Water evaporation sensor

HONDE TECHNOLOGY CO,LTD

1. Product Introduce

The water surface evaporation sensor can accurately measure the water surface evaporation per unit area.The weight of the liquid in the evaporating dish is measured by the high-precision weighing principle, and then the liquid level is calculated. Therefore, it can be used in a variety of environments, such as liquid or icing can be measured, which solves the disadvantages of using ultrasonic sensors or water pressure level sensors to measure the liquid level (1, inaccurate measurement when icing, 2, no It is easy to damage the sensor when it is water, 3, the accuracy is low), can be used with automatic weather station or professional evaporation recorder. The overall material is 304 stainless steel, which is durable, beautiful in appearance and accurate in measurement. There is a high-precision pressure sensor at the bottom. When water evaporates, the liquid level drops, and the pressure sensor data becomes smaller. By measuring this weak signal change, through the high-precision amplifier circuit and temperature compensation circuit, the evaporated liquid level height Δh can be calculated.

2. Product Features

1. High measurement accuracy
2. Stable performance and good linearity
3. Convenient installation and simple operation
4. Use 304 stainless steel, never rust, to ensure the service life of the sensor
5. Reasonable structure design and good appearance quality

3. Product application

The water surface evaporation sensor is an instrument used to measure the evaporation of the liquid surface, which is suitable for meteorology, plant and seed cultivation units, agricultural and forestry research institutions and other departments.

4. Product Parameter

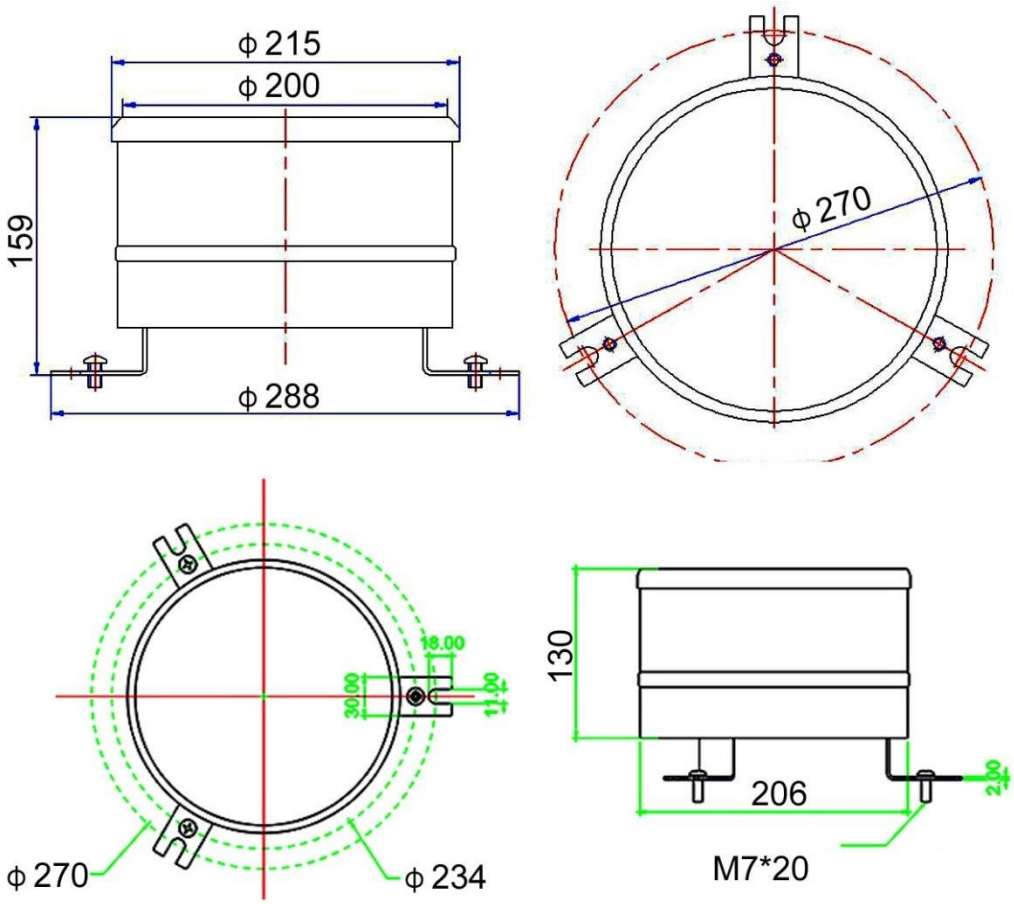
- Inner barrel diameter: 200mm (equivalent to 200mm evaporation surface)
- Outer barrel diameter: 215mm high: 80mm
- Precision: ±0.1mm
- Measuring range: 0 ~ 75mm
- Ambient temperature: -30℃ ~ 80℃
- Power supply mode: DC12 ~ 24V
- Output signal: A: Voltage signal (0 ~ 2V, 0 ~ 5V, 0 ~ 10V choose one of three)

B: 4 ~ 20mA (current loop)

C: RS485 (standard Modbus-RTU protocol, device default address: 01)

- Product weight: 2.2kg

5. Product Size



6. Connection method

The wide voltage power input can be 5~30V. When connecting the RS485 signal line, please note that the two lines of A/B cannot be reversed, and the addresses of multiple devices on the bus must not conflict. RS485 connection

M12 PIN NO.	Wire colour	Interface
1	Red	Positive power(5-30VDC)
2	Black	GND
3	Yellow	RS485 A
4	Green	RS485 B

7. Measurement methods

The evaporation sensor is set in an open and flat place in the open sky, and can be exposed to sunlight all day long. Adjust the level. The base is fixed with cement. It can be measured by injecting 75mm water before observation. If there is rain in the container, it should be reduced during observation and recording. The actual amount of evaporation is obtained by removing the rainfall. When calculating the data, the amount of evaporation will decrease, so the rainfall of this time should be added. The evaporation sensor can be connected to various data collectors with differential inputs, data acquisition cards, remote data acquisition modules and other equipment

9. Data conversion method

1. Analog output conversion

∆h: evaporation, unit: mm;

V: The voltage value collected by the collector, unit: V;

A: The current value collected by the collector, unit: mA;

Output	Conversion method（0 ~ 75mm）
0 ~ 2V DC	Δh = 37.5*V
0 ~ 5V DC	Δh = 15*V
0 ~ 10V DC	Δh = 7.5*V
4 ~ 20mA	Δh = （75/16）*A − 18.75

2. Modbus protocol

1. Standard Modbus-RTU protocol

Baud rate: 2400bit/s, 4800bit/s, 9600 bit/s can be set, the factory default is 9600bit/s

Check digit: none;

Data bit: 8; Stop bit: 1

2.Communication protocol examples and explanations

(1) Modify the address, for example: change the address of the transmitter with address 1 to 2, host → slave

Original address	Function code	Register address low	Register address high	New address low	New address high	CRC16 low	CRC16 high
0X01	0X06	0X00	0X00	0X00	0X02	0X08	0X0B

If success, the slave will send: 01 06 00 00 00 02 08 0B

Note: If you forget the original address of the sensor, you can use the broadcast address 0XFE instead. When using 0XFE, the host can only connect to one slave, and the return address is still the original address, which can be used as an address query method.

(2). Full scale and reference zero command

A. After the sensor is installed horizontally, it is in an anhydrous state, and the full scale command is sent:

Address	Function code	Fixed character		Present value		CRC16 low	CRC16high
0X01	0XA1	0X00	0X01	0X00	0X00	0XED	0XD3

If the reception is correct, return as it is, and the full scale command is completed.

B. Measure the depth with a steel ruler, inject 75mm water, and send the reference zero command:

Address	Function code	Fixed character		Present value:75mm		CRC16 low	CRC16high
0X01	0XA2	0X00	0X01	0X02	0XEE	0X28	0XFF

If the reception is correct, return as it is, and the reference zero command is completed.

(3) Query data

Query the data (evaporation Δh) of the sensor (address 1), master→slave

Address code	Function code	Register start address	Register length	Low check bit	Check code high
0X01	0X03	0X00 0X00	0X00 0X01	0X84	0X0A

- Response frame

Address code	Function code	Number of valid bytes	Register 0 data high	Register 0 data low	CRC 16 low	CRC16 high
0X01	0X03	0X02	0X00	0X23	0XF9	0X9D

Calculation instructions:

Data representation method: ÷10 after converting the data into decimal

The above data indicates that the amount of evaporation Δh: 3.5mm

(4) If there is rainfall and the rainfall is less than the actual evaporation Δh, the evaporation data will become smaller, and the actual return evaporation Δh1 should be added to the rainfall H data.

The conversion relationship is: Δh=Δh1 + H (Δh1 > 0) Commands can be sent to introduce rainfall, and the actual evaporation Δh can be calculated. Taking rainfall of 10mm as an example, master→slave

Address	Function code	Fixed character		Rainfall value 10mm		CRC16 low	CRC16high
0X01	0X03	0X00	0X01	0X02	0XEE	0X28	0XFF

If the reception is correct, return as it is, and the rainfall compensation command is completed.

10. Precautions for use

1. When you receive the product, please check whether the packaging is intact, and check whether the sensor model and specifications are consistent with the product you purchased;

2. The installation place should be kept away from chemical corrosion environment;

3. The sensors and wires should be far away from high-voltage electricity, heat sources, etc.;

4. Install horizontally, with a water volume of 75mm, try not to install it under trees to avoid leaves falling;

5. The sensor is a precision device, please do not disassemble it by yourself when using it, so as not to damage the product;