

Leaf Wetness Sensor

JW-LWS(Z21) RS485 Output



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1. Product Introduction

JW-LWS(Z21) leaf (Foliar) Wetness Sensor is an important tool for observing and studying leaf (Foliar) wetness, preventing pests and diseases, and spraying sprinkler control.

The accurate measurement of the moisture content of the leaf (Foliar) surface can be used to monitor the trace moisture or ice crystal residue.

The shape of the sensor is simulated by the blade, which can simulate the characteristics of the leaf (Foliar) surface, so that it can reflect the situation of the leaf (Foliar) surface more accurately. By measuring the variation of the dielectric constant of the upper surface of the blade, the mist, water vapor and ice can be measured.

2. Features

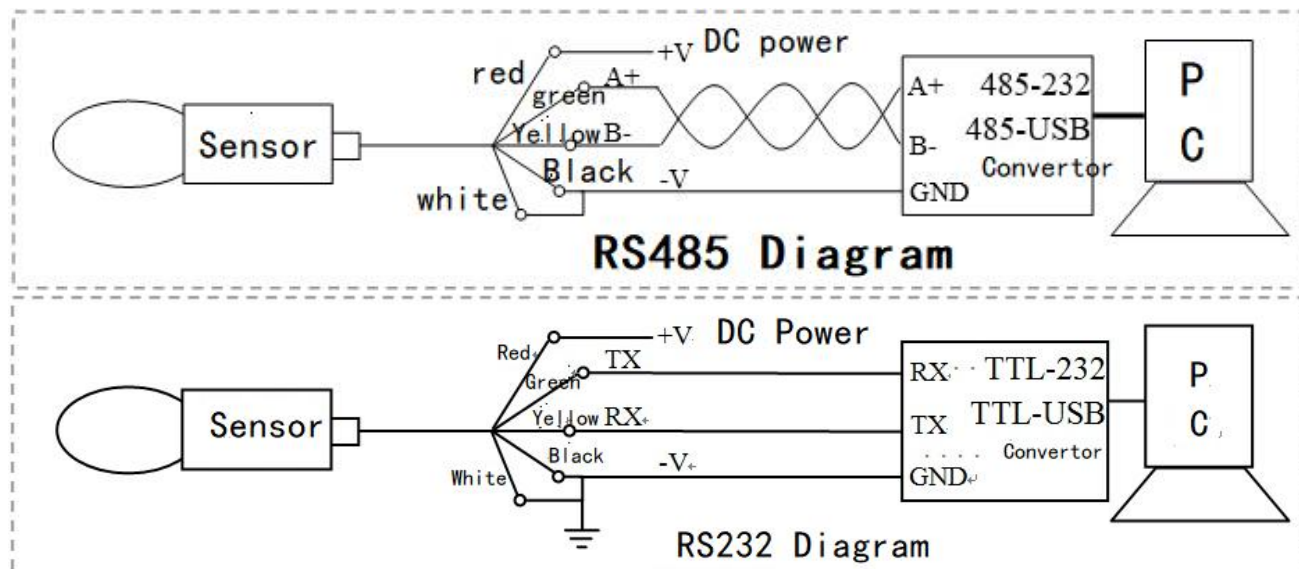
- Denser veins (15/cm)
- Detection of smaller droplets
- Sensitive measurement
- Good waterproof sealing performance
- High precision, fast response, reliable performance

3. Technical Parameters

	Leaf Wetness	Leaf Temperature
Measuring range	0-100.00%	-50°C ~ 80°C
Unit	% (m3/m3)	°C (centigrade degree)
Resolution	0.1% or 0.01%	0.1°C or 0.01°C
Accuracy	±3%(0-50%); ±6%(>50%)	< ±0.5°C (-10°C ~ 70°C) others < ±1°C (Others)
Swap precision	< 3%	< 0.5°C (-10°C ~ 70°C)
Repetition measurement error	< 2%	< 0.2°C
Measurement principle	Capacitance measurement in frequency domain (FDR)	RTD Thermal sensor, plus nonlinear correction
Quiescent current	peak value < 30mA · Average < 10mA	
Response Time	< 1 s	
Measured stability time	2s	
Protection level	IP67	
Working temperature range	-40°C ~ 85°C	
Measurement area	center on the central probe in a cylinder with a diameter of 7cm and a height of 10cm	
Cable length	standard 3.5m (UL2464, 5*22AWG), can be customized	
Power Supply	DC2-5V (Max 6V), DC5 ~ 24V (Max 26.7V)	
Output Signal	RS485/RS232/UART, MODBUS-RTU	

4. Lead Definition and Wiring Instructions

Red	Black	Green	Yellow	White
VCC	GND	485A+/232TX	485B-/232RX	SET



Mark : When the SET end (terminal) is connected to the negative pole of the power supply, it is in the collection mode; when the SET terminal is connected to the positive pole of the power supply, it is in the setting mode.

5. How to Use

5.1 Communication parameter setting

The SET end of the sensor is connected to power +, and the sensor is in the setting mode, allowing the modification of the internal EEPROM. The communication parameters displayed by the sensor at this time are fixed as: station address: 255, 9600, n, 8,1. You can set the sensor parameters to change the value of registers 0x200-0x204,0X209,0X20A

The SET end of the sensor is connected to power -, and the sensor is in acquisition mode. At this point, the communication parameters set inside the sensor will take effect, that is, the communication will run according to the parameters defined by 0x200-0x204.

In acquisition mode, the internal parameters cannot be modified, even if the sensor responds to the write command · Internal parameters will not be modified.

5.2 Leaf measurement

Put the leaf moisture sensor next to the crop and secure it with nonmetallic wire. The tilt Angle and orientation are close to the Angle of the leaf surface of the plant, and the spraying situation on the leaf surface can be sensed.

MODBUS-RTU Communication Protocol

What is a *function code*: the contents of the second byte sent by the host. Where *03* and *04* function codes means to read register values; *06* function code means to write a single register; *16* function code means to write multiple registers; *17* function code means to read device ID. No responses to other function codes.

Acronym description:

TT: station address, address range 1-255;

SS: starting address, 2 bytes, high bytes in front;

NN: number of registers ($NN \leq 11$), 2 bytes, high byte in front;

MM: number of bytes, 1 byte in front;

RR: register address, one set of 2 bytes, high bytes in front;

VV: register value, one set of 2 bytes, high bytes in front;

CRC: CRC check code;

?? : the version number

1) 03,04 function code, Read a single (or multiple) register (One time at most 8 registers)

Host send: TT 03 SS SS NN NN CRC1 CRC2, 8 bytes

Vice device response: TT 03 MM VV VV...CRC1 CRC2, at most 21 bytes

2) 06 Function code, write a single register

Host send: FF 06 RR RR VV VV CRC1 CRC2, 8 bytes

Vice device response: FF 06 RR RR VV VV CRC1 CRC2, 8 bytes

3) 16(0X10) function code, write multiple registers

Host send: FF 10 SS SS NN NN MM VV VV CRC1 CRC2, at most 9+16=25 bytes

Vice device response: FF 10 SS SS NN NN CRC1 CRC2, 8 bytes

4) 17(0X11) function code, Read the device ID

Host send: TT 11 CRC1 CRC2, 4 bytes

Vice device response: TT 11 0B "SMTS-II-485??" CRC1 CRC2, 19 bytes

For example:

(The SET end of the sensor is connected to the negative terminal of the power supply, which is in the acquisition mode, the station address is the factory default value 254):

Host send: **FE 03 00 00 00 02 D0 04**

Meaning of data:

FE-station address 254; **03**-function code; **00 00** register starting address; **00 02**-read 2 registers

Sensor response: **FE 03 04 00 15 00 FE 65 78**

Meaning of data:

FE-station address 254; **03**-function code; **04**-number of byte; **00 15**-To convert to decimal is 21, divide 10 equal to 2.1, means moisture 2.1%; **00 FE**-converted to decimal is 254, divide 10 equal to 25.4, means temperature is 25.4°C.

Users can send instructions in a fixed format: *FE 03 00 00 00 02 D0 04* , to obtain sensor moisture and temperature data.

The internal register address of sensor:

Register address	Register address HEX:	Content	Read-write	Range	Function code	Numerical meaning
00	00	Leaf wetness	Read only	0-1000 0-10000	3/4	0.0-100.0%,Resolution 0.1%; 0.00-100.00%,Resolution 0.1%,
01	01	Leaf temperature	Read only	-400~+800 -400~+8000	3/4	-40.0℃~80.0℃, Resolution 0.1℃ -40.00℃~80.00℃, Resolution 0.01℃
02	02		Read only	0	3/4	
03	03		Read only	0	3/4	
04	04	Wetness original AD value	Read only	0-10230	3/4	Wetness original AD value
05	05	Temperature original AD value	Read only	0-10230	3/4	Temperature original AD value
06	06	Device mark 1	Read only	0-65535	3/4	User - defined devices mark 1
07	07	Device mark2	Read only	0-65535	3/4	User - defined devices mark 2

*: Signed binary number representation, Binary complement representation.

Register address	Register address HEX:	Content	Read-write	Range	Function code	Numerical meaning
32	0X20	Resolution	Read-write	0,1	3/4/6/16	0:0.1; 1:0.01 Default 0
512	0X200	Station address	Read-write	1-255	3/4/6/16	MODBUS station address
513	0X201	Baud-rate	Read-write	0-5	3/4/6/16	0-1200 1-2400 2-4800 3-9600, default 4-19200 5-38400
514	0X202	Odd-even check	Read-write	0,1,2	3/4/6/16	0-No check, default 1-odd check 2-even check
515	0X203	Receive stop bit	Read-write	0,1	3/4/6/16	0-1 stop bite, default 1-2 stop bite
516	0X204	Send stop bit	Read-write	0,1	3/4/6/16	0-1 stop bite 1-2 stop bite, default
518	0X206	Response time interval		0-255	3/4/6/16	0-2550ms, unit 10 ms
521	0X209	Device mark 1	Read and write	0-65535	3/4/6/16	User - defined devices mark 1
522	0X20A	Device mark 2	Read and write	0-65535	3/4/6/16	User - defined devices mark 2

Marks: Serial communication is a fixed 8-bit data bit.

Register declaration:

Register address **0-7** is Read-only area and can read the measured data. The contents of registers **6** and **7** are the same as those of address **0X209** and **0X20A**. If you read the contents of registers **6** and **7** means to read the contents of read **0X209** and **0X20A**. These two registers can store four letters, which is for the user to store sensor identification and facilitate the user to distinguish the sensor. Address **0X200-0X20A** is the read and write communication parameters and user id.

5.3 Calibration

Connect SET (White) and power + (Red) wire and power on

- 1) 0%: keep sensor service dry, send command: 97 02 11 A1 40 78
- 2) 50%: put half sensor in the water, send command: 97 02 11 A2 00 79
- 3) 100%: put whole sensor in the water, send command: 97 02 11 A0 81 B8