**NT28B16 modbus rtu protocol**

**Function code : 03 Read/06 Write**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register address | Register contents | Register value | Remarks | R/W |
| 0x0000-0x000F  (0-15) | CH1-CH16  Temperature value | Unit 0.1℃ e.g :The read value is 213 ,the temperature is 21.3 | | R |
| 0x0020-0x002F  (32-47) | CH1-CH16  Resistance value | Unit 0.01KΩ e.g :The read value is 1012 ,the Resistance value 10.12KΩ | | R |
| 0x0040-0x004F  (64-79) | CH1-CH16 Temperature Correction value | >0 Temperature increase  <0 temperature decrease  Default : 0 | | R/W |
| 0x0060-0x006F  (96-111) | CH1-CH16  Resistance  Correction value | >0 Resistance increase  <0 Resistance decrease  Default : 0 | | R/W |
|  |  |  |  |  |
| 0x00F8  (248) | Automatic Temperature/Resistance report | 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 | | R/W |
| 0x00F9  (249) | Resistance temperature selection report | 0: Select the temperature value automatic reporting register: 0x0000-0x000F  1 : Select resistance value automatic reporting register: 0x0020-0x002F | | R/W |
| 0x00FB  (251) | Factory Reset | 00 | Factory Reset：  Enter the following command at the current baud rate:  FF 06 00 FB 00 00 ED E5 | R/W |
| 0x00FC  (252) | Command Return Time | 0-25 | Time interval for command return (unit: 40MS) Setting value: 0-25 | R/W |
| 0x00FD  (253) | RS485 address  (Station address) | Read address：FF 03 00 FD 00 01 00 24；  Set address to 0x02: FF 06 00 FD 00 02 8C 25 | | R/W |
| 0x00FE  (254) | Baud rate | 0-255 | 0:1200 1:2400 2:4800  3:9600（default）4:19200  5:38400 6：57600  7：115200  Others：Factory reset | R/W |
| 0x00FF  (255) | Parity | 0-2 | 0 None Parity  1 Even Parity  2 Odd Parity | R/W |

**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) |

RS485 address:0x01-0xFE

Function code 0x03

Register address：0x0000-0x000F 1-16channel temperature value

Read number：0x0001-0x0010

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: Read CH1 temperature value:

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；

For example: Read CH2 temperature value:

Send data(RS485 address is 1)：01 03 00 01 00 01 D5 CA

Returns data：01 03 02 FF 90 F9 D8

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

1. **Read NTC Resistance value**

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) |

RS485 address:0x01-0xFE

Function code 0x03

Register address：0x0020-0x002F 1-16channel Resistance value

Read number：0x0001-0x0010

The data length of the returned NTC resistance value is two bytes, the high order is in the front and the low order, and the two bytes are converted into a decimal number and then multiplied by 0.01k to be the NTC resistance value

For example: Read CH1 Resistance value:

Send data(RS485 address is 1)：01 03 00 20 00 01 85 C0

Returns data：01 03 02 04 8E 3A E0

01 RS485 address，03 Function，02 length，3A E0 crc16

048E is the resistance value, it is converted to decimal = 1166, 1166/100=11.66KΩ is the current resistance value；

1. **Set the temperature correction value**

If the temperature of the module deviates from the actual temperature, it can be corrected with this value. >0 temperature increases, <0 temperature decreases.

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) |

RS485 address:0x01-0xFE

Function code Write 0x06,Read 0x03

Register address：0x0040-0x004f,1-16 Channel temperature correction value

Setting Content：2Bytes

The highest digit indicates a positive or negative sign, 0 indicates positive, and 1 indicates negative, and the unit is 0.1 °C. When the highest bit is 1, it indicates a negative value. In this case, you need to add 1 to this value. You can also subtract 65536 from the value, which is the current temperature value. Prohibit the correction value to set the register to "0X0000"

For example 1: CH1 offset value is set to 2.0 °C

Send frame: 01 06 00 40 00 14 88 11

Return frame: 01 06 00 40 00 14 88 11 The return frame is the same as the send frame.

For example 2:CH2 the offset value is set to -3.0 ° C, 65536-30 = 65506 =0XFFE2

Send frame: 01 06 00 41 FF E2 18 67

Return frame: 01 06 00 41 FF E2 18 67 The return frame is the same as the send frame.

For example 3: CH3 Prohibit the correction value and set the register to "0X0000"

Send frame: 01 06 00 42 00 00 29 DE

Return frame: 01 06 00 42 00 00 29 DE The return frame is the same as the send frame.

**Special function Register**

**1.Set the 485 address(Slave ID)**

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) |

Modbus Address(PLC)：40254

RS485 address :0x01~0Xf8/0XFF

Function code:Write 0x06,Read 0x03

Register address:0x00FD(253)

Value: 2 bytes (values 1-248)

For example 1: Set the current device address to 0x02

Send data(address is 1): 01 06 00 FD 00 02 99 FB

Return data : 01 06 00 FD 00 02 99 FB

Send data(don't know the address): FF 06 00 FD 00 02 8C 25

Return data : FF 06 00 FD 00 02 8C 25

For example 2: Read device address(0X0001)

Send data : FF 03 00 FD 00 01 00 24

Return data : 01 03 02 00 01 79 84

Note：With this command, there can be only one module on the bus 485，More than one will go wrong!

**2.Write 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) |

Modbus Address(PLC)：40255

RS485 address :0x01~0x3F

Function code:Write 0x06;Read 0x03

Register address:0x00FE(254)

Value: 2 bytes (values 0-7)

For example 1, Change the baud rate to 4800bps:

Send data(address 1):01 06 00 FE 00 02 69 FB

Return data :01 06 00 FE 00 02 69 FB

Baud rate corresponds to the number: 0:1200 1:2400 2:4800 3:9600 4:19200 5:38400 6:57600 7: 115200 8: Factory reset

Note: 1 The baud rate will be updated only when the module is powered on again when this command is used!

2 When the number corresponding to the baud rate is 8, the factory settings can be restored

For example:01 06 00 FE 00 08 E9 FC

For example 2 Read the current baud rate:

Send data(address 1):01 03 00 FE 00 01 E5 FA

Return data :01 03 02 00 03 F8 45

01 RS485 address，03 Function,02 length,F8 45 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 5：38400 6:57600 7: 115200

**3. Set the temperature value/resistance value to automatically report (16 channels are set at the same time)**

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) |

Modbus Address(PLC)：40249

RS485 address :0x01~0x3F

Function code:Write 0x06;Read 0x03

Register address:0x00F8(248)

Value: 2 bytes (values 0-255)

For example : For example, the current query function should be changed to automatic reporting:

1 second automatic report : 01 06 00 F8 00 01 C9 FB

2 second automatic report : 01 06 00 F8 00 02 89 FA

3 second automatic report : 01 06 00 F8 00 03 48 3A

4 second automatic report : 01 06 00 F8 00 04 09 F8

5 second automatic report : 01 06 00 F8 00 05 C8 38

10 second automatic report: 01 06 00 F8 00 0A 88 3C

Disable reporting function(Query function): 01 06 00 F8 00 00 08 3B

**4.Set the current reporting mode**

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) |

Modbus Address(PLC)：40250

RS485 address :0x01~0x3F

Function code:Write 0x06;Read 0x03

Register address:0x00F9(249)

Value: 2 bytes (values 0-255)

0: Select the temperature value automatic reporting register: 0x0000-0x000F

1 : Select resistance value automatic reporting register: 0x0020-0x002F

For example Set the resistance value of 16 channels to be automatically reported:

Send data(address 1):01 06 00 F9 00 01 98 3B

Return data :01 06 00 F9 00 01 98 3B

**5.Set Command(Date) Return Time**

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) |

Modbus Address(PLC)：40253

RS485 address :0x01~0x3F

Function code:Write 0x06;Read 0x03

Register address:0x00FC(252)

Value: 2 bytes (values 0-25)

For example, set the data return delay to 200ms

Send data(address 1):01 06 00 FC 00 05 89 F9

Return data :01 06 00 FC 00 05 89 F9

Return the delay time calculation formula:X = 05 \* 40 = 200MS

Note: The maximum can be set to 1000MS. If it exceeds 1000MS, that is, the setting value is greater than 25, and the data return delay will be initialized.

That is: 01 06 00 FC 00 20 48 22 can make the data return delay to restore initialization 0

**6.Set Parity**

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) |

Modbus Address(PLC)：40256

RS485 address :0x01~0x3F

Function code:Write 0x06;Read 0x03

Register address:0x00FF(255)

Value: 2 bytes (values 0-2)

For example, set the parity to Even parity

Send data(address 1):01 06 00 FF 00 01 78 3A

Return data :01 06 00 FF 00 01 78 3A

0 None Parity 1 Even Parity 2 Odd Parity

Note: 1. When using this command, the module is powered on again, and the check digit will be updated!

2. When the setting is greater than 2, the default value will be restored to 0 after powering on again, and there will be no verification.

**7.Factory reset:**

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) |

Modbus Address(PLC)：40252

RS485 address : 0x01~0x3F

Function code:Write 0x06;

Register address:0x00FB(251)

Send data(address 1):FF 06 00 FB 00 00 ED E5

Return data :FF 06 00 FB 00 00 ED E5