XC7231

Smart Soil Moisture Controller

User Manual

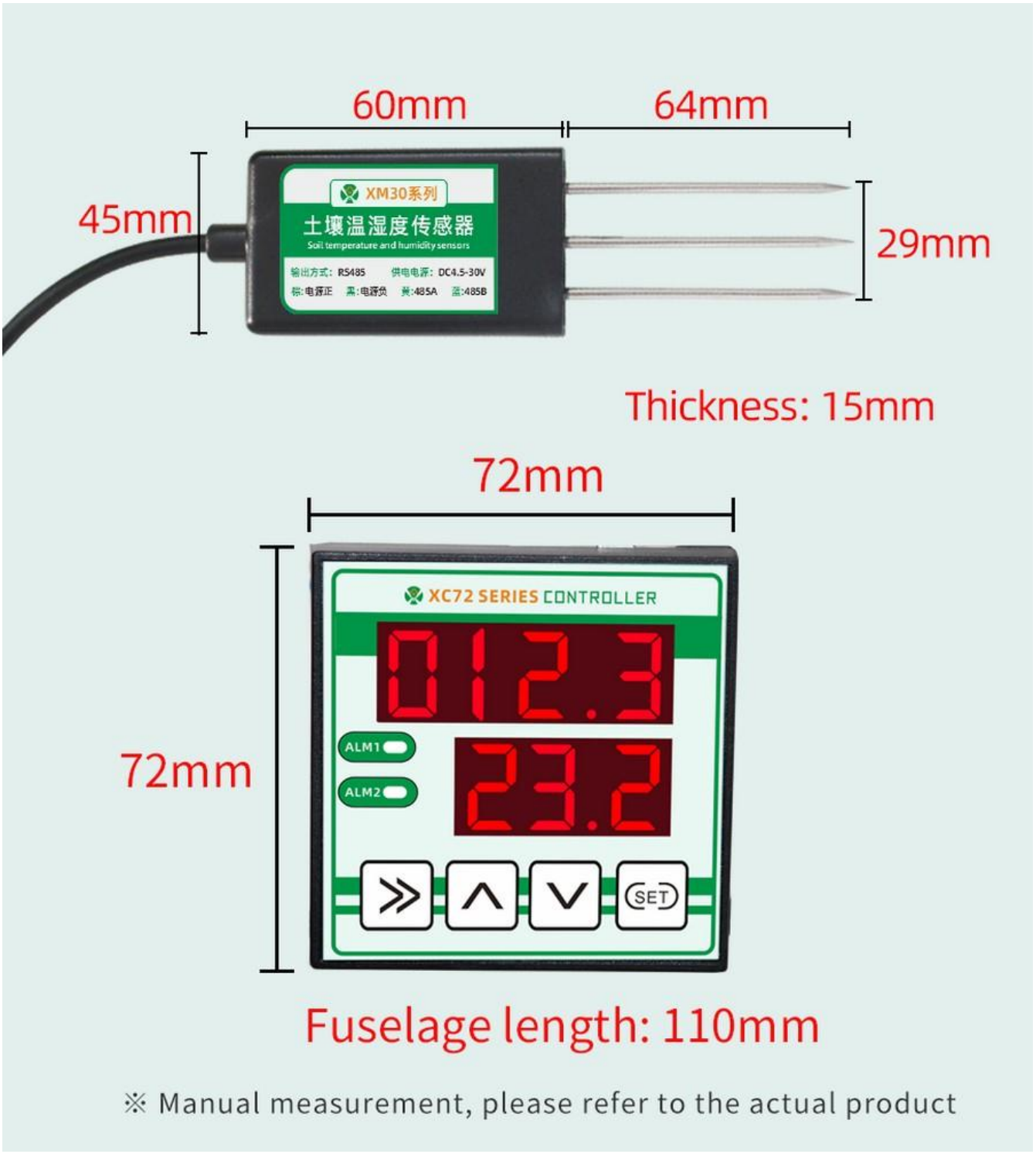
File Version: V24.7.27

XC7231 using the standard RS485 bus MODBUS-RTU protocol,easy access to PLC，DCS and other instruments or systems for monitoring soil Moisture state quantities.The internal use of high-precision sensing core and related devices to ensure high reliability and excellent long-term stability,can be customized RS232,RS485,CAN,4-20mA,DC0~5V\10V,ZIGBEE,Lora,WIFI,GPRS and other output methods.

Technical Parameters

Technical parameter	Parameter value
Brand	XUNCHIP
Moisture measuring range	0~100%
Moisture measuring accuracy	±3% @25℃
Communication Interface	RS485
Default baud rate	9600 8 n 1
Power	AC185~265V 1A
Dimensions	77mm×77mm×110mm
Running temperature	-30~85℃
Working humidity	5%RH~90%RH

Product Size



Communication protocols

Detailed explanation of the buttons to get started quickly

Standard MODBUS-RTU protocol, default baud rate 9600, invalid check, 8-bit data bits, software can change thresholds and other parameters, real-time query of illuminance data through RS485.

» : Use the position selection key when setting

^ : Adjust the up key

v : Downward adjustment key

SET : Set the key

The fourth page is for the mode settings

Mode 1: Heating and humidification control

Mode 2: Cooling and humidity control

※The upper temperature is displayed, and the lower is the humidity display

Key-to-key operation

◆Press and hold SET for two seconds and release it to enter the heating and humidification control setting Press "" to select a seat, and press "Λ" and "V" to adjust the value In mode 1, relay 1,2 operates when the value is lower than the down-line threshold Upper limit threshold: minimum temperature value 0, maximum value 99.9
The minimum humidity value is 0 and the maximumvalue is 99.9

◆Press SET once to enter the cooling and dehumidification control settings Press "" to select a seat, and press "Λ" and "V" to adjust the value In mode 2, relay 1,2 operates when the value is higher than the upper limit threshold Lower limit threshold: minimum temperature value 0, maximum value 99.9
The minimum humidity value is 0 and the maximum value is 99.9

◆Press SET twice to enter the control differential setting
Press "" to select a seat, and press "Λ" and "V" to adjust the value
Differential value: minimum temperature value 0, maximum value 10
The minimum humidity value is 0 and the maximum value is 10

◆Press SET three times to enter the control mode setting
Press "" to select a seat, and press "Λ" and "V" to adjust the value
Mode 1, below the lower threshold operation
Mode 2: Actions above the upper limit threshold
Mode 3: Above the upper limit threshold and below the lower limit

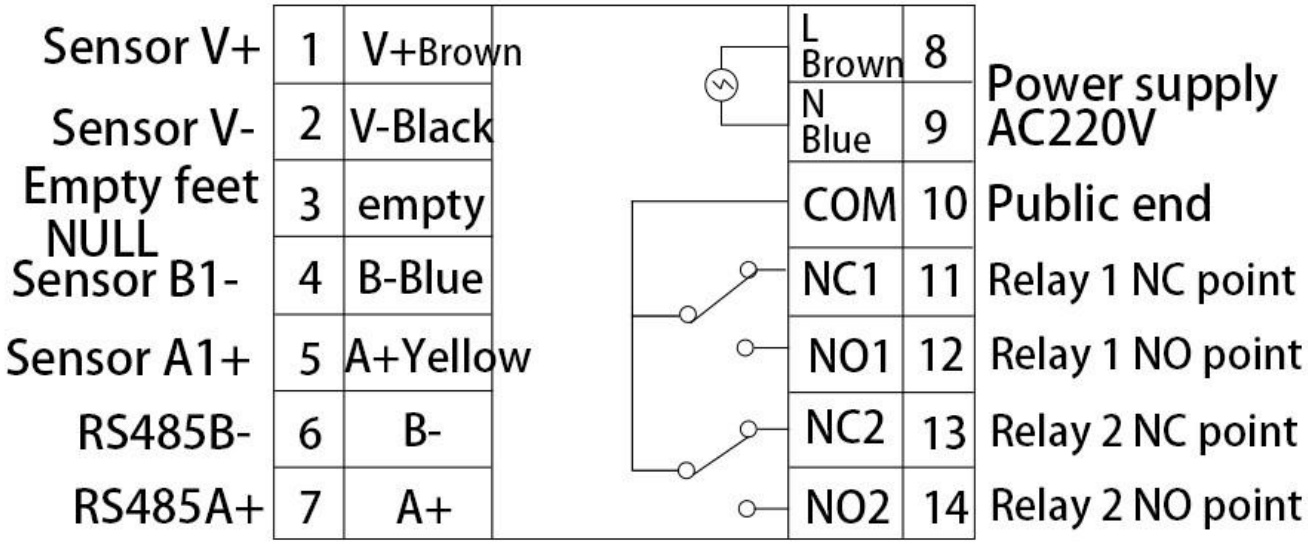
Wiring

Sensor wiring on the left

Brown	Sensor V+
Black	Sensor V-
Yellow	Sensor B1-
Blue	Sensor A1+

The right power supply is AC220V wiring

Brown	L Brown
Blue	N Blue



software to test

Detailed explanation of the buttons to get started quickly

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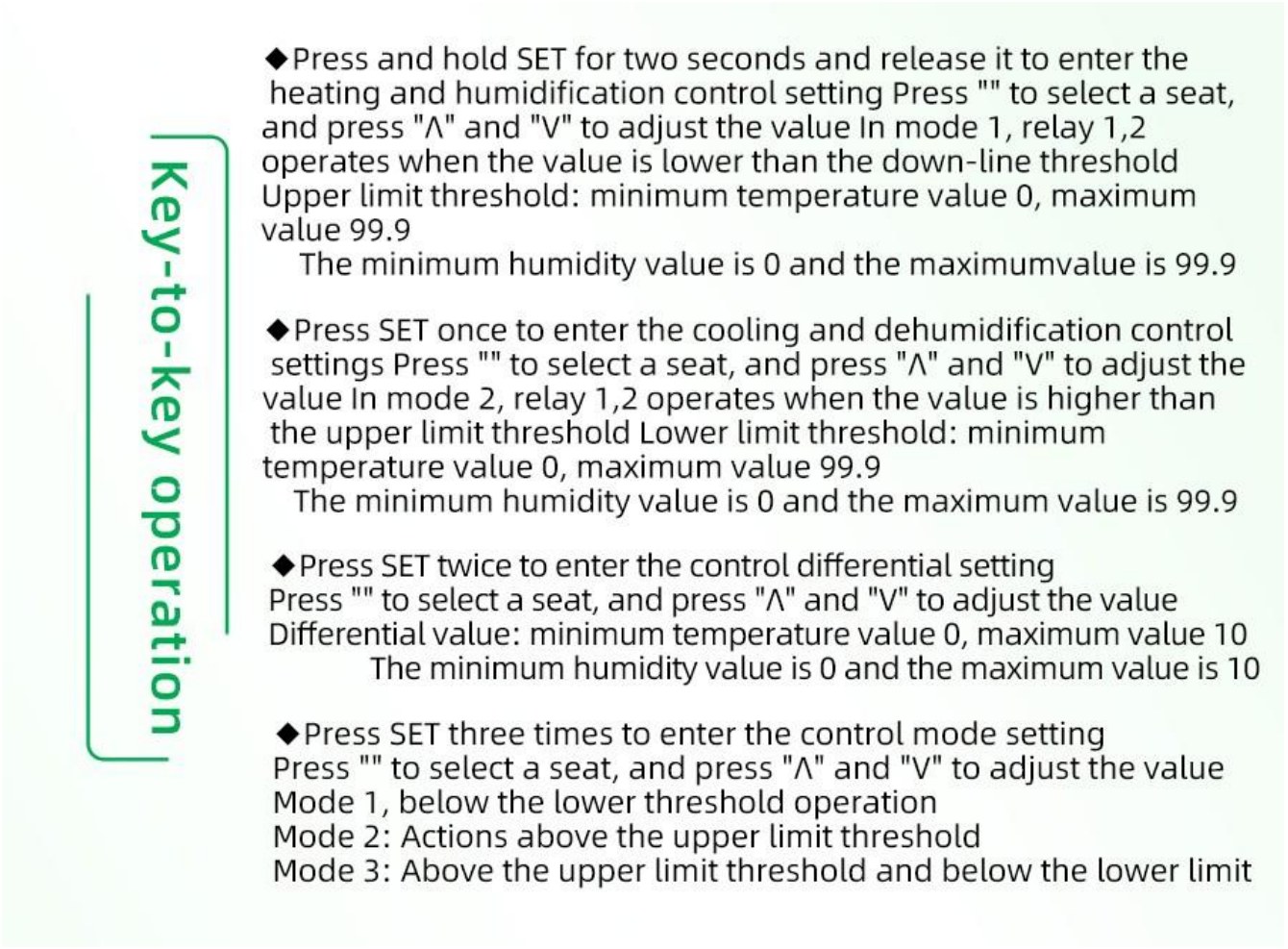

Wiring instructions

In the case of broken wires, wire the wires as shown in the figure. If the product itself has no leads, the core color is for reference.

How to use software?

Detailed explanation of the buttons to get started quickly

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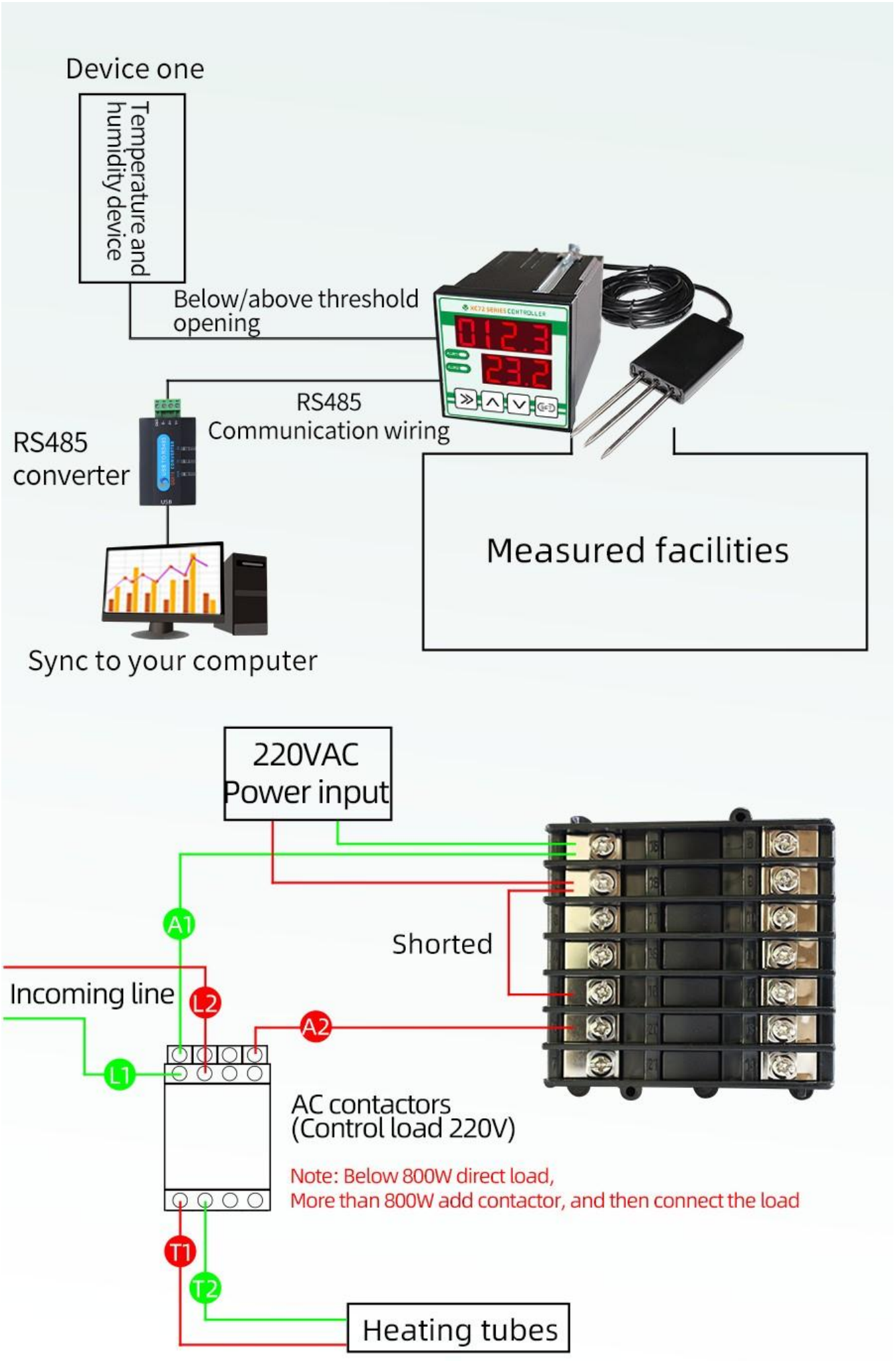
How to use?

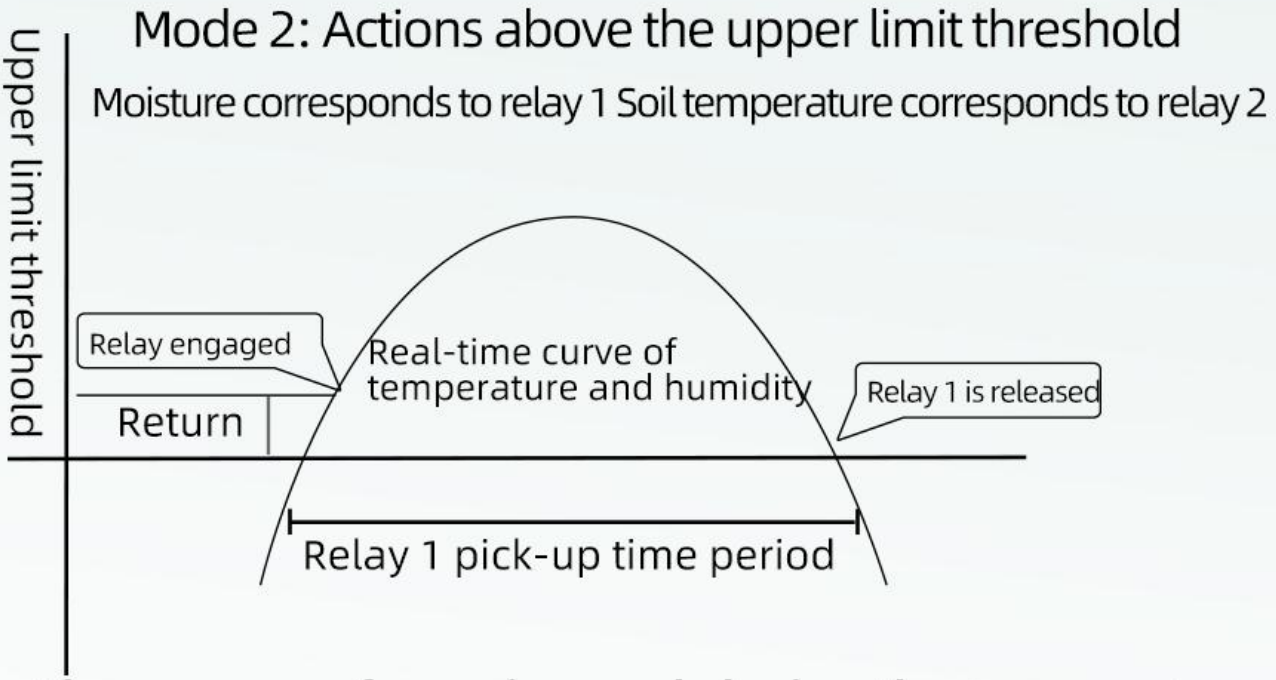
Soil temperature and humidity sensor is suitable for scientific experiments, water-saving irrigation, greenhouses, flowers and vegetables, grassland pastures, soil rapid measurement, plant culture, sewage treatment and measurement of water content of various particulate matter.

Application solution


Device one
Temperature and humidity device
Below/above threshold opening
RS485 Communication wiring
RS485 converter
Measured facilities
Sync to your computer
220VAC Power input
A1
Shorted
Incoming line
L2
A2
L1
AC contactors (Control load 220V)
Note: Below 800W direct load,
More than 800W add contactor, and then connect the load
T1
T2
Heating tubes

Control mode and process

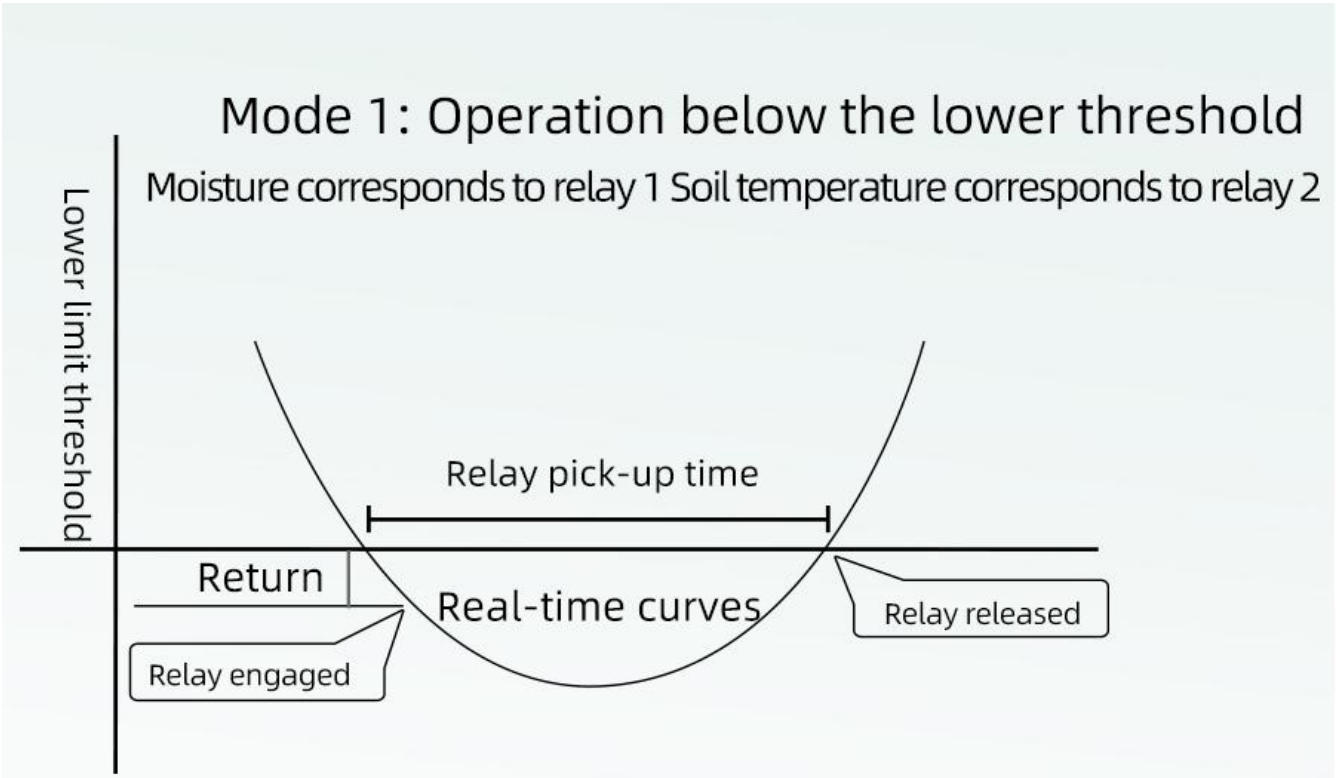
Above the upper limit threshold, below the lower threshold, over/below the threshold



The process of opening and closing the temperature and humidity control equipment

Relay 1 pick-up action conditions: measured value> upper limit threshold value + return difference value
Relay 1 release operating conditions: measured value< upper limit threshold-return difference value

*As shown in the figure above, when the measured value is higher than the upper limit threshold and the difference is added back, the controller relays power internally.Engage, turn on the device; When the measured value drops to the upper limit threshold minus the difference, it is continued Appliances disconnect, turn off the device.



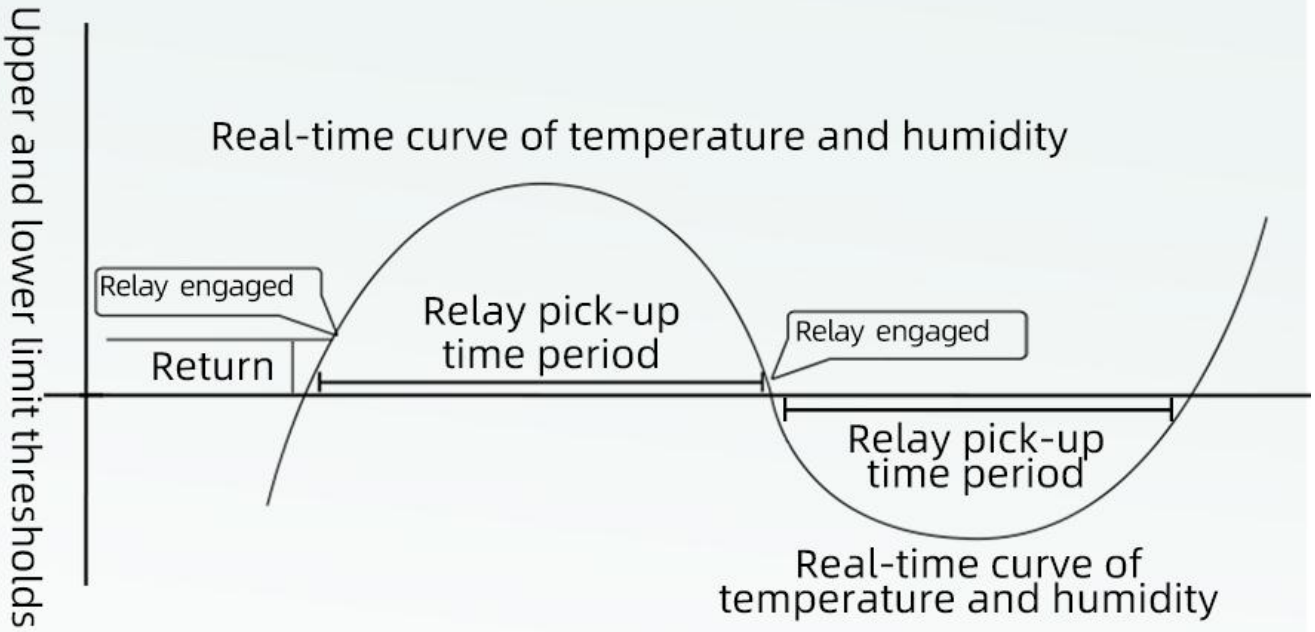
The process of opening and closing the temperature and humidity control equipment

Relay pick-up action conditions: measured value < lower limit threshold value - return difference value Relay release action condition: measured value > lower limit threshold value + return difference value

※As shown in the figure above, when the measured value is below the lower limit threshold minus the difference, the controller relays power internally device picks up, closes the equipment; When the measured value rises to the lower limit threshold and adds back to the difference, it is followed Appliance is disconnected and the device is turned on.

Mode 3: Over/Under threshold action

Relays above the upper limit threshold operate, below the lower threshold.Moisture corresponds to relay 1 Soil temperature corresponds to relay 2



The process of opening and closing the temperature and humidity control equipment

Relay pick-up conditions: measured value > upper limit threshold + return difference value

Relay pick-up conditions: measured value< lower limit threshold-return difference value

※As shown in the figure above, when the measured value is higher than the upper limit threshold + return difference value, the controller is internally relayed device is engaged, and the motor of the general control equipment is rotated so as to start the equipment; After starti ng, lower down When the threshold value is limited to the return diffe rence value, then the relay is engaged, and the motor of the general control equipment is reversed Turn off the device.

Measurement method

▶ Application of intelligent controllers

Selection example: When the water or temperature is exceeded/lower than the threshold during irrigation, the sensor will transmit the humidity and temperature data to the controller, and then the controller will turn off/open the irrigation device according to the pre-set threshold, and the data can be synchronized to the appropriate measurement location of the computer through the RS485 communication port, avoid stones, plane the topsoil according to the depth required for measurement, maintain the original tightness of the underlying soil, hold the sensor vertically into the soil, and do not shake left and right when inserting to ensure close contact with the soil

Buried surveys

Intelligent soil moisture temperature and humidity controller

Rapid measurement method

Select a suitable measurement location, avoid stones, plane the topsoil according to the depth required for measurement, maintain the original tightness of the underlying soil, hold the sensor and insert it vertically into the soil, and do not shake it from side to side when inserting to ensure close contact with the soil

Intelligent soil moisture temperature and humidity controller

Product List

Intelligent Soil Moisture Controller
(with Power Supply and Sensor)

Communication Protocol

The product uses RS485 MODBUS-RTU standard protocol format, all operation or reply commands are hexadecimal data. The default device address is 1 when the device leaves the factory, and the module or NON-Recorder default baud rate is 9600,8,n,1 ,but data recorder default baud rate is 115200 .

1. Read data (function code 0x03)

Inquiry frame (hexadecimal), sending example: query 1 data of 1# device, the upper computer sends the command: 01 03 00 00 00 01 84 0A .

Address	Function Code	Start Address	Data Length	Check Code
01	03	00 00	00 01	84 0A

For the correct query frame, the device will respond with data: 01 03 02 00 79 79 A6 , response format:

Address	Function Code	Length	Data 1	Check Code
01	03	02	00 79	79 A6

Data description: The data in the command is hexadecimal, take data 1 as an example, 00 79 is converted to decimal value as 121, assuming the data magnification is 100, then the real value is 121/100=1.21, Others and so on.

2. Common data address table

Configuration Address	Register Address	Register Description	Data Type	Value Range
40001	00 00	soil Moisture	Read Only	0~65535

40101	00 64	Model Code	Read/Write	0~65535
40102	00 65	total number of measuring points	read/write	1~20
40103	00 66	device address	read/write	1~249
40104	00 67	baud rate	read/write	0~6
40105	00 68	communication mode	read/write	1~4
40106	00 69	protocol type	read/write	1~10

3 Read and modify device address

(1) Read or query device address

If you don't know the current device address and there is only one device on the bus, you can query the device address through the commandFA 03 00 66 00 01 71 9E .

Device Address	Function Code	Start Address	Data Length	Check Code
FA	03	00 66	00 01	71 9E

FA means 250 is the general address, when you don't know the address, you can use 250 to get the real device address, 00 66 is the device address register.

For the correct query command, the device will respond, for example, the response data is: 0 1 03 02 00 01 79 84, and its format parsing is shown in the following table:

Device Address	Function Code	Start Address	Model Code	Check Code
01	03	02	00 01	79 84

In the response data, the first byte 01 represents the real address of the current device.

(2) Change device address

For example, if the current device address is 1 and we want to change it to 02, the command is: 01 06 00 66 00 02 E8 14 .

Device Address	Function Code	Register Address	Target Address	Check Code
01	06	00 66	00 02	E8 14

After the change is successful, the device will return the information: 02 06 00 66 00 02 E8 27 , and its format analysis is shown in the following table:

Device Address	Function Code	Register Address	Target Address	Check Code
02	06	00 66	00 02	E8 27

In the response data, after the modification is successful, the first byte is the new device address. Generally, after the device address is changed, it will take effect immediately. At this time, the user needs to change the query command of his software accordingly. .

4 Read and modify baud rate

(1) Read baud rate

The default factory baud rate of the device is 9600. If you need to change it, you can change it according to the following table and the corresponding communication protocol. For example, to read the baud rate ID of the current device, the command is: 01 03 00 67 00 01 35 D5 , the format is parsed as follows.

Device Address	Function Code	Start Address	Data Length	Check Code
01	03	00 67	00 01	35 D5

Read the baud rate code of the current device. Baud rate code: 1 is 2400; 2 is 4800; 3 is 9600; 4 is 19200; 5 is 38400; 6 is 115200.

For the correct query command, the device will respond, for example, the response data is: 01 03 02 00 03 F8 45, and its format analysis is shown in the following table:

Device Address	Function Code	Data Length	Baud Rate Code	Check Code
01	03	02	00 03	F8 45

According to the baud rate code, 03 is 9600, that is, the baud rate of the current device is 9600.

(2) Change the baud rate

For example, change the baud rate from 9600 to 38400, that is, change the code from 3 to 5, the command is: 01 06 00 67 00 05 F8 16 .

Device Address	Function Code	Register Address	Target Baud Rate	Check Code
01	06	00 67	00 05	F8 16

Change the baud rate from 9600 to 38400, that is, change the code from 3 to 5. The new baud rate will take effect immediately, and the device will lose response at this time, and the baud rate of the device needs to be checked accordingly Modified.

5 Read and modify correction value

(1) Read correction value

When there is an error between the data and the reference standard, we can reduce the display error by adjusting the correction value. The correction difference can be modified in a range of plus or minus 1000, that is, the value range is 0-1000 or 64535 -65535. For example, when the displayed value is too small by 100, we can correct it by adding 100. The command is: 01 03 00 6B 00 01 F5 D6 . In the command, 100 is hexadecimal 0x64 ;If you need to reduce it, you can set a negative value, such as -100, the corresponding hexadecimal value is FF 9C, the calculation method is 100-65535=65435, and then converted to hexadecimal, it is 0x FF 9C. Device The correction value starts from 00 6B. We take the first parameter as an example to illustrate. When there are multiple parameters, the correction value is read and modified in the same way.

Device Address	Function Code	Start Address	Data Length	Check Code
01	03	00 6B	00 01	F5 D6

For the correct query command, the device will respond, for example, the response data is: 01 03 02 00 64 B9 AF, and its format parsing is shown in the following table:

Device Address	Function Code	Data Length	Correction Value	Check Code
01	03	02	00 64	B9 AF

In the response data, the first byte 01 represents the real address of the current device, and 00 6B is the first state correction value register. If the device has multiple parameters, other parameters operate in the same way as this The same, generally temperature and humidity have this parameter, and lighting generally does not have this parameter.

(2) Change the correction value

For example, if the current state is too small, we want to add 1 to its real value, and add 100 to the current value. The correction operation command is: 01 06 00 6B 00 64 F9 FD .

Device Address	Function Code	Register Address	Target Address	Check Code
01	06	00 6B	00 64	F9 FD

After the operation is successful, the device will return the information: 01 06 00 6B 00 64 F9 FD , after the successful change, the parameters will take effect immediately.

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