BGT-WSD2

Temperature &Humidity Sensor

User’s Manual V.03

Company name：Beijing Guoxinhuayuan Technology Co., Ltd

Tel：86-10-63205221

Address： Bldg. 306, Guanganmen Street, Xicheng Dist.,

Beijing,100053,China

Thank you for choosing our products!
Due to the continuous improvement of our products, the products you purchased may differ from the illustrations in this manual without any notice. Please prevail in kind.

Product Introduction

BGT-WSD2 Atmospheric Temperature &Humidity Sensor is a professional measurement of ambient temperature and relative humidity. Sensors are built-in the water-proof and anti-UV shelter. 7 or 10 plates radiation shield is used to protect weather sensors and provides more accurate measurement results. The shield minimizes radiation reaching the sensor, minimizes radiation absorbed by the shield and maximizes ambient air flow around the sensor.

It is widely used in agriculture, forestry, meteorology as well as a climate chamber, warehousing and other places.

Technical Parameters

Radiation Shield: 7 or 10 plates
Temperature：
Measuring Range:-40～100℃(Digital)
-20～50℃(Analog)
Resolution: 0.1℃
Accuracy: ±0.3℃;
Humidity:
Measuring Range：0～100%RH,
Resolution:0.1%RH
Accuracy: ±3%RH
Power supply: DC 9-30V
Output: Digital:RS485（Modbus）/ RS232
Analog: 4-20mA/0-20mA/0-2.5V/0-5V/1-5V
Cable Length：Standard: 2M
Working environment: Temperature -40℃～100℃
Humidity ≤100%RH (No condensation)
Ingress Protection: IP45
Weight: 700 g（With radiation shield）
Power consumption: 150mW

Wiring Method

（1）If the sensor is equipped with our data logger, directly use the sensor cable to connect the sensor with the corresponding interface on the data logger.

（2）If the sensor is purchased separately, the order of the wires as followed:

Color	Signal output			
	Current	Voltage	RS485	RS232
Red	Power+	Power+	Power+	Using RS485 to RS232 adapter
Black	Temperature	Temperature	485 A+	
Yellow	Humidity	Humidity	485 B-	
Green	Power GND	Power GND	Power GND	

Analog Output Formula

Current:	
4-20mA	Formula: F = (I-4) / 16 * A + B
0-20mA	Formula: F = (I-4) / 20 * A + B
Voltage:	
0-2.5V	Formula: F = V / 2.5 * A + B
0-5V	Formula: F = V / 5 * A + B
1-5V	Formula: F =（V-1）/ 4 * A + B

Note: F in the table is the value of the sensor, and I and V are the current and voltage detected on the signal line respectively.

A is the range width of the sensor, which is equal to the upper limit of the sensor minus the lower limit (positive or negative). For example, if the temperature is -20~50℃, A=70.

B is the lower limit of the sensor, which can be positive or negative, such as the lower limit of temperature (range -20~50℃) -20.Such as humidity (range 0~100%RH).

Example: the customer bought 4-20 mA temperature and humidity sensors. Detection current on signal

line 1 is I=8mA, detection current on signal line 2 is 15 mA.

(1) Temperature range A = 70, lower limit B = -20.

Then the calculated temperature F=(i-4)/16*A+B= (8-4)/16* 70+ (-20) = -2.5℃

(2) humidity range A=100, humidity lower limit B=0.

Then the calculated humidity value F=(i-4)/16*A+B= (15-4)/16* 100+0 = 68.7%RH

Communication Protocol

1. If you are using a single sensor connected to the computer to read data directly, it is recommended to use the ASCII private protocol,you can visual display in ASCII (hex send, non-hex receive);
2. If you are multi-sensor connected to the PLC,configuration or access programmable collector, it is recommended to use the Standard ModBus-RTU protocol (see below, hex send and receive)

Standard ModBus-RTU protocol

1.The serial format

8 data bits, 1 stop bit, no parity bit. Baud rate 9600 bps, serial debugging software set to send and receive hex, the two communication intervals of at least 1000ms, the instructions in the CRC for the parity bit, two bytes. Default address 1

2.Communication format

【1】Write device address (eg: write address 01)

Send	00	06	00	20	00	01	48	11
Description		Write	Start address		New address		CRC check	
Return	00	06	00	20	00	01	48	11
Description		write	Start address		New address		CRC check	

Return 01 86 ****it indicates that the configuration was not successful.

【2】Read device address(eg: read address 01)

Send	00	03	00	20	00	01	84	11
Description	address						CRC check	
Return	00	03	02	00	01		44	44
Description	Address				Device address		CRC check	

【3】Read device baud rate (eg: read baud rate =9600)

Send	01	03	00	10	00	01	85	CF
Description	Address	Read	Start address		Read points		CRC check	
Return	01	03	02		00	02	39	85
Description	Address	Read	Data length		Device data		CRC check	

Baud rate = data*4800. Return data 00 02, then baud rate =4800*2=9600.

【4】Write device communication baud rate (For example: write baud rate of 9600.)

Send	01	06	00	10	00	02	09	CE
Description	Address	Write	Start address		New Baud rate		CRC check	
Return	01	06	00	10	00	02	09	CE
Description	Address	Write	Start address		New baud address		CRC check	

Baud rate = data *4800. Return data 00 02, then baud rate =4800*2=9600. The supported baud rates are 4800, 9600,14400, 19200, 38400, 57600, 115200. If other unsupported baud rates are written, they will be automatically restored to 9600 after restart.If returns 01 86 ****, it indicates that the configuration was not successful.

【5】Read temperature and humidity integrative data(eg: read data of address 1）

Send	01	03	00	00	00	02	C4	0B
Description	Address		Start address		Read points		CRC check	
Return	01	03	04	01 1D		02 AD	AB	14
Description	Address		Data byte	Temperature		Humidity	CRC check	

Sensor returned data is 0x011D，0x02AD which will convert to decimalism,and add 1 decimal point,which are mean temperature value is 28.5, humidity value is 68.5% RH

Conversion of sensor negative values (inverse binary plus 1): For example, the temperature hexadecimal code is "FF 3D", translated into binary as "1111111100111101", its binary first digit is "1", so its value is negative, if the first digit is "0", then it is positive.The specific conversion steps are as follows

(1)Replace the first digit of its binary with "0" to get: "01111111 00111101"

(2) After the reverse of the last 15 bits, we get: "00000000 11000010"

(3) Add "1" and you get: "00000000 11000011"

According to the positive number representation method, the decimal value "195" is obtained, because it is negative, it is "-195", the temperature takes 1 decimal point, the result is divided by 10, the final result is "-19.5", so: FF 3D → -19.5℃.

【 6 】 Change communication protocol (eg. Switching to ASCII protocol)

Send	01	06	00	14	00	03	89	CF
Description	Address	Write	Start address		01-MODBUS 03-ASCII		CRC check	
Return	01	06	00	14	00	03	89	CF
Description	Address	Write	Start address		Data		CRC check	

Return 01 86 ****it indicates that the configuration was not successful.

Change the protocol from 01-MODBUS to 03-ASCII.

ASCII Private protocol

1. The serial format

Data bit 8, stop bit 1, parity bit none. Baud rate 9600bps, two communication intervals at least 1000ms.

2.Communication format

【1】Write device new address(eg: write address 01)

Send	AA	00	10	00	01
Description	Start	Broadcast address	Write	Write address	New address
Return	OK				
Description	Write new address successfully				

【2】Read device address

Send	AA	00	03	00	00
Description	Start	Broadcast address	Read	Read address	
Return	Address=001				
Description	Read address is 1				

【3】Read real-time data

Send	AA	01	03	0F	00
Description	Start	Device address	Read	Read data	
Return	T=-20℃，H=60.1%RH				
Description	Returned value is temperature and humidity				

【4】Change protocol (eg.: switching to MODBUS protocol）

Send	AA	01	10	01	01
Description	Start	Address	Write	Write protocol	01-MODBUS 03-ASCII
Return	OK				
Descript	Write new protocol successfully				

ion	

Change the protocol from 03-ASCII to 01-MODBUS.

In the above description, the transition characters such as spaces are ignored. Serial software (such as SSCOM3.3) check HEX sent, do not check the HEX display. After the device is powered on, it will return start.

Modbus CRC check steps

1. Preset 16-bit register hexadecimal FFFF, said the register for the CRC register;
2. The first 8-bit data and CRC register low or XOR, the result placed in the CRC register;
3. The contents of the register to the right one (toward the low),with 0 to fill the most significant bit, check the lowest bit;
4. If the least significant bit is 0: Repeat step 3 (shift again) If the least significant bit is 1: The CRC register is XOR'ed with the polynomial A001 (1010 0000 0000 0001)
5. Repeat steps 3 and 4 until 8 shifts to the right so that the entire 8-bit data is completely processed;
6. Repeat step 2 to step 5 for the next 8-bit data processing;
7. The resulting CRC register is the CRC code (the resulting CRC code is low after high).

Attention in Use

1. Please check the packaging is intact, and check the product model is consistent with the selection;
2. Do not live wiring, check the wiring is completed after the correct power;
3. Sensor length will affect the product output signal, do not use when changing products, if there is a need to change, please contact with the manufacturer;
4. Sensor is a precision device, the user when in use,please do not disassemble, with sharp objects or corrosive liquid contact with the sensor surface, so as not to damage the product;

Trouble shooting

1. Analog signal or RS232, RS485 output instrument display value is not correct. May not be able to get the correct data due to wiring problems or communication serial port failure. Please check the wiring is correct, solid,serial port is occupied, the serial port settings are correct;
2. If not for the above reasons, please contact the manufacturer.