Communication Protocol Modbus RTU between Temperature Controller and Upper Computer

I. Interface specifications

In order to connect with a PC or PLC controller to monitor or control the temperature controllers centrally, the temperature controller provides two digital communication interfaces, RS232 and RS485. When the RS232 communication interface is used, the upper computer can only connect one temperature controller with three-wire connection. The transmission distance is about 15 meters. When the RS485 communication interface is used, the upper computer only needs to be equipped with an RS232 to RS485 converter, which can connect up to 64 controllers with two-wire connection. And the transmission distance is about one kilometer.

II. Communication protocol (suitable for all 1 ~ 16 channels of our factory)

1. The communication baud rate is adjustable in 1200, 2400, 4800, and 9600. The data format is 1 start bit, 8 data bits, 1 stop bit, and no parity bit.
2. Upper computer reads a parameter (2 bytes)

Controller number	Function code (03)	Parameter first address	Number of bytes to read	CRC16
1byte	1byte	2byte	2byte	2byte

3. The controller returns (2 bytes):

Controller number	Function code (03)	Parameter first address	Parameter value	CRC16
1byte	1byte	1byte	2byte	2byte

4. Upper computer writes a parameter (2 bytes) and the controller returns (2 bytes) (the frame format is the same):

Controller number	Function code (03)	Parameter first address	Parameter value	CRC16
1byte	1byte	2byte	2byte	2byte

5. Channel display value address:

   *Refer to the temperature controller user manual for parameter codes and addresses

Channel 1: 1001H	Channel 2: 1002H	Channel 3: 1003H	Channel 4: 1004H
Channel 5: 1005H	Channel 6: 1006H	Channel 7: 1007H	Channel 8: 1008H
Channel 9: 1009H	Channel 10: 100AH	Channel 11: 100BH	Channel 12: 100CH
Channel 13: 100DH	Channel 14: 100EH	Channel 15: 100FH	Channel 16: 1010H

6. Main control output status address of the controller:

Channel 1: 1101H	Channel 2: 1102H	Channel 3: 1103H	Channel 4: 1104H
Channel 5: 1105H	Channel 6: 1106H	Channel 7: 1107H	Channel 8: 1108H
Channel 9: 1109H	Channel 10: 110AH	Channel 11: 110BH	Channel 12: 110CH
Channel 13: 110DH	Channel 14: 110EH	Channel 15: 110FH	Channel 16: 1110H

7. Temperature controller alarm output status address:

   1200H

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
AL16	AL15	AL14	AL13	AL12	AL11	AL10	AL9	AL8	AL7	AL6	AL5	AL4	AL3	AL2	AL1

III. Notes

1. The program part of the upper computer to write data to the temperature controller should be added with the parameter limit function according to the specifications of the controller. So as to prevent the data exceeding the range from being written into the controller, and making it unable to work normally. For the code and range of each parameter, see "temperature controller user manual".
2. The interval time for the upper computer to send read or write commands should be greater than or equal to 0.2 seconds. If it is too short, the controller may not have time to respond.
3. The controller doesn't send the decimal point information, so it should be set as needed when programming the upper computer.
4. The measured value is 32767 (7FFFH) means HH (over the upper limit), 32512 (7F00H) means LL (over the lower limit).
5. Except the CRC check byte is low bit first, all other double bytes are high bit first.