MODBUS Pressure and Level transmitter communication protocol

1.summary:

All message formats are in accordance with GBZ 19582.1-2004 Modbus Based Industrial Automation Network Specification-Part 1: Modbus Application Protocol

This protocol complies with the subset RTU mode in the MODBU-RTU protocol, and the communication mode is the RS485 half-duplex working mode.

2. Serial data format:

Serial port setting: no check, 8 bit data, 1 bit stop bit.

Example: 9600, N, 8,1 meaning: 9600bps, no check, 8 bit data bit, 1 bit stop.

The serial port port rate supported by this transmitter is:

1200,2400,4800,9600,19200,38400，

Check bit supported by this transmitter:

N, O, and E: NONE, ODD, and EVEN.

Polynomial of CRC check: 0 xA 001.

The data in the process of data communication is partially processed according to the double-byte symbolic plastic data. If the data identifies floating points, the writing needs to read the decimal point to determine the size of the data.

The other part is floating point number format, floating point number format is float at format, 4 byte floating point number, large end mode. ABCD byte order.

The functional code of the modbus-rtu protocol supported by this protocol is: 0x03,0x04,0x06,0x10 in total 4 kinds

3. Communication format:

1. Read the command format (03 / 04 function code) for example

A. Send the read command format:

address	FC	Data Start (H)	Data Start (L)	Number of data (H)	Number of data (L)	CRC16 (L)	CRC16 (H)
0X01	0X03	0X00	0X00	0X00	0X01	0X84	0X0A

B. Return to the read data format: for example

address	FC	DL	data (H)	data (L)	CRC16 (L)	CRC16 (H)

0X01	0X03	0X02	0X00	0X01	0X79	0X84

2. Write command format (06 function code)

address	FC	Data Start (H)	Data Start (L)	data (H)	data (L)	CRC16 (L)	CRC16 (H)
0X01	0X06	0X00	0X00	0X00	0X02	0X08	0X0B

B. Return to the read data format: for example

address	FC	Data Start (H)	Data Start (L)	data (H)	data (L)	CRC16 (L)	CRC16 (H)
0X01	0X06	0X00	0X00	0X00	0X02	0X08	0X0B

3. Abnormal response was returned

address	FC	exception code	CRC16 (L)	CRC16 (H)
0X01	0X80 + function code	0x01 (illegal function) 0x02 (illegal data address) 0x03 (illegal data		

Level communication example (read PV)

The address of the 0-5m sensor communication device address is 1, (address range 1-255)

Now the CRC check =C5 CB. Send and return data as follows:

Sent: 01 03 00 04 00 01 C5 CB

Return: 0103 02 09 C4 BF 87

Data 09 C4 hexadecimal system is 2500 decimal system (retain 1 decimal number), so the current liquid level is 250.0cm (in cm unit)

Pressure communication example (read PV):

0-500 kpa pressure sensor communication device address is 1 (address range 1-255)

The CRC check =C5 CB. Send and return data are as follows:

Sent: 01 03 00 04 00 01 C5 CB

Return: 01 03 02 09 C4 BF 87

Data 09 C4 decimal 2500 (retain one decimal)

Therefore, the current liquid level is 250.0kpa (in kpa)

4. Supported commands and commands and data meanings:

The MODBUS-RTU protocol command list is as follows:

FC	Data start address	word number	Byte number	data area	Directive meaning
0x03 / 0x04 Functional code reads the data					
0x03/0x04	0x0000	1	2	1-255	Read from machine address 01 03 00 00 00 01 84 0A
0x03/0x04	0x0001	1	2	0-1200 1-2400 2-4800 3-9600 4-19200 5-38400 6-57600 7-115200	Porter rate read 01 03 00 01 00 01 D5 CA
0x03/0x04	0x0002	1	2	0-MPa, 1- KPa, 2- Pa, 3- bar, 4- mbar, 5-Kgcm2, 6- PSI,6 7-mH2O, 8-mmH2O, 9-inH2O, 10-H2O, 11- mHg- 12-mmHg, 13-inHg, 14-atm, 15-Torr, 16-m, 17cm, 18-mm, 19-Kg, 20-℃ , 21- PH, 22-℉ 23-Empty	Pressure / temperature unit 01030002000125CA

0x03/0x04	0x0003	1	2	0-#### 1-###.# 2-##.## 3-#.### 4-.####	The decimal points represent the 0-4 decimal points, respectively 010300030001740A
0x03/0x04	0x0004	1	2	-32768-32767	Pressure/temperature measurement output value 010300040001C5CB
0x03/0x04	0x0005	1	2	-32768-32767	Transmitter range zero point 010300050001940B
0x03/0x04	0x0006	1	2	-32768-32767	The transmitter range is full point 010300060001640B
0x03/0x04	0x000c	1	2	-32768-32767	Zero bit offset value, the factory is generally 0 0103000C00014409
0x03/0x04	0x0016	2	4	4 Byte floating point number	Measurevalues of floating point specifications 01030016000225CF
0x03/0x04	0x0025	1	2	0-2	Serial check position: 1- none 2- odd 3- even
0x06 the function code to write the data					
0x06	0x0000	1	2	1-255	Overwrite the from-machine address 010600000001480A
0x06	0x0001	1	2	0-1200 1-2400 2-4800 3-9600 4-19200 5-38400 6-57600 7-115200	Modify the Porter rate 010600010003980B
0x06	0x000c	1	2	-32768-32767	Zero-bit offset value. Pressure output value = calibration measurement

					value + zero-bit offset value 0106000C000049C9
0x06	0x0025	1	2	0-2	Serial check bit. 0106002500009801
Save and restore the factory					
0x06	0x000F		2	0- Save to user area	0106000F0000B9C9
0X06	0x0010		2	1-Return to the factory parameters	01060010000149CF

explain:

1. Modifying the wave rate time transmitter will reply the modified data with the port rate sent by the host. After the response, the then the transmitter port rate will change to the modified target value.
2. When the address is modified, the data is also replied with the address before the modification. After the reply, the transmitter address will be automatically modified.
3. The save and reply factory command returns the original value, indicating that the transmitter has accepted the command of the host.
4. When restoring the factory data, it should be noted that the parameters saved by the factory may be inconsistent with the ones saved by the user, so the address, port rate and calibration data may not be consistent, so the transmitter must be searched again after restoring the factory parameters.
5. Users can modify only 4 data, namely address, port rate, check bit, and zero bit offset value. After modification, the user needs to send the save instruction according to the new communication format before the card can be saved.
6. General users are not allowed to modify the calibration data of the transmitter .Self-sending modifying
   the calibration data command will cause the transmitter output comman dexception code.
7. If the data needs to be read by the floating point number, such as 6.000.

   But this agreement stipulates that the data are communicated by plastic data, so the read data is 6000, and then calculated according to the position of the decimal point to get 6.000, for example, the decimal point is 3,6000 / 10 (3), is 6000 divided by 10, get the data of 6.000.
8. Negative values are represented in the complement method.

9. Please refer to the customer evaluation software provided by the company for detailed verification.
10. The floating point data output is added, and the floating point data format is large-end ABCD format, as defined by IEEE754.