



HONDE TECHNOLOGY CO.,LTD

Pneumatic Water Gauge Sensor

User Manual



RD-RWG-01



1.Description

The pressure transmitter uses a high-performance pressure-sensitive chip that combines advanced circuit processing and temperature compensation techniques to convert pressure into a linear current or voltage signal. The product is small in size, easy to install, and is insulated by a stainless steel case. It is suitable for measuring gases such as gas and liquid compatible with the material of the contact part. It can be used to measure gauge pressure, negative pressure and absolute pressure.

2.Application

This product is widely used in water plants, oil refineries, sewage treatment plants, building materials, light industry, machinery and other industrial fields to achieve the measurement of liquid, gas and steam pressure.

3.Features

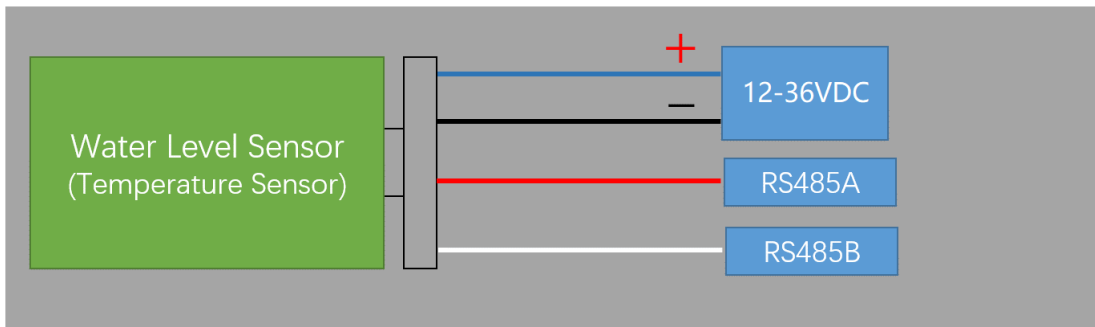
- Reverse polarity and current limit protection
- Laser resistance temperature compensation
- Programmable adjustment
- Anti-vibration, anti-shock, anti-radio frequency electromagnetic interference
- Strong overload and anti-interference ability, economical and practical

4.Main Technique

- Measuring range:0~10meters (-0.1~0~60Mpa)
- Measuring accuracy:0.2%
- Output signal: RS485
- Overload capability: < 1.5 times the range
- Temperature drift: 0.03% FS/°C
- Power supply: 12-36VDC typical 24V
- Medium temperature: -20~75°C
- Ambient temperature: -30~80°C
- Measuring medium: gas or liquid that does not corrode stainless steel



5.Electrical wiring diagram



6.MODBUS Communication Protocol

1. Overview

This protocol complies with the MODBUS communication protocol and adopts the subset RTU method in the MODBUS protocol. RS485 half-duplex working mode.

2. Serial data format

Serial port settings: no parity, 8 bits of data, 1 stop bit.

Example: 9600, N, 8, 1 Meaning: 9600bps, no parity, 8 data bits, 1 stop.

The serial port baud rate supported by this transmitter is:

1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

Polynomial of CRC check: 0xA001.

The data in the data communication process is all processed according to the double-byte signed integer data. If the data identifies the floating point number, the write needs to read the decimal point to determine the size of the data.

3. Communication format

1. Read water level

First , Read output value

Address	Function code	Data start address (H)	Data start address (L)	Number of data (H)	Number of data (L)	CRC16 (L)	CRC16 (H)
0X01	0X03	0X00	0X04	0X00	0X01	0XC5	0XCB

Data returned:

Address	Function Code	Data length	Return data High byte (H)	Return data Low byte (L)	CRC16(L)	CRC16(H)
0X01	0X03	0X02	0X00	0X0A	0X38	0X43



Second need read decimal

Send instruction:

Address	Function code	Start address (H)	Start address (L)	Number of data (H)	Number of data (L)	CRC16 (L)	CRC16 (H)
0X01	0X03	0X00	0X03	0X00	0X01	0X74	0X0A

Return:

Address	Function Code	Data length	Return data High byte (H)	Return data Low byte (L)	CRC16(L)	CRC16(H)
0X01	0X03	0X02	0X00	0X03	0XF8	0X45

0003 means three decimal

So the water level is 000A(Hexadecimal)=10 (Decimal)/1000 =0.01 meter.

2. Modify the sensor address, modify the address from 01 to 02

A. Send read command format:

Original address	Function code	Data start address (H)	Data start address (L)	New address (H)	New address (L)	CRC16 low	CRC16 high
0X01	0X06	0X00	0X00	0X00	0X02	0X08	0X0B

If success, it will return : 01 06 00 00 00 02 08 0B

3. Error and abnormal command response return data format:

Address	Function code	Exception code	CRC16 Low byte (L)	CRC16 High byte (H)
0x01	0x80 + function code	0x01: (Illegal function) 0x02: (Illegal data address) 0x03: (Illegal data)		

4. Function code and data address list

Register name	Data type	Offset address		Register type	Remarks
		(Dec)	(Hex)		
Slave address	Unsigned integer type	0	0x0000	Read/write	Value range: (1 ~ 255)
Baud rate	Unsigned integer type	1	0x0001	Read/write	Value range: (0 ~ 7) 0-1200; 1-2400 2-4800; 3-9600 4-19200; 5-38400 6-57600; 7-115200



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Unit	Unsigned integer type	2	0x0002	Read-only	Value range: (0 ~ 8) 0-Mpa (°C); 1-Kpa 2-Pa; 3-Bar 4-mbar; 5-kg/cm2 6-Psi; 7-mh2o 8-mmh2O;
Decimal digits	Unsigned integer type	3	0x0003	Read-only	Value range: (0 ~ 3) 0-# # # #; 1-# # #. # 2-# #. # #; 3-#. # # #
Measure output value	Signed integer type	4	0x0004	Read-only	Value range: (-1999 ~ 9999)
Range zero	Signed integer type	5	0x0005	Read-only	
Full range point	Signed integer type	6	0x0006	Read-only	
Floating point output	Single precision floating point type	7	0x0007	Read-only	Single precision floating point number
		8	0x0008		
Instrument status	Unsigned integer type	9	0x0009	Read-only	0: Pressure; 1: Temperature
Parity bit	Unsigned integer type	10	0x000A	Read/write verification	Value range: (0 ~ 2) 0: No check 1: Even check 2: Odd check
Data size end	Unsigned integer type	11	0x000B	Read/write verification	Value range: (0 ~ 1) (Note: only valid for measured output value, other registers default to large-end mode) 0: Large-end mode (high bytes first) 1: Small-end mode (low bytes first)
Zero offset value	Signed integer type	12	0x000C	Read/write verification	Value range: (-1999 ~ 9999)
Filter coefficient	Unsigned integer type	13	0x000D	Read/write verification	Value range: (0 ~ 4)
Gain coefficient	Signed integer type	14	0x000E	Read/write verification	Value range: (-1999 ~ 9999)
User functions	Unsigned integer type	15	0x000F	Write only	0000H: Save user data 0055H: Zero clearing 2020H: Advanced User Modification Enable 00AAH: Restore factory settings



5. Precautions

1. Communication related parameters, address, baud rate, check bit, after modification immediately effective, switch value related parameters modified, need to send save instructions after effective.
2. When modifying the address, the address before modification is used to reply to the data, and the transmitter address will be automatically modified after reply.
3. The Save and Restore Factory command returns the original value, indicating that the transmitter has accepted the command from the host.
4. Attention should be paid when restoring factory data. The parameters saved by the factory may be inconsistent with those saved by the user, so the address, baud rate and calibration data may be inconsistent. Therefore, the transmitter must be searched again after restoring factory parameters.
5. This protocol stipulates that all data are communicated by shaping data. For example, the main variable data is 6.000 MPa, three decimal places, and the read data is 6000. Then, the operation should be done according to the position of the decimal point to get 6.000. For example, if the decimal point is 3, it means $6000/10^3$, that is, 6000 divided by the third power of 10, and the data is 6.000.

6. Examples of commonly used commands: (example data are hexadecimal, sensor address is 1)

1. Read the main variable data:

A. Send instructions: 01 03 00 04 00 01 C5 CB

B. Returned data: 01 03 02 00 0A 38 43 (0x000A is the read value of the primary variable)

2. Read decimal places:

A. Send instructions: 01 03 00 03 00 01 74 0A

B. Returned data: 01 03 02 00 03 F8 45 (0x0003 is the decimal place)

So the read data needs to be converted from hex to decimal divided by 1000.

3. Read the transmitter address:

A. Send instructions: 01 03 00 00 00 01 84 0A

B. Return data: 01 03 02 00 01 79 84 (0x0001 is the read transmitter address)

4. Read the transmitter baud rate:

A. Send instructions: 01 03 00 01 00 01 D5 CA

B. Return data: 01 03 02 00 03 F8 45 (0x0003 is the baud rate of the read transmitter, and the baud rate



is 9600 according to the data description list)

5. Modify the transmitter address: (The original address of the transmitter is 0x01, which is modified to 0x02)

A. Send instructions: 01 06 00 00 00 02 08 0B

B. Return data: 01 06 00 00 00 02 08 0B (0x0002 is the modified transmitter address)

6. Modify the baud rate of the transmitter: (The original baud rate of the transmitter is 9600, which is modified to 4800)

A. Send instructions: 01 06 00 01 00 02 59 CB

B. Return data: 01 06 00 01 00 02 59 CB (0x0002 is the modified transmitter baud rate, and the baud rate is 4800 according to the data description list)

Note: Save to user area command should be sent after modifying the command, otherwise, the modified data will be lost because it is not saved after the transmitter is powered down.

The save to user area command is as follows: the save command code after the address is changed from 1 to 2

A. Send instruction: 02 06 00 0F 00 00 B9 FA

B. Return data: 02 06 00 0F 00 00 B9 FA (0x0000 is the save function code, which means save to user area)

7. Calibrated in air

The sensor is placed in the air and the liquid level is 0 by default, so place the sensor in the air and send the following command to perform automatic calibration:

A. Send instruction: 01 06 00 0F 00 55 79 F6

If success, it will feedback: 01 06 00 0F 00 55 79 F6

8. Make the offset calibration

(1) Need send the following instruction to enter the offset calibration channel

01 06 00 0F 20 20 A1 D1

If success, it will feedback: 01 06 00 0F 20 20 A1 D1

(2) Then make the calibration, for example add 2mm, please send the following instruction



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01 06 00 0C 00 02 C8 08

If success, it will feedback: 01 06 00 0C 00 02 C8 08

(3) For example, if minus 2 mm in the sensors of address 01, then send

01 06 00 0C FF FE 89 B9

If success, it will feedback: 01 06 00 0C FF FE 889 B9