Huaqingjun PT100 Temperature Acquisition Module General Manual

Hello dear customer:

Please read the operating instructions and precautions carefully before starting to use to reduce accidents.

The personnel responsible for installation and operation should strictly follow the safety regulations. The safety problems in the instructions do not represent all of them.

It only represents a supplement to each safety precaution.

4-Channel PT100 Instruction Manual Contents

Chapter 1: Hardware Parameters

1：Analog Acquisition Module

Technical parameter	Description
Number of input channels	4-Channel
Working voltage	DC 8V~35V（With reverse polarity protection）
Working current	<200mA
Signal input method	PT100（2, 3, 4 wire compatible input）
Resolution	15 bits
Accuracy class	Better than ±0.2℃
Communication interface	RS485 hardware isolation
Communication protocol	Standard Modbus RTU protocol
Communication baud rate	1200/2400/4800/960/19200/38400/57600/115200bps
Communication data format	8 data bits, 1/2 stop bits, parity check, no check can be set
Communication distance	>1000 meters
Protection measures	Power input polarity protection, communication error indication
Installation method	Standard 35mm U-rail
Environmental requirements	Temperature range: -10~65℃, humidity range: 0~85% without condensation

Chapter 2: Setting of Communication Way (DIP switch)

Note: For all 485 communication modules of our company, the gear of the DIP switch must be configured before the first use. Each time the DIP switch is changed, its settings will take effect after the next power cycle.

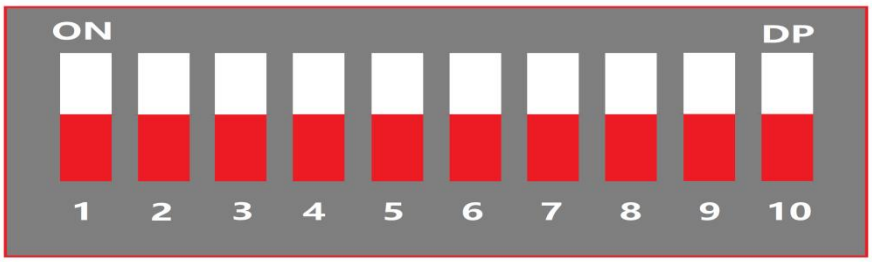
Factory default:

Device address: 1

Baud rate: 9600bps

Data format: 8 data bits, 1 stop bit, no parity;

Communication timeout: 10 seconds



Data verification of communication port	S1	S2
No verification	0FF	OFF
Odd verification	OFF	ON
Even verification	ON	ON

Baud rate options	S3	S4	S5
1200	OFF	OFF	OFF
2400	OFF	OFF	ON
4800	OFF	ON	OFF
9600	OFF	ON	ON
19200	ON	OFF	OFF
38400	ON	OFF	ON
57600	ON	ON	OFF
115200	ON	ON	ON

Setting of module hardware address	S6	S7	S8	S9	S10
0	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	ON	ON
4	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	ON	OFF	ON
6	OFF	OFF	ON	ON	OFF
7	OFF	OFF	ON	ON	ON
8	OFF	ON	OFF	OFF	OFF
9	OFF	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON	OFF
11	OFF	ON	OFF	ON	ON
12	OFF	ON	ON	OFF	OFF

13	**OFF**	**ON**	**ON**	**OFF**	**ON**
14	**OFF**	**ON**	**ON**	**ON**	**OFF**
15	**OFF**	**ON**	**ON**	**ON**	**ON**
16	**ON**	**OFF**	**OFF**	**OFF**	**OFF**
17	**ON**	**OFF**	**OFF**	**OFF**	**ON**
18	**ON**	**OFF**	**OFF**	**ON**	**OFF**
29	**ON**	**OFF**	**OFF**	**ON**	**ON**
20	**ON**	**OFF**	**ON**	**OFF**	**OFF**
21	**ON**	**OFF**	**ON**	**OFF**	**ON**
22	**ON**	**OFF**	**ON**	**ON**	**OFF**
23	**ON**	**OFF**	**ON**	**ON**	**ON**
24	**ON**	**ON**	**OFF**	**OFF**	**OFF**
25	**ON**	**ON**	**OFF**	**OFF**	**ON**
26	**ON**	**ON**	**OFF**	**ON**	**OFF**
27	**ON**	**ON**	**OFF**	**ON**	**ON**
28	**ON**	**ON**	**ON**	**OFF**	**OFF**
29	**ON**	**ON**	**ON**	**OFF**	**ON**
30	**ON**	**ON**	**ON**	**ON**	**OFF**
31	**ON**	**ON**	**ON**	**ON**	**ON**

Chapter 3: Register Information

1：“4-Channel PT100 Analog Acquisition ” Register Information

Input port	Register address (hexadecimal)	PLC register address	Remark	Attributes
Input channel Ai1	0x0064	40101	**Actual temperature=collected value/10** **E.g:** **The collection is 0x00FF (255), then the temperature = 25.5 degrees**	Read only
Input channel Ai2	0x0065	40102		Read only
Input channel Ai3	0x0066	40103		Read only
Input channel Ai4	0x0067	40104		Read only

2：Communication Timeout Register

Timeout register	Register address (hexadecimal)	Register address (decimal)	Remark	Attributes
High-bit	0x7530（Power-off save）	30000	**Communication timeout (default 10 seconds)**	Read/write
Low-bit	0x7531（Power-off save）	30001		Read/write

Timeout register description:

If the communication is interrupted for some reason, and the failure time is greater than the time set in the timeout register, it is considered that the communication has timed out (the fault indicator on the module will be always on, and it will not go out until the communication is normal)

Example: If the timeout is set to 3 seconds, two registers need to be written:

Because 3 seconds = 3000 milliseconds; 3000 (decimal) = 0x0bb8 (hexadecimal)

So 7530H=0x0000 and 7531H=0x0bb8

Analysis: [0x0000 (high 16 bits) *65536] + 0x0bb8 (low 16 bits) = 0x0bb8 (ie 3000mS)

Chapter 4: Modbus-RTU Communication Implementation

1：Modbus-RTU Function Code

Function code	Function	Attributes	Related products
0x03	Read single or consecutive multiple registers	Read	PT100 temperature acquisition module
0x06	Write to a single holding register	Write	PT100 temperature acquisition module
0x10	Write multiple holding registers consecutively	Write	PT100 temperature acquisition module

2：03 Function code read single or consecutive multiple registers

Note: Non-existent holding registers or discrete registers cannot be read, otherwise the module will respond with an error message.

Example: The master requests to read the value of 1 holding register starting from address 0064H

1） Main station demand.

Demand contents	Length	Scope	Example
Sub-station address	1 byte	0x00～0x1F	0x01
Function code	1 byte	0x03	0x03
Initial address	2 bytes		0x0064
Input quantity	2 bytes	0x0001～0x0004	0x0001
CRC verification	2 bytes		0xC5D5

2）**Abnormal Response from sub-station**

Demand contents	Length	Scope	Example
Sub-station address	1 byte	0x00～0x1F	0x01
Function code	1 byte	0x03	0x03
Number of valid bytes	1 byte		0x02
Data collected	2*N bytes	Return length：input quantity(N) * 2	0x00FF
CRC verification	2 bytes		0xF804

Palindrome analysis: There are 1 data collected, respectively.

are the input channel Ai1

Ai1=0x00FF (decimal 255) ie 255/10=25.5℃

If the return code is 0xEEEE (invalid value), it means that the PT100 temperature acquisition module has not collected the data of the PT100, and it is necessary to check whether the wiring of the PT100 is correct.

3）The abnormal response from the sub-station.

Demand contents	Length	Scope	Example
Sub-station address	1 byte	0x00～0x1F	0x01
Function code	1 byte		0x83
Error code	1 byte	0x01（not a supported function code）	0x01
		0x02（the initial address is out the range of specification）	
		0x03（the register quantity is beyond the specification）	
		0x04（data checking error）	
CRC verification	2 bytes		0x80F0

If the acquisition module replies to this message, you need to troubleshoot one by one according to the error code in the response

3：06 Function code write to a single holding register

Attention: The holding register designated in the demand must exist and is editable. Otherwise, the module will give an error response.

1） The main station demand

Example: Change the high-bit register of the timeout time of PT100

Demand contents	Length	Scope	Example
Sub-station address	1 byte	0x00～0x1F	0x01
Function code	1 byte	0x06	0x06
Initial address	2 bytes		0x7530
Register value	2 bytes		0x0000
CRC verification	2 bytes		0x93C9

2） Normal response from the sub-station

Demand contents	Length	Scope	Example
Sub-station address	1 byte	0x00～0x1F	0x01
Function code	1 byte	0x06	0x06
Initial address	2 bytes		0x7530
Register value	2 bytes		0x0000
CRC verification	2 bytes		0x93C9

3） The abnormal response from the sub-station

Demand contents	Length	Scope	Example
Sub-station address	1 byte	0x00～0x1F	0x01
Function code	1 byte		0x86
Error code	1 byte	0x01（not a supported function code）	0x01
		0x02（the initial address is out the range of the module）	
		0x03（the register is not within the specified sphere）	
		0x04（data verification error）	
CRC verification	2 bytes		0x83A0

If the acquisition module replies to this message, you need to troubleshoot one by one according to the error code in the response.

3：10 Function code write to a single holding register

Attention: The holding register designated in the demand must exist and is editable. Otherwise, the module will give an error response.

1） The main station demand

Example: Change the high register (0x7530) and low register (0x7531) of the timeout time of PT100

Demand contents	Length	Scope	Example
Sub-station address	1 byte	0x00～0x1F	0x01
Function code	1 byte	0x10	0x10
Initial address	2 bytes		0x7530
Number of registers	2 bytes	N	0x0002
Byte quantity	1 byte	2*N	0x04
Register value	2*N bytes		0x0000
			0x2710
CRC verification	2 bytes		0xB015

2） The normal response from the sub-station

Demand contents	Length	Scope	Example
Sub-station address	1 byte	0x00～0x1F	0x01
Function code	1 byte	0x10	0x10
Initial address	2 bytes		0x7530
Register value	2 bytes		0x0002
CRC verification	2 bytes		0x5BCB

3）The abnormal response from the sub-station

Demand contents	Length	Scope	Example
Sub-station address	1 byte	0x00～0x1F	0x01
Function code	1 byte		0x90
Error code	1 byte	0x01（not a supported function code）	0x01
		0x02（initial address is out the range of the specification）	
		0x03（the coil quantity is out the range of the specification）	

		0x04（data verification error）	
CRC verification	2 bytes		0x8DC0

If the acquisition module replies to this message, you need to troubleshoot one by one according to the error code in the response.

Chapter 5: Description of Module Indicators

System indicator

There are 3 system indicators ("power indicator", "communication indicator", "timeout indicator")

Power indicator: When the module is connected to the working voltage, the power indicator will be lit.

Communication indicator light: When the module detects that there is satisfactory data on the 485 bus, the light will flash, otherwise it will go out. When the speed of the data is fast, the flashing speed of the light will be faster, and even the effect will be always on.

Timeout indicator: When the module loses communication and the disconnection time exceeds the time specified by the timeout register, the timeout indicator will be lit, otherwise, if the communication is normal, the indicator will be off.

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