IOT-S300SMT

Soil temperature and humidity Conductivity sensor Product Manual

（ V1.0 ）

● Important statement

Operation errors will shorten the life of the product, reduce its performance, and may cause accidents in severe cases. Please read this manual carefully before use. Give this manual to the end user. Please keep the manual in a safe place for reference when needed. The manual is for reference only, and the actual design and appearance shall prevail.

1. Basic settings of communication protocol

Transmission method: MODBUS-RTU mode

Communication parameters: default baud rate 9600bps (optional 4800bps, 9600bps, 14400bps, 19200bps, 28800bps, 38400bps, 57600bps, can be configured according to user requirements), 1 start bit, 8 data bits, no parity, 1 stop Bit

Slave address: the factory default is 1, which can be configured according to user requirements; the universal slave address is 200 (note: if a multi-machine communication network is formed, other slave addresses cannot be set to 200)

2. keep the register list

Parameter	MODBUS holding register address (16 bits)
Real-time value Default signed	0000H~0002H are moisture, temperature, EC in sequence
Slave Address	002FH, unsigned integer representation Default:1
Baud Rate	0030H, the default baud rate is 9600, and it is saved as 96 when saving, and so on (all to be divided by 100)

Note: 1. Access to other addresses is not allowed.

2、float representation IEEE754, single format, 32 bit

s e[8] f[23]

s e7 e6 e5 e4 e3 e2 e1 e0 f22 f21 f20 f19 f18 f17 f16 f15 f14 f12 f11 f10 f9 f8 f7 f6 f5 f4 f3 f2 f1 f0

Splitting into 4 bytes for Modbus encoding

A: [s e7 e6 e5 e4 e3 e2 e1]

B: [e0 f22 f21 f20 f19 f18 f17 f16]

C: [f15 f14 f12 f11 f10 f9 f8]

D: [f7 f6 f5 f4 f3 f2 f1 f0]

Most masters do use the A, B, C, D representation.

3. Data message format

(1) Function code 0x03---Query the contents of the slave device register

Master message	Correct message from the device
Slave address (0x01 ~ 0xF7 1 byte)	Slave address (0x01 ~ 0xF7 1 byte)
Function code (0x03 1 byte)	Function code (0x03 1 byte)
Starting register address (2 bytes)	Number of bytes in data area (2*Number of registers*1 byte)
Number of registers (2 bytes)	Data area (Register data 2*Number of registers*1 byte)
CRC check code (2 bytes)	CRC check code (2 bytes)

(2) Function code 0x06---preset the number of slave device registers

Master message	Correct message from the device
Slave address (0x01 ~ 0xF7 1 byte)	Slave address (0x01 ~ 0xF7 1 byte)
Function code (0x06 1 byte)	Function code (0x06 1 byte)
Starting register address (2 bytes)	Number of bytes in data area (2*Number of registers*1 byte)
Data written to the register (2* Number of registers 1 byte)	Data(Register data 2*Number of registers*1 byte)
CRC check code (2 bytes)	CRC check code (2 bytes)

Note: 1. CRC check code low bit first, high bit behind; register address, register number and data are all high bit first and low bit behind;

2. The register word length is 16bit (two bytes);

4. Read register data

a. Description and command format

Register address (Hex)	Register content	Function code	Type of data
0x0000	Moisture content	03	signed
0x0001	temperature	03	signed
0x0002	Conductivity	03	signed
0x0003	Salinity	03	signed
0x0004	TDS total dissolved solids	03	signed

b. Examples of reading data:

Read slave address is 1, read soil moisture content, temperature, EC data data

★ Host query command:

Slave Address	01H	Slave address (default is 1)
Function	03H	Function code
Starting Address Hi	00H	The upper 8 bits of the starting register address
Starting Address Lo	00H	The lower 8 bits of the starting register address
No. of Registers Hi	00H	The upper 8 bits of the number of registers
No. of Registers Lo	03H	The lower 8 bits of the number of registers
CRC Check Lo	05H	CRC check code low 8 bits
CRC Check Hi	CBH	CRC check code high 8 bits

5. Preset a single register

a. Parameter description and command format

Register address (decimal)	Register content	Function code	Type of data	Description
47	Slave address	03	signed	Address range: 1~247
48	Baud rate	03	signed	Set the baud rate to 9600 and write 96 (all must be divided by 100)
49	Sensor data type	03	signed	1：floatABCD; 0: signed
50	Communication self-recovery function	03	signed	1: open; 0: close
51 .. 55	Keep	03	signed	For function expansion
56	Temperature calibration value	03	signed	Integer (expanded by 10 times)
57	Water content calibration value	03	signed	Integer (expanded by 10 times)
58	Keep	03	signed	For function expansion
59	Conductivity calibration value	03	signed	Integer
60	Filter times	03	signed	12~40 times
61	Keep	03	signed	For function expansion
62	Keep	03	signed	For function expansion
100	Restore system defaults	03	signed	Write password to restore parameters

Note:

1. When the read real-time data type is floatABCD, if you set the above parameters, you need to read the register address above 20, function code 03, data type signed, and the MOBUS POLL tool can open the setting.

2. The system parameter recovery password is generally not public.

b. Example for modifying the baud rate: (modifying the baud rate to 57600bps)

Note: 57600 should be divided by 100 and set to 576.

★ Host query command:

Slave Address	01H	Slave address (default is 1)
Function	06H	Function code
Starting Address Hi	00H	The address of the holding register of the baud rate is 000BH
Starting Address Lo	30H	The address of the holding register of the baud rate is 000BH
Data Hi	02H	When the baud rate is 57600bps, the value of the register is 0240H
Data Lo	40H	When the baud rate is 57600bps, the value of the register is 0240H
CRC Check Lo	89H	CRC check code low 8 bits
CRC Check Hi	55H	CRC check code high 8 bits

c. Example for modifying the slave address: (modify the slave address to 71)

★ Host query command:

Slave Address	01H	Slave address (default is 1)
Function	06H	Function code
Starting Address Hi	00H	The upper 8 bits of the register start address
Starting Address Lo	2FH	The lower 8 bits of the register start address
Data Hi	00H	When the slave address is 71, the value of the register is 0047H
Data Lo	47H	When the slave address is 71, the value of the register is 0047H
CRC Check Lo	F8H	CRC check code low 8 bits
CRC Check Hi	31H	CRC check code high 8 bits

6. Performance indicators

Power supply	DC 4.5 ~ 30V	
Maximum power consumption	About 0.5W	
Operating temperature	-40℃ ~ 85℃	
Conductivity parameter	Range	0 ~ 20000us/cm
	Resolution	1us/cm
	Precision	±3% in the range of 0-10000us/cm; ±5% in the range of 10000-20000us/cm
Soil moisture parameters	Range	0 ~ 100%
	Resolution	0.1%
	Precision	2% within 0-40%, 3% within 40-100%
Soil temperature parameter	Range	-30℃ ~ 85℃ (range can be customized)
	Resolution	Resolution: 0.1℃
	Precision	±0.5℃
Conductivity temperature compensation	Built-in temperature sensor for compensation	
Protection level	IP68	
Probe material	Anti-corrosion special electrode	
Sealing material	Black flame-retardant epoxy resin	
Default cable length	1.5 meters, cable length can be customized according to requirements	
Output signal	RS485 (Modbus-RTU protocol)	