

CYW-PR-JRRS485 Series

Pressure transmitter

USER MANUAL

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1. Product Overview

The C Y W P R J R S 4 8 5 series pressure transmitter uses a diffusion silicon piezoresistive pressure sensor with stainless steel isolation membrane as the signal measuring element to accurately measure the pressure.

The measuring element converts the pressure into a corresponding voltage signal, which is amplified by an instrument op amp and then collected by a high-precision 24 bit A/D converter, converted into a digital signal, calibrated by a microcontroller, and outputs an RS-485 signal.

This transmitter is equipped with an RS-485 communication interface that supports the standard M O D B U S-R T U protocol. The communication address and serial port properties can be set, and the communication distance can reach up to 2000 meters, enabling remote monitoring.

The transmitter has undergone long-term aging and stability assessment, and its performance is stable and reliable; It can be widely used in various fields of hydraulic and pneumatic control systems such as urban water supply and drainage, sewage treatment, river and reservoir systems.

2. Product Features

- ◆ Anti reverse connection and electrostatic protection
- ◆ Wide voltage power supply: DC7-36V
- ◆ Anti disturbance performance: anti vibration impact, anti RF interference
- ◆ High precision: 24 bit high-precision AD acquisition, high-precision diffused silicon sensor
- ◆ Communication method: RS-485
- ◆ Stable and reliable: Industrial grade microcontroller
- ◆ Easy installation: compact structure, diverse wiring forms, convenient for installation and use in different working conditions and environments

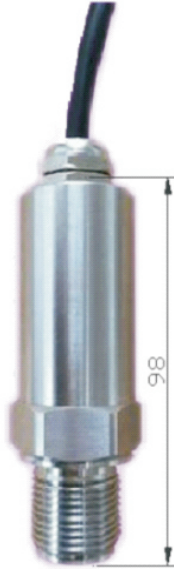


3. Technical parameters

Items	Parameter	Unit
Measurement medium	Liquid (non corrosive to stainless steel shell), gas	
Power supply mode	D C 7~3 6 (anti reverse connection)	V
Output signal	RS485	
(Optional)	0~5	V
	0~10	V
Pressure range	0~0.1\1\1.6\2\3.5 (Other ranges can be customized)	MPa
Accuracy class	±0.25	%FS
Overload capacity	150	%FS
Long term stability	±0.2	%FS/年
Zero temperature coefficient	±0.1	%FS/℃
Full temperature coefficient	±0.15	%FS/℃
Operation temperature	-10~80	℃
Storage temperature	-40~80	℃
Protection grade	IP65	
Interface size	M20*1.5 thread (Other sizes can be customized)	mm
Shell and membrane	stainless steel	
Hessman connector	A B S Engineering Plastics	
Communication protocol	MODBUS-RTU protocol	

4. Equipment size, pins, and wiring instructions

4.1 Equipment size (mm)



Lead wire type



Aviation plug-in type



Hessman connector type

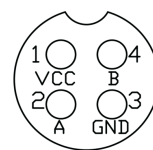
4.2 Device Pin Definition

4.2.1 Definition of 2-wire pins

Pin definition of lead type transmitter

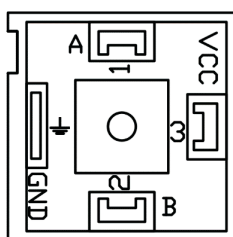
Pressure sensor	Broen: VCC
	Black: GND
	Green: A
	Blue: B

Pin definition of aviation plug-in transmitter



1. VCC: Positive power supply
2. A: Positive pole of RS-485
3. GND: Power Ground
4. B: Negative pole of RS-485

Definition of Husman type transmitter pins



1. A: Positive pole of RS-485
2. B: Negative pole of RS-485
3. VCC: Positive power supply
4. GND: Power Ground

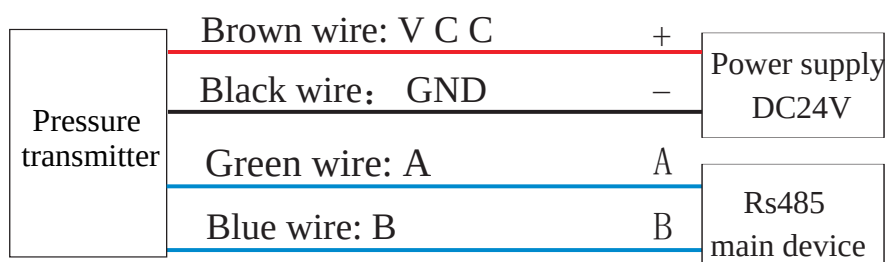
4.3 Equipment wiring instructions

The input voltage range of the CYW-PR-JRRS485 series pressure transmitter is 7-30VDC, and all operations are non energized. Power can only be supplied after all components are fully connected.

The "red line" is connected to the positive pole of the power supply, and the "black line" is connected to the ground of the power supply. The input power supply of this transmitter has anti reverse protection, but attention must still be paid to the positive and negative poles of the power supply when connecting.

The CYW-PR-JRRS485 series pressure transmitter is equipped with an RS-485 communication interface , which can set communication address and serial port properties. The communication distance is up to 2000 meters, and remote monitoring can be achieved.

When connecting the CYW-PR-JRRS485 series pressure transmitter to the power supply and RS-485 communication interface, an outgoing line needs to be connected. The schematic diagram of the connection is shown in the figure.



Equipment wiring diagram

Note: When wiring the RS 4 8 5 signal line, A and B should not be reversed, and addresses between multiple devices on the bus should not conflict.

4.4 Changing device register values

(1) In the case of unknown device address or serial port properties:

The CYW-PR-JRRS485 device has fixed interface parameters of 9600bps serial port baud rate, 8-bit data bits, no checksum, 1-bit stop bit, and address 1 within 250ms after startup . During this time, instructions can be sent to read the device address and baud rate. The instructions are as follows:

Address	Function code	Starting register address	Number of registers	CRC16
0x01	0x03	0x00 0x00	0x00 0x02	0xC4 0x0B

Data parsing:

The address is 0x01, the function code is 0x03, the starting register address is 0x00 0x00, and the number of registers is 0x00 0x02;

Read the address and baud rate of the device.

The device address and baud rate are as follows (in hexadecimal):

Address	Function code	Starting register address	Data	CRC16
0x01	0x03	0x04	0x00 0x01 0x00 0x03	0xEB 0xF2

Data parsing:

The data is 0x00 0x01 0x00 0x03;

The device address is 1 and the baud rate is 9600bps;

(2) Already know the device address or serial port properties:

After the CYW-PR-JRRS485 device is powered on, it can perform a read operation on the device register through function code 3;

Write to the device register using function code 6.

5. Precautions

1. After receiving the product, please check if the packaging is intact and verify if the model is consistent with the one you have purchased.
2. Ensure that the power supply voltage meets the product's power supply requirements and that the wiring is correct and secure.
3. This transmitter is used in media that are non corrosive to silicon and stainless steel (or aluminum alloy), and it is prohibited for the transmitter to come into contact with corrosive or overheated media.
4. The maximum pressure of the tested system may not exceed the rated value of 150% FS in an instant.
5. The sealed joint of the transmitter must not be loose and must maintain a reliable seal.
6. The transmitter must be used according to specifications, and different types cannot be interchanged.
7. Sensors are precision components. Users are advised not to disassemble, modify, or touch the diaphragm on their own during use to avoid permanent damage to the product.
8. Please strictly follow the precautions when using, otherwise the consequences will be borne by yourself.

6. Use and installation

1. Equipment installation must be carried out without pressurization or power supply.
2. Installation must be carried out by professional technicians who have read and understood this manual.
3. This product is not explosion-proof and can cause serious personal injury and significant material damage when used in explosion-proof areas.
4. It should be installed in places with small temperature fluctuations as much as possible, while avoiding vibration and impact.
5. This product is suitable for pressure measurement of various general corrosive liquids and gases. It is prohibited to measure media that are incompatible with the material in contact with the transmitter.
6. If a pressure tube is required for the transmitter, it should be noted that highly corrosive or overheated media should not come into contact with the transmitter to prevent slag from settling inside the pressure tube. The pressure tube should be kept as short as possible.

And when measuring steam or other high-temperature media, the working temperature of the transmitter should not exceed the limit. When used for steam measurement, the pressure pipe should be filled with water to prevent direct contact between the transmitter and steam.

7. Handle with care and do not throw or throw at will. Please do not use brute force during installation.
8. In hydraulic systems, attention should be paid to installing the pressure interface of this product upwards (to facilitate gas discharge).
9. When the pressure interface is upward or sideways during installation, it is necessary to ensure that no liquid flows through the equipment housing, otherwise moisture and dirt will block the atmospheric port near the electrical connection, and even cause equipment failure.
It is necessary to ensure that the threaded connection edges of electrical connections are free of dust and dirt residue.
10. If installed in harsh environments where there is a risk of damage such as lightning strikes or overvoltage, we recommend that users provide lightning protection and overvoltage protection between the distribution box or power supply and the transmitter.
11. When measuring steam or other high-temperature media, be careful not to let the medium temperature exceed the working temperature of the transmitter.
If necessary, a cooling device should be installed.
When freezing occurs in winter, transmitters installed outdoors need to adopt anti freezing measures to prevent the liquid at the pressure inlet from expanding due to freezing, which may cause damage to the sensor.
12. During installation, a pressure shut-off valve should be installed between the transmitter and the medium to facilitate maintenance and prevent blockage of the pressure tap, which may affect measurement accuracy .
13. During the installation process, a wrench should be used to tighten the transmitter from the hexagonal nut at the bottom of the equipment to avoid directly turning the upper part of the equipment and causing the connecting wire to disconnect.
14. This product belongs to weak current equipment and must be wired separately from strong current cables. It should comply with the relevant national wiring standards (GB/T50312-2016) for wiring.
15. During the pressure measurement process, pressure should be slowly applied and released to avoid sudden increase to high pressure or decrease to low pressure.
16. When disassembling the transmitter, ensure that the pressure source and power supply have been disconnected to prevent accidents caused by medium ejection.

7. Troubleshooting

Fault phenomenon	Cause analysis	Exclusion method
The transmitter has no output signal	1.The transmitter is not powered	Connect the wires correctly according to the wiring diagram
	2 . Transmitter wiring error	
Output irregular jumps under constant pressure	1.Strong on-site RF interference	Use shielded cables and ground the shielding layer
	2.Not using shielded cables	
When the transmitter is not connected to pressure, the corresponding output value is incorrect	The transmitter is not working in its required environment	Move the transmitter to the designated environment for operation or take measures to make the environment meet the requirements
The output value of the transmitter does not match the measured pressure	1.Supply voltage exceeds the range	1. Is the power supply voltage within the range
	2.Excessive external load	2. Adjust the external load

Attachment MODBUS Command Protocol (RS-485)

1. Function code

This device supports rich function codes, and the corresponding function codes operate on the corresponding registers, as shown in the table below:

Function code	Meaning	Operable register address
3	Read data from each register	0x0~0x4、0xC
6	Write data from each register	0x0、0x1、0x3、0xC

1.1 Example Function Code 3, Read Slave Register Data

Host message:

Defination	Address	Function code	Starting register address	Number of registers	CRC check code
Number of bytes	1	1	2	2	2
Value	1~254	3		N	CRC16

Response when the slave is normal:

Defination	Address	Function code	Starting register address	Number of registers	CRC check code
Number of bytes	1	1	1	N*2	2
Value	1~254	3	N*2		CRC16

Response when the slave is wrong:

Defination	Address	Function code	Starting register address	CRC check code	
Number of bytes	1	1	1	2	
Value	1~254	3+0x80	Refer to the error code table	CRC16	

1.2 Example Function Code 6, Read Slave Register Data

Host message:

Defination	Address	Function code	Starting register address	Data	CRC check code
Number of bytes	1	1	2	N*2	2
Value	1-254	6			CRC16

Response when the slave is normal:

Name	Address	Function code	Starting register address	Number of registers	CRC check code
Number of bytes	1	1	2	N*2	2
Value	1-254	6			CRC16

Response when the slave is wrong:

Name	Address	Function code	Exception Code	CRC check code
Number of bytes	1	1	1	2
Value	1-254	6 + 0x80	Refer to the error code table	CRC16

1.3 Other Function Codes

All other function codes follow the MODBUS RTU standard protocol, and the same applies to error response codes. Before using the function codes of this device, please refer to the relevant MODBUS RTU manuals.

2: Error Code Table

Error code	Abnormal description
1	Function code error, which refers to a function code that is not supported by this device.
2	Address error, that is, the received register address exceeds the register address range of this device.
3	Data error, that is, the corresponding register of the device does not support the data.

3. Register List

Function code	Starting address of data	Number of registers	Data byte	Attribute	Data range	Meaning of instructions
0x03 0x06	0x0000	1	2	R/W	1-254	Read and write slave address Factory default address: 01
0x03 0x06	0x0001	1	2	R/W	0-1200 1-2400 2-4800 3-9600 4-19200	Baud rate read and write Factory default baud rate: 9600
0x03	0x0002	1	2	R	0-Mpa 1-Kpa 2-Pa	Unit
0x03	0x0003	1	2	R/W	0-#### 1-###. # 2-##. ## 3-#. ###	The decimal points represent 0-3 decimal places respectively
0x03	0x0004	1	2	R	-32768-32767	Measure output value
0x03 0x06	0x000c	1	2	R/W	-32768-32767	Zero offset value, factory default value: 0 Pressure output value=calibrated measurement value+zero offset value

Note:

1. When modifying the baud rate, the transmitter will reply with the modified data according to the baud rate sent by the host. After replying, the transmitter baud rate will become the modified target value.
2. When modifying the address, reply to the data according to the original address, and the transmitter address will be automatically modified after the reply is completed.
3. General users are not allowed to modify the calibration data of the transmitter. If calibration and modification are required, please contact our company to request the transmitter calibration software.

4.1 Example: Read the unit, decimal place, and measurement value of device address 0x01

Inquiry frame (hexadecimal):

Address code	Function code	Starting register address	Number of registers	CRC check code
0x01	0x03	0x00 0x02	0x00 0x03	0xA4 0x0B

Response frame (hexadecimal):

Address code	Function code	Data length	Data	CRC check code
0x01	0x03	0x00 0x02	0x00 0x00 0x00	0xD3 0x25
			0x03 0x06 0x40	

Data parsing:

Unit: 0x00 0x00, Unit: MPa

Number of decimal places: 0x00 0x03, data is to 3 decimal places

Data collection and calculation:

Hexadecimal 0640=>Decimal 1600=> $1600/10^3=1.6\text{MPa}$

4.2 Example: Change the transmitter address from device address 1 to 2

Inquiry frame (hexadecimal):

Address code	Function code	Starting register address	Function code	CRC check code
0x01	0x06	0x00 0x00	0x00 0x02	0x08 0x0B

Data parsing:

Address code: 0x01, operate on device with address 1;

Function code: 0x06, which means to perform write operations on the device;

Starting register address: 0x00 0x00, check the register list to see the device address, that is, operate on the device address;

Data: 0x00 0x02, device address has been changed to 2.

Response frame (hexadecimal):

Address code	Function code	Starting register address	Function code	CRC check code
0x01	0x06	0x00 0x00	0x00 0x02	0x08 0x0B

Data parsing:

The transmitter address with device address 1 has been successfully changed to 2.