INSTRUCTION MANUAL

SOIL PH SENSOR

Weihai JXCT Electronic Technology Co., Ltd.

Ⅰ BRIEF INTRODUCTION

1.1 Product overview

The transmitter is widely used for pH detection and sewage treatment in aqueous solution. Three parts of the sensor input power supply, induction probe, signal output are completely isolated. safe and reliable, beautiful appearance and convenient installation. It is suitable for agricultural planting, industrial production, environmental monitoring, animal husbandry and sewage treatment.

1.2 Functional features

The probe of this product adopts PH electrode, the signal is stable and the precision is high. It has the characteristics of wide measuring range, good linearity, good waterproof performance, easy to use, easy to install and long transmission distance.

1.3 Product advantages

- Consistent, stable and reliable
- Small zero drift and good repeat ability
- Low power consumption and long service life
- High sensitivity and fast response
- The product has been tested in various environments and has strong anti-interference ability

- It adopts epoxy resin vacuum filling, IP68 waterproof and dustproof

1.4 Primary parameters

PARAMETERS	PARAMETER CONTENT
DC SUPPLY (DEFAULT)	12-24V DC
CONSUME POWER	≤0.15W
MEASUREMENT ACCURACY	±0.3pH
PH MEASUREMENT RANGE	3-9pH
LONG TERM STABILITY	≤5%/year
OUTPUT SIGNAL	4-20mA/0-5V/0-10V
WORKING TEMPERATURE	0-55℃
RESPONSE SPEED	≤15s

Ⅱ PRODUCT DESCRIPTION

2.1 Product appearance and dimension

*The product is measured by hand, and there may be 1-3mm error.

2.2 Inventory

Check the list of devices before installation:

Name	Number
THE SENSOR DEVICE	1
12V POWER ADAPTER(Optional)	1
USB TO 485 DEVICE(Optional)	1
WARRANTY CARD / CERTIFICATE	1

2.3 Interface description

The power interface is wide-voltage power input 12-24V. Analog products should pay attention to the positive and negative signal lines. Do not reverse the positive or negative of the current/voltage signal lines.

	Line Color	Description
Power	Brown	Power supply Positive(12-24V DC)

	Black	Power supply Negative
	White	Soil PH
Communication	Gray	Soil Temperature(Optional)
	Blue	485-B
	Yellow	485-A

Caution: please be careful not to take the wrong order. The wrong wiring will cause the equipment to burn down. At the same time, it must be noted that the positive output of voltage/current is an active output, and the positive output of voltage/current must not be connected to the positive position of power supply, which will definitely lead to burnout.

We provide default cable length of 1.2meters, you can extend the cable yourself according to your needs.

2.4 Measurement Method

Speed measurement method

Select the appropriate measurement site, avoid the stones, ensure that the steel needle does not hit a hard object, throw the topsoil at the required depth of measurement, keep the

underlying soil tightness, grip the sensor vertically into the soil, insert It is not possible to shake left and right. It is recommended to measure multiple times within a small area of a measurement point to obtain the average value.

Buried method

Dig a pit with a diameter of >20cm vertically and insert the sensor steel needle horizontally into the wall of the pit at a predetermined depth. After the pit is buried tightly and stable for a period of time, it can be measured and recorded for several days, months, or even longer.

2.5 Precautions

- Avoid stones to ensure that the steel needle does not touch hard objects
- The sensor is inserted into the soil and can not shake left and right
- When the sensor is inserted into the pit wall, it needs to be buried tightly
- avoid the installation in the area that is easy to heat transfer and will directly cause temperature difference with the area to be measured, otherwise it will cause inaccurate pH measurement

Ⅲ Installation And Use Of Configuration Software

3.1 485 Output mode

Our company provides supporting "sensor monitoring software", which is convenient to use computers to read the parameters of sensors, and flexibly modify the device ID and address of sensors.

3.1.1 Sensor connected to computer

After connecting the sensor to the computer through USB to 485 and providing power supply, you can see the correct COM port in the computer ("my computer properties device manager port" view COM port).

As shown in the figure above, your serial port number is com10. Please remember this serial port and fill in the serial port number in the sensor monitoring software.

If no COM port is found in the device manager, it means that you have not inserted usb-485 or installed the driver correctly. Please contact the technical personnel for help.

3.1.2 Use of sensor monitoring software

The software interface is shown as follows :

After opening the software, first select the "sensor type" at the top of the software, then obtain the serial port number and select the correct serial port according to the method in Chapter 3.1.1, and then click "automatically obtain the current baud rate and address" to automatically detect all devices and baud rates on the current 485 bus. Please note that it is necessary to ensure that there is only one sensor on the 485 bus when using the software to obtain automatically. Then click "connect device" to get sensor data information in real time.

3.1.3 Modify baud rate and device address

In case of disconnection of "device connection", click "modify baud rate and slave station number" in "configure sensor communication parameters" to complete relevant settings. Please restart the device after setting, and then "automatically obtain the current baud rate and address" to

change the address and baud rate to the address and baud rate you need.

3.2 Analog output mode

3.2.1 4-20mA output

For the three wire current connection mode, connect the power line (brown wire and black wire) of the sensor to the power supply; connect the positive pole of the multimeter to the white wire and the negative pole to the black wire, then the signal can be collected.
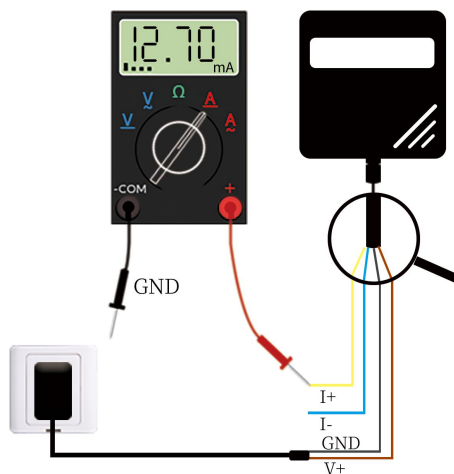
电流输出型(4-20mA)
三线制接法
第一步
用12V~24V的电源适配器
连接传感器
第二步
正确挑选万用表量程或连
接模拟量信号采集器
第三步
对照公式计算

GND

I+
I-
GND
V+

3.2.2 0-5V/0-10V output

For the three wire current connection mode, connect the power line (brown wire and black wire) of the sensor to the power supply; connect the positive pole of the multimeter to the white wire and the negative pole to the black wire, then

the signal can be collected.
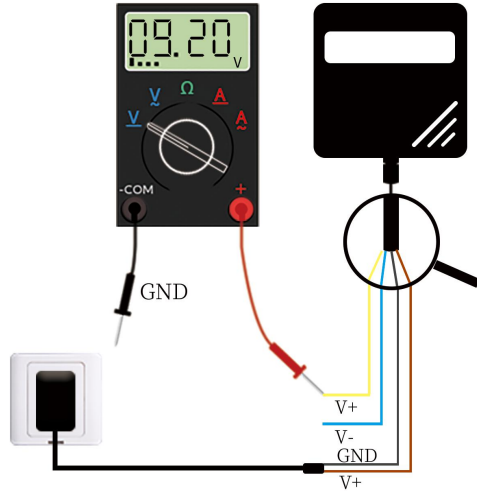

电压输出型(0-5V/0-10V)
三线制接法
第一步
用12V~24V的电源适配器
连接传感器
第二步
正确挑选万用表量程或连
接模拟量信号采集器
第三步
对照公式计算

GND

V+
V-
GND
V+

Ⅳ COMMUNICATION PROTOCOL

4.1 Basic parameters of 485 communication

PARAMETER	CONTENT
CODE	8-bit binary
DATA BITS	8 bits
PARITY BIT	no
STOP BIT	1 bit
WRONG CALIBRATION	CRC long cyclic code
BAUD RATE	2400bps / 4800bps / 9600bps can be set, factory default is 9600bps

4.2 Definition of data frame format

Modbus RTU communication protocol is adopted, with the format 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

Time of end structure ≥ 4 bytes

Address code: it is the function indication of the transmitter. This transmitter only uses function code 0x06 (read register data).

Data area: the data area is the specific address, which is unique in the communication network (factory default 0x01).

Function code: command communication data sent by the host. Note that the high byte of 16bits data is in front!

CRC code: two byte check code.

Query frame

Address code	Function code	Register start address	Register length	Check code low	Check code high
1 byte	1 byte	2 byte	2 byte	1 byte	1 byte

Reply frame

Address code	Function code	Number of valid bytes	First data area	Second data area	Data area n

| 1byte | 1byte | 2byte | 2byte | 2byte | 2byte |

4.3 Register address

Register address	PLC configuration address	content	operation
0006H	40007	High precision pH value (unit: 0.01ph)	read-only
000dH	4000e	Low precision pH value (unit: 0.1ph)	read-only
0100H	40101	Device address (0-252)	Reading and writing
0101H	40102	Baud rate (2400 / 4800 / 9600)	Reading and writing

4.4 Example and explanation of communication protocol

4.4.1 Read the pH value of device address 0x01

Query frame

Address code	Function code	Register start address	Register length	Check code low	Check code high
0x01	0x03	0x00 0x0d	0x00 0x01	0x15	0xC9

Response frame (e.g. read pH 7.1ph)

Address code	Function code	Register start address	Register length	Check code low	Check code high
0x01	0x03	0x02	0x00 0x47	0xD8	0x15

Description of pH calculation:

0047h (HEX) = 71 = > pH = 7.1ph

4.4.2 read the pH value of equipment address 0x01

Query frame

Address code	Function code	Register start address	Register length	Check code low	Check code high
0x01	0x03	0x00 0x06	0x00 0x01	0x64	0x0B

Reply frame

Address code	Function code	Register start address	Register length	Check code low	Check code high
0x01	0x03	0x02	0x01 0x34	0xD8	0x15

Description of pH calculation:

0047h (HEX) = 308 = > pH = 3.08ph

4.5 Analog communication output

● Analog quantity 4-20mA current output

Current value	variable

4mA	3
20mA	9

The calculation formula is p = (3 * I + 12) / 8

Where I is in mA. 4mA represents zero point and 20mA represents maximum range linear conversion.

● Analog 0-10V voltage output

Voltage value	variable
0V	3
10V	9

The calculation formula is p = (6 * V + 30000) / 10000

Where the unit of V is mV, please use 0V for zero point and 10V for maximum range linear conversion.

● Analog 0-5V voltage output

Voltage value	variable
0V	0
5V	9

The calculation formula is p =(6*V+15000)/5000

Where the unit of V is mV, please use 0V for zero point and 5V for maximum range linear conversion.