



Total radiation sensor

Model:TBQ-2C

TBQ-2C 型总辐射传感器

一、产品概述:

(Product Overview)

TBQ-2C 总辐射系列传感器是一种应用于太阳辐射观测的短波总辐射传感器。它是符合最新的 ISO9060 和 WMO 技术标准的 C 级总辐射传感器。

TBQ-2C 型太阳总辐射传感器测量接收地球平面上辐照度的辐射表，主要用来测量光谱范围为 0.285-3 μm 太阳总辐射。如水平向下放置可测量反射辐射，加敷衍射遮光环可测量散射辐射。

The TBQ-2C total radiation series sensor is a shortwave total radiation sensor designed for solar radiation observation. It is a Class C total radiation sensor that complies with the latest ISO9060 and WMO technical standards.

The TBQ-2C total solar radiation sensor is a radiometer designed to measure the irradiance received on the Earth's surface. It primarily serves to measure total solar radiation within the spectral range of 0.285-3 μm . When placed horizontally downward, it can measure reflected radiation, and with the addition of a diffraction shading ring, it can measure scattered radiation.



二、产品特点:

(Product Features)

1. 采用高精度热电堆式半导体加工工艺，使得整体批次性能以及测量精度更高更加稳定精准。
2. 无源精准测量，灵敏度高。
3. 集成度高，体积小巧，重量轻，安装更方便。

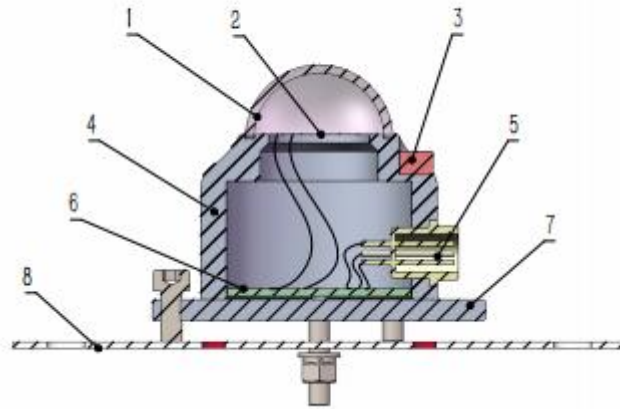
1. The use of high-precision thermopile semiconductor processing technology ensures higher, more stable, and more accurate overall batch performance and measurement precision.
2. Passive and precise measurement with high sensitivity.
3. High integration, compact size, light weight, and easier installation.

三、工作原理:

(operational principle)

总辐射表主要用来测量波长为 0.285-3.0 微米太阳辐射，该表由高精度石英玻璃罩、热电堆传感器、遮光板、表体等部件组成。热电堆传感器是该表的核心部分，可以将太阳辐射所产生的能量转化为电能，生成一个与入射辐射通量成正比的电压值。

The total radiation meter is primarily used to measure solar radiation with wavelengths ranging from 0.285 to 3.0 micrometers. The instrument consists of a high-precision quartz glass cover, thermopile sensors, a light shield, and the body itself. The thermopile sensor is the core component, converting the energy generated by solar radiation into electrical energy, producing a voltage value proportional to the incident radiation flux.



- | | | |
|---------------------------------|--|-------------------------|
| (1) 石英玻璃罩
Quartz glass cover | (2) 带黑色涂层的热电堆传感器
Thermoelectric stack sensor with black coating | (3) 水准泡
Level bubble |
| (4) 外壳金属主体
Shell metal body | (5) 航空插头
Aviation plug | (6) 保护盖板
Cover plate |
| (7) 金属底座
Metab | (8) 安装托盘
Install the tray | |

四、应用场景:

(Application scenarios)

可广泛应用于气象探测, 大气环境监测, 气候观测, 太阳能利用, 农业, 建筑物理研究等太阳辐射能量的测量。

五、技术指标:

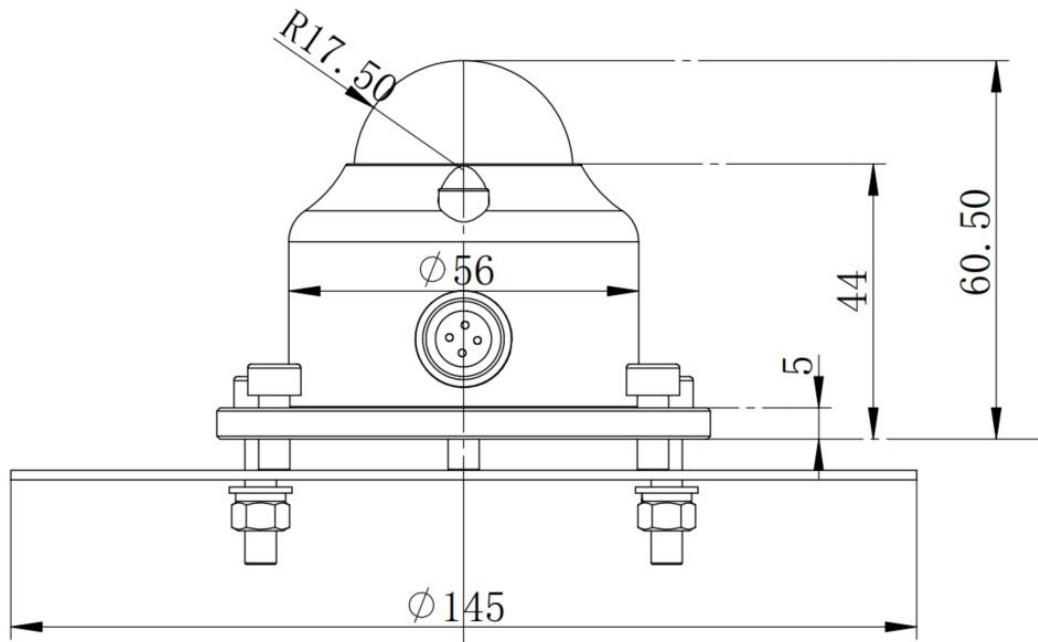
(Qualification)

光谱范围 Spectral Range	285-3000nm
测量范围 Measuring range	0~2000W/m ²
供电电源 Power Supply Voltage	DC6~30V (0~20mV 设备无需供电) (The equipment does not require power supply)
信号输出 Signal output	0~20mV / RS485 / 4-20mA
灵敏度 Sensitivity	7-14 μV/w. m ⁻²
响应时间 Response time	≤10 秒 (99%)
内阻 Internal resistance	≤30 Ω
年稳定性 Yearly stability	±2%
非线性 Nonlinear	±2%
精度 Accuracy	≤5%
水平校准 Horizontal alignment	水准泡 Level bubble
工作环境温度 Operating ambient temperature	-40°C ~ +80°C
工作环境湿度 Work environment humidity	0~100%RH

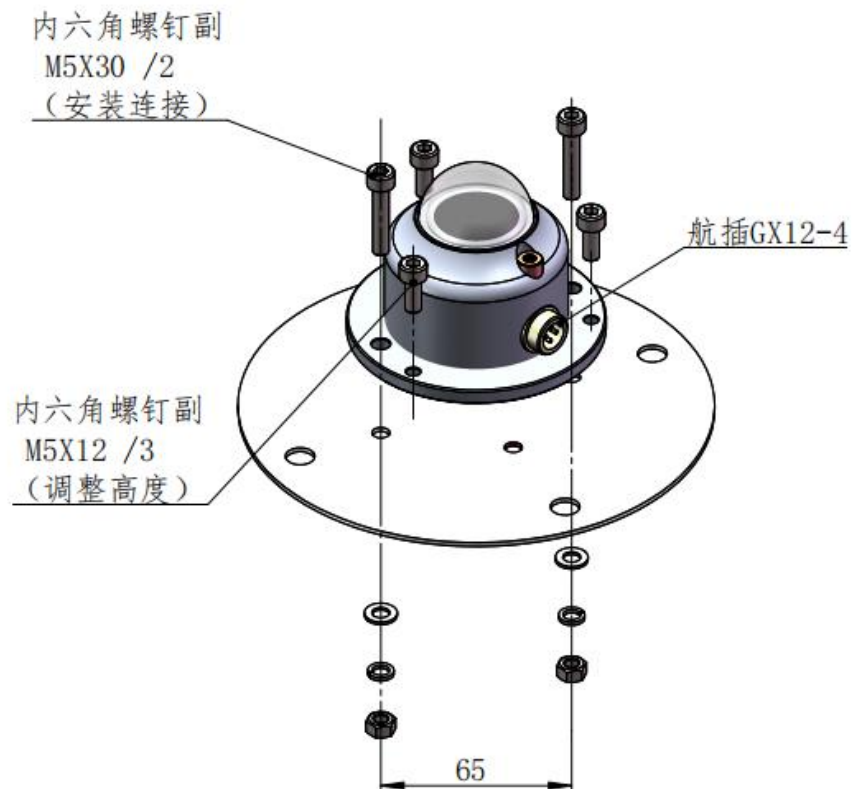
重量(不包括电缆线) Weight (excluding cable)	0.5kg
仪器线长 The instrument line is long	标配: 3米 Standard: 3 meters
建议校准周期 Suggest calibration cycle	两年一次 Twice a year

六、产品尺寸及安装图:

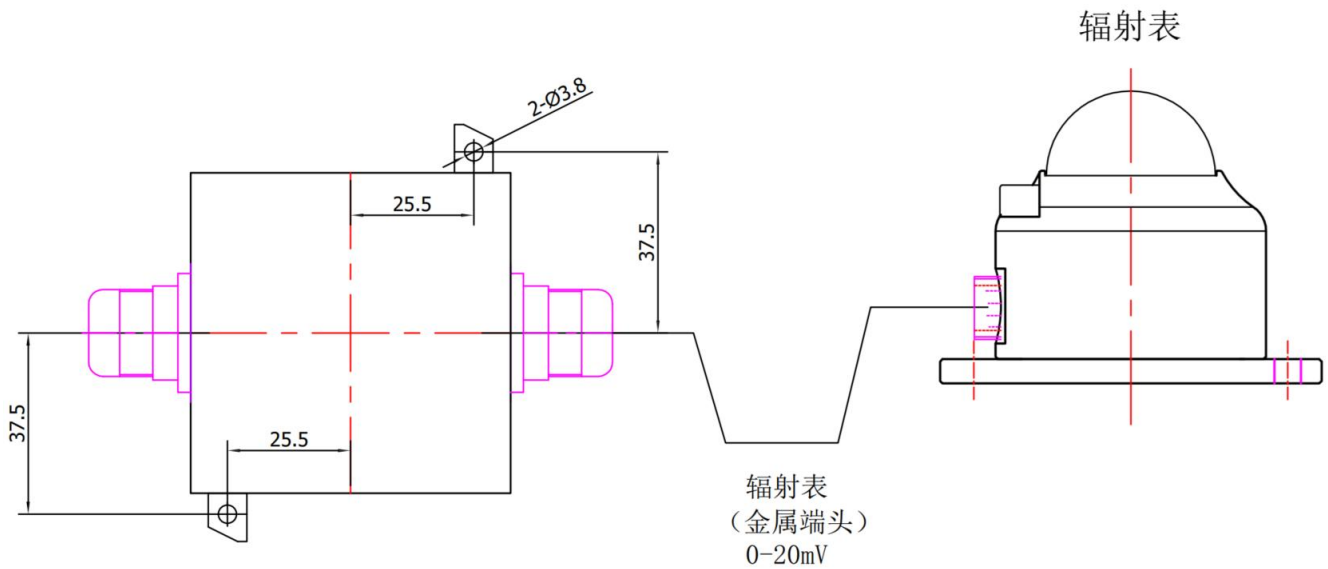
(Product size and installation diagram)



传感器尺寸图



传感器安装示意图



4~20mV 转换器尺寸及安装示意图 (如有)

七、使用安装:

(Use the installation)

1、收货检查 Receive inspection

送达客户的货物应该包括如下物件:

The goods delivered to the customer shall include the following items:

总辐射传感器 TBQ-2C 系列 1 台(含电缆线)

校准合格证书 1 份

固定螺钉 1 套

擦镜布 1 片

用户手册 1 份

在收到货后请进行外观完好性检验, 并且建议用户把合格证书存放在安全的地方。

Total radiation sensor TBQ-2C series 1 (including cable)

One calibration certificate

Set of fixing screws

One lens cloth

User manual 1 copy

After receiving the goods, please conduct an appearance integrity inspection, and it is recommended that users store the certificate of conformity in a safe place.

2、设备检验 equipment check

(1) TBQ-2C 总辐射系列传感器 0~20mV 输出设备:

TBQ-2C total radiation series sensor 0~20mV output equipment:

在检查传感器外观完好后对其性能做简单检测，检测仪器可以用手持式万用表来进行。检测在蓝色(-)电线和白色(+)电线之间的传感器阻抗，万用表的电阻值刻度应在 200Ω 范围内。先取一个极性值，交换极性再测量一次，取平均值为测量值。电线的典型电阻值是 0.1Ω/m。典型的阻抗测量值应该小于 200 欧姆。无限阻抗表示电路开路；零阻抗表示电路短路。

检测传感器是否对光产生响应:把万用表调在直流电压测量的最灵敏档，通常是 100mV 或更小。把传感器暴露在强光源下，例如离一个 100 瓦灯泡 10cm 的距离，这时候可以检测到几个毫伏的电压信号。用一块不透光的布遮暗传感器或关灯，仪器的电压输出会下降，并在一分钟内接近于零毫伏。

After checking that the sensor appears intact, perform a simple performance test using a handheld multimeter. Test the impedance between the blue (-) and white (+) wires of the sensor; the resistance scale on the multimeter should be within the range of 200Ω. First, take one polarity reading, then switch the polarity and measure again, taking the average as the measurement value. The typical resistance value for the wire is 0.1Ω/m. A typical impedance measurement should be less than 200 ohms. Infinite impedance indicates an open circuit; zero impedance indicates a short circuit.

Check if the sensor responds to light: Set the multimeter to its most sensitive DC voltage measurement setting, typically 100mV or lower. Expose the sensor to a strong light source, such as being 10cm away from a 100-watt bulb, and you should be able to detect a few millivolts of voltage signal. Cover the sensor with an opaque cloth or turn off the lights, and the instrument's voltage output will drop, approaching zero millivolts within one minute.

(2) TBQ-2C 总辐射系列传感器 RS485 输出设备:

TBQ-2C total radiation series sensor RS485 output device:

在检测传感器外观完好后对其性能做简单检测，检测仪器可以用 USB 转 485 连接上位机来进行。将总辐射传感器的 RS485 通讯线按照线序定义连接，然后给传感器供电，通过 RS485 通讯接口读取辐射数据。然后把传感器暴露在强光源下，例如离一个 100 瓦灯泡 10cm 的距离，这时候可以发送报文，读取传感器的辐射数据，数据一般在 1000W/m²以内。用一块不透光的布遮暗传感器或关灯，仪器的数据输出会下降，并在一分钟内接近于零。

After confirming that the sensor's appearance is intact, perform a simple performance test. The testing instrument can be connected to the host computer via USB to 485. Connect the RS485 communication line of the total radiation sensor according to the wiring sequence, then power the sensor and read the radiation data through the RS485 communication interface. Next, expose the sensor to a strong light source, for example, 10cm away from a 100-watt bulb. At this point, you can send a message to read the sensor's radiation data, which typically ranges within 1000 W/m². Cover the sensor with an opaque cloth or turn

off the lights; the instrument's data output will decrease and approach zero within one minute.

(3) TBQ-2C 总辐射系列传感器 4~20mA 输出设备:

TBQ-2C total radiation series sensor 4~20mA output equipment:

在检测传感器外观完好后对其性能做简单检测，检测仪器可以用手持式万用表来进行。将总辐射传感连线按照线序定义连接，然后给传感器供电，用万用表的电流档来读取辐射数据。然后把传感器暴露在强光源下，例如离一个 100 瓦灯泡 10cm 的距离，这时候可以测量传感器的输出电流（传感器输出范围为 4-20mA，线性对应 0-2000 W/m² 的辐射数值），数据一般在 1000W/m² 以内。用一块不透光的布遮暗传感器或关灯，仪器的数据输出会下降，并在一分钟之内接近于 4mA。

After confirming that the sensor's appearance is intact, perform a simple performance test using a handheld multimeter. Connect the total radiation sensing wires according to their defined sequence, then power the sensor and read the radiation data with the current setting on the multimeter. Next, expose the sensor to a strong light source, such as being 10cm away from a 100-watt bulb. At this point, you can measure the output current of the sensor (the sensor's output range is 4-20 mA, linearly corresponding to 0-2000 W/m² of radiation values), which typically falls within 1000 W/m². Cover the sensor with an opaque cloth or turn off the lights; the instrument's data output will decrease and approach 4mA within one minute.

3、传感器安装 Sensor installation

TBQ-2C 总辐射系列传感器通常水平安装，但是它也可以倾斜安装或倒置安装。无论在哪种安装方式下，传感器测量的都是入射到与传感器感应面表面平行的平面上的辐射量。

总辐射传感器的安装位置应视野开阔，特别是在一年当中日出和日落方位应没有大于 5° 的遮挡物，可选在地面或楼顶平台安装，设置专用的立柱或平台。在台柱上部固定一块比总辐射传感器底座稍大的金属板，并与仪器的接触面有良好的隔热。立柱平台离地面约 1.5m，要求牢固，即使受到严重冲击振动（如大风等），也不改变仪器的水平状态。为了获得更高精度的测量，我们建议用户使用加热通风罩。

安装时，先把总辐射传感器的白色防护罩卸下，再将总辐射传感器安装在台上，仪器接线柱方向朝北，用螺钉将仪器初步定在安装板上，然后利用仪器上所附的水准泡，调整底座上调节脚，使总辐射传感器的感应面处于水平状态，然后固定安装螺钉，最后将白色防护罩装上。TBQ-2C 固定安装注意事项见表 2

The TBQ-2C total radiation series sensor is usually installed horizontally, but it can also be installed at an angle or upside down. In either case, the sensor measures the amount of radiation incident on a plane parallel to the surface of the sensor's sensing surface.

The installation position of the total radiation sensor should have an open field of view, especially ensuring that there are no obstructions greater than 5 degrees in the direction of sunrise and sunset throughout the year. It can be installed on the ground or a rooftop platform, with dedicated pillars or platforms set up. A metal plate slightly larger than the base of the total radiation sensor should be fixed at the top of the pillar, ensuring good thermal insulation between it and the instrument. The pillar platform should be about 1.5 meters above the ground, securely mounted so that even under severe impact vibrations (such as strong winds), the horizontal state of the instrument remains unchanged. To

achieve higher measurement accuracy, we recommend users use a heated ventilation hood.

When installing, first remove the white protective cover of the total radiation sensor, then install the total radiation transmitter on the platform. The instrument's terminal should face north. Use screws to initially secure the instrument to the mounting plate. Next, use the level bubble attached to the instrument to adjust the base feet so that the sensing surface of the total radiation sensor is level. Then fix the installation screws, and finally reinstall the white protective cover. For TBQ-2C fixed installation precautions, see Table 2

表2 TBQ-2C 总辐射系列传感器固定安装注意事项 Table 2 Precautions for the fixed installation of TBQ-2C total radiation series sensors	
机械固定 Mechanical fixation	用附件中的螺钉将总辐射传感器固定在安装底板上。 Attach the total radiation sensor to the mounting plate with the screws in the attachment.
安装位置 Installation site	应该避免在太阳光入射路径和仪器之间摆放物品,以防止在仪器上产生阴影。 Items should be avoided between the path of sunlight and the instrument to prevent shadows from being created on the instrument.
水平校准 Horizontal alignment	如果是水平固定,使用仪器上的水准泡需要耐心多次调整水平调节脚。 If the level is fixed, it takes patience to adjust the level feet many times when using the bubble on the instrument.
安装方向 Installation direction	接线端朝北。 The wiring terminal faces north.
安装高度 Mounting height	如果是倒置安装的话,WMO 建议安装在离地面不低于1.5米的高度。 If installed upside down, the WMO recommends installing it no less than 1.5 meters above the ground.
倾斜 Bias	TBQ-2C 通常水平安装,但是在一些应用上可以倾斜安装或倒置安装,在各种情况下它测量入射在一个与

	<p>传感器表面平行的区域表面上太阳辐射通量。</p> <p>The TBQ-2C is usually installed horizontally, but can be installed at an angle or upside down in some applications. In all cases, it measures the solar radiation flux incident on a surface parallel to the sensor surface.</p>
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4、接线方式 Mode of connection

为了获得连续的测量数据，TBQ-2C 总辐射系列传感器需要连接数据采集系统。

TBQ-2C 总辐射系列传感器中 0~20mV 输出设备是一个无源传感器，它不需任何功率。电缆实际上接收电容噪声，是一个失真信号源。一般说来建议尽可能缩短数据采集器或放大器与传感器之间的距离。

TBQ-2C 总辐射系列传感器中 RS485 输出和 4~20mA 输出设备是有源传感器，需要按照正确接线供电。

参照表 2 正确连接传感器电缆至数据采集系统：

In order to obtain continuous measurement data, the TBQ-2C total radiation series sensor needs to be connected to the data acquisition system.

The 0~20mV output device in the TBQ-2C total radiation series sensor is a passive sensor that requires no power. The cable actually receives capacitive noise and is a source of distorted signals. Generally, it is recommended to minimize the distance between the data collector or amplifier and the sensor.

The RS485 output and 4~20mA output devices in the TBQ-2C total radiation series sensors are active sensors that need to be powered according to the correct wiring.

Connect the sensor cable to the data acquisition system correctly according to Table 2:

表 2 接线方式		
Table 2 Wiring method		
信号 Signal	颜色 Dyestuff	测量系统 Instrumentationsystem
0-20mV 输出传感器 0-20mV output sensor		
传感器输出+ Sensor output +	红色 Red	电压输入+ Voltage input +
传感器输出- Sensor output-	蓝色 Blue	电压输入-或地 Voltage input-or ground
屏蔽 Shield	屏蔽 Shield	地 The earth
RS485 输出接线方式 RS485 output wiring mode		
电源输入+ Power input +	红色 Red	电源输出+ Power output +

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电源输入- Power input-	黑色 Black	电源输出-或地 Power output-or ground
RS485-A 信号输出 RS485-A signal output	黄色 Yellow	RS485-A
RS485-B 信号输出 RS485-B signal output	绿色 Green	RS485-B
4-20mA 输出接线方式 4-20mA output wiring mode		
电源输入+ Power input +	红色 Red	电源输出+ Power output +
信号输出 Signal output	黄色 Yellow	4-20mA 输入 4-20mA input
电源输入- Power input-	蓝色 Blue	电源输出-或地 Power output-or ground

八、注意事项:

(Precautions)

- 1、请检查包装是否完好，并核对产品型号是否与选型一致；
- 2、切勿带电接线，接线完毕检查无误后方可通电；
- 3、安装时应将该表的插头朝北放置，先调水平然后再固定；
- 4、在测量辐射时请拿下辐射表上的保护盖。

- 1、Please check whether the package is intact and check whether the product model is consistent with the selection;
- 2、Do not connect the wire with power, and check that there is no error after the wiring is completed;
- 3、When installing, the plug of the meter should be placed northward, first adjust the level and then fix it;
- 4、Remove the protective cover from the radiation meter when measuring radiation.

九、保养维护:

(Maintenance)

- 1、日常应及时检查石英玻璃窗口是否清洁，如有灰尘、水汽凝结物应及时用吸耳球吹或用软布、光学镜片纸擦净。
- 2、下雨后擦拭干净水珠，冬天更应该经常除霜，用于避免因水珠的折射造成数值误差。
- 3、表内进入水汽及湿气，发现表内有细密水雾或者干燥剂变白（干燥剂本身是蓝色）应尽快烘干（50-55度），或更换干燥剂，否则会造成数据准确性降低。
- 4、倾斜总辐射表应正确使用，定期维护，建议使用两年以上返厂进行标定测量精度，避免影响数据的精准度。

- 1、In time, the quartz glass window should be checked to see whether it is clean. If there is dust or water vapor condensation, it should be blown with a suction ball or wiped clean with a soft cloth or optical lens paper.
- 2、Wipe off the water droplets after rain, and defrost more often in winter to avoid numerical errors caused by the refraction of water droplets.
- 3、Enter water and moisture into the table. If you find fine water mist or white desiccant (the desiccant itself is blue) on the table, dry it as soon as possible (50-55 degrees) or replace the desiccant, otherwise the accuracy of the data will be reduced.
- 4、The tilt total radiation meter should be used correctly and maintained regularly. It is recommended to return the instrument to the factory for calibration and measurement accuracy after two years to avoid affecting the accuracy of data.

十、故障排除：

(Debugging)

1、数据准确性降低 Reduced data accuracy

- (1) 倾斜总辐射表上有灰尘，或者下雨后有水珠，或者冬天玻璃罩上结霜；

解决方法：及时用于用吸耳球吹或用软布、光学镜片纸擦净。

- (2) 表内进入水汽及湿气，发现表内有细密水雾或者干燥剂变白（干燥剂本身是蓝色）；

解决方法：应尽快烘干（50-55度），或更换干燥剂。

- (3) 表的精度下降，返厂进行标定测量精度。

- (1) The tilt of the total radiation meter has dust on it, or water droplets after rain, or frost on the glass cover in winter;

Solution: use ear bulb to blow or clean with soft cloth or optical lens paper in time.

- (2) Water and moisture enter the inside of the table, and find that there is fine water mist or desiccant white (the desiccant itself is blue);

Solution: dry as soon as possible (50-55 degrees), or replace the desiccant.

- (3) The accuracy of the table is decreased, and it is returned to the factory for calibration and measurement accuracy.

2、无数据显示或数值差距太大，检测数据线是否正常，测量辐射时请拿下辐射表上的保护盖，如果还不显示数据或数值差距太大，请及时联系厂家售后，售后根据情况做相应的解决方案。

If the data is not displayed or the value difference is too large, check whether the detection data line is normal. When measuring radiation, please remove the protective cover on the radiation meter. If the data is still not displayed or the value difference is too large, please contact

the manufacturer's after-sales service in time, and the after-sales service will make corresponding solutions according to the situation.

十一、服务承诺:

(service commitment)

TBQ 总辐射传感器从出厂之日起 2 年内因非人为因素造成质量问题, 生产单位负责免费维修或更换。如果用户人为损坏, 本公司将成本价维修。另外, 我公司郑重承诺负责出厂产品终身成本价维修。

If the total radiation sensor of TBQ is caused by non-human factors within 2 years from the date of factory delivery, the manufacturer shall be responsible for free maintenance or replacement. If the user damages it intentionally, our company will repair it at cost price. In addition, our company solemnly promises to be responsible for lifetime cost price maintenance of the products delivered from the factory.

附录 1: 通讯点表

Appendix 1: List of communication points

数据地址 Data address	寄存器名称 Register name	特性 Character	数据类型 Data type	输出范围 Output range
0x0000	辐射值 Radiation value	R		0~2000
0x0501	Modbus 地址 Modbus Address	R/W		1~255, (0xFF 为广播地址) (0xFF is the broadcast address)
0x0503	波特率 Baud rate	R/W		1~6 (阶梯值代表 4800、9600、19200、 38400、57600、115200; 默认 2, 代表 9600) (The step value represents 4800, 9600, 19200, 38400, 57600, 115200; the default 2 represents 9600)

附录 2: 通讯规约

Appendix 2: Communications Regulations

1、通讯参数 Communication parameters

通讯波特率: 9600 可配置

数据位: 8 位

停止位: 1

奇偶校验: 无效验

通讯方式: RS485

通讯地址范围: 1~255 可配置 (默认为 1)

通讯协议: Modbus-RTU 协议

Communication baud rate: 9600 configurable

Data bits: 8 bits

Stop position: 1

Odd and even parity: invalid check

Communication mode: RS485

The range of the mailing address: 1 to 255 is configurable (default is 1)

Communication protocol: Modbus-RTU protocol

2、功能码介绍 Function code introduction

【1】功能码 03H (读多个寄存器)

Function code 03H (read multiple registers)

查询: 下行

Query: Downstream

报文格式: 设备地址+功能码+寄存器起始地址+寄存器数量+CRC16 校验

Message format: device address + function code + register starting address + number of registers + CRC16 check

例子: example

设备地址 Device address	功能码 Function code	寄存器 起始地址 高字节 Register start address high byte	寄存器 起始地址 低字节 Register start address lower byte	寄存器 数量 高字节 Register quantity high byte	寄存器 数量 低字节 Register quantity lower byte	CRC16 校验 低字节 CRC16 verification lower byte	CRC16 校验 高字节 CRC16 verification high byte
0x01	0x03	0x00	0x00	0x00	0x01	0x84	0x0A

含义如下:

The meaning is as follows:

1、设备地址: 在一个 485 总线上可以挂接多个设备, 此处地址表示想和哪一个地址设备通讯。

2、功能码: 读多个寄存器的功能码位 03

3、起始地址高 8 位、低 8 位: 表示想读取的寄存器的起始地址, 例子中起始地址为 0。

4、寄存器数量高 8 位、低 8 位: 表示从起始地址开始读多少个寄存器。例子中为 1 个寄存器。注意, 在返回的信息中一个寄存器需要返回二个字节。

5、CRC 校验: 使用 CRC-16/MODBUS, 多项式为: $(x^{16} + x^{15} + x^2 + 1)$, 低位在前高位在后。

1、Device address: Multiple devices can be connected to a 485 bus. Here the address indicates which address device you want to communicate with.

2、Function code: Read the function code bit 03 of multiple registers

3、The high 8 bits and low 8 bits of the starting address: indicate the starting address of the register to be read. In this example, the starting address is 0.

4、Register count high 8 bits, low 8 bits: indicates how many registers to read from the starting address. In this example, one register is returned. Note that one register in the returned information requires two bytes.

5、CRC verification: Use CRC-16/MODBUS, the polynomial is: $(x^{16} + x^{15} + x^2 + 1)$, The low is in front and the high is behind.

响应: 上行

Response: Upstream

设备地址 Device address	功能码 Function code	数据长度 字节数 DL	寄存器 1 高字节 Register 1	寄存器 1 低字节 Register 1	CRC 校验 低字节 CRC	CRC 校验 高字节 CRC
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		Number of bytes	high byte	lower byte	verification lower byte	verification high byte
0x01	0x03	0x02	0x00	0x6F	0xF8	0x68

含义如下：

The meaning is as follows:

1、设备地址与功能码和上面相同。

2、数据长度字节数：表示返回数据的字节个数。例子中返回了一个寄存器数据，共2个字节

3、寄存器 1 高字节，寄存器 1 低字节是第一个寄存器，例子返回的十进制值分别是 111；

4、CRC 校验同上

1、The device address is the same as the function code above.

2、Data length number of bytes: indicates the number of bytes returned. In this example, a register data is returned, which consists of 2 bytes

3、The high byte of register 1 and the low byte of register 1 are the first registers, and the decimal values returned by the example are 111;

4、CRC verification is the same as above

【2】设置与上位机通讯地址：（标准 MODBUS）

Set the communication address with the host computer:(standard MODBUS)

名称 Name	字节 Byte	数据 Data
传感器地址 Sensor address	1	0xXX: 总辐射表地址 Total radiation meter address
功能码 Function code	1	0x10: 功能码（固定 0x10） Function code (fixed 0x10)
寄存器地址高字节 The high byte of the register address	1	0x05: 设置寄存器高字节 Set the high byte of the register
寄存器地址低字节 Low byte of the register address	1	0x01: 设置寄存器低字节 Set the low byte of the register
寄存器数量高字节 Register number high byte	1	0x00: 寄存器数量高字节 Register number high byte
寄存器数量低字节 Register count low byte	1	0x01: 寄存器数量低字节 Register count low byte
数据字节长度 Data byte length	1	0x02: 数据字节长度 Data byte length
数据区---寄存器数据高字节 Data area-high byte of register data	1	0xXX: 设备通讯地址 Device communication address
数据区---寄存器数据低字节 Data area--Low byte of register data	1	0x00: 寄存器数据低字节 Low byte of register data
CRC 校验和 CRC check sum	2	CRC 校验 CRC verification

数据帧-应答：总辐射表 -> 上位机

Data frame-response: total radiation meter-> upper computer

名称 Name	字节 Byte	数据 Data
传感器地址 Sensor address	1	0xXX: 总辐射表地址 Total radiation meter address
功能码 Function code	1	0x10: 功能码 Function code

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设置寄存器高字节 Set the high byte of the register	1	0x00: 设置寄存器高字节 Set the high byte of the register
设置寄存器低字节 Set the low byte of the register	1	0x05: 设置寄存器低字节 Set the low byte of the register
字节长度高字节 Byte length high byte	1	0x00: 字节长度高字节 Byte length high byte
字节长度低字节 Byte length low byte	1	0x01: 字节长度低字节 Byte length low byte
CRC 校验和 CRC check sum	2	CRC 校验 CRC verification

【3】设置与上位机通讯波特率：（标准 MODBUS）

Set the communication baud rate with the host computer: (standard MODBUS)

名称 Name	字节 Byte	数据 Data
传感器地址 Sensor address	1	0xXX: 总辐射表地址 Total radiation meter address
功能码 Function code	1	0x10: 功能码（固定 0x10） Function code (fixed 0x10)
寄存器地址高字节 The high byte of the register address	1	0x05: 设置寄存器高字节 Set the high byte of the register
寄存器地址低字节 Low byte of the register address	1	0x03: 设置寄存器低字节 Set the low byte of the register
寄存器数量高字节 Register number high byte	1	0x00: 寄存器数量高字节 Register number high byte
寄存器数量低字节 Register count low byte	1	0x01: 寄存器数量低字节 Register count low byte
数据字节长度 Data byte length	1	0x02: 数据字节长度 Data byte length
数据区---寄存器数据高字节 Data area-high byte of register data	1	0xXX: 通讯波特率 Communication baud rate 【说明】 0x01: 4800 explain 0x02: 9600 0x03: 19200 0x04: 38400 0x05: 57600 0x06: 115200
数据区---寄存器数据低字节 Data area--Low byte of register data	1	0x00: 寄存器数据低字节 Low byte of register data
CRC 校验和 CRC check sum	2	CRC 校验 CRC verification

数据帧-应答：总辐射表 -> 上位机

Data frame-response: total radiation meter-> upper computer

名称 Name	字节 Byte	数据 Data
传感器地址 Sensor address	1	0xXX: 总辐射表地址 Total radiation meter address
功能码 Function code	1	0x10: 功能码 Function code
设置寄存器高字节 Set the high byte of the register	1	0x00: 设置寄存器高字节 Set the high byte of the register

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设置寄存器低字节 Set the low byte of the register	1	0x05: 设置寄存器低字节 Set the low byte of the register
字节长度高字节 Byte length high byte	1	0x00: 字节长度高字节 Byte length high byte
字节长度低字节 Byte length low byte	1	0x01: 字节长度低字节 Byte length low byte
CRC 校验和 CRC check sum	2	CRC 校验 CRC verification