5-CH RTD Temperature Signal to RS485/232 Acquisition Converter
(24 Bits A/D Converter, data acquisition)

Features:
>> Five temperature signal acquisition, isolated converter RS-485/232 output
>> 24-bit AD converter, testing accuracy > 0.05%
>> 4-wire measurement, long-term compensation, high accuracy
>> Support RTD broken-wire detection
>> Programmable PT100 or PT1000 signal input
>> Can be programmed calibration module precision through RS485/232 interface
>> 3000VDC Isolation between signal input and signal output
>> Wide power supply range: 8~32VDC
>> Supports MODBUS RTU protocol
>> DIN35 Rail-mounted
>> Users can set module address, baud rate and so on

Typical Application:
>> Temperature signal measurement/monitoring/control
>> RS-485 remote I/O, data acquisition
>> RS-232/485 bus industrial automation control system
>> Industrial field signal data acquisition and recording
>> Industrial field signal isolation and long-term transmission
>> Medical, industrial product development

Product Overview:
WAYJUN WJ25 series products realize the signal acquisition between sensor and host, to measure five channels temperature signal. WJ25 series products can be applied to RS-232/485 bus industrial automation control system, temperature signal measurement, monitoring and control and so on.

Products include power supply isolation, signal isolation, linearization, A/D conversion and RS-485 serial communication. Each serial interface can connect up to 255 pieces WJ25 Series modules, communication using ASCII code or MODBUS RTU communication protocol, and its instruction set compatible with the ADAM modules, baud rate can be set by the code, with other manufacturers control module hang in the same RS-485 bus for easy programming.
WJ25 series products are based on SCM's intelligent monitoring and control system, users set the calibration value, address, baud rate, data format, checksum status, and configuration information are all stored in nonvolatile memory EEPROM.

WJ25 products are according to industry standard design, isolation between signal input / output, can withstand voltage 3000VDC, high anti-interference ability and reliability. Operating temperature range is -45 ~ +85 °C.

Function Description:
WJ25 signal isolation acquisition module can be used to measure five channels temperature signal,

1. Temperature signal input
24-Bit acquisition accuracy, 5-CH temperature signal input. All products signal input range have been calibrated. In use, users also can program calibration easily.

2. Communication protocol
   - Communication Interface: one channel standard RS-485 communication interface, or one standard RS-232 communication interface, specify when ordering.
   - Communication Protocols: supports two protocols, characters protocol of the command set defined and MODBUS RTU communication protocol. Can be programmed using the kind of communication protocol, can be achieved with PLC, RTU of many Brands or computer monitoring system for network communication.

   - Data Format: 10 Bits. 1 start bit,8 data bits,1 stop bit.
   - Address: (0 to 255) and baud rate (2400,4800,9600,19200,38400,57600,115200bps) can be set, the most long-distance about communication networks is up to 1200 meters, through the twisted-pair shielded cable.
   - Communication interface of high anti-jamming design, ± 15KV ESD protection, communication response time is less than 100mS.

3. Anti-jamming
According to need to set the checksum. Module internal has transient suppression diodes, can inhibit a variety of surge pulse, protection module, and internal digital filter can also be well suppressed from the grid frequency interference.

Product Selection:

<table>
<thead>
<tr>
<th>WJ25</th>
<th>Interface</th>
<th>485: output is RS-485 interface</th>
<th>232: output is RS-232 interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part No.: WJ25-485 means RTD temperature signal input, output is RS485 interface</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part No.: WJ25-232 means RTD temperature signal input, output is RS232 interface</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WJ25 General parameters:
(typical @ +25 °C, Vs to 24VDC)

- Input type: PT100 input / PT1000 input
- Accuracy: 0.05%
- Temperature drift: ± 30 ppm / °C (± 50 ppm / °C, maximum)
- Input temperature range: (1) PT100,-200–400°C (2) PT1000,-200–600°C (3) PT1000,-200–400°C (4) PT1000,-200–600°C
- AD Conversion rate: 5 Sps
- Common Mode Rejection (CMR): 120 dB (1kΩ Source Imbalance @ 50/60 Hz)
- Normal Mode Rejection (NMR): 60 dB (1kΩ Source Imbalance @ 50/60 Hz)
- Input Protection: over-voltage protection, over-current protection
- Communication: RS-485 protocol or RS-232 standard characters protocols and MODBUS RTU communication protocol

Baud Rate (2400,4800,9600,19200,38400,57600,115200 bps) can be selected via software
Address (0 to 255) can be selected via software

Communication Response Time: 100 ms maximum

Power Supply: +8 ~ 32VDC wide range power supply, internal anti-reverse and over-voltage protection circuit

Power Loss: less than 1W

Operating Temperature: - 45 ~ +80 °C

Humidity: 10 ~ 90% (no condensation)

Storage Temperature: - 45 ~ +80 °C

Storage Humidity: 10 ~ 95% (no condensation)

Isolation Voltage: input / output: 3K VDC, 1 minute, leakage current: 1mA

Which output signal and power supply are common ground.

Shock Voltage: 3KVAC, 1.2/50us (peak)

Dimensions: 120 mm x 70 mm x 43mm

### Footprint Function:

<table>
<thead>
<tr>
<th>PIN</th>
<th>Name</th>
<th>Function</th>
<th>PIN</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IEXC3+</td>
<td>Channel 3 RTD provides a constant current +</td>
<td>14</td>
<td>IEXC0−</td>
<td>Channel 0 RTD provides a constant current −</td>
</tr>
<tr>
<td>2</td>
<td>SENSEN3+</td>
<td>Channel 3 RTD voltage signal detection +</td>
<td>15</td>
<td>SENSEN0−</td>
<td>Channel 0 RTD voltage signal detection −</td>
</tr>
<tr>
<td>3</td>
<td>SENSEN3−</td>
<td>Channel 3 RTD voltage signal detection −</td>
<td>16</td>
<td>SENSEN0+</td>
<td>Channel 0 RTD voltage signal detection +</td>
</tr>
<tr>
<td>4</td>
<td>IEXC3−</td>
<td>Channel 3 RTD provides a constant current −</td>
<td>17</td>
<td>IEXC0+</td>
<td>Channel 0 RTD provides a constant current +</td>
</tr>
<tr>
<td>5</td>
<td>IEXC4+</td>
<td>Channel 4 RTD provides a constant current +</td>
<td>18</td>
<td>IEXC1−</td>
<td>Channel 1 RTD provides a constant current −</td>
</tr>
<tr>
<td>6</td>
<td>SENSEN4+</td>
<td>Channel 4 RTD voltage signal detection +</td>
<td>19</td>
<td>SENSEN1−</td>
<td>Channel 1 RTD voltage signal detection −</td>
</tr>
<tr>
<td>7</td>
<td>SENSEN4−</td>
<td>Channel 4 RTD voltage signal detection −</td>
<td>20</td>
<td>SENSEN1+</td>
<td>Channel 1 RTD voltage signal detection +</td>
</tr>
<tr>
<td>8</td>
<td>IEXC4−</td>
<td>Channel 4 RTD provides a constant current −</td>
<td>21</td>
<td>IEXC1+</td>
<td>Channel 1 RTD provides a constant current +</td>
</tr>
<tr>
<td>9</td>
<td>NC</td>
<td>No connect</td>
<td>22</td>
<td>IEXC2−</td>
<td>Channel 2 RTD provides a constant current −</td>
</tr>
<tr>
<td>10</td>
<td>DATA+</td>
<td>RS-485 signal +</td>
<td>23</td>
<td>SENSEN2−</td>
<td>Channel 2 RTD voltage signal detection −</td>
</tr>
<tr>
<td>11</td>
<td>DATA−</td>
<td>RS-485 signal −</td>
<td>24</td>
<td>SENSEN2+</td>
<td>Channel 2 RTD voltage signal detection +</td>
</tr>
<tr>
<td>12</td>
<td>PW+</td>
<td>Power supply +</td>
<td>25</td>
<td>IEXC2+</td>
<td>Channel 2 RTD provides a constant current +</td>
</tr>
<tr>
<td>13</td>
<td>GND</td>
<td>Power supply-, digital signal output ground</td>
<td>26</td>
<td>A, GND</td>
<td>All channels analog signal shields</td>
</tr>
</tbody>
</table>

![Wiring Diagram](image-url)
Initialization WJ25 modules:

All WJ25 modules, if you use RS-485 network, must be assigned a unique address code, address code value of hexadecimal numbers between 00 and FF. However, all new WJ25 modules uses a factory initial settings, as follows:

- Address code: 01
- Baud rate: 9600 bps
- Checksum is disable

Character Communication Protocol (If you need to set MODBUS RTU communication protocol, please refer to chapter about MODBUS RTU Communication Protocol)

As the new module address codes are the same, their address will be contradictory to other modules, so when you set up the system, you must reconfigure each WJ25 module address. WJ25 module can be connected the power cord and RS485 communication lines, through configuration commands to modify the WJ25 module address. Baud rate, parity and status, communication protocols also need to be adjusted according to user requirements. In the modified baud rate, parity and status, communication protocol, you must first enter the module to the default state, or can not be modified.

Let the module into the default state:

WJ25 module has a special INIT pin. Connecting the INIT PIN to ground (GND PIN), then open power, the module into the default state. In this state, the module is configured as follows:

- Address code 00
- 9600 bps baud rate
- Checksum is disable

At this time, via configuration commands you can modify the WJ25 module baud rate, parity, checksum state and other parameters, by setting the module communication protocol command to select the communication protocol. When are not sure a module specific configuration, can also be configured by installing the jumper, so that the module into the default state, then reconfigure the module. If clients need set the module to MODBUS RTU communication protocol, see the MODBUS protocol section for instructions.

Note: In normal use, put the INIT switch to the NORMAL position.

WJ25 character protocol command set:

Order is by a series of characters, such as first code, address ID, variables, an optional checksum byte and a terminator (cr) which can show command. In addition to wildcard address “***”synchronization command, the host only commands a WJ25 module once.

Command format: (Leading Code) (Addr) (Command) [data] [checksum] (cr)

(Leading code) prefix is the first letter of the command. All commands require a command prefix, such as %,$,#,@,... etc.

(Addr) module address code, if not specified below, range is from 00 ~ FF (hexadecimal).

(Command) shows the command code or variable values.

[Data] some output command needs data

[Checksum] brackets Checksum (checksum) shows an optional parameter, only the checksum is enabled, need this option.

Character

When enabled checksum (checksum), users need [Checksum]. It accounted for 2 - character. Commands and responses must be attached checksum feature. Checksum used to check all input commands to help you find the host to the module command module to the host response to errors and mistakes. Checksum characters placed in command or in
response to the character after the carriage return before.

Calculated as follows: two characters, the hexadecimal number for all issued prior to the ASCII values of and, then with hexadecimal digits 0xFF phase proceeds.

Examples: Disable checksum (checksum)
command: $002 (cr)
response: !00020600 (cr)
Enable checksum
command: $002B6 (cr)
response: !00020600 A9 (cr)

'\$' = 0x24   '0' = 0x30   '2' = 0x32
B6=(0x24+0x30+0x30+0x32) AND 0xFF

'!' = 0x21   '0' = 0x30   '2' = 0x32   '6' = 0x36
A9=(0x21+0x30+0x30+0x30+0x32+0x30+0x36+0x30+0x30+0x30+0x30+0x30+0x30+0x30) AND 0xFF

Command response:
Response message depends on a variety of commands. Response also is consists of several characters, includes leading code, variables and end tags. The first code of response signal has two: '! Or ' >' indicates that a valid command and '?' means invalid. By checking the response information, you can monitor whether the command is valid

Note:
1. In some cases, many commands use the same command format. To ensure that you use a command in the address is correct, if you use the wrong address and this address represents another module, then the command will take effect in another module, resulting in an error.
2. the command must be entered in uppercase letters.

1. Read Measurement Data Command
Description: Returns the analog input measurement data from the module in the currently configured data format
Command Format: #AA (cr)
Parameters: # delimiter character. Hexadecimal 23H
AA module address, range is 00-FF(hexadecimal). Factory address is 01, converted to hexadecimal ASCII code for each character. Such as address 01 into hexadecimal are 30H and 31H.
(cr) is the terminating character, carriage return (0Dh)
Response: >(data)(cr) command is valid.
? AA (cr) invalid command or illegal operation.
Parameter Description: > delimiter character
(data) Returns data. The data format is in Engineering Units. Percent of FSR, Two’s complement hexadecimal, Hexadecimal is each character ASCII code. Refer to Chapter 3 Command Set.
(cr) terminating character, carriage return (0Dh)
There is no response if the module is format error or communication error or address does not exist, the module does not respond. If you are using serial communication software, but can not enter the return key characters, please switch to hexadecimal format for communicate

Example:
Commands (character format) #01 (cr)
(Hexadecimal format) 2330310D
Module response (character format) +100.00+200.00+300.00+400.00+500.00 (cr)
(Hexadecimal format) 3e2b3130302e30302b3230302e30302b3330302e30302b3430302e30302b3530302e30300D
2. Read Channel N Analog Module Data Command
   Description: Read back channel N analog input data from the module, as the current data formats
   Command Format: #AAN(cr)
   Parameters: # delimiter character.
   AA module address, range is 00-FF(hexadecimal). Factory address is 01, converted to hexadecimal ASCII code for each character. Such as address 01 into hexadecimal are 30H and 31H.
   N channel code 0~F, if hexadecimal: 30H~ 39H, 41H~46H
   (cr) is the terminating character, carriage return (0Dh)
   Response: >(data)(cr) command is valid.
   ?AA(cr) invalid command or illegal operation.
   Parameters: > delimiter character
   (data) Returns data. The data format is in Engineering Units, Percent of FSR, Two’s complement hexadecimal.Refer to Chapter 3 Command Set.
   (cr) terminating character, carriage return (0Dh)
   There is no response if the module is format error or communication error or address does not exist.
   Example: Commands (character format) #010(cr)
   (Hexadecimal format) 233031300D
   Module response (character format) >+018.00 (cr)
   (Hexadecimal format) 3E2B3031382E3030300D
   At address 01H module, channel 0 input signal is +18.00deg.C (Data format is engineering units)

3. Set WJ25 Module Command
   Description: Set address, input ranges, baud rate, data formats, checksum and state for a WJ25 analog input module, counter data are stored in a EEPROM.
   Command Format: %AANNTTCFFFF(cr)
   Parameter: % delimiter character
   AA module address, (range 00-FF) represents the 2-character hexadecimal. Factory address is 01, converted to hexadecimal ASCII code for each character. Such as address 01 into hexadecimal are 30H and 31H.
   NN indicates new module hexadecimal address, value NN range is 00–FF, converted to
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Hexadecimal ASCII code for each character. Such as address 18 into hexadecimal are 31H and 38H.

**TT** hexadecimal indicates type code. WJ25 must be set 00~03

<table>
<thead>
<tr>
<th>Type Code</th>
<th>Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>PT100,-200~400°C</td>
</tr>
<tr>
<td>01</td>
<td>PT100,-200~600°C</td>
</tr>
<tr>
<td>02</td>
<td>PT1000,-200~400°C</td>
</tr>
<tr>
<td>03</td>
<td>PT1000,-200~600°C</td>
</tr>
</tbody>
</table>

Table 3 temperature range code

**CC** Baud Rate code (hexadecimal)

<table>
<thead>
<tr>
<th>Baud rate code</th>
<th>Baud rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>2400 baud</td>
</tr>
<tr>
<td>05</td>
<td>4800 baud</td>
</tr>
<tr>
<td>06</td>
<td>9600 baud</td>
</tr>
<tr>
<td>07</td>
<td>19200 baud</td>
</tr>
<tr>
<td>08</td>
<td>38400 baud</td>
</tr>
<tr>
<td>09</td>
<td>57600 baud</td>
</tr>
<tr>
<td>0A</td>
<td>115200 baud</td>
</tr>
</tbody>
</table>

Table 3 Baud rate code

**FF** Hexadecimal 8-bit represents the data format, checksum. Note from bits2 to bits5 not be set to zero.

<table>
<thead>
<tr>
<th>Bit7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 Data format, checksum and code

Bit7: Reserved bits (must set to 0)
Bit6: checksum states, if 0: Disabled, if 1: Enabled
Bit5-bit2: Not used (must set to 0)
Bit1-bit0: Data Format Bit
  00: Engineering Units
  01: % of FSR
  10: Twos complement hexadecimal
(cr) terminating character, carriage return (0Dh)

**Response:** !AA(cr) command is valid

?AA(cr) command is invalid or illegal operation, or do not set up line before changing baud rate or checksum

**Parameter Description:**

! delimiter character which indicates a valid command.

? delimiter character which indicates an invalid command.

AA represents input module address

(cr) terminating character, carriage return (0Dh)

If you configure module for the first time, AA=01H and NN equal to new address. If reconfigure module changing address, input range, data formats, AA equals to present configured address, NN equals to the current or new address. If reconfigure module changing baud rate or checksum state, must set INIT switch to the INIT position, make module into the default mode, module address is 00H, also AA=00H, NN=present or new address.
There is no response if the format error or communication error or address does not exist.

Example:  command  %0111000600(cr)
response  !11(cr)

Description: %  delimiter character
00  indicates you want to configure the WJ25 module original address set to 01H.
11  indicates new module hexadecimal address is 11H
00  indicates temperature range PT100, -200~+400 deg.C
06  indicates baud rate: 9600 baud
00  indicates data format is Engineering Units, checksum is disabled

4. Read Set Status Command
Description: Read configuration for a specified WJ25 module.
Command Format:  $AA2(cr)
Parameter:  $  delimiter character
AA  module address, (range 00-FF) represents the 2-character hexadecimal
2  indicates read set state command
(cr) terminating character, carriage return (0Dh)
Response: !AA TT CC FF (cr)  command is valid
?AA(cr)  command is invalid or illegal operation
!  delimiter character
AA  represents input module address
TT  temperature range code, Table 2
CC  Baud rate code, Table 3
FF  Table 4
(cr) terminating character, carriage return (0Dh)

There is no response if the format error or communication error or address does not exist.

Example:  command  S302(cr)
response  !300F0600(cr)

5. Offset Calibration Command
Description: Calibrate all input module channels offset errors, connect the standard resistor to channel 0 and then send command.
Command Format:  $AA10(cr)
Parameter:  $  delimiter character
AA  module address, (range 00-FF) represents the 2-character hexadecimal
10  represents offset calibration command
(cr) terminating character, carriage return (0Dh)
Response: !AA (cr)  command is valid
?AA(cr)  command is invalid or Illegal operation
!  delimiter character which indicates a valid command.
?  delimiter character which indicates a invalid command.
AA represents input module address
(cr) terminating character, carriage return (0Dh)

Products have been calibrated, user can use them directly. After calibrating offset command, then calibrate gain errors. During calibration, WJ25 modules need to be connected to the input of the appropriate input signal. Different input range requires a different input thermal resistance. (See following Calibration information)

There is no response if the format error or communication error or address does not exist.

Example: command $0110(cr)
response !01 (cr)
Calibrate module channel 0 offset at address 01H.

6. Gain Calibration Command
Description: Calibrates an analog input module gain, connect the standard resistor to channel 0 and then send command.
Command Format: $AA0N(cr)
Parameter: $ delimiter character
AA module address, (range 00-FF) represents the 2-character hexadecimal
00 represents gain calibration command
(cr) terminating character, carriage return (0Dh)
Response: !AA(cr) command is valid
?AA(cr) command is invalid or illegal operation
! delimiter character which indicates a valid command.
? delimiter character which indicates a invalid command.
AA represents input module address
(cr) terminating character, carriage return (0Dh)

Products have been calibrated, user can use them directly. After calibrating offset command, then calibrate gain errors. During calibration, module needs to be connected to the input of the appropriate input signal. Different input range requires a different input thermal resistance. (See following Calibration information)

There is no response if the format error or communication error or address does not exist.

Example: command $0100(cr)
Response !01 (cr)
Calibrate module gain errors at address 01H.

7. Read Module Name Command
Description: Return a WJ25 module name from the specified analog input module
Command Format: $AAM(cr)
Parameter: $ delimiter character
AA module address, (range 00-FF) represents the 2-character hexadecimal
M represents Read module name command
(cr) terminating character, carriage return (0Dh)
Response: !AA(Module Name)(cr) command is valid
?AA(cr) command is invalid or illegal operation
! delimiter character which indicates a valid command.
? delimiter character which indicates a invalid command.
AA represents input module address
(Module Name) module name WJ25
(cr) terminating character, carriage return (0Dh)
There is no response if the format error or communication error or address does not exist.

Example: command $08M(cr)
          response !08WJ25(cr)
Module is WJ25 at address 08H

8. Enable or Disable Channel Command
Description: Send enable or disable module data acquisition channel command to a specified module.
Command Format: SAA5AB(cr)
Parameters: $ delimiter character
            AA module address, (range 00-FF) represents the 2-character hexadecimal
            5 enable or disable module data acquisition channel command
            AB Two hex: the first one represents Channel 4
            the second represents Channel 3 ~ 0
            0: Disable
            1: enable
            (cr) terminating character, carriage return (0Dh)
Response: !AA(cr) command is valid
          ?AA(cr) command is invalid or illegal operation
          ! delimiter character which indicates a valid command.
          ? delimiter character which indicates a invalid command.
          AA represents input module address
          (cr) terminating character, carriage return (0Dh)
There is no response if the format error or communication error or address does not exist.
Example: command $01517(cr)
          response !01 (cr)
Description: set channel value: 0x37
            1 is 0001, means enable Channel 4.
            7 is 0111, means enable Channel 2, 1 and 0, disable Channel 3.

9. Read Channel Status Command
Description: Read channel status command to a specified analog input module
Command Format: SAA6(cr)
Parameter: $ delimiter character
            AA module address, (range 00-FF) represents the 2-character hexadecimal
            6 read channel status command
            (cr) terminating character, carriage return (0Dh)
Response: !AAAB(cr) command is valid
          ?AA(cr) command is invalid or illegal operation
          ! delimiter character which indicates a valid command.
          ? delimiter character which indicates a invalid command.
          AA represents input module address
          AB Two hex: the first represents Channel 4
             the second represents Channel 3 ~ 0
            0: Disable
            1: enable
            (cr) terminating character, carriage return (0Dh)
There is no response if the format error or communication error or address does not exist.

Example: command   $186 (cr)
           response   ! 181F (cr)

Description: The current Channel status value is 0x1F.
             0x1F is 0001, 1111 mean all channels are enabled at address 18H.

10. Read channel disconnection detection command

Description: Sending read channel disconnection detection command to a special analog input module

Command Format: $AAAB(cr)

Parameter: $ delimiter character
AA module address, (range 00-FF) represents the 2-character hexadecimal
B read channel disconnection detection command
(cr) terminating character, carriage return (0Dh)

Response: !AAAB (cr) command is valid
?AAAB (cr) command is invalid or illegal operation

delimiter character which indicates a valid command.
? delimiter character which indicates a invalid command.

<table>
<thead>
<tr>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>IN4</td>
<td>IN3</td>
<td>IN2</td>
<td>IN1</td>
<td>IN0</td>
</tr>
</tbody>
</table>

AA represents input module address
AB Two hex: the first represents Channel 4
the second represents Channel 3 ~ 0
0: channel is connected
1: channel has been disconnected

(cr) terminating character, carriage return (0Dh)

There is no response if the format error or communication error or address does not exist.

Example: command   $18B (cr)
           response   ! 181E (cr)

Description: The current Channel status value is 0x1E.
             0x1E is 0001, 1111 mean channel 0 is connected, channels 1~4 are disconnectd at address 18H.

11. Set Communication Protocol Command

Description: Set the module communication protocol to characters protocol or Modbus RTU protocol.

Command Format: $AAPV(cr)

Parameter: $ delimiter character
AA module address, (range 00-FF) represents the 2-character hexadecimal
P set communication protocol command
V protocol code, 0 or 1
0; characters protocol
1: Modbus RTU protocol
(cr) terminating character, carriage return (0Dh)

Response: !AAAB(cr) command is valid
?AAAB(cr) command is invalid or illegal operation

delimiter character which indicates a valid command.
? delimiter character which indicates a invalid command.
AA represents input module address
(cr) terminating character, carriage return (0Dh)

There is no response if the format error or communication error or address does not exist.

Set command protocol must be effective by default.

**Example 1:**

**Command** $00P1(cr)

**Response** !00 (cr)

Set protocol command to Modbus RTU

**Example 2:**

**Command** $00P0(cr)

**Response** !00 (cr)

Set protocol command to characters protocol

### Input Ranges & Data Formats

WJ25 uses three data formats:

- **00:** Engineering Units
- **01:** % of FSR
- **10:** Twos complement hexadecimal

<table>
<thead>
<tr>
<th>Input Range</th>
<th>Data Format</th>
<th>+F.S</th>
<th>ZERO</th>
<th>-F.S</th>
<th>Displayed Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT100,-200~400°C</td>
<td>Engineering Units</td>
<td>+400.00</td>
<td>±00.00</td>
<td>-200.00</td>
<td>0.01°C</td>
</tr>
<tr>
<td></td>
<td>% of FSR</td>
<td>+100.00</td>
<td>±000.00</td>
<td>-050.00</td>
<td>0.01%</td>
</tr>
<tr>
<td></td>
<td>Twos complement hexadecimal</td>
<td>7FFFFF</td>
<td>000000</td>
<td>C00000</td>
<td>1LSB</td>
</tr>
<tr>
<td>PT100,-200~600°C</td>
<td>Engineering Units</td>
<td>+600.00</td>
<td>±000.00</td>
<td>-200.00</td>
<td>0.01°C</td>
</tr>
<tr>
<td></td>
<td>% of FSR</td>
<td>+100.00</td>
<td>±000.00</td>
<td>-033.33</td>
<td>0.01%</td>
</tr>
<tr>
<td></td>
<td>Twos complement hexadecimal</td>
<td>7FFFFF</td>
<td>000000</td>
<td>D55555</td>
<td>1LSB</td>
</tr>
<tr>
<td>PT1000,-200~400°C</td>
<td>Engineering Units</td>
<td>+400.00</td>
<td>±0.0000</td>
<td>-200.00</td>
<td>0.01°C</td>
</tr>
<tr>
<td></td>
<td>% of FSR</td>
<td>+100.00</td>
<td>±000.00</td>
<td>-050.00</td>
<td>0.01%</td>
</tr>
<tr>
<td></td>
<td>Twos complement hexadecimal</td>
<td>7FFFFF</td>
<td>000000</td>
<td>C00000</td>
<td>1LSB</td>
</tr>
<tr>
<td>PT1000,-200~600°C</td>
<td>Engineering Units</td>
<td>+600.00</td>
<td>±000.00</td>
<td>-200.00</td>
<td>0.01°C</td>
</tr>
<tr>
<td></td>
<td>% of FSR</td>
<td>+100.00</td>
<td>±000.00</td>
<td>-033.33</td>
<td>0.01%</td>
</tr>
<tr>
<td></td>
<td>Twos complement hexadecimal</td>
<td>7FFFFF</td>
<td>000000</td>
<td>D55555</td>
<td>1LSB</td>
</tr>
</tbody>
</table>

Table 4 Input Range and Data Format

**Example:**

1. Input Range is PT100,-200~400 deg. C, Input is 400 deg. C:

   **Command** #010(cr)
   
   Engineering Units Response $+400.00(cr)
   
   Percent of FSR Response $+100.00(cr)
   
   Twos complement Response $7FFFFF (cr)
   
   Twos complement Response $4CCCCC(cr)
**Module Calibration:**

We have calibrated the module, the user can use directly.

You can also use the product calibration function to re-calibrate the module. During calibration, the module needs to be entered the appropriate signal, different input range needs different input signals.

In order to improve calibration accuracy, it is recommended to calibrate using the following equipment:

**A high-precision resistance box, can be accurate to 0.01 ohm.**

**Calibration:**

1. According to the module input range, connects to the corresponding input signal.
2. To WJ25 module channel 0 input 0 ohm resistance.
3. Until the signal stabilized, send the offset calibration $ AA10 command to WJ25 module.
4. To WJ25 module channel 0 input 100% of full scale resistance signal
   - If PT100, full scale 400 deg.C, adjust resistance to 247.092 ohms.
   - If PT100, full scale 600 deg.C, adjust resistance to 313.708 ohms.
5. Until the signal is stable, send the gain calibration $ AA00 command to WJ25 module.
6. Finished

**Modbus RTU communication protocol:**

Module default protocol is character communications protocol. If you need to set the module to Modbus RTU protocol, please follow these settings:

1. Put INIT switch to INIT position.
2. Connect the power cord and the communication interface cable.
3. Turn on the power, the module enters the default state automatically, address 00, baud rate 9600.
4. Wait 5s, module is initialization.
5. Send the command $00P1 (cr), check the response, if is !00 (cr), set successfully.
6. Turn off the power, INIT switch to the NORMAL position.
7. The module has been set to the Modbus RTU protocol mode successfully.

Appears !00 in the received data, set successfully.

If as the above figure, did not respond or respond incorrectly, it indicates setting unsuccessful. Please turn off the power and check all wiring and INIT switch, then turn on the power testing.
Modbus RTU function code:

The module supports Modbus RTU communication protocol function code 03 (read hold register) and function code 06 (set a single register), the command format according to the standard Modbus RTU communication protocol.

The correspondence between the MODBUS protocol range and the data high 16 bits

<table>
<thead>
<tr>
<th>Input Range</th>
<th>Register Address</th>
<th>+F.S</th>
<th>ZERO</th>
<th>-F.S</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT100,-200~400℃</td>
<td>40001~40005</td>
<td>0x7FFF</td>
<td>0x0000</td>
<td>0xC000</td>
</tr>
<tr>
<td>PT1000,-200~400℃</td>
<td>40011~40015</td>
<td>0x0FA0 (4000)</td>
<td>0x0000</td>
<td>0xF830 (-2000)</td>
</tr>
<tr>
<td>PT100,-200~600℃</td>
<td>40001~40005</td>
<td>0x7FFF</td>
<td>0x0000</td>
<td>0xD555</td>
</tr>
<tr>
<td>PT1000,-200~600℃</td>
<td>40011~40015</td>
<td>0x1770 (6000)</td>
<td>0x0000</td>
<td>0xF830 (-2000)</td>
</tr>
</tbody>
</table>

Register Description: (Common applications reading high 16-bit data to meet the accuracy requirements)

<table>
<thead>
<tr>
<th>Address 4X (PLC)</th>
<th>Address (PC, DCS)</th>
<th>Data Property</th>
<th>Data Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>40001</td>
<td>0000</td>
<td>Input Analog Signal</td>
<td>Read Only</td>
</tr>
<tr>
<td>40002</td>
<td>0001</td>
<td>Input Analog Signal</td>
<td>Read Only</td>
</tr>
<tr>
<td>40003</td>
<td>0002</td>
<td>Input Analog Signal</td>
<td>Read Only</td>
</tr>
<tr>
<td>40004</td>
<td>0003</td>
<td>Input Analog Signal</td>
<td>Read Only</td>
</tr>
<tr>
<td>40005</td>
<td>0004</td>
<td>Input Analog Signal</td>
<td>Read Only</td>
</tr>
<tr>
<td>40011</td>
<td>0010</td>
<td>Input Analog Signal</td>
<td>Read Only</td>
</tr>
<tr>
<td>40012</td>
<td>0011</td>
<td>Input Analog Signal</td>
<td>Read Only</td>
</tr>
<tr>
<td>40013</td>
<td>0012</td>
<td>Input Analog Signal</td>
<td>Read Only</td>
</tr>
<tr>
<td>40014</td>
<td>0013</td>
<td>Input Analog Signal</td>
<td>Read Only</td>
</tr>
<tr>
<td>40015</td>
<td>0014</td>
<td>Input Analog Signal</td>
<td>Read Only</td>
</tr>
</tbody>
</table>
## RTD Temperature acquisition converter WJ25

### Table 5 Modbus RTU register description

<table>
<thead>
<tr>
<th>Register</th>
<th>Module Address</th>
<th>Description</th>
<th>Access Mode</th>
<th>Value Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>40211</td>
<td>0210</td>
<td>Module Name</td>
<td>Read Only</td>
<td>High:0x00 Low:0x29</td>
</tr>
<tr>
<td>40221</td>
<td>0220</td>
<td>Channel status</td>
<td>Read/Write</td>
<td>0x1F as bit corresponding channel 4 ~ 0</td>
</tr>
<tr>
<td>40222</td>
<td>0221</td>
<td>Type Code</td>
<td>Read/Write</td>
<td>0x00 – 0x03 corresponds to a different input type</td>
</tr>
<tr>
<td>40223</td>
<td>0222</td>
<td>disconnected detection</td>
<td>Read Only</td>
<td>0x1F as Bit corresponding channel 4 ~ 0: Normal, 1: disconnected</td>
</tr>
</tbody>
</table>

### Example 1:

If the module address is 01, hexadecimal sent: 010300000001840A, to get the data register data 40001.

<table>
<thead>
<tr>
<th>Module address</th>
<th>Read holding register</th>
<th>Register address High</th>
<th>Register address low</th>
<th>Register quantity high</th>
<th>Register quantity low</th>
<th>CRC check low</th>
<th>CRC check high</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>03</td>
<td>00</td>
<td>00</td>
<td>00</td>
<td>01</td>
<td>84</td>
<td>0A</td>
</tr>
</tbody>
</table>

If module reply: 010302199973BE read data: 0x1999, if the type code is 00 (Pt100, -200~400°C), conversion 0x1999*20mA/0x7FFF = 4mA. That indicates the input channel 0 temperature is 80 deg.C.

<table>
<thead>
<tr>
<th>Module address</th>
<th>Read holding register</th>
<th>Data Bytes</th>
<th>Data High</th>
<th>Data Lower</th>
<th>CRC check low</th>
<th>CRC check high</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>03</td>
<td>02</td>
<td>19</td>
<td>99</td>
<td>BE</td>
<td>73</td>
</tr>
</tbody>
</table>

### Example 2:

If the module address is 01, hexadecimal sent: 0103000A0001A408, to get the data register data 40011.

<table>
<thead>
<tr>
<th>Module address</th>
<th>Read holding register</th>
<th>Register address High</th>
<th>Register address low</th>
<th>Register quantity high</th>
<th>Register quantity low</th>
<th>CRC check low</th>
<th>CRC check high</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>03</td>
<td>00</td>
<td>0A</td>
<td>00</td>
<td>01</td>
<td>A4</td>
<td>08</td>
</tr>
</tbody>
</table>

If module reply: 0103020BB8BF06 read data: 0x0BB8, converted to 10 into the 3000, and then divided by 10, that now the channel 0 input temperature is 300.0 deg.C.

<table>
<thead>
<tr>
<th>Module address</th>
<th>Read holding register</th>
<th>Data Bytes</th>
<th>Data High</th>
<th>Data Lower</th>
<th>CRC check low</th>
<th>CRC check high</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>03</td>
<td>02</td>
<td>19</td>
<td>99</td>
<td>BF</td>
<td>06</td>
</tr>
</tbody>
</table>
Read register address 40001 ~ 40005 data example, channel 0 temperature is 300 deg.C, other channels are disconnect.

Read register address 40011~40015 data example, channel 0 temperature is 300 deg.C, other channels are disconnect.
Warranty
Two years (but violate operating rules and requirements to create damage, clients need pay maintenance costs)

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