiring diagram****10 Appendix****10.1 Appendix I: Modbus Protocol Description**

PLC and RTU are connected via RS485/RS232 with Modbus communication protocol and RTU as a slave. The baud rate can be set according to the actual demand. The byte structure is 1 start bit, 8 data bits, 1 stop bit and no parity check.

## 一、Data frame format

Address parity check	Function code	Data content	CRC16
1 byte	1 byte	Indefinite length	2 bytes

## 二、Function code 0x03

The device uses the 03 function code of the Modbus protocol. This function enables the host to obtain the real-time measurement value of the slave, which is specified as a single-precision floating-point value (i.e. occupying two consecutive register addresses), and the corresponding data are expressed in different register addresses.

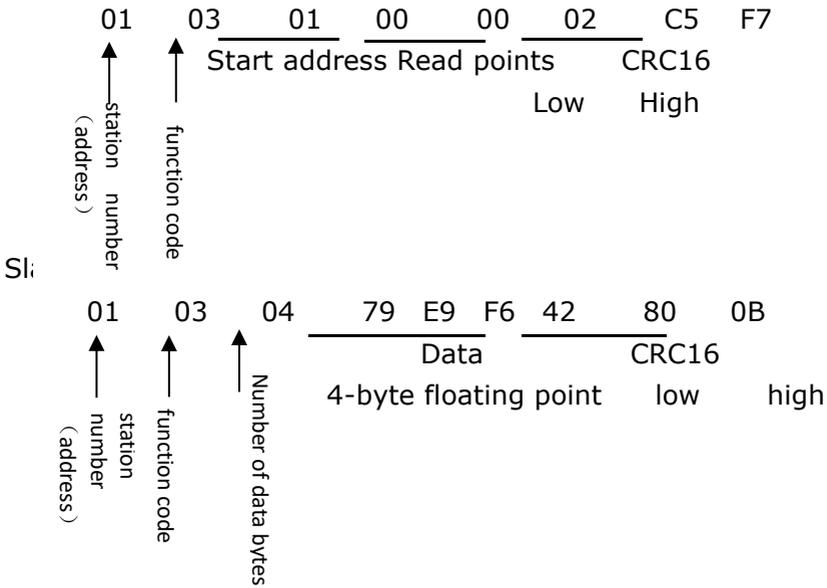
The command format of the master consists of slave address, function code, start address, read points and CRC16; the command format of the slave response consists of slave address, function code, data area and CRC16. The data in the data area is the data returned by the slave from the start address to the beginning of the consecutive registers.

CRC16 two bytes, except CRC16 itself all bytes are involved in the CRC16 calculation. The low byte comes before and the high byte comes after.

## 三、Example

Take 0x03 function code to read the first water level value as an example to illustrate.

Host call:



The low byte of the data comes first, the water level value is a four-byte floating point number (following the IEEE754 standard), and the water level indicated by 0x42F6E979 is 123.456m.

### 10.2 Appendix II: Sensor Data Memory Address Allocation Table

No.	Data type	Address	Unit
1	Section area	0x0000	m <sup>2</sup>
2	Instantaneous air temperature	0x0002	degree centigrade
3	Instantaneous water temperature	0x0004	degree centigrade
4	Reserved	0x0006	
5	Reserved	0x0008	

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6	Daily evaporation	0x000A	mm
7	Current evaporation	0x000C	milliseconds
8	Barometric pressure	0x000E	hectopascal
9	Locks, dams and reservoir gates opening height	0x0010	m
10	Reserved	0x0012	
11	Reserved	0x0014	
12	Reserved	0x0016	
13	Ground temperature	0x0018	degrees centigrade
14	Instantaneous depth to groundwater	0x001A	m
15	Wave height	0x001C	m
16	Soil water content at 10 cm	0x001E	%
17	Soil water content at 20 cm	0x0020	%
18	Soil water content at 30 cm	0x0022	%
19	Soil water content at 40 cm	0x0024	%
20	Soil water content at 50 cm	0x0026	%
21	Soil water content at 60 cm	0x0028	%
22	Soil water content at 80 cm	0x002A	%
23	Soil water content at 100 cm	0x002C	%
23	Humidity	0x002E	%
25	Reserved	0x0030	
26	Precipitation in 1-hour period	0x0032	mm
27	Precipitation in 2-hour period	0x0034	mm
28	Precipitation in 3 hours	0x0036	mm
29	6-hourly precipitation	0x0038	mm
30	12-hourly precipitation	0x003A	mm
31	Daily precipitation	0x003C	mm
32	Current precipitation	0x003E	mm

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33	Precipitation in 1-minute intervals	0x0040	mm
34	Precipitation in 5-minute intervals	0x0042	mm
35	10-minute period precipitation	0x0044	mm
36	30-minute period precipitation	0x0046	mm
37	Heavy rainfall	0x0048	mm
38	Cumulative precipitation	0x004A	mm
39	Instantaneous flow, pumping flow	0x004C	m <sup>3</sup> /s
40	Taking (discharge) outlet flow1	0x004E	m <sup>3</sup> /s
41	Taking (discharge) outlet flow2	0x0050	m <sup>3</sup> /s
42	Taking (discharge) outlet flow3	0x0052	m <sup>3</sup> /s
43	Taking (discharge) outlet flow4	0x0054	m <sup>3</sup> /s
44	Taking (discharge) outlet flow5	0x0056	m <sup>3</sup> /s
45	Taking (discharge) outlet flow6	0x0058	m <sup>3</sup> /s
46	Taking (discharge) outlet flow7	0x005A	m <sup>3</sup> /s
47	Taking (discharge) outlet flow8	0x005C	m <sup>3</sup> /s
48	Total outflow, total flow through gate	0x005E	m <sup>3</sup> /s

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49	Water conveyance equipment flow, flow through gates (groups)	0x0060	m <sup>3</sup> /s
50	Sand transport	0x0062	million tonnes
51	Wind direction	0x0064	
52	Wind force (class)	0x0066	
53	Wind speed	0x0068	m/s
54	Cross-sectional mean flow velocity	0x006A	m/s
55	Current instantaneous flow velocity	0x006C	m/s
56	Reserved	0x006E	
57	Instantaneous river water level, tide leve	0x0070	m/s
58	Water level under reservoir (gate, station)	0x0072	m/s
59	reservoir (gate, station) on the water level	0x0074	m/s
60	Water level at intake (discharge) 1	0x0076	m/s
61	Water level at intake (discharge) 2	0x0078	m/s
62	Water level at intake (discharge)3	0x007A	m/s
63	Water level at intake (discharge)4	0x007C	m/s
64	Water level at intake (discharge)5	0x007E	m/s
65	Water level at intake	0x0080	m/s

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	(discharge)6		
66	Water level at intake (discharge) 7	0x0082	m/s
67	Water level at intake (discharge) 8	0x0084	m/s
68	Containment	0x0086	Kg/m <sup>3</sup>
69	Reserved	0x0088	
70	pH	0x008A	
71	Dissolved Oxygen	0x008C	mg/l
72	Conductivity	0x008E	microsiemens/cm
73	Turbidity	0x0090	degrees
74	permanganate index	0x0092	mg/l
75	Redox potential	0x0094	mv
76	Ammoniacal nitrogen	0x0096	mg/l
77	Total phosphorus	0x0098	mg/l
78	Total Nitrogen	0x009A	mg/l
79	Total Organic Carbon	0x009C	mg/l
80	Copper	0x009E	mg/l
81	Zinc	0x00A0	mg/l
82	Selenium	0x00A2	mg/l
83	Arsenic	0x00A4	mg/l
84	Total mercury	0x00A6	mg/l
85	Cadmium	0x00A8	mg/l
86	Lead	0x00AA	mg/l
87	Chlorophylla	0x00AC	mg/l
88	Water pressure1	0x00AE	kPa
89	Water pressure2	0x00B0	kPa
90	Water pressure3	0x00B2	kPa
91	Water pressure4	0x00B4	kPa
92	Water pressure5	0x00B6	kPa

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93	Water pressure6	0x00B8	kPa
94	Water pressure7	0x00BA	kPa
95	Water pressure8	0x00BC	kPa
96	Water meter 1 hourly quantity	0x00BE	m <sup>3</sup>
97	Water meter 2 hourly quantity	0x00C0	m <sup>3</sup>
98	Water meter 3 hourly quantity	0x00C2	m <sup>3</sup>
99	Water meter 4 hourly quantity	0x00C4	m <sup>3</sup>
100	Water meter 5 hourly quantity	0x00C6	m <sup>3</sup>
101	Water meter 6 hourly quantity	0x00C8	m <sup>3</sup>
102	Water meter 7hourly quantity	0x00CA	m <sup>3</sup>
103	Water meter 8 hourly quantity	0x00CC	m <sup>3</sup>
104	Water Meter 1Hourly Volume	0x00CE	m <sup>3</sup> /h
105	Water Meter 2 Hourly Volume	0x00D0	m <sup>3</sup> /h
106	Water Meter 3 Hourly Volume	0x00D2	m <sup>3</sup> /h
107	Water Meter 4 Hourly Volume	0x00D4	m <sup>3</sup> /h
108	Water Meter 5 Hourly Volume	0x00D6	m <sup>3</sup> /h
109	Water Meter6 Hourly Volume	0x00D8	m <sup>3</sup> /h
110	Water Meter 7 Hourly Volume	0x00DA	m <sup>3</sup> /h
111	Water Meter 8 Hourly Volume	0x00DC	m <sup>3</sup> /h
112	Reserved	0x00DE~	

### 10.3 Appendix III: CRC16 Code Calculation Procedure

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

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- 2, the first 8-bit data with the low bit of the 16-bit CRC register is different or, put the result in the CRC register;
- 3, shift the contents of the register one bit to the right (towards the low bit), fill the highest bit with 0, and check the lowest bit;
- 4, if the lowest bit is 0: repeat step 3 (shift again)  
If the lowest bit is 1: the CRC register is iso-or with the polynomial A001 (1010 0000 0000 0001);
5. Repeat steps 3 and 4 until it is shifted right 8 times so that the entire 8-bit data is all processed;
- 6, repeat steps 2 to 5 for the next 8-bit data;
- 7, the final CRC register obtained is the CRC code;
8. When putting the CRC result into the information frame, the high and low bits will be exchanged, and the low bit comes first.



## Technical Support

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