PTA9B01 PT100 RS485 sensor protocol

Function code

RS485 address (Station address) (1)	Function (1)	Register address (2)	Read number (2)	CRC16 (2)
	03 Read			
	06 Write			

Read-only register,Read Function code Is 03				
Register address	Register contents	Number of bytes	Units	Remarks
0x0000	Temperature value	2	0.1℃	For example, the data is 255, which is equal to 25.5 ℃
0x0001	PT100 resistance value	2	0.1Ω	For example, the data is 1000, which is equal to 100.0Ω
Read / write register; Read function code is 03 ,Write function code is 06				
0x0002	RS485 address (Station address)	2		Read Address 0XFF Write Address 1-247
0x0003	Baud rate	2		0~4 0:1200 1:2400 2:4800 3:9600（default） 4:19200 5: Factory reset
0x0004	Temperature correction value This register can only be written Data read: 0XFFFF	2	0.1℃	If the temperature is deviated, please input the correct temperature value for correction
0x0005	PT100 resistance correction positive value This register can only be written Data read: 0XFFFF	2	0.1Ω	If the PT100 resistance value is deviated, please input the correct resistance value for correction
0x0006	Automatic upload of temperature	2	Second	0: Query function (default) 1-255: Automatically report, the unit is second. 1: Report every 1 second 2: Report every 2 seconds 10: Report every 10 seconds Maximum interval of 255 seconds

Serial baud rate：9600（default），N，8，1

Modbus RTU Communication protocol：

1. **Read temperature**

Send data

RS485 address (Station address) (1)	Function (1)	Register address (2)	Read number (2)	CRC16(2)

Returns data

RS485 address (Station address) (1)	Function (1)	Number of bytes (1)	data (n)	CRC16(2)

Function code 0x03
Register address：0x0000
Read number：0x0001
The return of the temperature data is two bytes， High-bit in the former and low-bit in the post， convert it to decimal and divided by 10, is the current temperature value；The highest bit 1 indicates a negative value， this value directly subtracting 65536， is the current temperature value.

For example:
send data(RS485 address is 1)：01 03 00 00 00 01 84 0A
Returns data：01 03 02 00 DB F8 1F
01 RS485 address，03 Function，02 length，F8 1F crc16
00DB is the temperature value, the highest bit is 0, so the temperature is positive, it is converted to decimal = 219, 219/10=21.9 is the current temperature value；

Returns data：01 03 02 FF 90 F2 3F
FF90 is the temperature value, the highest bit is 1, so the temperature is negative, it is converted to decimal = 65424, (65424-65536)/10=-11.2 is the current temperature value

2. **Read resistance value of PT100 sensor (corresponding to temperature)**

Send data

RS485 address (Station address) (1)	Function (1)	Register address (2)	Read number (2)	CRC16(2)

Returns data

RS485 address (Station address) (1)	Function (1)	Number of bytes (1)	data (n)	CRC16(2)

Function code 0x03
Register address：0x0000
Read number：0x0002
The return of the resistance value data is two bytes， High-bit in the former and low-bit in the post， convert it to decimal and divided by 10, is the resistance value ；
For example:
send data(RS485 address is 1)：**01 03 00 01 00 01 D5 CA**
Returns data：01 03 02 03 E9 79 3A
01 RS485 address，03 Function，02 length，79 3A crc16
03E9 is the resistance value, it is converted to decimal = 1001, 1001/10=100.1 is the resistance value；

3. Read RS485 address

Send data

RS485 address (Broadcast address) (1)	Function (1)	Register address (2)	Read number (2)	CRC16(2)

Returns data

RS485 address (Broadcast address) (1)	Function (1)	Number of bytes (1)	data (n)	CRC16(2)

Broadcast address 0xff
Function code 0x03
Register address：0x0002
Read number：0x0001

For example:
send data：FF 03 00 02 00 01 30 14
Returns data：FF 03 02 00 01 50 50
FF Broadcast address，03 Function，02 length，01 is the current module RS485 address , 50 50 crc16
Note: When using this command, only one temperature module can be connected to the RS485 bus, more than one will be wrong!

4. Write RS485 address

Send data

RS485 address (Station address) (1)	Function (1)	Register address (2)	Setting Content (2)	CRC16(2)

Returns data

RS485 address (Station address) (1)	Function (1)	Register address (2)	Register value (2)	CRC16(2)

Function code 0x06
Register address：0x0002
Setting Content：2Bytes(1-247)

For example, The current RS485 address is 1, We need to change the RS485 address to 3:
send data(RS485 address is 1)：01 06 00 02 00 03 68 0B
Returns data：01 06 00 02 00 03 68 0B

5. Read baud rate

Send data

RS485 address (Station address) (1)	Function (1)	Register address (2)	Read number (2)	CRC16(2)

Returns data

RS485 address (Station address) (1)	Function (1)	Number of bytes (1)	data (n)	CRC16(2)

Function code 0x03
Register address：0x0003
Read number：0x0001
For example:
send data(RS485 address is 1)：01 03 00 03 00 01 74 0A
Returns data：01 03 02 00 03 F8 45
01 RS485 address，03 Function，02 length，38 F1 crc16
03 means the current baud rate is 9600bps
Baud rate corresponds to the number: 0: 1200 1: 2400 2: 4800 3: 9600 4: 19200

6. Write baud rate

Send data

Slave ID(Device Address) (1)	Function (1)	Register address (2)	Setting Content (2)	CRC16(2)

Returns data

Slave ID(Device Address) (1)	Function (1)	Register address (2)	Register value (2)	CRC16(2)

Function code 0x06

Slave ID : 0x01~0xFE

Register address: 0x0003

Setting Content: 2Bytes(0-4)

For example, Change the baud rate to 4800bps:

send data(Slave ID is 1): 01 06 00 03 00 02 F8 0B

Returns data: 01 06 00 03 00 02 F8 0B

Baud rate corresponds to the number: 0: 1200 1: 2400 2: 4800 3: 9600 4: 19200

5: Factory reset

Note: 1 The baud rate will be updated when the module is powered up again!

2 The factory setting can be restored when the baud rate corresponding to the number is 5.

For example: 01 06 00 03 00 05 B9 C9

7. Set the temperature correction value

If the collected temperature deviates from the actual temperature, please input the correct temperature value in this register.

Send data

RS485 address (Station address) (1)	Function (1)	Register address (2)	Setting Content (2)	CRC16(2)

Returns data

RS485 address (Station address) (1)	Function (1)	Register address (2)	Register value (2)	CRC16(2)

Function code 0x06

Register address: 0x0004

Setting Content: 2Bytes

Setting value: 2 bytes, the highest bit represents the sign of positive and negative values, 0 represents positive, 1 represents negative, and the unit is 0.1°C. When the highest bit is 1, it means a negative value. At this time, you need to add 1 to this value, or you can directly subtract 65536 from this value to get the current temperature value.

For example 1: The correct temperature is 25.5°C, and the temperature read is 26.4°C. It can be corrected by entering the correct temperature. 25.5*10=255, converted to hexadecimal 0XFF
Send frame: 01 06 00 04 00 FF 88 4B
Return frame: 01 06 00 04 00 FF 88 4B The return frame is the same as the send frame.

For example 2: Change the temperature to -12.1℃, 65536-121=65,415 =0XFF87
Send frame: 01 06 00 04 FF 87 C9 99
Return frame: 01 06 00 04 FF 87 C9 99 The return frame is the same as the send frame.

8. Set PT100 resistance correction value

If the collected PT100 resistance value deviates from the actual resistance value, please input the correct resistance value in this register.

Send data

RS485 address (Station address) (1)	Function (1)	Register address (2)	Setting Content (2)	CRC16(2)

Returns data

RS485 address (Station address) (1)	Function (1)	Register address (2)	Register value (2)	CRC16(2)

Function code 0x06
Register address: 0x0005
Setting Content: 2Bytes
For example : The current PT100 resistance is 100Ω, and the read value is 102Ω. It can be corrected by entering the correct resistance value. 100*10=1000, converted to hexadecimal 0X03E8

Send frame: 01 06 00 05 03 E8 99 75
Return frame: 01 06 00 05 03 E8 99 75 The return frame is the same as the send frame.

9. Read temperature automatic reporting function

Send data

RS485 address	Functio	Register address	Read number (2)	CRC16(2

(Station address)(1)	n (1)	(2)		)

Returns data

RS485 address (Station address)(1)	Function (1)	Number of bytes (1)	data (n)	CRC16(2)

Function code 0x03
Register address：0x0006
Read number：0x0001
For example:
send data(RS485 address is 1)：01 03 00 06 00 01 64 0B
Returns data：01 03 02 00 00 B8 44
01 RS485 address，03 Function，02 length，00 means query function ,
B8 44 crc16

10. Set temperature automatic reporting function

Send data

RS485 address (Station address)(1)	Function (1)	Register address (2)	Setting Content (2)	CRC16(2)

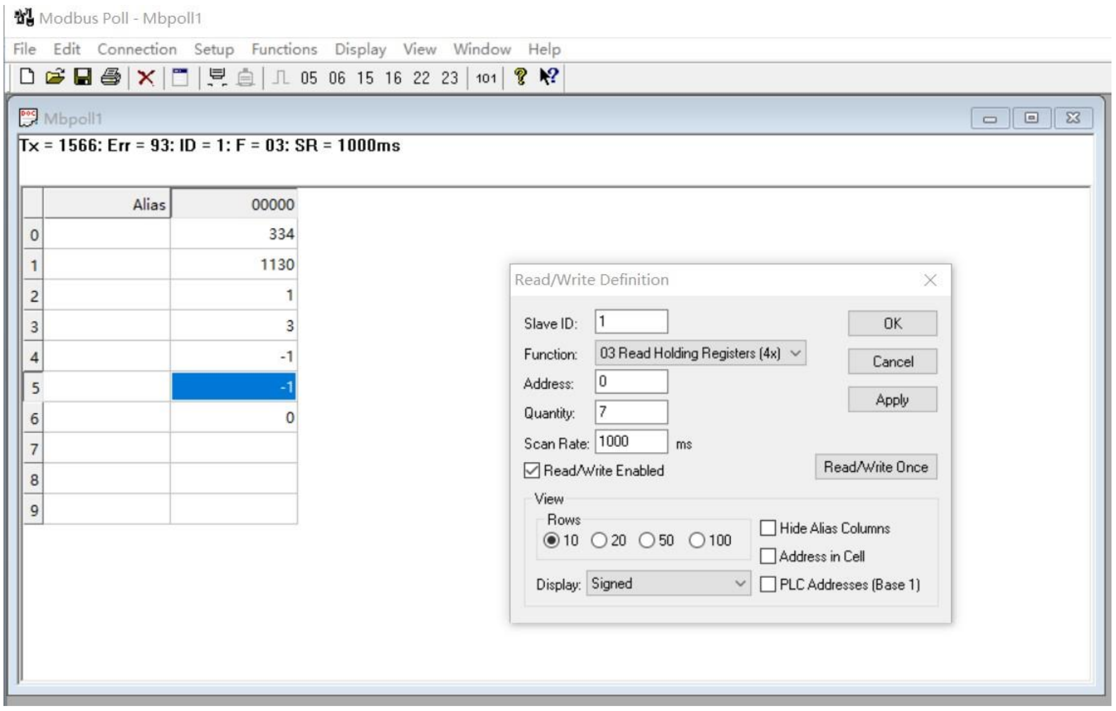
Returns data

RS485 address (Station address)(1)	Function (1)	Register address (2)	Register value (2)	CRC16(2)

Function code 0x06
Register address：0x0006
Setting Content：1Bytes
For example : For example, the current query function should be changed to automatic reporting:
Automatically report in 1 second, send frame (address is 1) 01 06 00 06 00 01 A8 0B
Automatically report in 2 second, send frame (address is 1) 01 06 00 06 00 02 E8 0A
Automatically report in 3 second, send frame (address is 1) 01 06 00 06 00 03 29 CA
Automatically report in 4 second, send frame (address is 1) 01 06 00 06 00 04 68 08
Automatically report in 5 second, send frame (address is 1) 01 06 00 06 00 05 A9 C8
Automatically report in 10 second, send frame (address is 1) 01 06 00 06 00 0A E9 CC

Disable reporting function: send frame (address is 1) 01 06 00 06 00 00 69 CB

MODBUS commands you can use "Modbus Poll" input, The value of 7 registers can be read as shown below（CRC check generated automatically）


Modbus Poll - Mbpoll1
File Edit Connection Setup Functions Display View Window Help
Mbpoll1

Tx = 1566: Err = 93: ID = 1: F = 03: SR = 1000ms

	Alias	00000
0		334
1		1130
2		1
3		3
4		-1
5		-1
6		0
7		
8		
9		

Read/Write Definition

Slave ID: 1
Function: 03 Read Holding Registers (4x)
Address: 0
Quantity: 7
Scan Rate: 1000 ms
[✓] Read/Write Enabled
View
Rows: [● 10] ○ 20 ○ 50 ○ 100
Display: Signed
☐ Hide Alias Columns
☐ Address in Cell
☐ PLC Addresses (Base 1)

OK
Cancel
Apply
Read/Write Once

You can also use HyperTerminal serial input, as shown below
（Manually add CRC check）

Ready: COM1

CRC check code(C51 MCU)：

const unsigned char code auchCRCHi[256] = {

```
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00,
0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00,
0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00,
0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00,
0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00,
0xC1, 0x81, 0x40,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00,
0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00,
0xC1, 0x81, 0x40,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41,
0x01, 0xC0, 0x80, 0x41, 0x00, 0xC1, 0x81, 0x40, 0x00, 0xC1, 0x81, 0x40, 0x01,
0xC0, 0x80, 0x41,
0x00, 0xC1, 0x81, 0x40, 0x01, 0xC0, 0x80, 0x41, 0x01, 0xC0, 0x80, 0x41, 0x00,
0xC1, 0x81, 0x40
} ;
const unsigned    char code auchCRCLo[256] = {
0x00, 0xC0, 0xC1, 0x01, 0xC3, 0x03, 0x02, 0xC2, 0xC6, 0x06, 0x07, 0xC7, 0x05,
0xC5, 0xC4,0x04,
0xCC, 0x0C, 0x0D, 0xCD, 0x0F, 0xCF, 0xCE, 0x0E, 0x0A, 0xCA, 0xCB, 0x0B, 0xC9,
0x09, 0x08, 0xC8,
0xD8, 0x18, 0x19, 0xD9, 0x1B, 0xDB, 0xDA, 0x1A, 0x1E, 0xDE, 0xDF, 0x1F, 0xDD,
0x1D, 0x1C, 0xDC,
0x14, 0xD4, 0xD5, 0x15, 0xD7, 0x17, 0x16, 0xD6, 0xD2, 0x12, 0x13, 0xD3, 0x11,
0xD1, 0xD0, 0x10,
0xF0, 0x30, 0x31, 0xF1, 0x33, 0xF3, 0xF2, 0x32, 0x36, 0xF6, 0xF7, 0x37, 0xF5,
0x35, 0x34, 0xF4,
0x3C, 0xFC, 0xFD, 0x3D, 0xFF, 0x3F, 0x3E, 0xFE, 0xFA, 0x3A, 0x3B, 0xFB, 0x39,
0xF9, 0xF8, 0x38,
0x28, 0xE8, 0xE9, 0x29, 0xEB, 0x2B, 0x2A, 0xEA, 0xEE, 0x2E, 0x2F, 0xEF, 0x2D,
0xED, 0xEC, 0x2C,
0xE4, 0x24, 0x25, 0xE5, 0x27, 0xE7, 0xE6, 0x26, 0x22, 0xE2, 0xE3, 0x23, 0xE1,
0x21, 0x20, 0xE0,
0xA0, 0x60, 0x61, 0xA1, 0x63, 0xA3, 0xA2, 0x62, 0x66, 0xA6, 0xA7, 0x67, 0xA5,
0x65, 0x64, 0xA4,
0x6C, 0xAC, 0xAD, 0x6D, 0xAF, 0x6F, 0x6E, 0xAE, 0xAA, 0x6A, 0x6B, 0xAB, 0x69,
0xA9, 0xA8, 0x68,
0x78, 0xB8, 0xB9, 0x79, 0xBB, 0x7B, 0x7A, 0xBA, 0xBE, 0x7E, 0x7F, 0xBF, 0x7D,
0xBD, 0xBC, 0x7C,
0xB4, 0x74, 0x75, 0xB5, 0x77, 0xB7, 0xB6, 0x76, 0x72, 0xB2, 0xB3, 0x73, 0xB1,
0x71, 0x70, 0xB0,
0x50, 0x90, 0x91, 0x51, 0x93, 0x53, 0x52, 0x92, 0x96, 0x56, 0x57, 0x97, 0x55,
0x95, 0x94, 0x54,
0x9C, 0x5C, 0x5D, 0x9D, 0x5F, 0x9F, 0x9E, 0x5E, 0x5A, 0x9A, 0x9B, 0x5B, 0x99,
0x59, 0x58, 0x98,
0x88, 0x48, 0x49, 0x89, 0x4B, 0x8B, 0x8A, 0x4A, 0x4E, 0x8E, 0x8F, 0x4F, 0x8D,
0x4D, 0x4C, 0x8C,
0x44, 0x84, 0x85, 0x45, 0x87, 0x47, 0x46, 0x86, 0x82, 0x42, 0x43, 0x83, 0x41,
0x81, 0x80,0x40
} ;
```

```
unsigned int CRC_16(unsigned char *str,unsigned int usDataLen)
{
 unsigned char uchCRCHi = 0xFF ; /* high byte of CRC initialized */
 unsigned char uchCRCLo = 0xFF ; /* low byte of CRC initialized */
       unsigned uIndex ; /* will index into CRC lookup table */
       while (usDataLen--)/* pass through message buffer */
       {
           uIndex = uchCRCHi ^ *str++ ; /* calculate the CRC */
           uchCRCHi = uchCRCLo ^ auchCRCHi[uIndex];
           uchCRCLo = auchCRCLo[uIndex] ;
       }
 return (uchCRCHi << 8 | uchCRCLo) ;
}
```