Soil sensor（5PIN Probe, RS485 output type）manual

This manual works for below type:

THPH-S
CPH-S
THCPH-S
NPKPH-S
NPKTHPH-S
NPKPHC-S
NPKPHCTH-S

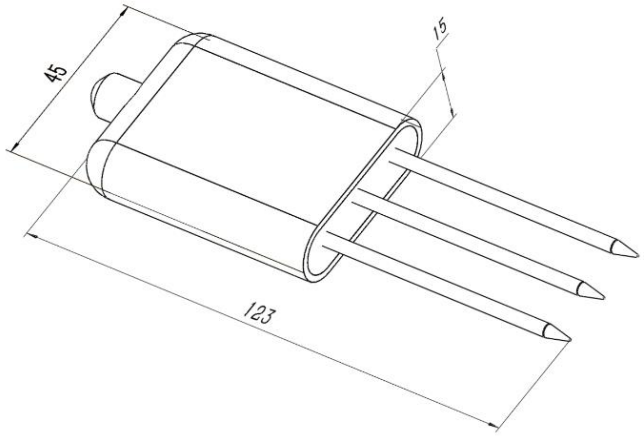
Soil parameters measuring

T=Temperature	• Measuring range: -40℃-80℃ • Accuracy: ±5℃ (25℃) • Long-term stability: ≤0.1%℃/y • Response time: ≤15s
H=Humidity	• Measuring range: 0-100%RH • Accuracy: 2% within 0-50%, 3% within 50-100% • Long-term stability: ≤1%RH/y • Response time: ≤4s
C=Conductivity (EC)	• Measuring range: 0-200000us/cm • Accuracy: 0-10000 us/cm range is ±3%; 10000-20000 us/cm range is ±5% • Long-term stability: ≤1%uS/cm • Response time: ≤1s
PH=PH	• Measuring range: 3-9 PH • Accuracy: ±0.3PH • Long-term stability: ≤5%/year • Response time: ≤10S
N=Nitrogen P=Phosphorus K=Potassium	• Measuring range: 1-1999 mg/kg(mg/L) • Resolution：1 mg/kg(mg/L) • Accuracy: ±2%FS • Response time: ＜1S

Specification

Power supply	DC4.5-30V
Max Power consumption	0.5W@24V DC
Protection class	IP68, long-term immersion in water use
Cable length	2M
Operating environment	-40℃-80℃
Overall dimensions	45 * 15 * 123mm

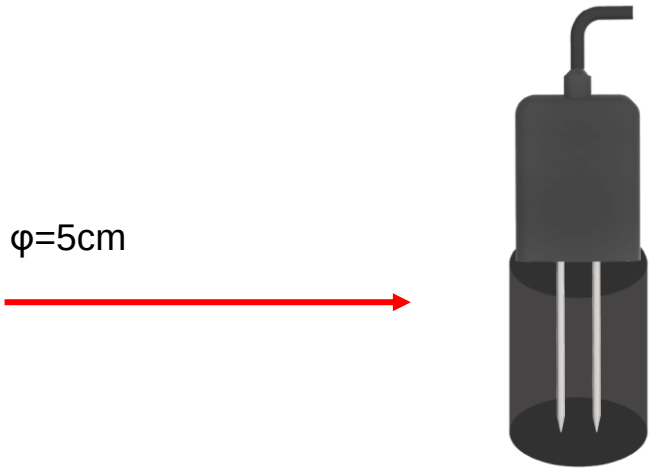
Size



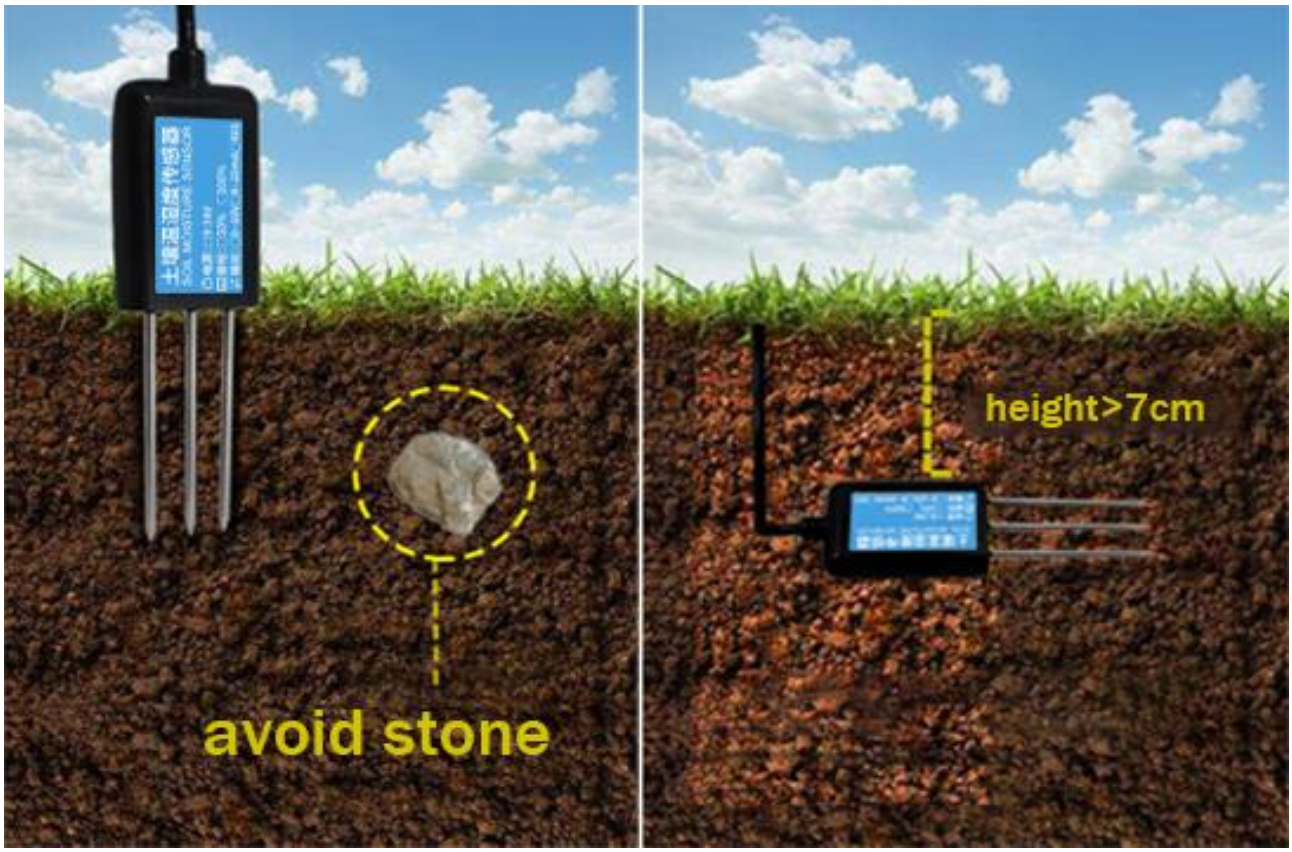
Wiring

Cable color	description
Brown	Power + (DC5-30V)
black	Power -
yellow	RS485 A+
blue	RS485 B-

Measuring range



Installation



RS485 communication

Default parameters: 4800,n,8,1

Default device address is 1

Modbus RTU protocol

Read status registers, read function code: 0x30					
Register address (Hex)	PLC Address (decimal)	meaning	Number of bytes	content	remark
0000	40001	Humidity	2	0.1%RH	read
0001	40002	Temperature	2	0.1℃	read
0002	40003	Conductivity	2	1	read
0003	40004	PH	2	0.1	read
0004	40005	Nitrogen content	2	real value	read
0005	40006	Phosphorus content	2	real value	read
0006	40007	Potassium content	2	real value	read
0007	40008	Salinity	2	1	read
0008	40009	TDS	2	1	read
0022	40035	Conductivity factor	2	0-100 correspond to 0.0%-10.0% Default 0.0%	read / write
0023	40036	Salinity factor	2	0-100 correspond to 0.00-1.00 Default 55 (0.55)	read / write

0024	40037	TDS factor	2	0-100 correspond to 0.00-1.00 Default 50 (0.5)	read / write
0050	40081	Temperature calibration value	2	0.1	read / write
0051	40082	Humidity calibration value	2	0.1	read / write
0052	40083	Conductivity calibration value	2	1	read / write
0053	40084	PH calibration value	2	1	read / write
04E8	41257	Nitrogen content coefficient High byte	2	real value (float)	read / write
04E9	41258	Nitrogen content coefficient Low byte	2		
04EA	41259	Nitrogen content calibration value	2		read / write
04F2	41267	Phosphorus content coefficient High byte	2	real value (float)	read / write
04F3	41268	Phosphorus content coefficient Low byte	2		
04F4	41269	Phosphorus content calibration value	2		read / write
04FC	41277	Potassium content coefficient High byte	2	real value (float)	read / write
04FD	41278	Potassium content coefficient Low byte	2		
04FE	41279	Potassium content calibration value	2		read / write
Parameters registers, read function code: 0x30 (0x40), write function code: 0x10					
07D0	42001	Slave ID	2		1-254
07D1	42002	baud rate	2		0: 2400 1: 4800 2: 9600 Default 4800

coefficient and calibration like the formula

Y=AX+B

Y is reading value

X is original value

A is coefficient

B is calibration

E.g., read Humidity, temperature, conductivity together:

Master sends

Address	Function Code	Start Address (Hi)	Start Address (Lo)	Number of Points (Hi)	Number of Points (Lo)	Error Check (Lo)	Error Check (Hi)
0x01	0x03	0x00	0x00	0x00	0x03	0x05	0xCB

Sensor responds:

Address	Function Code	Number of byte	humidity value	temperature value	conductivity value	Error Check (Lo)	Error Check (Hi)
0x01	0x03	0x06	0x02 0x92	0xFF 0x9B	0x03 0xE8	0x38	0x75

Temperature calculate:

When temperature less than 0, value will be responded in complement

Temperature: FF9B H= -101 => temperature= -10.1℃

Humidity: 292 H= 658 => humidity= 65.8%

Conductivity: 3E8 H= 1000 => Conductivity = 1000 us/cm