# 86 shell LCD Temperature and humidity transmitter user's manual (Type 485)

Document version：V2.1

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# 1. product description

## 1.1product description

The transmitter has a liquid crystal display, real-time display of temperature and humidity, screw-free terminal wiring on the back, can be installed on a standard 86mm junction box. The equipment adopts standard MODBUS-RTU communication protocol, RS485 signal output, and the communication distance can reach up to 2000 meters (actual measurement). Probe built-in type and extension type are optional, widely used in communication equipment room, warehouse building and automatic control and other places that need temperature and humidity monitoring. Safe and reliable, beautiful appearance and convenient installation.

## 1.2Features

1. Large-screen LCD display, beautiful and elegant

2. The wiring terminal adopts military-grade spring-type screwless terminal, which can be connected by pressing and inserting. Even if there is no screwdriver, the wire can be quickly connected on site, which can adapt to the wire diameter of 0.3～2.0mm2

3. Adopt high-precision temperature and humidity measurement unit, on-site self-calibration, good long-term stability and small drift

4. Use special 485 circuit, standard ModBus-RTU communication protocol, communication address and baud rate can be set

5.10~30V DC wide voltage range power supply

6. Probe built-in extension is optional, the probe built-in type is simple and convenient to install, the probe extension type can choose a variety of probes for different occasions, the probe line can be up to 30 meters long

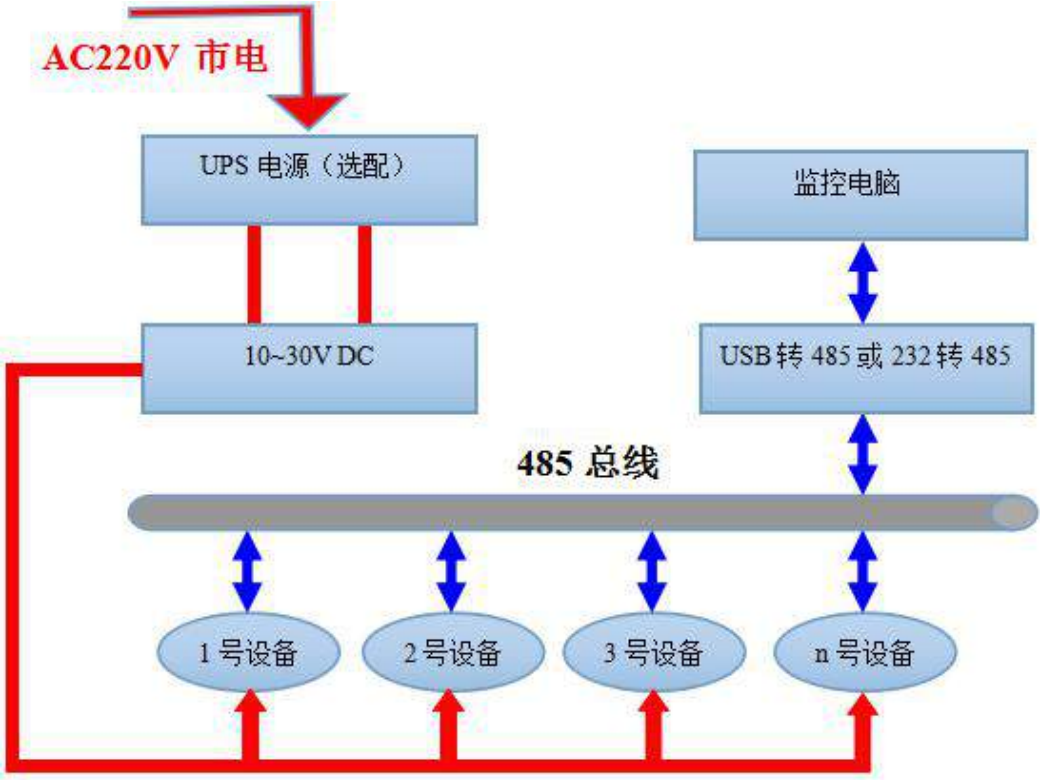
7. Buttons can set parameters, easy to operate

## 1.3Main Specifications

<table>
<tr><td>DC power supply (default)</td><td colspan="2">10-30V DC</td></tr>
<tr><td>Maximum power consumption</td><td colspan="2">0.4W</td></tr>
<tr><td rowspan="2">A quasi accuracy</td><td>humidity</td><td>±2%RH（5%~95%RH，25℃）</td></tr>
<tr><td>temperature</td><td>±0.4℃（25℃）</td></tr>
<tr><td rowspan="2">B quasi-accuracy (default)</td><td>humidity</td><td>±3%RH（5%RH~95%RH，25℃）</td></tr>
<tr><td>temperature</td><td>±0.5℃（25℃）</td></tr>
<tr><td>Transmitter circuit operating temperature and humidity</td><td colspan="2">-20℃~+60℃，0%RH~80%RH</td></tr>
<tr><td rowspan="3">Probe working temperature</td><td>Built-in probe</td><td rowspan="3">-40~+80℃</td></tr>
<tr><td>Extension hardcover probe</td></tr>
<tr><td>Extension waterproof</td></tr>
</table>

| | | |
|---|---|---|
| | probe | |
| Probe working humidity | 0~100%RH | |
| letter of agreement | Modbus-RTU letter of agreement | |
| output signal | 485 signal | |
| Temperature display resolution | 0.1℃ | |
| Humidity display resolution | 0.1%RH | |
| Temperature and humidity refresh time | 1S | |
| Long-term stability | temperature | ≤0.1℃/y |
| | humidity | ≤1%RH/y |
| Response time | temperature | ≤15s（1m/s Wind speed） |
| | humidity | ≤4s（1m/s Wind speed） |
| Hole Size | 60mm | |
| parameter settings | Modify directly through software settings or keys | |

## 1.4System framework diagram



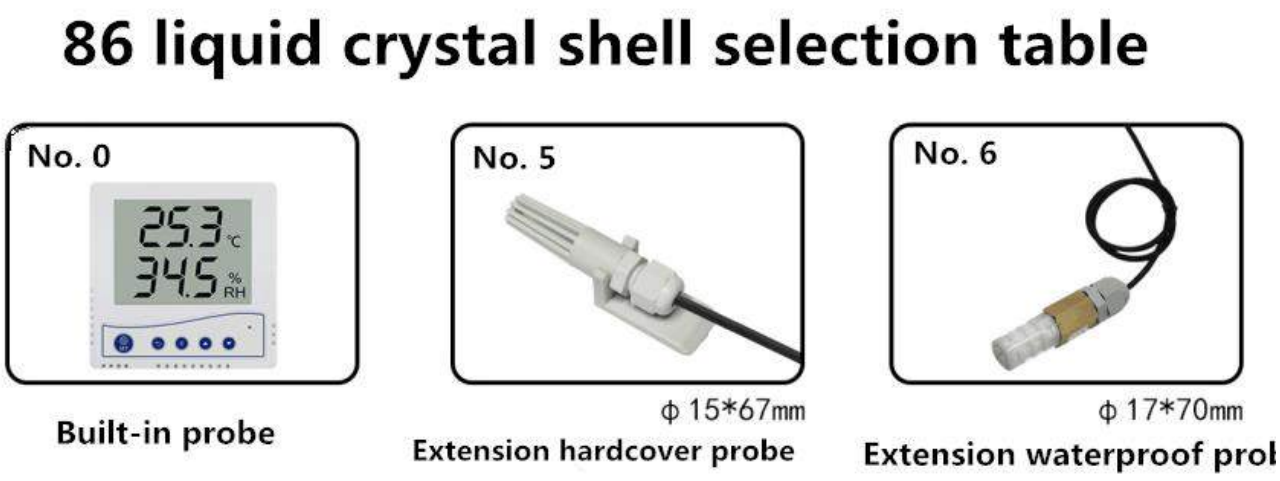

**System solution block diagram**

# 2.product model

| | | | |
|---|---|---|---|
| RS- | | | Company code |
| | WS- | | Temperature and humidity transmission, sensor |

| | | | | | |
|---|---|---|---|---|---|
| | | N01- | | | RS485（Modbus protocol） |
| | | | 1A- | | 86 LCD shell with keys |
| | | | | 0 | Built-in probe |
| | | | | 5 | Extension hardcover probe |
| | | | | 6 （ 1AWNo such model） | Extension waterproof probe |

| 0 | 5 | 6 |
|---|---|---|
|  Probe built-in type |  The probe has a mounting seat for easy installation; The probe is waterproof and sensitive, but it is not suitable for occasions with particularly large dust; |  The probe is waterproof and the reaction speed is slightly slower, which is suitable for occasions with particularly large dust; However, if the site is frequently watered, it will cause the probe humidity to fall slowly; |




# 3. Equipment installation instructions

## 3.1 Check before installation

Equipment List:

1. 1 transmitter device

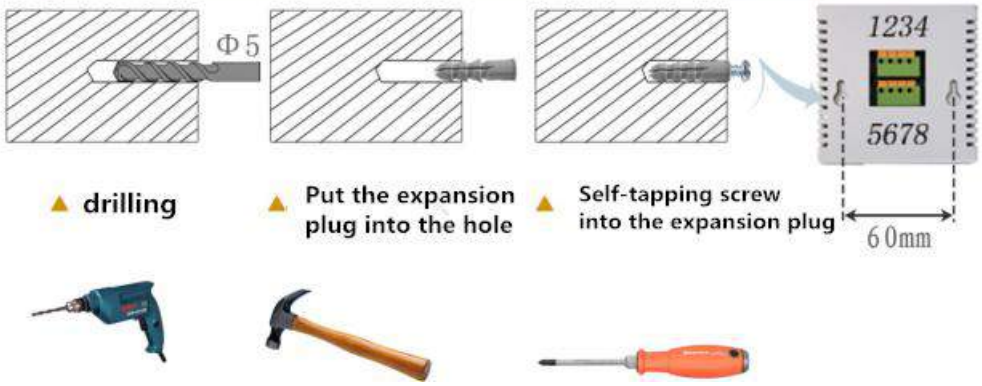
2. Conformity certificate, warranty card, calibration report, etc.

3. Self-tapping screws (2 pcs), expansion plugs (2 pcs)

4.USB to 485 (optional)

5.485 terminal resistance (gift from multiple devices)

## 3.2installation steps



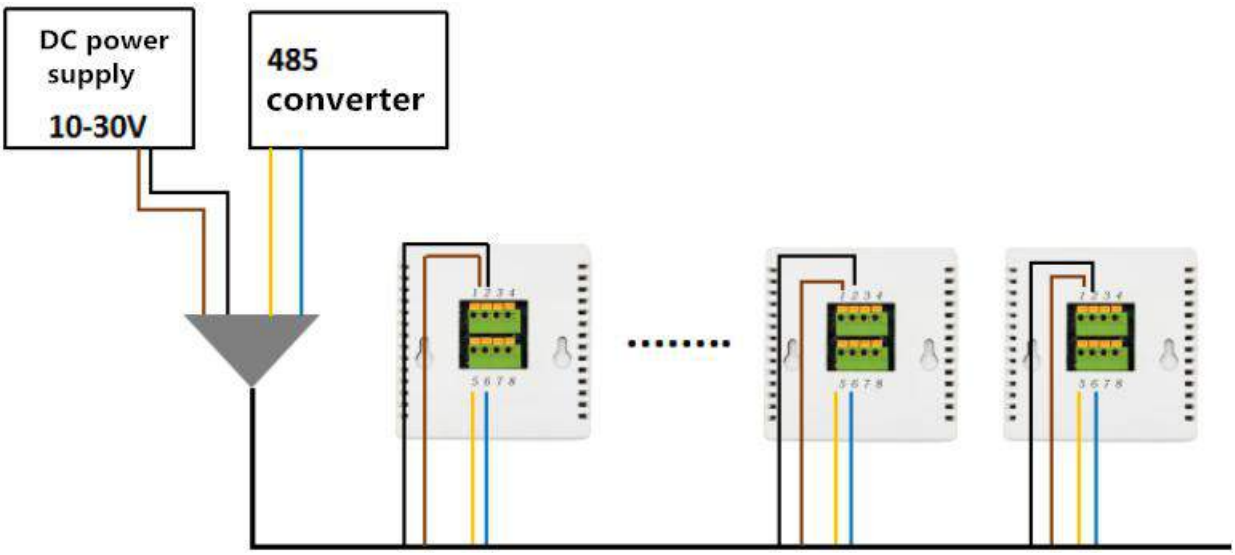



## 3.3Interface Description

Wide voltage power input can be 10~30V. When connecting the 485 signal line, please note that the two lines A\B cannot be reversed, and the addresses of multiple devices on the bus must not conflict.

## 3.4 Equipment wiring

When multiple 485 type devices are connected to the same bus, there are certain requirements for field wiring. For details, please refer to the "485 Device Field Wiring Manual" in the data package.




| Serial number | Explanation | Serial number | Explanation |
|---|---|---|---|
| 1 | Power is positive（10~30V DC） | 5 | 485-A |
| 2 | Negative power supply | 6 | 485-B |
| 3 | Sensor yellow wire | 7 | Sensor black wire |
| 4 | Sensor brown wire | 8 | Sensor blue wire |
| Note: Products with built-in sensors 3, 4, 7, 8 are idle | | | |

### 3.5Panel display instructions


# 4. Configuration software installation and use

## 4.1 Software selection

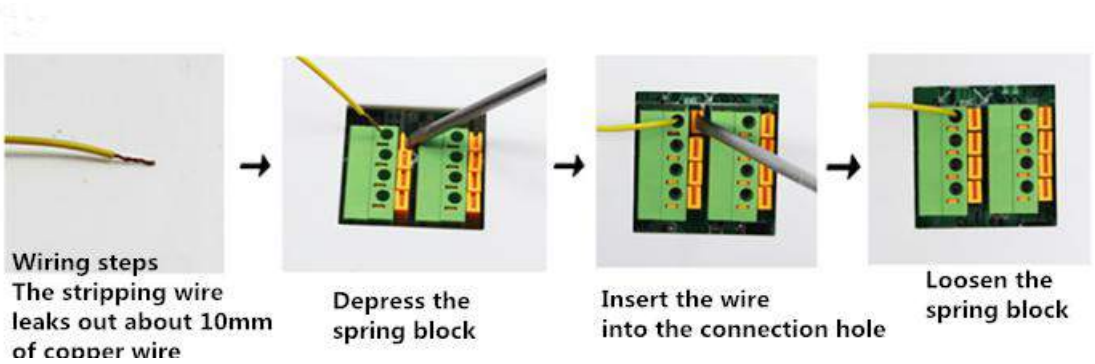
**If you need to modify the address and baud rate of the device, you need to use the configuration software to set.**

Open the data package and select "Debug Software" --- "485

Number configuration software", found 

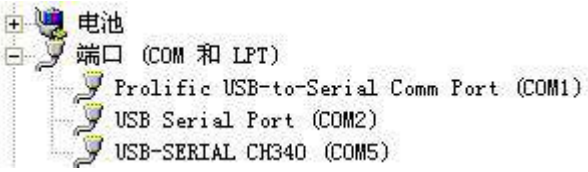
Just open it.

**Note: When using this configuration software, a single device must be connected! The wiring diagram of the device is as follows:**




## 4.2 parameter settings

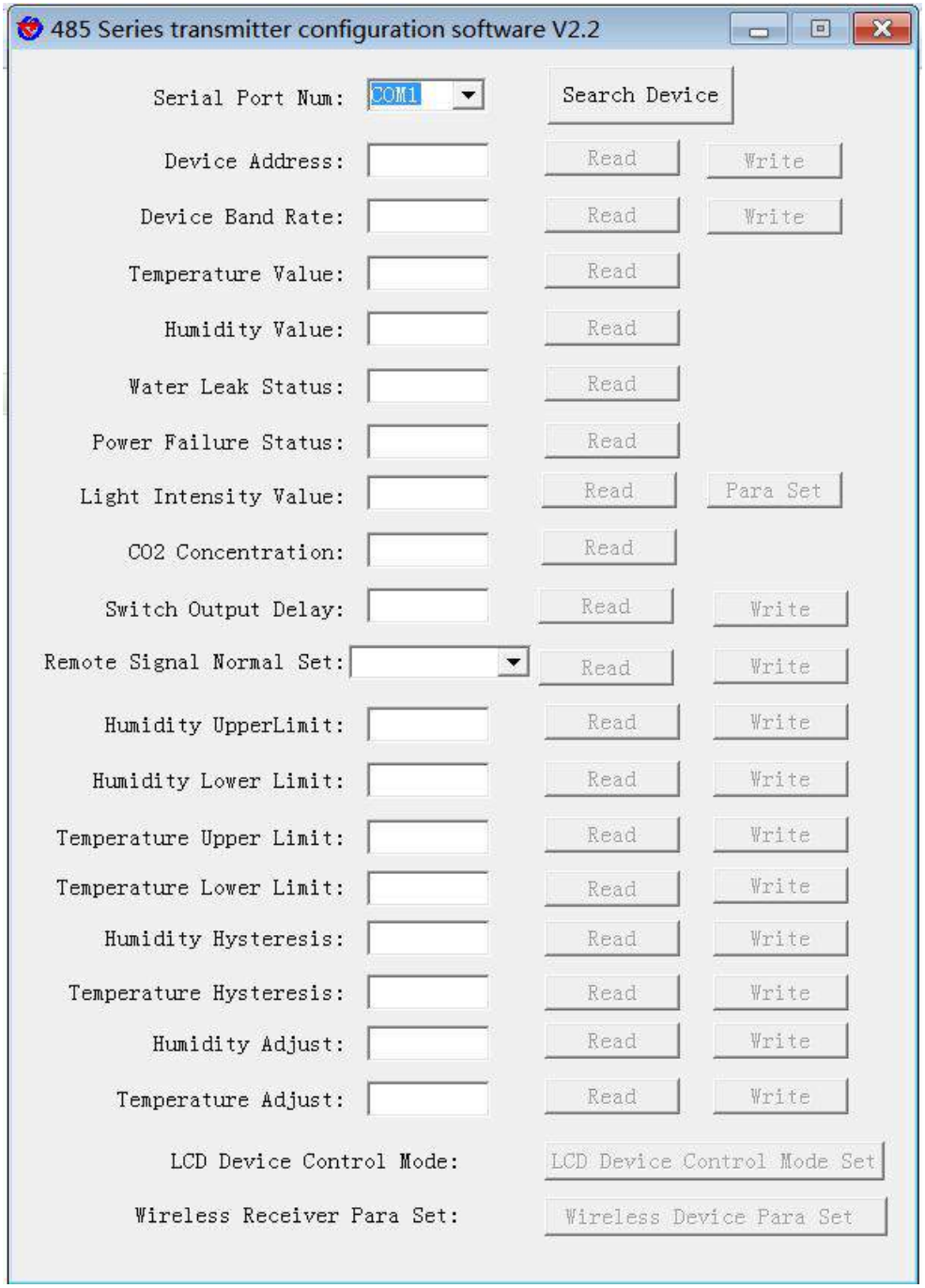
①, select the correct COM port ("COM" port in "My Computer-Properties-Device Manager-Port" to view the COM port), the following figure lists several different 485 converter driver names.




② Only connect one device and power it on, click the test baud rate of the software, the software will test the baud rate and address of the current device, the default baud rate is 4800bit/s, and the default address is 0x01.

③ Modify the address and baud rate according to the needs of use, and at the same time can query the current functional status of the device.

④ If the test is unsuccessful, please recheck the device wiring and 485 driver installation.




# 5. letter of agreement

## 5.1Communication basic parameters

| | |
|---|---|
| Coding | 8-bit binary |
| Data bit | 8 bit |
| Parity bit | no |
| Stop bit | 1 person |
| Error checking | CRC (Redundant Cyclic Code) |
| Baud rate | 2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 4800bit/s |

## 5.2 Data frame format definition

Using Modbus-RTU communication protocol, the format is as follows:

Time of initial structure ≥ 4 bytes

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

End structure ≥ 4 bytes of time

Address code: It is the address of the transmitter, which is unique in the communication network (factory default 0x01).

Function code: instruction function instruction issued by the host, this transmitter only uses function code 0x03 (read register data).

Data area: The data area is specific communication data, pay attention to the high byte of 16bits data first!

CRC code: two-byte check code.

Host inquiry frame structure:

| address code | function code | Register start address | Register length | Check digit low | Check digit high |
|---|---|---|---|---|---|
| 1byte | 1byte | 2byte | 2byte | 1byte | 1byte |

Slave response frame structure:

| address code | function code | Effective bytes | Data area | Second data area | Nth data area | Check code |
|---|---|---|---|---|---|---|
| 1byte | 1byte | 1byte | 2byte | 2byte | 2byte | 2byte |

## 5.3 Register address

| Register address （16Hex） | Register address （10Hex） | PLC or configuration address (10 hex) | content | operating |
|---|---|---|---|---|
| 0000 H | 0 | 40001 | humidity | Read only |
| 0001 H | 1 | 40002 | (10 times greater than actual humidity) | Read only |

## 5.4 Sample communication protocol and explanation

**Example: Read the temperature and humidity value of device address 0x01**

Inquiry frame (hexadecimal):

| address code | function code | starting address | Data length | Check digit low | Check digit high |
|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x00 0x00 | 0x00 0x02 | 0xC4 | 0x0B |

Response frame (hexadecimal): (for example, the temperature is -10.1℃, the humidity is 65.8%RH)

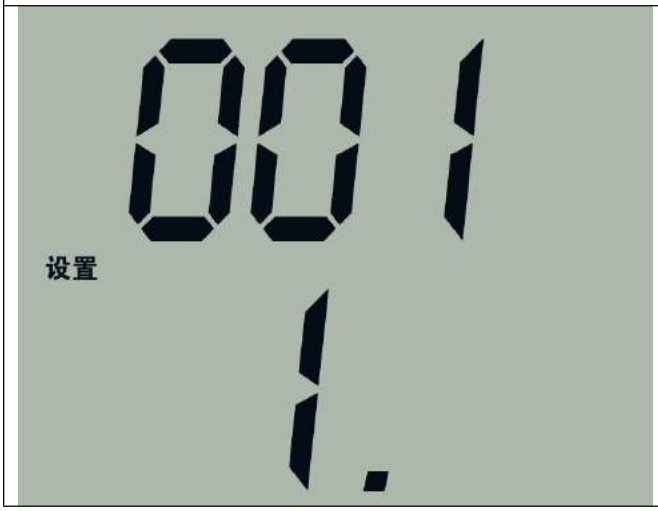
| address code | function code | Returns the number of valid bytes | Humidity value | Temperature value | Check digit low | Check digit high |
|---|---|---|---|---|---|---|
| 0x01 | 0x03 | 0x04 | 0x02 0x92 | 0xFF 0x9B | 0x5A | 0x3D |

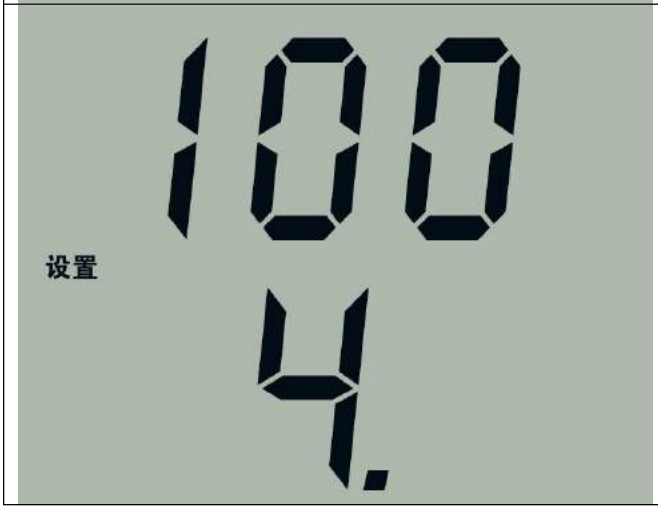
Temperature calculation:
When the temperature is lower than 0 ℃, the temperature data is uploaded in the form of complement.
Temperature: FF9B H (Hexadecimal) = -101 => Temperature = -10.1℃
Humidity calculation:
Humidity: 292 H (hexadecimal) = 658 => Humidity = 65.8%RH

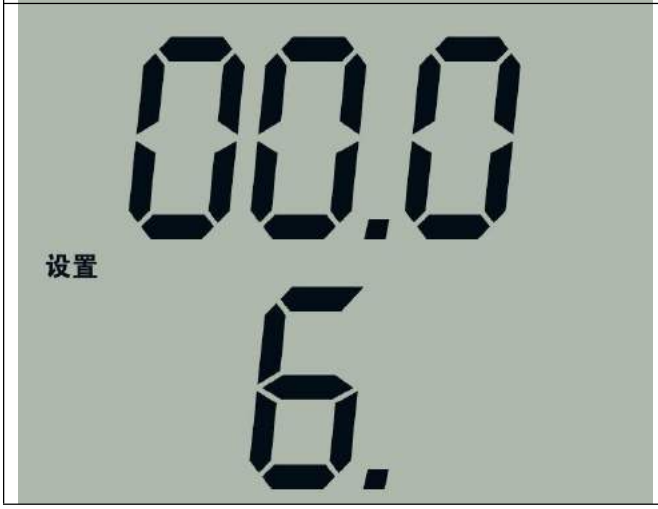
# 6. Key operation instructions

## 6.1Key setting

In the temperature and humidity display main interface, long press SET to enter the parameter setting interface, short press F2 to turn the page, if you want to modify the parameters of the current interface, short press F3 to increase the value, short press F4 to decrease the value, after setting, short Press SET to save, and short press F1 to return to the main interface. The specific parameter interface is as follows:

| UI | Explanation |
|---|---|
|  | Set the address of the device<br>Range: 1~255<br>Default value: 1 |

| | |
|---|---|
|  | Set the device baud rate<br>Range: 2400/4800/9600<br>Default value: 4800 |
|  | Set the upper temperature limit of the device<br>Range: -100~999<br>Default value: 100 |
|  | Set the upper humidity limit of the device<br>Range: 0~100<br>Default value: 100 |

| | |
|---|---|
|  | Set the lower temperature limit of the device<br>Range: -100~999<br>Default value: 0 |
|  | Set the lower humidity limit of the device<br>Range: 0~100<br>Default value: 0 |

There are six items of equipment that can be set: address, baud rate, temperature upper limit, humidity upper limit, temperature lower limit, and humidity lower limit.

Press the SET button for 2 seconds to enter the setting state, press F2 to change the setting items, short press F2 to rotate and display in the order of "address, baud rate, upper temperature limit, upper humidity limit, lower temperature limit, lower humidity limit".

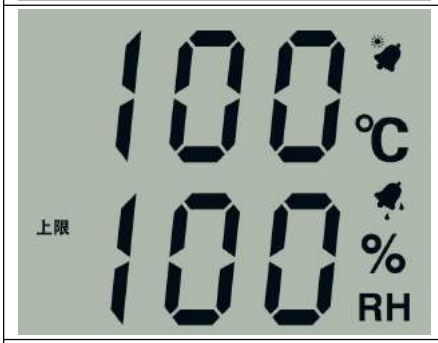
| The lower row shows the label | Interface description | Key operation instructions |
|---|---|---|
| 1 | address | Press F1 to return to the temperature and humidity query interface; short press F2 to switch to the address setting interface; short press F3 address plus 1, long press F3 address plus 10; short press F4 address minus 1, long press F4 address minus 10. Short press SET key to save the displayed address value as the target address. |
| 2 | Baud rate | Press F1 to return to the temperature and humidity query interface; short press F2 to switch to the baud rate setting interface; press F3 baud rate to switch between 2400, 4800, 9600; short press F4 baud |

| | | |
|---|---|---|
| | | rate between 2400, 4800, 9600 Switch between. Short press SET to save the displayed baud rate as the target baud rate. |
| 3 | Upper temperature limit | Press F1 to return to the temperature and humidity query interface; short press F2 to switch to the humidity upper limit setting interface; short press F3 plus 1, long press F3 plus 10; short press F4 minus 1, long press F4 minus 10. Short press SET to save the displayed upper temperature limit as the target upper temperature limit. |
| 4 | Humidity upper limit | Press F1 to return to the temperature and humidity query interface; short press F2 to switch to the humidity upper limit setting interface; short press F3 plus 1, long press F3 plus 10; short press F4 minus 1, long press F4 minus 10. Short press SET to save the displayed humidity upper limit value as the target humidity upper limit value |
| 5 | Lower temperature limit | Press F1 to return to the temperature and humidity query interface; short press F2 to switch to the lower temperature limit setting interface; short press F3 plus 1, long press F3 plus 10; short press F4 minus 1, long press F4 minus 10. Short press SET to save the displayed temperature lower limit value as the target temperature lower limit value. |
| 6 | Humidity lower limit | Press F1 to return to the temperature and humidity query interface; short press F2 to switch to the lower humidity setting interface; short press F3 plus 1, long press F3 plus 10; short press F4 minus 1, long press F4 minus 10. Short press SET to save the displayed humidity lower limit value as the target humidity lower limit value. |

## 6.2Key query

In the main interface state, short press F1/F2/F3/F4 to query the current parameter value, the specific operation and display are as follows:

| UI | Operation buttons | Explanation |
|---|---|---|

| | | |
|---|---|---|
|  | Short press F1 | Display the current temperature and humidity value |
|  | Short press F2 | Display the current device address and baud rate |
|  | Short press F3 | Display the currently set upper limit of temperature and humidity |
|  | Short press F4 | Display the currently set lower limit of temperature and humidity |

## 6.3Turn off/on audible alarm

In the main interface state, long press F3 key to turn off the sound alarm; long press F4 key to turn on the sound alarm.

# 7.Common problems and solutions

## The device cannot be connected to a PLC or computer

possible reason:

1) The computer has multiple COM ports, and the selected port is incorrect.

2) The device address is wrong, or there are devices with duplicate addresses (the factory default is all 1).

3) Baud rate, check mode, data bit, stop bit error.

4) The host's polling interval and waiting time for answering are too short, and both need to be set above 200ms.

5) The 485 bus is disconnected, or the A and B lines are reversed.

6) If the number of devices is too large or the wiring is too long, power should be supplied nearby, add a 485 enhancer, and 120Ω terminal resistance.

7) The USB to 485 driver is not installed or damaged.

8) The equipment is damaged.

# 8. Contact information

Shandong Renke Control Technology Co., Ltd.

Address: 2 / F, East Block, Building 8, Shun Tai Plaza, High-tech Zone, Jinan City, Shandong Province

Post code: 250101

Phone: 400-085-5807

Website: www.renkeer.com

**Cloud platform address: en.0531yun.cn  Or: eniot.0531yun.cn**

**Web QR:**

# 9. Document history

V1.0 document creation

V2.0 document update

V2.1 update selection

# Appendix: Shell dimensions

86 liquid crystal shell: 86×86×26mm