

**Manual of SRC Series Plug-in Remote I/O Terminal**

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1.Product Overview



## 1.1 Product Introduction

The plug-in I/O terminal adopts a combination structure of coupler module, power module, and I/O terminal. The coupler connects expandable I/O terminals to a real-time industrial Ethernet system, and the backplane uses SC bus. The coupler module is responsible for fieldbus communication, thereby achieving real-time data exchange between I/O terminals and couplers/controllers.

There are various types of plug-in I/O terminal, which, with high real-time performance, satisfies the requirements of customers for high-speed data acquisition, optimizing system configuration, simplifying on-site wiring, and improving system reliability.

## 1.2 Product Features

* Occupies fewer nodes

A node consists of a bus coupler, 1-32 I/O terminals, and an end cap.

* Rich functional extensions

Supports flexible expansion and have complete range of I/O types; It can integrate multiple digital modules, analog modules, and temperature modules, suitable for different application requirements.

* Flexible configuration

Multiple types of plug-in I/O terminals can be combined arbitrarily.

* Strong compatibility

The coupler communication interface complies with communication standards and supports mainstream PROFINET master stations and EtherCAT master stations.

* Small volume

Occupy small space due to compact structure.

* Easy to diagnose

The indicator design is complete, the module status is clear, and it is easy to detect and maintain.

* Fast speed

Adopt SC-bus for backplane: the maximum scanning cycle is 1 ms.

* Easy to install

DIN 35mm standard guide rail installation.

With bullet wiring terminal, facilitate wiring.

## 1.3 Application Mode

The coupler module is connected to the controller on the application site, and the I/O terminal shall be connected with the input/output sensors on the application site. The usual process for data acquisition, processing, and control is as follows:

a. The input I/O terminal collects signals on site and sends them to the coupler through the internal bus;

b. The controller reads and processes data from the coupler through the fieldbus, and then writes the output data into the coupler;

c. The coupler then writes the output data to the output I/O terminal through the internal bus, thereby achieving device control.

Scalable I/O terminals include digital input module, digital output module, digital input/output module, analog input module, analog output module, temperature module, etc.

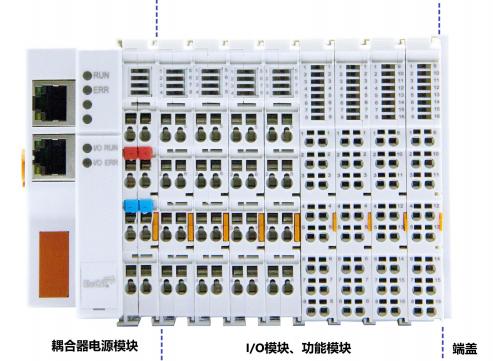
**Application mode:** Integrate different application modules such as power module, coupler, digital quantity, analog quantity, temperature and other modules.

**Application configuration:** It can adapt to different types of I/O terminal combinations based on the main station access capability, number of stations, I/O points, functional types, and other requirements.

**Configuration rule:** The module is arranged from left to right as follows: coupler module, power module, I/O terminal, end cap (must be configured), etc.

The product adopts a combination of couplers, I/O terminals, and end caps, with the following two combinations.

**Product combination method I (coupler power supply, I/O terminal, end cover)**



End cover

I/O terminal, functional modules

Coupler power supply

**Product combination method II (coupler power supply, I/O terminal, expansion power module, I/O terminal, end cap)**



# Product Type



## 2.1 Module List

|  |  |
| --- | --- |
| **Module type** | **Product** |
| Coupler module | SRC8100 PROFINET bus coupler module |
| SRC8200 EtherCAT bus coupler module |
| Digital I/O terminal | SRC2116 16-channel digital output module, NPN type, 24VDC, 0.5A |
| SRC2216 16-channel digital output module, PNP type, 24VDC, 0.5A |
| SRC1116 16-channel digital input module, NPN type, 24VDC, filtering 3ms |
| SRC1216 16-channel digital input module, PNP type, 24VDC, filtering 3ms |
| Analog I/O terminal | SRC3118 8-channel analog voltage input module |
| SRC3138 8-channel analog current input module |
| SRC4018 8-channel analog voltage output module |
| SRC4038 8-channel analog current output module |
| Temperature acquisition module | SRC3804 4-channel thermistor and thermocouple temperature acquisition module |
| Functional module | SRC5001 24V single ended incremental encoder count module |
| SRC5031 5V differential incremental encoder count module |
| SRC5041 SSI encoder count module |
| SRC6041 RS485/RS422/RS232 gateway module |

# Module Introduction

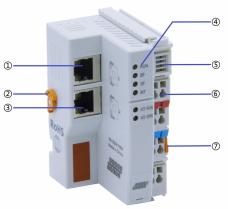


## 3.1 SRC8100 PROFINET coupler

### 3.1.1 Technical Specifications

|  |  |  |
| --- | --- | --- |
| **PROFINET interface parameters** | | |
| Bus protocol | | PROFINET |
| Number of I/O stations | | Depends on the controller |
| Data transmission medium | | Ethernet/PROFINET CAT5 cable |
| Transmission speed | | 100 Mbps |
| Transmission distance | | ≤ 100 meters (station distance) |
| Bus interface | | 2 × RJ45 |
| **Power parameters** | | |
| Power module | Working power supply | 18~36 VDC |
| Output voltage | 5 VDC |
| Output current | 2 A |
| Coupler module | Working power supply | 5 VDC |
| Working current | ≤400 mA |
| **General Technical Specifications** | | |
| Specification and size | | 100 × 48 × 69 mm (see [section 4.4.1](#bookmark159) for dimension diagram) |
| Weight | | 180 g |
| Working temperature | | -10~ +60℃ |
| Storage temperature | | -20℃ ~ +75℃ |
| Relative humidity | | 95%, no condensation |
| Protection level | | IP20 |

### 3.1.2 Panel Structure

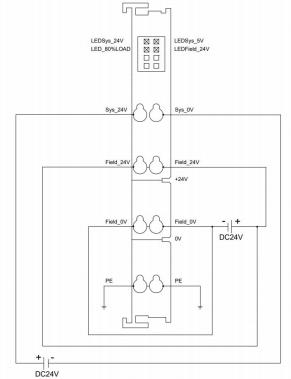


|  |  |  |
| --- | --- | --- |
| **No.** | **Name** | **Description** |
| ① | Bus interface IN | RJ45 |
| ② | Guide rail rotation buckle | Suitable for fixing D IN 35mm guide rail |
| ③ | Bus interface OUT | RJ45 |
| ④ | Indicators and indicator identifier | Indicate the operating status of the module |
| ⑤ | Power indicator | Indicate power status |
| ⑥ | Power wiring erminal | 8P elastic compression terminal block |
| ⑦ | Module disassembly pull-out strip | disassembly pull-out strip |

### 3.1.3 Indicator function

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PROFINET Coupler identifier and indicator** | | | | |
| **Identifier** | **Name** | **Color** | **Status** | **Status description** |
| LED1 | Input power indicator | Green | Remain ON | Input power connection |
| OFF | Input power not connected |
| LED2 | Output power indicator | Green | Remain ON | 5V output power supply is normal |
| OFF | No output power supply |
| LED3 | 80% load indicator | Ged | Remain ON | The output current of the 5V power supply exceeds 1.6A |
| OFF | The output current of the 5V power supply does not exceed 1.6A |
| LED4 | On site power indicator | Green | Remain ON | On site power supply connection |
| OFF | The on-site power supply is not connected |
| RDY | Running status indicator | Green | Remain ON | The system is running normally |
| OFF | System running abnormally or not powered on |
| SF | System alarm indicator | Ged | Remain ON | There is an abnormality in the module's operation |
| OFF | The module works without any abnormalities |
| BF | Network alarm indicator | Ged | Flash | The network connection is abnormal |
| OFF | The network connection is normal |
| MT | MAINT maintenance indicator | Yellow | Remain ON | PROFINET diagnostic alarms that require or demand maintenance status |
| OFF | PROFINET diagnostic alarms that do not require or require maintenance status |
| I/O RUN | I/O operation indicator | Green | Remain ON | The system is currently engaged in process data exchange |
| Flashing 1Hz | I/O terminal powered on, data exchange ready status |
| OFF | I/O terminal not powered on |
| I/O ERR | I/O error indicator | Red | Remain ON | SC bus communication establishment failure or loss of slave station |
| OFF | Initialization status, not powered on or error free |

### 3.1.4 Power Wiring Diagram



\*Sys is the system side power supply, Field is the on-site power supply, and the two on-site power supplies need to be isolated.

\*On-site power supply 24V internally conductive, 0V internally conductive, and PE internally conductive.

## 3.2 SRC8200 EtherCAT coupler

### 3.2.1 Technical Specifications

|  |  |  |
| --- | --- | --- |
| **EtherCAT interface parameters** | | |
| Bus protocol | | EtherCAT (MDP) |
| Number of I/O stations | | According to the main station settings |
| Data transmission medium | | Ethernet/EtherCAT CAT5 cable |
| Transmission speed | | 100 Mbps |
| Transmission distance | | ≤ 100 meters (station distance) |
| Bus interface | | 2 × RJ45 |
| **Power parameters** | | |
| Power module | Working power supply | 18~36 VDC |
| Output voltage | 5 VDC |
| Output current | 2 A |
| Coupler module | Working power supply | 5 VDC |
|  | Working current | ≤400 mA |
| **General Technical Specifications** | | |
| Specification and size | | 100 × 48 × 69 mm (see [section 4.4.1](#bookmark160) for dimension diagram) |
| Weight | | 185 g |
| Working temperature | | -10~ +60℃ |
| Storage temperature | | -20℃ ~ +75℃ |
| Relative humidity | | 95%, no condensation |
| Protection level | | IP20 |

### 3.2.2 Panel Structure

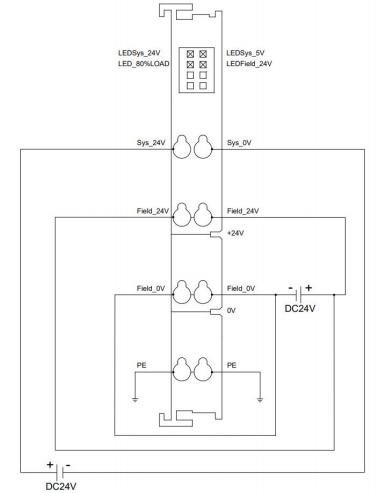


|  |  |  |
| --- | --- | --- |
| **No.** | Name | **Description** |
| ① | Bus interface IN | RJ45 |
| ② | Guide rail rotation buckle | Suitable for fixing D IN 35mm guide rail |
| ③ | Bus interface OUT | RJ45 |
| ④ | Indicators and indicator identifier | Indicate the operating status of the module |
| ⑤ | Power indicator | Indicate power status |
| ⑥ | Power terminal block | 8P elastic compression terminal block |
| ⑦ | Module disassembly pull-out strip | Disassembly pull-out strip |

### 3.2.3 Indicator function

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **EtherCAT coupler identifier and indicator** | | | | |
| **Identifier** | **Name** | **Color** | **Status** | **Status description** |
| LED1 | Input power indicator | Green | Remain ON | Input power connection |
| OFF | Input power not connected |
| LED2 | Output power indicator | Green | Remain ON | 5V output power supply is normal |
| OFF | No output power supply |
| LED3 | 80% load indicator | Ged | Remain ON | The output current of the 5V power supply exceeds 1.6A |
| OFF | The output current of the 5V power supply does not exceed 1.6A |
| LED4 | On site power indicator | Green | Remain ON | On-site power supply connection |
| OFF | On-site power supply is not connected |
| RUN | Running status indicator | Green | Remain ON | EtherCAT OP |
| Flash 5Hz | EtherCAT Preop |
| Regularly flash(Off for 1S and Remain ON for 200 ms, cycle | EtherCAT SafeOP |
| OFF | Initialization state or not powered on, EtherCAT Init |
| ERR | System alarm indicator | Red | Remain ON | The coupler is abnormal |
| OFF | Initialization status, not powered on or no error |
| I/O RUN | I/O operation indicator | Green | Remain ON | The system is currently engaged in process data exchange |
| Flash 1Hz | I/O terminal powered on, data exchange ready status |
| OFF | I/O terminal not powered on |
| I/O ERR | I/O error indicator | Red | Remain ON | Fail to establish SC-bus communication or loss of slave station |
| OFF | Initialization status, not powered on or no error |

### 3.2.4 Power Wiring Diagram



\*Sys is the system side power supply, Field is the on-site power supply, and the two on-site power supplies need to be isolated.

\*On-site power supply 24V internally conductive, 0V internally conductive, and PE internally conductive.

## 3.3 Digital I/O terminal

### 3.3.1 Technical Specifications

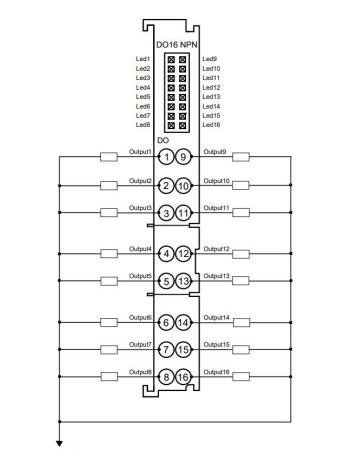
|  |  |
| --- | --- |
| **Digital input (SRC1116/SRC1216)** | |
| Rated voltage | 24 VDC (18V~30V) |
| Number of signal points | 16 |
| Signal type | NPN/ PNP |
| “0” signal voltage (PNP) | -3~+3 V |
| “1” signal voltage (PNP) | 15~30 V |
| “0” signal voltage (NPN) | 15~30 V |
| “1” signal voltage (NPN) | -3~+3 V |
| input filter | 3 ms |
| Input current | 4 mA |
| Isolation method | Optocoupler isolation |
| Isolation voltage withstand | 500 VAC |
| Channel indicator | Green LED light |
| **Digital output (SRC2116/SRC2216)** | |
| Rated voltage | 24 VDC (18V~30V) |
| Number of signal points | 16 |
| Signal type | NPN/ PNP |
| Load type | Resistive load, inductive load |
| Single channel rated current | NPN type Max: 500 mA  PNP type Max: 500 mA |
| Port protection | Overvoltage and overcurrent protection |
| Isolation method | Optocoupler isolation |
| Isolation voltage withstand | 500 VAC |
| Channel indicator | Green LED light |
| **General Technical Specifications** | |
| Specification and size | 16 channel digital I/O terminal: 100 × 14.8 × 68.67 mm (see [section 4.4.2](#bookmark161) for dimension diagram) |
| Weight | 50 g |
| Working temperature | -10~ +60℃ |
| Storage temperature | -20℃ ~ +75℃ |
| Relative humidity | 95%, no condensation |
| Protection level | IP20 |

### 3.3.2 Indicator function

|  |  |  |  |
| --- | --- | --- | --- |
| **I/O terminal indicator description** | | | |
| **Identifer** | **Color** | **Status** | **Status description** |
| Input channel indicators Led1~Led8 | Green | Remain ON | The module channel has signal input |
| OFF | The module channel has no signal input or abnormal signal input |
| Output channel indicators Led1~Led8 | Green | Remain ON | The module channel has signal output |
| OFF | The module channel has no signal output or abnormal signal output |

### 3.3.3 Wiring diagram

<3.3.3.1> SRC2116 16 channel digital output (NPN)

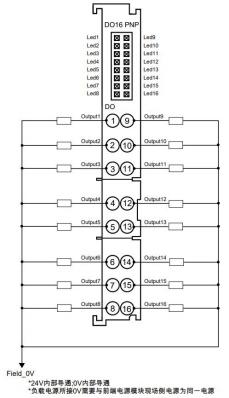


Field-24V

\*24V internally conductive: 0 V internally conductive

The 24V connected to the load power supply needs to be the same power supply as the on-site measured power supply of the front-end power module.

<3.3.3.2> SRC2216 16-channel Digital Output (PNP)

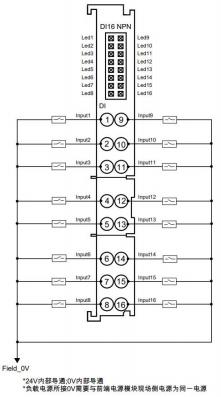


Field-0V

\*24V internally conductive: 0 V internally conductive

\*The 0V connected to the load power supply needs to be the same power supply as the on-site measured power supply of the front-end power module.

<3.3.3.3> SRC1116 16-channel digital input (NPN)

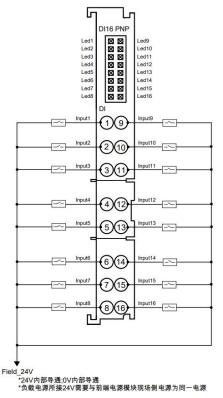


Field-0V

\*24V internally conductive: 0 V internally conductive

\*The 0V connected to the load power supply needs to be the same power supply as the on-site measured power supply of the front-end power module.

<3.3.3.4> SRC1216 16-channel Digital Input (PNP)



Field-24V

\*24V internally conductive: 0 V internally conductive

\*The 24V connected to the load power supply needs to be the same power supply as the on-site measured power supply of the front-end power module.

## 3.4 Analog I/O terminal

### 3.4.1 Technical Specifications

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Analog input (SRC3118/SRC3138)** | | | | |
| Input points | 8 | | | |
| Input signal (voltage type) | 0~+10 V, -10 V~+10 V (adjustable range) | | | |
| Input signal (current type) | 0~20 mA, 4~20 mA (adjustable range) | | | |
| Resolution | 16 bit | | | |
| Sampling rate | 4/8-channel analog voltage input module | | ≤1 ksps | |
| 4/8-channel analog current input module | | ≤1 ksps | |
| Accuracy | 4/8-channel analog voltage input module | | ±0.1% | |
| 4/8-channel analog current input module | | ±0.1% | |
| input filter | 10 times (adjustable filtering times) | | Smooth level 1~200 | |
| Input impedance (voltage type) | ≥2 kΩ | | | |
| Input impedance (current type) | 100 Ω | | | |
| Isolation voltage withstand | 500 VAC | | | |
| Channel indicator | Green LED light | | | |
| **Analog output (SRC4018/SRC4038)** | | | | |
| Output points | 8 | | | |
| Output signal (voltage type) | 0~+10 V, -10~+10 V (adjustable range) | | | |
| Output signal (current type) | | 0~20 mA, 4~20 mA (adjustable range) | | |
| Resolution | | 12 bit | | |
| Accuracy | | 4/8-channel analog voltage output module | | ±0.1% |
| 4/8-channel analog current output module | | ±0.1% |
| Load impedance (voltage type) | | ≥2 kΩ | | |
| Load impedance (current type) | | ≤500 Ω | | |
| Isolation voltage withstand | | 500 VAC | | |
| Channel indicator | | Green LED light | | |
| **General Technical Specifications** | | | | |
| Specification and size | | 8-channel analog I/O terminal: 100 × 14.8 × 68.67 mm (see [section 4.4.2](#bookmark162) for dimension diagram) | | |
| Weight | | 50 g | | |
| Working temperature | | -10~ +60℃ | | |
| Storage temperature | | -20℃ ~ +75℃ | | |
| Relative humidity | | 95%, no condensation | | |
| Protection level | | IP20 | | |

<3.4.1.1> Voltage input/output range selection and code value table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Voltage input/output range selection and code value range** | | | | |
| Range selection | 0 | 1 | 2 | 2 |
| Range of measurement | -10 V~+10 V | 0 ~ + 10 V | -10 V~+10 V | 0~ +10 V |
| Code value range | -32768~32767 | 0~32767 | -27648~27648 | 0~27648 |
| Voltage input calculation formula | D =(65535/20)\*U | D =(32767/10)\*U | D =(55296/20)\*U | D =(27648/10)\*U |
| Voltage output calculation formula | U =(D\*20)/65535 | U =(D\*10)/32767 | U =(D\*20)/55296 | U=(D\*10)/27648 |
| Code value  Corresponding table | Refer to Table 3-1 Voltage Code Value Table. | | | |

Note: D represents code value, and U represents voltage.

Table 3-1 Voltage Code Value Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Range**  **Voltage** | **0 (Default)** | **1** | **2** | **3** |
| **Code value** | **Code value** | **Code value** | **Code value** |
| -10 | -32768 | - | -27648 | - |
| -9 | -29491 | - | -24883 | - |
| -8 | -26214 | - | -22118 | - |
| -7 | -22937 | - | -19354 | - |
| -6 | -19661 | - | -16589 | - |
| -5 | -16384 | - | -13824 | - |
| -4 | -13107 | - | -11059 | - |
| -3 | -9830 | - | -8294 | - |
| -2 | -6554 | - | -5530 | - |
| -1 | -3277 | - | -2765 | - |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 3277 | 3277 | 2765 | 2765 |
| 2 | 6554 | 6553 | 5530 | 5530 |
| 3 | 9830 | 9830 | 8294 | 8294 |
| 4 | 13107 | 13107 | 11059 | 11059 |
| 5 | 16384 | 16384 | 13824 | 13824 |
| 6 | 19661 | 19660 | 16589 | 16589 |
| 7 | 22937 | 22937 | 19354 | 19354 |
| 8 | 26214 | 26214 | 22118 | 22118 |
| 9 | 29491 | 29490 | 24883 | 24883 |
| 10 | 32767 | 32767 | 27648 | 27648 |
|  | Code value=(65535/20) \* voltage | Code value=(32767/10) \* Voltage | Code value=(55296/20) \* Voltage | Code value=(27648/10) \* Voltage |
|  | Voltage=(code value \* 20)/65535 | Voltage=(code value \* 10)/32767 | Voltage=(code value \* 20)/55296 | Voltage=(code value \* 10)/27648 |

<3.4.1.2> Selection of current input/output range and code value table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Selection of current input/output range and code value range** | | | | |
| Range selection | 0 | **1** | **2** | **3** |
| Range of measurement | 4~20 mA | 0~20 mA | 4~20 mA | 0~20 mA |
| Code value range | 0~65535 | | 0~27648 | |
| Formula for calculating current input | D =65535/16\*I-16 384 | D =(65535/20)\*I | D =(27648/16)\*I-6 912 | D =(27648/20)\*I |
| Formula for calculating current output | I =(D+16384)\*16/ 65535 | I =(D\*20)/65535 | I =((D+6912)\*16)/ 27648 | I =(D\*20)/27648 |
| Code value  Corresponding table | Refer to Table 3-2 for the current code value table. | | | |

Note: D represents code value, and I represents current.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Range selection Range**  **Electric current** | **0 (default)** | **1** | **2** | **3** |
| **4-20mA** | **0-20mA** | **4-20mA** | **0-20mA** |
| **Code value** | **Code value** | **Code value** | **Code value** |
| 0 | - | 0 | - | 0 |
| 1 | - | 3277 | - | 1382 |
| 2 | - | 6554 | - | 2765 |
| 3 | - | 9830 | - | 4147 |
| 4 | 0 | 13107 | 0 | 5530 |
| 5 | 4096 | 16384 | 1728 | 6912 |
| 6 | 8192 | 19661 | 3456 | 8294 |
| 7 | 12288 | 22937 | 5184 | 9677 |
| 8 | 16384 | 26214 | 6912 | 11059 |
| 9 | 20479 | 29491 | 8640 | 12442 |
| 10 | 24575 | 32768 | 10368 | 13824 |
| 11 | 28671 | 36044 | 12096 | 15206 |
| 12 | 32767 | 39321 | 13824 | 16589 |
| 13 | 36863 | 42598 | 15552 | 17971 |
| 14 | 40959 | 45875 | 17280 | 19354 |
| 15 | 45055 | 49151 | 19008 | 20736 |
| 16 | 49151 | 52428 | 20736 | 22118 |
| 17 | 53247 | 55705 | 22464 | 23501 |
| 18 | 57343 | 58982 | 24192 | 24883 |
| 19 | 61439 | 62258 | 25920 | 26266 |
| 20 | 65535 | 65535 | 27648 | 27648 |
| 21 | 65535 | 65535 | 29376 | 29030 |
| 22 | 31104 | 30413 |
| 22.81 | 32511 | 31538 |
| 22.96 | 32767 | 31743 |
| 23 | 31795 |
| 23.52 | 32511 |
| 23.70 | 32767 |
| 24 |
| 25 |
|  | Code value=65535/16 \* current -16384 | Code value=(65535/20) \* current | Code value=(27648/16)  \*Current -6912 | Code value=(27648/20) \* current |

Note:

When the input current of range 2 is higher than 22.81 mA, the code value is displayed as 32767; When the specified code value is higher than 32511, the output current is 22.81 mA.

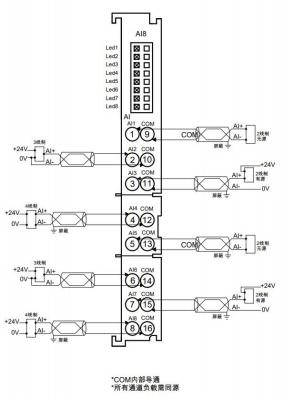
When the input current of range 3 is higher than 23.52 mA, the code value displays 32767; When the specified code value is higher than 32511, the output current is 23.52 mA.

## 3.4.2 Indicator function

|  |  |  |  |
| --- | --- | --- | --- |
| **I/O terminal indicator description** | | | |
| Identifier | **Color** | **Status** | **Status description** |
| Input channel indicator Led1~Led8 | Green | Remain ON | The module channel has signal input |
| OFF | The module channel has no signal input or abnormal signal input |
| Output channel indicator Led1~Led8 | Green | Remain ON | The module channel has signal output |
| OFF | The module channel has no signal output or abnormal signal output |

### 3.4.3 Wiring diagram

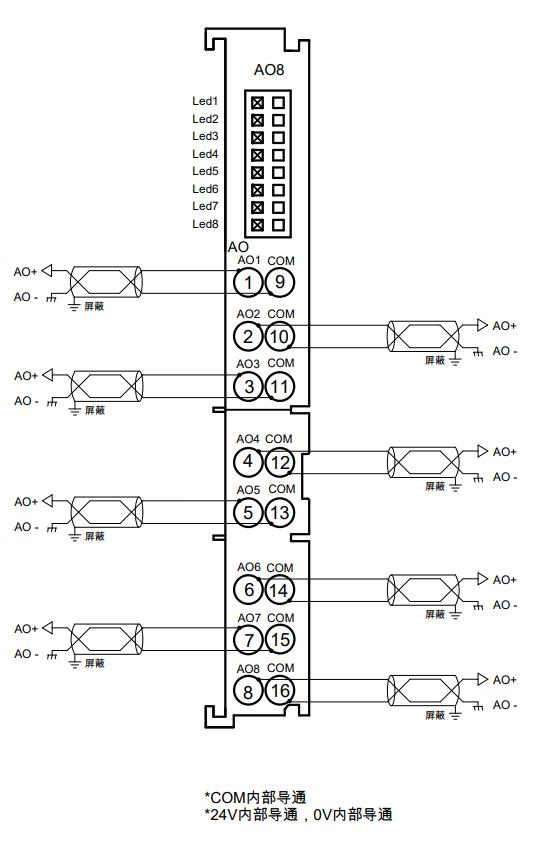
[3.4.3.1 8](3.4.3.18)-channel analog voltage (SRC3118)/current (SRC3138) input module



\*COM internally conductive

\*Loads of all channels shall be conductive.

[3.4.3. 2 8](3.4.3.28)-channel analog voltage (SRC4018)/current (SRC4038) output module



\*COM internally conductive

\*24V internally conductive and 0V internally conductive.

## 3.5 SRC3804 Temperature Acquisition Module

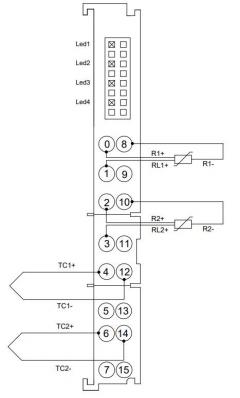
### 3.5.1 Technical Specifications

|  |  |  |
| --- | --- | --- |
| **Temperature Input** | | |
| Number of channels | 4 | |
| Sensor type | Thermocouple | Thermal resistance |
| Connection method | 2-wire system | 2-wire, 3-wire system |
|  | K: -200~1370℃  J: -200~1200℃  E: -200~1000℃  S: -50~1690℃  B: 50~1800℃ | Pt100: −200~850℃  Pt200: −200~600℃  Pt500: −200~600℃  Pt1000: −200~600℃ |
| Accuracy | ±0.5% | ±1℃ |
| Sensitivity | 0.1℃ | |
| Resolution | 16 bit (int type) | |
| Channel indicator | Green LED light | |
| **General Technical Specifications** | | |
| Specification and size | 100 × 14.8 × 68.67 mm (see [section 4.4.2](#bookmark163) for dimension diagram) | |
| Weight | 50 g | |
| Woking temperature | -10~ +60℃ | |
| Storage temperature | -20℃ ~ +75℃ | |
| Relative humidity | 95%, no condensation | |
| Protection level | IP20 | |

### 3.5.2 Indicator function

|  |  |  |  |
| --- | --- | --- | --- |
| **Module indicator description** | | | |
| **Identifier** | **Color** | **Status** | **Status description** |
| Channel indicators Led1~Led4 | Green | Remain ON | Temperature acquisition between -200~2000 ℃ or measure resistance higher than 0 Ω |
| OFF | Temperature acquisition not between -200~2000 ℃ or the measured resistance is 0 Ω |

### 3.5.3 Wiring diagram



## 3.6 SRC5001 24V single ended incremental encoder count module

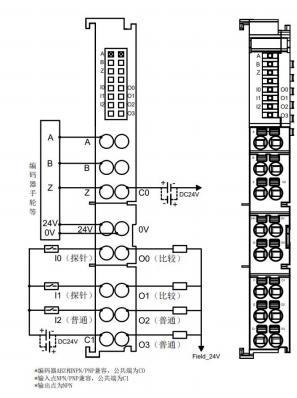
### 3.6.1 Technical Specifications

|  |  |
| --- | --- |
| **Interface parameters** | |
| Process data volume: downward | 10 Bytes |
| Process data volume: Upstream | 17 Bytes |
| Channel type | Encoder input channel: 1 set of channels (A-phase, B-phase, and Z-phase), PNP/NPN |
| Probe input channel: 2-channel, PNP/NPN |
| Ordinary digital input channel: 1 channel, PNP/NPN |
| Compare output channels: 2-channel, NPN |
| Ordinary digital output channels: 2-channel, NPN |
| Refresh rate | 1 ms |
| **Technical parameter** |  |
| System input power supply | 5VDC |
| Rated value of on-site power supply (range) | 24VDC (18V~36V) |
| Rated input channel voltage (range) | 24VDC (15V~30V) |
| Encoder pulse input mode | AB orthogonal (ABZ), directional pulse (Pul+Dir), dual pulse (CW/CCW) |
| Encoder pulse input frequency | 1MHz |
| Real time speed of reporting channel | Support |
| Z phase zeroing | Support |
| count multiplies setting | 4x/2x/1x (default 1x) |
| Circular counting | Support |
| count range | 0~2 ^ 32-1 or 0~circular count resolution x count multiplies -1 |
| Encoder ring count resolution setting [1] | Support (ring count resolution setting range is 0~65535) |
| Count initial value setting | Support (initial count value setting range is 0-2 ^ 32-1) |
| Reverse counting | Support |
| Encoder input hardware filtering | Support (levels 0-15) |
| Probe function (high-speed hardware latch) | Support |
| Probe input frequency | 1MHz |
| Compare output function | Support |
| Compare the response speed of output signals | 50us |
| Function selection of input and output pins | Support |
| Power- down memory | Support |
| External dimensions | 100× 14.8 ×68.67mm |
| Weight | 50g |
| Wiring method | Screw free quick plug |
| Installation method | DIN 35mm rail installation |
| Working temperature | -10℃ ~ +60℃ |
| Storage temperature | -20℃ ~ +75℃ |
| Relative humidity | 95%, no condensation |
| Protection level | IP20 |

### 3.6.2 Indicator function

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Identifier** | **Color** | **Status** | **Status description** |
| Encoder input AB phase indicator | A | Green | Remain ON | Encoder enabled |
| B | OFF | Encoder not enabled |
| Encoder input Z-phase indicator | Z | Green | Remain ON | Encoder Z-phase reset function enabled |
| OFF | Encoder Z-phase reset function not enabled |
| Input channel indicator | I0~I2 | Green | Remain ON | The channel has signal input |
| OFF | The channel has no signal input |
| Output channel indicator | O0~O3 | Green | Remain ON | The channel has signal output |
| OFF | The channel has no signal output |

### 3.6.3 Wiring diagram



\*NPN/PNP compatible for encoder ABZ phase, common terminal C0

\*Input point NPN/PNP compatible for input point, common terminal C1

\*The output point is NPN

### 3.6.4 Use Cases

* **Encoder 1 inputs AB orthogonal pulses, with a total of 40000 pulses. Encoder 1 probe inputs channel 1 for latch.**

a. Configure the configuration parameters;

a) Set Encoder 1 Pulse Mode to AB orthogonal pulse mode, that is, set Encoder 1 Pulse Mode to 0: ABZ;

b) Set Encoder 1 Count Multiples 4 times, that is, set Encoder 1 Count Multiples to 4;

c) Set Encoder 1 Count Range to 0~ring count resolution x count multiplies -1, that is, set Encoder 1 Count Range to 1: Resolution x Multiples;

d) Set Encoder 1 ring count resolution to 20000, that is, set Encoder 1 Count Resolution to 20000;

e) Set Encoder 1 count direction t to forward count, that is, set Encoder 1 Count Direction to 0: Forward;

f) Set the initial value of Encoder 1 Count to 0, that is, set Encoder 1 Count Initial Value to 0;

g) Set the probe mode of Encoder 1 to channel 1 single and channel 2 single, that is, set Encoder 1 Probe Trigger Mode to 0: CH1\_Simple CH2-Single;

h) Set encoder 1 probe trigger edge to the raising edge of channel 1 and the raising edge of channel 2, that is, set Encoder 1 Probe Trigger Edge to 0: CH1\_ Raising CH2\_Raising;

b. Enable encoder 1 count and enable encoder 1 probe input channel 1 latch;

a) Set downstream data Encoder\_1 Enable to 1;

b) Set downstream data Encoder\_1 Input Latch CH1 Enable to 1;

c. Encoder 1 starts inputting pulses, and encoder 1 probe inputs a valid signal into channel 1.

* **Encoder 1 inputs directional pulses, with a total of 40000 pulses. Encoder 1 compare output channel 1 for comparison and output**

a. Configure the configuration parameters;

a) Set Encoder 1 pulse mode to directional pulse mode, that is, set Encoder 1 Pulse Mode to 1: Pul+Dir;

b) Set count range of Encoder 1 to 0-2 ^ 32-1, that is, set Encoder 1 Count Range to 0:2 ^ 32;

c) Set counting direction of Encoder 1 to forward counting, that is, set Encoder 1 Count Direction to 0: Forward;

d) Set the initial value of Encoder 1 Count to 0, that is, set Encoder 1 Count Initial Value to 0;

e) Set Encoder 1 Compare Output Channel 1 pulse time to 10 seconds, that is, set Encoder 1 Compare Output CH1 Time to 10000;

b. Enable encoder 1 count to enable, and set encoder 1 compare output channel 1 to set comparison set value, compare direction, and comparison mode

a) Set downstream data Encoder\_1 Enable to 1;

b) Set downstream data Encoder\_1 Compare Output CH1 SetValue to 1000;

c) Set downstream data Encoder\_1 Compare Output CH1 Direction to 1 for incremental comparison;

d) Set downstream data Encoder\_1 Compare Output CH1 Mode to 1 for repeated triggering;

e) Set downstream data Encoder\_1 Compare Output CH1 Enable to 1 for enabling;

c. Encoder 1 starts to input pulses.

## 3.7 SRC5031 5V differential incremental encoder count module

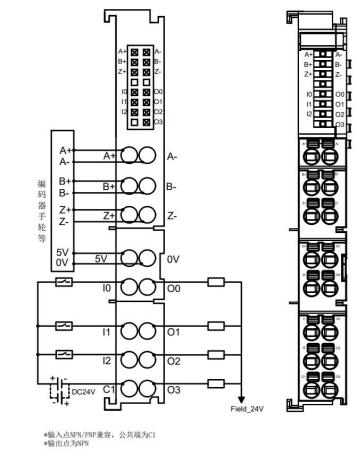
### 3.7.1 Technical Specifications

|  |  |
| --- | --- |
| **Technical parameter** | |
| System input power supply | 5VDC |
| Rated value of on-site power supply (range) | 24VDC (18V~36V) |
| Encoder signal type | 5VDC (differential) |
| Encoder pulse input mode | AB orthogonal (ABZ), directional pulse (Pul+Dir), dual pulse (CW/CCW) |
| Encoder pulse input frequency | 1MHz |
| Real time speed of reporting channel | Support |
| Z phase zeroing | Support |
| count multiplies setting | 4x/2x/1x (default 1x) |
| Circular count | Support |
| Count range | 0~2 ^ 32-1 or 0~circular count resolution x count multiplies -1 |
| Encoder ring count resolution setting [1] | Support (ring count resolution setting range is 0~65535) |
| Count initial value setting | Support (initial count value setting range is 0-2 ^ 32-1) |
| Reverse count | Support |
| Encoder input hardware filtering | Support (levels 0-15) |
| Probe function (high-speed hardware latch) | Support |
| Probe input frequency | 1MHz |
| Compare output function | Support |
| Compare the response speed of output signals | 50us |
| Function selection of input and output pins | Support |
| Power-down memory | Support |
| External dimensions | 100× 14.8 ×68.67mm |
| Weight | 50g |
| Wiring method | Screw free quick plug |
| Installation method | 35mm rail installation |
| Working temperature | -10℃ ~ +60℃ | |
| Storage temperature | -20℃ ~ +75℃ | |
| Relative humidity | 95%, no condensation | |
| Protection level | IP20 | |

### 3.7.2 Indicator function

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Identifier** | **Color** | **Status** | **Status description** |
| Encoder input AB phase indicator | A+/A- | Green | Remain ON | Encoder enabled |
| B+/B- | OFF | Encoder not enabled |
| Encoder input Z-phase indicator | Z+/Z- | Green | Remain ON | Encoder Z-phase reset function enabled |
| OFF | Encoder Z-phase reset function not enabled |
| Input channel indicator | I0~I2 | Green | Remain ON | The channel has signal input |
| OFF | The channel has no signal input |
| Output channel indicator | O0~O3 | Green | Remain ON | The channel has signal output |
| OFF | The channel has no signal output |

### 3.7.3 Wiring diagram



\*NPN and PNP are compatible for input point and common end C1

\*Output point PNP

### 3.7.4 Use case

* **Encoder 1 inputs AB orthogonal pulses, with a total of 40000 pulses. Encoder 1 probe inputs channel 1 for latch.**

d. Configure the configuration parameters;

a) Set Encoder 1 Pulse Mode to AB orthogonal pulse mode, that is, set Encoder 1 Pulse Mode to 0: ABZ;

b) Set Encoder 1 Count Multiples 4 times, that is, set Encoder 1 Count Multiples to 4;

c) Set Encoder 1 Count Range to 0~ring count resolution x count multiplies -1, that is, set Encoder 1 Count Range to 1: Resolution x Multiples;

d) Set Encoder 1 ring count resolution to 20000, that is, set Encoder 1 Count Resolution to 20000;

e) Set Encoder 1 count direction t to forward count, that is, set Encoder 1 Count Direction to 0: Forward;

f) Set the initial value of Encoder 1 Count to 0, that is, set Encoder 1 Count Initial Value to 0;

g) Set the probe mode of Encoder 1 to channel 1 single and channel 2 single, that is, set Encoder 1 Probe Trigger Mode to 0: CH1\_Simple CH2-Single;

h) Set encoder 1 probe trigger edge to the raising edge of channel 1 and the raising edge of channel 2, that is, set Encoder 1 Probe Trigger Edge to 0: CH1\_ Raising CH2\_Raising;

e. Enable encoder 1 count and enable encoder 1 probe input channel 1 latch;

c) Set downstream data Encoder\_1 Enable to 1;

d) Set downstream data Encoder\_1 Input Latch CH1 Enable to 1;

c. Encoder 1 starts inputting pulses, and encoder 1 probe inputs a valid signal into channel 1.

* **Encoder 1 inputs directional pulses, with a total of 40000 pulses. Encoder 1 compare output channel 1 for comparison and output**

d. Configure the configuration parameters;

f) Set Encoder 1 pulse mode to directional pulse mode, that is, set Encoder 1 Pulse Mode to 1: Pul+Dir;

g) Set count range of Encoder 1 to 0-2 ^ 32-1, that is, set Encoder 1 Count Range to 0:2 ^ 32;

h) Set counting direction of Encoder 1 to forward counting, that is, set Encoder 1 Count Direction to 0: Forward;

i) Set the initial value of Encoder 1 Count to 0, that is, set Encoder 1 Count Initial Value to 0;

j) Set Encoder 1 Compare Output Channel 1 pulse time to 10 seconds, that is, set Encoder 1 Compare Output CH1 Time to 10000;

e. Enable encoder 1 count to enable, and set encoder 1 compare output channel 1 to set comparison set value, compare direction, and comparison mode

a) Set downstream data Encoder\_1 Enable to 1;

b) Set downstream data Encoder\_1 Compare Output CH1 SetValue to 1000;

c) Set downstream data Encoder\_1 Compare Output CH1 Direction to 1 for incremental comparison;

d) Set downstream data Encoder\_1 Compare Output CH1 Mode to 1 for repeated triggering;

e) Set downstream data Encoder\_1 Compare Output CH1 Enable to 1 for enabling;

f. Encoder 1 starts to input pulses.

## 3.8 SRC5041 SSI Encoder Count Module

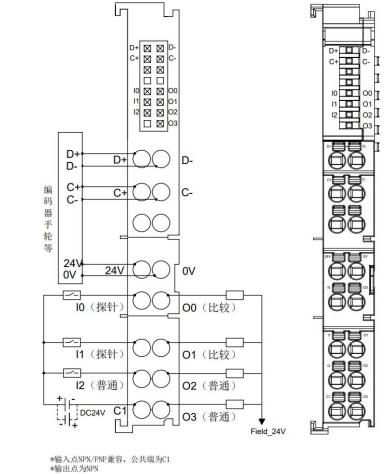
### 3.8.1 Technical Specifications

|  |  |  |
| --- | --- | --- |
| **Interface parameters** | | |
| Bus protocol | SC-Link | |
| Process data volume: downward | 10 Bytes | |
| Process data volume: Upstream | 17 Bytes | |
| Digital IO | Input: 3 Ch, PNP/NPN | Output: 4 Ch, NPN |
| Refresh rate | 1 ms | |
| **Technical specification** | | |
| System input power supply | 5VDC | |
| Rated value of on-site power supply (range) | 24VDC (18V～36V) | |
| Rated input channel voltage (range) | 5VDC (differential) | |
| Encoder pulse input mode | Absolute Value SSI | |
| Encoder input | 1 channel | |
| Data frame length | 10-40 bits | |
| Position value format | Support Gray code or binary | |
| Position value LSB/MSB | Can be set | |
| SSI encoder clock frequency | ≤2.0 MHz | |
| Read interval time | Can be set | |
| Capture function | Support | |
| External dimensions | 100 × 14.8 ×68.67mm | |
| Weight | 50g | |
| Wiring method | Screw free quick plug | |
| Installation method | DIN 35mm rail installation | |
| **Digital input** |  | |
| Rated voltage | 24 VDC (18V～30V) | |
| Number of signal points | 3 | |
| Signal type | NPN/PNP | |
| “0” signal voltage (PNP) | -3~ +3 V | |
| “1” signal voltage (PNP) | 15~30 V | |
| “0” signal voltage (NPN) | 15~30 V | |
| “1” signal voltage (NPN) | -3~ +3 V | |
| Input current | 4 mA | |
| Isolation method | Optocoupler isolation | |
| Isolation voltage withstand | 500 VAC | |
| Channel indicator | Green LED light | |
| **Digital output** |  | |
| Rated voltage | 24 VDC (18V～30V) | |
| Number of signal points | 4 | |
| Signal type | NPN | |
| Load type | Resistive load, inductive load | |
| Single channel rated current | Max: 500 mA | |
| Port protection | Overcurrent protection | |
| Isolation method | Optocoupler isolation | |
| Isolation voltage withstand | 500 VAC | |
| Channel indicator | Green LED light | |

### 3.8.2 indicator function

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Identifier** | **Color** | **Status** | **Status description** |
| Data cable channel indicator | D+/D- | Green | Remain ON | The channel has signal input |
| OFF | The channel has no input or signal input is abnormal |
| Clock line channel indicator | C+/C- | Green | Remain ON | The channel has signal output |
| OFF | The channel has no output or signal output is abnormal |
| Input channel indicator | I0~I2 | Green | Remain ON | The channel has signal input |
| OFF | The channel has no input or signal input is abnormal |
| Output channel indicator | O0~O3 | Green | Remain ON | The channel has signal output |
| OFF | The channel has no output or signal output is abnormal |

### 3.8.3 Wiring diagram



## 3.9 SRC6041 RS485/RS422/RS232 gateway module

### 3.9.1 Technical Specifications

|  |  |
| --- | --- |
| **Interface parameters** | |
| Bus protocol | SC-Link |
| Process data volume: downward | 40 Bytes |
| Process data volume: Upstream | 40 Bytes |
| **Technical specifications** | |
| Number of channels | 1 channel |
| Communication interface type | RS232, RS485, RS422 |
| Communication protocol | Modbus RTU, Modbus ASCII |
| Baud rate | 1200bps~115200bps |
| Power | 70mA@5VDC |
| Weight | 50g |
| Size | 100× 14.8 ×68.67mm |
| Working temperature | -10℃ ~ +60℃ |
| Storage temperature | -20℃ ~ +75℃ |
| Relative humidity | 95%, no condensation |
| Protection level | IP20 |

**Serial port parameters**

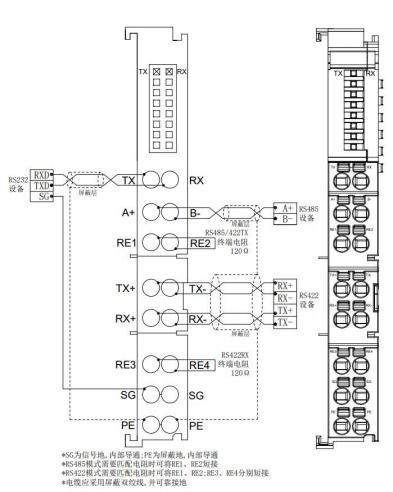
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter Name** | **Description** | **Value range** | **Description** | |
| Communicate Mode | Communication mode | 0 | MRM | Modbus RTU Master, also known as RTU Master Mode |
| 1 | MRS | Modbus RTU Slave, also known as RTU Slave Mode [1] |
| 2 | MAM | Modbus ASCII Master, also known as ASCII Master Mode |
| 3 | MAS | Modbus ASCII Slave, also known as ASCII Slave Mode [1] |
| 4 | FP | FreePort stands for Free Port Mode [1] |
| 5 | PT | PassThrough mode |
| Baud Rate | Serial port baud rate | 0 | 1200 bps | |
| 1 | 2400 bps | |
| 2 | 4800 bps | |
| 3 | 9600 bps | |
| 4 | 19200 bps | |
| 5 | 38400 bps | |
| 6 | 57600 bps | |
| 7 | 115200 bps | |
| StopBit | Stop bit | 0 | 1 Bit | |
| 1e | 2 Bits | |
| ParityBit | Parity check bit | 0 | None :without verification | |
| 1 | Odd: Odd Verification | |
| 2 | Even: even parity check | |
| WordFormat | Character format | 0 | 8 Bits | |
| 1 | 7 Bits | |
| StationNo | Modbus Slave Number | 1~247 | Effective in slave mode | |
| SlaveRspDelay | Response delay | 0~65535 | Unit ms | |

Note [1]: Modbus RTU Slave, Modbus ASCII Slave, and FreePort modes are currently not supported.

### 3.9.2 Indicator function

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Identifier** | **Color** | **Status** | **Status description** |
| Input channel indicator | RX | Green | Flash | The channel has data reception |
| OFF | The channel has no data reception |
| Output channel indicator | TX | Green | Flash | The channel has data transmission |
| OFF | The channel has no data transmission |

3.9.3 Wiring diagram



\*SG is the signal ground and internally conductive; PE is a shielded ground and internally conductive;

\*When matching resistors in RS485 mode, RE1 and RE2 can be short circuited;

\*When RS422 mode requires matching resistors, RE1 and RE2 can be used; RE3 and RE4 are respectively short circuited

\*The cable should be shielded twisted pair and reliably grounded.

4.Installation and Disassembly



## 4.1 Installation Guide

**Installation/disassembly precautions**

Ensure that the cabinet is well ventilated (such as installing exhaust fans on the cabinet).

Do not install this device next to or above equipment that may cause overheating.

Install the module vertically and maintain air to circulate around it (there should be at least 50mm of space for air circulation above and below the module).

After installing the module, be sure to secure the module with the fixing buckle on the left side of the coupler module.

Be sure to power off the device for installation/disassembly of the device.

## 4.2 Installation and disassembly steps

|  |  |
| --- | --- |
| **Module installation and disassembly** | |
| Module installation steps | 1. Install the coupler power module on the fixed guide rail first. |
| 2. Install the required I/O terminals or functional modules on the right side of the power module in sequence. |
| 3. After installing all the required modules, install the end caps and assemble modules. |
| 4. Rotate the orange fixing buckle on the left side of the coupler module to the module. |
| Module disassembly steps | 1. When disassembling a module separately, directly pull the orange pull strip of the module outward. |
| 2. Continue pulling the orange pull strip to directly disassemble and extract the module. |
| 3. To replace a module, disassemble it and insert into the new module. |

## 4.3 Installation Diagram

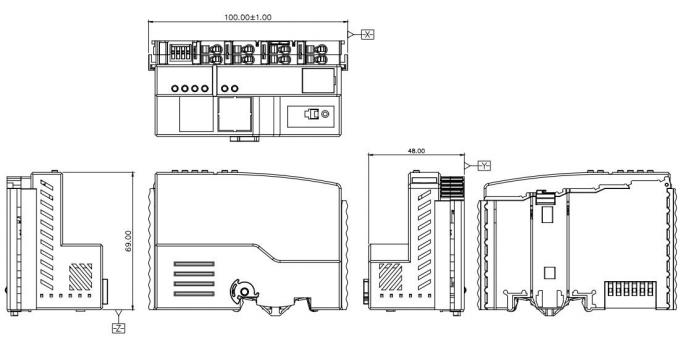
|  |  |
| --- | --- |
| **Installation of coupler power module and I/O terminal** | **Step** |
| Figure ① | Align the coupler power module vertically with the rail slot, push it into place, and then install the I/O terminals on the right side in sequence, aligning with the right side of the power module, as shown in Figure ① on the left. |
| Figure ② | As shown in Figure ②, push the I/O terminal towards the guide rail with force. When you hear a “click” sound, the module is installed in place. |
| Figure ③ | Install the required I/O terminals or functional modules one by one, align the left card slot of the module with the rightmost side of the installed module, and push it in as shown in Figure ③. When you hear a "click" sound, the module is installed in place. |

|  |  |
| --- | --- |
| **Installation of end cover** | **Step** |
| Figure ④ | Install the end cover on the right side of the last module, as shown in Figure ④. Please refer to the installation method of the I/O terminal. After the end cover is pushed into place, as shown in Figure ⑤. |
| Figure ⑤ |  |
| **Disassemble** | **Step** |
| Figure ⑥ | The orange pull assemble of the module to be disassembled or replaced can be directly pulled outward, as shown in Figure ⑥ on the left. |
| Figure ⑦ | After pulling out the orange pull strip outward, continue to pull it outward as shown in Figure ⑦, and the module can be directly pulled out. |

## 4.4 Dimensional drawing

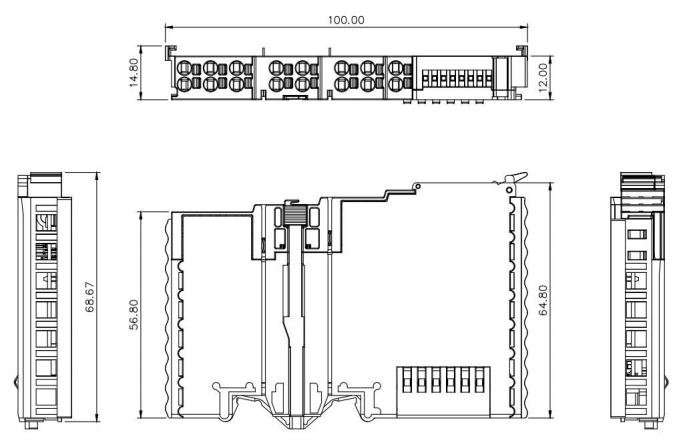
### 4.4.1 External dimensions of coupler

**External specifications of coupler (unit: mm)**



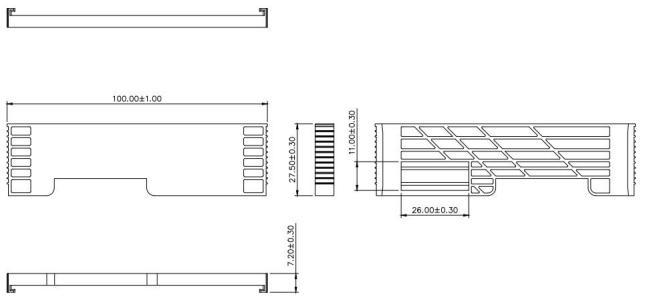
### 4.4.2 Dimensions of 16-channel cage shell

**16 channel I/O terminal, common terminal module, temperature acquisition module external specifications (unit: mm)**



### 4.4.3 Module Dimensions of End Block

End cap external specifications (unit: mm)



Note: All are installed with DIN 35mm standard guide rails, with specifications of 35 \* 7.5 \* 1.0 and 35 \* 15 \* 1.0 (Unit: mm).

# 5.Wiring



## 5.1 Wiring terminals

|  |  |  |  |
| --- | --- | --- | --- |
| **Wiring terminals** | | | |
| Power module terminal | Extreme numbers | 8P | |
| Wire diameter | 28~12 AWG 0.2~2.5 mm² | |
| I/O terminals | Extreme numbers | 8-channel cage shell | 8P |
| 16 channel cage shell | 16P |
| Wire diameter | 8 channel cage shell | 28~12 AWG 0.2 ~2.5 mm² |
| 16 channel cage shell | 28~16 AWG 0.2 ~1.5 mm² |
| Bus interface | 2 × RJ45 | Category 5 or above UTP or STP (STP is recommended) | |

## 5.2 Wiring Instructions and Requirements

**Precautions for power wiring**

* The module system side power supply and the on-site side power supply should be configured and used separately, and should not be mixed.
* PE needs to be reliably grounded.

|  |  |
| --- | --- |
| **Requirements for Wiring Tools** | |
| The power terminal and I/O module signal line terminal adopt a screw free design, and cables can be installed and disassembled with a flathead screwdriver (specification: ≤ 3mm). |  |
| **Requirements for stripping length** | |
| The recommended cable stripping length for power and signal line terminals is 8-9 mm. |  |
| **Wiring method** | |
| Single stranded hard wire, after peeling off the corresponding length of wire, press down the spring plate and insert the single stranded wire at the same time.  Multiple flexible wires can be directly connected or paired with corresponding standard specifications of cold pressed terminals (tube type insulated terminals, as shown in the table below) after stripping the corresponding length of wire. The wire can be inserted by pressing down the spring plate at the same time. |  |

The specifications of power terminals and signal line terminals are shown in the following table:

|  |  |  |
| --- | --- | --- |
| **Specification Table for Tube Type Insulation End** | | |
| Specification requirements | Model | Wire cross-sectional area mm ² |
| The tube type insulated terminal L is 8 mm long | E0308 | 0.3 |
| E0508 | 0.5 |
| E7508 | 0.75 |
| E1008 | 1.0 |
| E1508 | 1.5 |
| E2508 | 2.5 |

# 6.Parameter Description



## 6.1 Output signal clear/hold

The clear/hold function is designed for modules with output channels, which can configure the output action of the module when communication is disconnected.

Clear output: When communication is disconnected, the module output channel automatically clears the output.

Hold output: When communication is disconnected, the module output channel holds output.

## 6.2 Digital input filter

Digital input filter can prevent unexpected rapid changes in program response to input signals, which may be caused by switch contact jumps or electrical noise. The current default configuration for digital input filter is 3ms, and the support range is 0-20ms. When configured to 3ms, it can filter out clutter within 3ms, and the channel cannot be configured separately.

The 3 ms input filter time means that a single signal can only be detected when it changes from “0” to “1” or from “1” to “0” for 3 ms, while a single high or low pulse shorter than 3 ms will not be detected.

## 6.3 Analog filter settings

● **Analog input filter function**

The analog input filter function can internally average the A/D converted data to reduce the impact of fluctuations in the input signal caused by noise and other factors.

Analog input is subjected to moving average processing with a specified number of A/D conversions.

● **Filter function configuration**

Each channel can be configured separately, with a configuration range of 1-200 and default of 10 times.

The sampling rate of the 8-channel module is 1.25KHz/8-channels (800us/8-channels);

The sampling rate of the 4-channel module is 2.5KHz/4-channel (400us/4-channel).

## 6.4 Analog Range Configuration

The analog range setting function is used to set the range of analog signals (see “[3.5 Analog Parameters](#bookmark46)” for details on the range).

## 6.5 SR5001 Encoder Count Module

### 6.5.1 Upstream data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Upstream Data 17 bytes** | | | | |
| **Name** | **Meaning** | **Value range** | **Data type** | **Length** |
| Encoder\_1 Probe Input CH1 | Encoder probe input signal channel 1 | 0: No signal input | bool | 1 bit |
| 1: Have signal input |
| Encoder\_1 Probe Input CH2 | Encoder probe input signal channel 2 | 0: No signal input | bool | 1 bit |
| 1: Have signal input |
| Encoder\_1 Input CH3 | Encoder ordinary input signal channel 3 | 0: No signal input | bool | 1 bit |
| 1: Have signal input |
| Encoder\_1 Probe Input CH1 Latched Finish | Encoder probe input channel 1 latch completion flag bit | 0:1->0 latch once, flip once | bool | 1 bit |
| 1: 0->1 latch once, flip once |
| Encoder\_1 Probe Input CH2 Latched Finish | Encoder probe input channel 2 latch completion flag bit | 0:1->0 latch once, flip once | bool | 1 bit |
| 1: 0->1 latch once, flip once |
| Encoder\_1 Count Value | Encoder count value | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Latch CH1 Value | Encoder probe input channel 1 latch value | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Latch CH2 Value | Encoder probe input channel 2 latch value | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Speed | Encoder speed | -2^31~2 ^31-1 | signed32 | 4 bytes |

**Upstream data description:**

* **Encoder\_1 Probe Input CH1/CH2**

The encoder is equipped with two probe input channels, indicating the presence or absence of input signals from the corresponding probe input channels.

When the probe input channel latch function is not enabled, it can be used as a regular digital input channel.

* **Encoder\_1 Input CH3**

The encoder is equipped with one ordinary digital input channel, indicating the presence or absence of the corresponding DI channel input signal.

* **Encoder\_1 Probe Input CH1/CH2 Latched Finish**

The encoder is equipped with two probe input channels. After the probe input channel is latched, the flag bit will flip from 0 to 1 or 1 to 0.

Example 1: Encoder 1 probe input channel 1 has a latch completion flag bit of 0. After completing one latch, the flag becomes 1, and after completing another latch, the flag becomes 0.

* **Encoder\_1 Count Value**

The encoder count value corresponds to the current count value of the encoder, with a range of 0-2 ^ 32-1.

* **Encoder\_1 Latch CH1/CH2 Value**

The encoder is equipped with 2 probe input channels. By inputting signals that meet the set conditions into the probe input channels, the current count value of the corresponding encoder can be quickly latched. Therefore, the range of the latched value is the same as the count value, with a range of 0-2 ^ 32-1.

* **Encoder Speed Encoder\_1 Speed**

The encoder speed is the pulse speed of the input channel of the encoder, with a numerical range of -2 ^ 31~2 ^ 31-1.

### 6.5.2 Downstream data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Downstream instruction 10 bytes** | | | | |
| **Name** | **Meaning** | **Value range** | **Data type** | **Length** |
| Encoder\_1 Enable | Encoder Count Enable | 0: Disable | bool | 1 bit 0 |
| 1: Enable |
| Encoder\_1 Z Phase Clear Enable | Encoder Z-phase reset enable | 0: Disable | bool | 1 bit 1 |
| 1: Enable |
| Encoder\_1 Count Clear | Zero encoder count value | 0: Disable | bool | 1 bit 2 |
| 1: Enable |
| Encoder\_1 Compare Output CH1 Enable | Encoder compare output channel 1 enabled | 0: Disable | bool | 1 bit 3 |
| 1: Enable |
| Encoder\_1 Compare Output CH2 Enable | Encoder compare output channel 2 enabled | 0: Disable | bool | 1 bit 4 |
| 1: Enable |
| Encoder\_1 Compare Output CH1 Direction | Encoder compare output channel 1 compare direction | 0: Decreasing comparison | bool | 1 bit 5 |
| 1: Incremental comparison |
| Encoder\_1 Compare Output CH2 Direction | Encoder compare output channel 2 compare direction | 0: Decreasing comparison | bool | 1 bit 6 |
| 1: Incremental comparison |
| Encoder\_1 Compare Output CH1 Mode | Encoder compare output channel 1 trigger mode | 0: Single trigger | bool | 1 bit 7 |
| 1: Repeated triggering |
| Encoder\_1 Compare Output CH2 Mode | Encoder compare output channel 2 trigger mode | 0: Single trigger | bool | 1 bit 0 |
| 1: Repeated triggering |
| Encoder\_1 Output CH1(Compare) | Encoder output channel 1 (comparative output) | 0: Output high-level 24V | bool | 1 bit 1 |
| 1: Output low level 0V |
| Encoder\_1 Output CH2(Compare) | Encoder output channel 2 (comparative output) | 0: Output high-level 24V | bool | 1 bit 2 |
| 1: Output low level 0V |
| Encoder\_1 Output CH3 | Encoder output channel 3 (normal output) | 0: Output high-level 24V | bool | 1 bit 3 |
| 1: Output low level 0V |
| Encoder\_1 Output CH4 | Encoder output channel 4 (normal output) | 0: Output high-level 24V | bool | 1 bit 4 |
| 1: Output low level 0V |
| Encoder\_1 Input Latch CH1 Enable | Encoder probe input channel 1 latch enable | 0: Disable | bool | 1 bit 5 |
| 1: Enable |
| Encoder\_1 Input Latch CH2 Enable | Encoder probe input channel 2 latch enable | 0: Disable | bool | 1 bit 6 |
| 1: Enable |
| Encoder\_1 Compare Output CH1 SetValue | Encoder compare output channel 1 set value | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Compare Output CH2 SetValue | Encoder compare output channel 2 set value | 0~2 ^32-1 | unsigned32 | 4 bytes |

**Downstream data description:**

* **Enable Encoder\_1 Enable**

0: disabled; 1: enabled.

* **Encoder\_1 Z Phase Clear Enable**

0: disabled; 1: enabled.

After Z Phase Clear Enable is enabled, the current count value is cleared by detecting the Z phase signal of the encoder. The encoder generates a Z phase pulse every time it rotates, and the count value is cleared once.

The physical resolution of the encoder is the number of pulses output when the encoder rotate every revolution, and the count multiple × physical resolution is the maximum count value every revolution. When the Z phase clear function is enabled, the count value is cleared once every revolution of encoder.

* **Encoder\_1 Count Clear**

Edge control, when it is detected to be reset from 0 to 1, the corresponding encoder count value is cleared. If the encoder count initial value is set, the count value is also cleared.

* **Encoder\_1 Compare Output CH1/CH2 Enable**

0: disabled; 1: enabled.

When disabled, it can be used as a regular digital output channel.

* **Encoder\_1 Compare Output CH1/CH2 Direction**

Set Encoder\_1 Compare Output CH1/CH2 Direction to 0, implying decreasing comparison, that is, the direction in which the count value decreases from large to small; Set Encoder\_1 Compare Output CH1/CH2 Direction to 1, implying incremental comparison, that is, the direction of counting values from small to large.

* **Encoder\_1 Compare Output CH1/CH2 Mode**

0 (single trigger), 1 (repeated trigger).

For single trigger, after the compare output function is enabled, a pulse output will be triggered when the count value meets conditions, and no further comparison is made afterwards. To trigger the compare output again, the compare output function shall be re-enabled.

For repeated trigger, after the compare output function is enabled, a pulse output will be triggered when the count value meets conditions. After that, the next comparison will immediately begin, but the pulse output will not restart for a period of time during the compare output pulse time. After pulse output within the certain period of time of compare output trigger, the pulse output will be triggered again in case the comparison output conditions are met.

* **Encoder\_1 Output CH1/CH2 (Compare)**

When the compare output channel function is not enabled, it can be used as a regular digital output channel. For Digital channel output (NPN type output): When set to “0”, it outputs a high level of 24V, and when set to "1", it outputs a low level of 0V.

When the compare output is valid, the level of this pin will be flipped, so the invalid/valid level corresponding to the compare output can be set by first setting this bit and then enabling the compare output .

**Note: 24V does not have load capacity.**

* **Encoder\_1 Output CH3/CH4**

When set to “0”, it outputs a high level of 24V, and when set to “1”, it outputs a low level of 0V.

**Note: 24V does not have load capacity.**

* **Encoder\_1 Input Latch CH1/CH2 Enable**

0 :enable , 1 : disable

* **Encoder\_1 Compare Output CH1/CH2 SetValue**

The set value of encoder compare output channel is consistent with that of encoder count range, 0-2 ^ 32-1.

After the compare output function is enabled, the module will compare whether the current count value is consistent with the set value. When the compare direction is consistent with the compare set value, the corresponding compare output channel will output a pulse with adjustable time.

### 6.5.3 Definition of Configuration Parameters

The module configuration has a total of 12 parameters, as shown in the table below. **Note: The configuration parameters will take effect when the encoder is next enabled.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Function** | **Parameter Name** | **Value range** | **Default value** |
| Encoder 1 pulse mode | Encoder1 Pulse Mode | 0: ABZ (AB orthogonal) | 0 |
| 1: Pul+Dir (directional pulse) |
| 2: CW/CCW (dual pulse) |
| Encoder 1 filter | Encoder1 Filter | Level 0-15 | 7 |
| Encoder 1 count multiples | Encoder1 Count Multiples | 1. 2, 4 (only effective in AB orthogonal mode) | 1 |
| Encoder 1 count range | Encoder1 Count Range | 0: 2 ^32 (0~2 ^32-1) | 0 |
| 1: Resolution×Multiples  (0~circular count resolution x count multiplies -1, only effective in AB orthogonal mode) |
| Encoder 1 ring count resolution | Encoder1 Count Resolution | 0~65535 | 0 |
| Encoder 1 counting direction | Encoder1 Count Direction | 0: Forward | 0 |
| 1: Reverse |
| Encoder 1 count initial value | Encoder1 Count Initial Value | 0~2 ^32-1 | 0 |
| Encoder 1 probe mode | Encoder1 Probe Trigger Mode | 0: CH1\_Single CH2\_Single  Channel Single, Channel 2 Single | 0 |
| 1: CH1\_Repeat CH2\_Single  Channel 1 Repeat, Channel 2 Single |
| 2: CH1\_Single CH2\_ Repeat  Channel 1 Single, Channel 2 Repeat |
| 3: CH1\_ Repeat CH2\_ Repeat  Channel 1 Repeat, Channel 2 Repeat |
| Encoder 1 probe trigger edge | Encoder1 Probe Trigger Edge | 0: CH1\_Raising CH2\_Raising  Channel 1 raising edge, channel 2 raising edge | 0 |
| 1: CH1\_Falling CH2\_Raising  Channel 1 falling edge, channel 2 raising edge |
| 2: CH1\_Raising CH2\_Falling  Channel 1 raising edge, channel 2 falling edge |
| 3:CH1\_Falling CH2\_Falling  Channel 1 falling edge, channel 2 falling edge |
| Pulse time of Encoder 1 compare output channel 1 | Encoder1 Compare Output CH1 Time | 0~65535 (unit: ms) | 10 |
| Pulse time of Encoder 1 compare output channel 2 | Encoder1 Compare Output CH2 Time | 0~65535 (unit: ms) | 10 |
| Power down storage enable | Power Down Storage | 0: OFF off | 1 |
| 1: ON Enable |

<6.5.3.1> Encoder Counting Function

There are seven encoder count parameters, **encoder pulse mode, filter, count multiples, count range, ring count resolution, count direction, and count initial value.**

**Encoder pulse mode:** The encoder count supports input pulse modes, including AB orthogonal mode, directional pulse mode, and CW/CCW mode.

**Encoder filter:** Encoder filter is effective in all three pulse modes, with a total of 16 levels of filtering (0~15). Level 0 indicates no filter, and level 15 indicates the maximum filter degree. The default encoder filter parameter is level 7 and can be configured as needed.

**Encoder count multiple:** The encoder count multiple is only effective in AB orthogonal pulse mode.

**Encoder count range:** The count range of the encoder can be set to 0~2 ^ 32-1 or 0~ring count resolution x count multiple - 1. The former is suitable for the majority of situations, while the latter is suitable for situations where the encoder has no Z phase signal but still needs to be used for single circle count.

**Encoder ring count resolution:** The ring count resolution is used to set the count range of the encoder, which is set from 0 to 65535.

**Note: The ring count resolution here is different from the physical resolution of the encoder itself.**

**Encoder count direction:** The encoder count direction defaults to 0 for forward count; When set to 1 for re-enabling, the encoder will count in reverse.

**Encoder count initial value:** The encoder count initial value can be configured and will automatically take effect after the encoder is re-enabled. The initial count value range is 0-2 ^ 32-1. Note: When the Power Down Storage function is enabled, the initial count value is invalid, and the encoder count initial value is always 0.

**Example 1:** Encoder 1 pulse mode is set to AB orthogonal mode, and the count range of the encoder is 0~ring count resolution x count multiple -1. The ring count resolution is set to 50000, the count multiple is 4, the counting direction is forward, and the initial counting value is 0. Therefore, the count range is 0~200000. The module is connected to an encoder with a physical resolution of 1000. After starting count, the count value increases from 0. The encoder rotates once and the count value is 1000 × 4, namely 4000. After reaching 200000, the count value will return to zero and continue counting.

<6.5.3.2> Probe Function

There are two types of functional probe parameters, **probe mode** and **probe trigger edge**. The encoder is equipped with 2 probe input channels, and by inputting corresponding signals to the probe input channels, the corresponding encoder count values can be latched.

**Probe mode:** The probe mode parameters can be configured to enable the encoder to operate in single/continuous mode for each probe function channel.

If the probe function channel is configured in single mode, after the probe function is enabled, when the channel inputs a signal that meets the set conditions, the count value can be latched once; When a signal that meets the set conditions is inputted again in the future, the count value will not be latched any longer unless the probe function channel is re-enabled.

If the probe function channel is configured in continuous mode, after the probe function is enabled, each time a signal that meets the set conditions is input to the channel, the count value can be latched once, indicating that the count value can be latched multiple times.

**Probe trigger edge**: to configure each probe function channel of the encoder to be triggered by raising /falling edges. The latch trigger signals of two probe function channels of each encoder can be configured separately, and the latch values can be displayed separately.

The probe input channel is compatible with PNP/NPN signals through COM terminal. When the COM terminal is connected to 0V, the input signal is PNP type, and the input high-level 24V signal is valid, while the input low-level 0V signal is invalid; When the COM terminal is connected to 24V, the input signal is NPN type, and the input low-level 0V signal is valid, while the input high-level 24V signal is invalid.

To trigger raising edge indicates that the probe input channel is triggered from an invalid signal to a valid signal, and to trigger falling edge indicates that it is triggered from a valid signal to an invalid signal.

<6.5.3.3> Compare Output Function

The **compare output function** is configured by the compare output channel enable, compare output set value, compare direction, single/repeated trigger mode, and compare output channel pulse time. When the encoder’s count value reaches the set value and meets the compare direction, the corresponding compare output channel will output a pulse with adjustable time, which is the compare output pulse time. The pulse output response speed of the compare output function can reach 50us.

The configuration parameters for the compare output function include **the pulse time of the encoder compare output channel** , with a configurable time range of 0-65535ms.

The encoder is equipped with two compare output channels, and the compare output channel enable, compare output set value, compare direction, and single/repeated trigger mode can all be set in the downstream data. When the compare output channel function is not enabled, the compare output channel can be used as a regular digital output.

**Example 1:** When the compare output channel 1 of encoder 1 is used as a regular digital output, the output value is set to 0 (the output value is set to 24V for NPN type output), and the channel indicator is turned off.

Set the value of encoder 1 compare output channel 1 at 1000, the compare direction to incremental comparison, and the compare output to single trigger mode, and configure the pulse time of 5 seconds for compare output channel 1. After the function of compare output channel 1 is enabled, when the count value of Encoder 1 increases from small to large (satisfying the compare direction) and reaches 1000, the compare output channel 1 will be output as the compare output channel. The status will flip from the original high-level output to low-level output, the pulse output time is 5 seconds, and the channel indicator will remain on for 5 seconds. After 5 seconds, the high-level output will be restored and the channel indicator will turn off. When the count value meets the set vale of compare output and compare direction again, due to the single trigger mode of the compare output trigger, the compare output channel has no response.

**Example 2:** When the compare output channel 1 of encoder 1 is used as a regular digital output, the output value is set to 1 (the output is 0V for NPN type output), and the channel indicator remains on.

Set the value of compare output channel 1 of encoder 1 at 1000, the compare direction to decremental comparison, and the compare output to repeated trigger, and configure the pulse time of 5 seconds for compare output channel 1. After the function of compare output channel 1 is enabled, when the count value of Encoder 1 increases from small to large (not satisfying the compare direction) and reaches 1000, the compare output channel 1 has no response. When the count value of Encoder 1 deceases from large to small (satisfying the compare direction) and reaches 1000, and the state will flip from the original low-level output to high-level output. The pulse output time is 5 seconds, and the channel indicator will turn off for 5 seconds. After 5 seconds, the low-level output will be restored and the channel indicator will remain on.

When the compare output trigger mode is repeated trigger and the count value meets the compare output set value and compare direction again within 5 seconds of pulse output time, the compare output channel will not change the pulse output status and will continue to complete the pulse output for 5 seconds. When the comparison condition is met again after 5 seconds, the state will flip again, from the original high-level output to low-level output. The pulse output time is 5 seconds, and the channel indicator will turn off for 5 seconds.

<6.5.3.4> Power down storage function

When the power down storage enable parameter is enabled, the encoder count value can be stored in case of system power outage. The default setting is 1 to enable the power down storage function, and 0 to disable the power down storage function.

When the power down storage function is enabled, the initial value of the encoder count is invalid, and the initial values of the encoder count are all 0.

## 6.6 SRC5031 5V differential incremental encoder count module

### 6.6.1 Upstream Data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **17 bytes of upstream data** | | | | |
| **Name** | **Meaning** | **Value range** | **Data type** | **Length** |
| Encoder\_1 Probe Input CH1 | Encoder probe input signal channel 1 | 0: No signal input | bool | 1 bit |
| 1: Have signal input |
| Encoder\_1 Probe Input CH2 | Encoder probe input signal channel 2 | 0: No signal input | bool | 1 bit |
| 1: has signal input |
| Encoder\_1 Input CH3 | Encoder ordinary input signal channel 3 | 0: No signal input | bool | 1 bit |
| 1: Have signal input |
| Encoder\_1 Probe Input CH1 Latched Finish | Encoder probe input channel 1 latch completion flag bit | 0:1->0 latch once, flip once | bool | 1 bit |
| 1: 0->1 latch once, flip once |
| Encoder\_1 Probe Input CH2 Latched Finish | Encoder probe input channel 2 latch completion flag bit | 0:1->0 latch once, flip once | bool | 1 bit |
| 1: 0->1 latch once, flip once |
| Encoder\_1 Count Value | Encoder count value | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Latch CH1 Value | Encoder probe input channel 1 latch value | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Latch CH2 Value | Encoder probe input channel 2 latch values | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Speed | Encoder speed | -2^31~2 ^31-1 | signed32 | 4 bytes |

**Upstream data description:**

* **Encoder\_1 Probe Input CH1/CH2**

The encoder is equipped with two probe input channels, indicating the presence or absence of input signals from the corresponding probe input channels.

When the probe input channel latch function is not enabled, it an be used as a regular digital input channel.

* **Encoder\_1 Input CH3**

The encoder is equipped with one ordinary digital input channel, indicating the presence or absence of the corresponding DI channel input signal.

* **Encoder\_1 Probe Input CH1/CH2 Latched Finish**

The encoder is equipped with two probe input channels. After the probe input channel is latched once, the flag bit will flip from 0 to>1 or 1 to>0.

Example 1: The flat bit of the Encoder 1 probe input channel 1 Latched Finish is 0. After the probe input channel is latched once, the flag bit becomes 1, and then becomes 0 after the probe input channel is latched once again.

* **Encoder\_1 Count Value**

The encoder count value corresponds to the current count value of the encoder, with a range of 0-2 ^ 32-1.

* **Encoder\_1 Latch CH1/CH2 Value**

The encoder is equipped with 2 probe input channels. By inputting signals that meet the set conditions into the probe input channels, the current count value of the corresponding encoder can be quickly latched. Therefore, the range of the latched value is the same as the count value, with a range of 0-2 ^ 32-1.

* **Encoder\_1 Speed**

The encoder speed is the pulse speed of the input channel of the encoder, with a range of -2 ^ 31~2 ^ 31-1.

### 6.6.2 Downstream data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Downstream instruction 10 bytes** | | | | |
| **Name** | **Meaning** | **Value range** | **Data type** | **Length** |
| Encoder\_1 Enable | Encoder Count Enable | 0: Disable | bool | 1 bit 0 |
| 1: Enable |
| Encoder\_1 Z Phase Clear Enable | Encoder Z-phase reset enable | 0: Disable | bool | 1 bit 1 |
| 1: Enable |
| Encoder\_1 Count Clear | Zero encoder count value | 0: Disable | bool | 1 bit 2 |
| 1: Enable |
| Encoder\_1 Compare Output CH1 Enable | Encoder compare output channel 1 enabled | 0: Disable | bool | 1 bit 3 |
| 1: Enable |
| Encoder\_1 Compare Output CH2 Enable | Encoder compare output channel 2 enabled | 0: Disable | bool | 1 bit 4 |
| 1: Enable |
| Encoder\_1 Compare Output CH1 Direction | Encoder compare output channel 1 compare direction | 0: Decreasing comparison | bool | 1 bit 5 |
| 1: Incremental comparison |
| Encoder\_1 Compare Output CH2 Direction | Encoder compare output channel 2 compare direction | 0: Decreasing comparison | bool | 1 bit 6 |
| 1: Incremental comparison |
| Encoder\_1 Compare Output CH1 Mode | Encoder compare output channel 1 trigger mode | 0: Single trigger | bool | 1 bit 7 |
| 1: Repeated triggering |
| Encoder\_1 Compare Output CH2 Mode | Encoder compare output channel 2 trigger mode | 0: Single trigger | bool | 1 bit 0 |
| 1: Repeated triggering |
| Encoder\_1 Output CH1(Compare) | Encoder output channel 1 (compare output) | 0: Output high-level 24V | bool | 1 bit 1 |
| 1: Output low level 0V |
| Encoder\_1 Output CH2(Compare) | Encoder output channel 2 (compare output) | 0: Output high-level 24V | bool | 1 bit 2 |
| 1: Output low level 0V |
| Encoder\_1 Output CH3 | Encoder output channel 3 (normal output) | 0: Output high-level 24V | bool | 1 bit 3 |
| 1: Output low level 0V |
| Encoder\_1 Output CH4 | Encoder output channel 4 (normal output) | 0: Output high-level 24V | bool | 1 bit 4 |
| 1: Output low level 0V |
| Encoder\_1 Input Latch CH1 Enable | Encoder probe input channel 1 latch enable | 0: Disable | bool | 1 bit 5 |
| 1: Enable |
| Encoder\_1 Input Latch CH2 Enable | Encoder probe input channel 2 latch enable | 0: Disable | bool | 1 bit 6 |
| 1: Enable |
| Encoder\_1 Compare Output CH1 SetValue | Encoder compare output channel 1 set value | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Compare Output CH2 SetValue | Encoder compare output channel 2 set value | 0~2 ^32-1 | unsigned32 | 4 bytes |

**Downstream data description:**

* **Enable Encoder\_1 Enable**

0: disabled; 1: enabled.

* **Encoder\_1 Z Phase Clear Enable**

0: disabled; 1: enabled.

After Z Phase Clear Enable is enabled, the current count value is cleared by detecting the Z phase signal of the encoder. The encoder generates a Z phase pulse every time it rotates, and the count value is cleared once.

The physical resolution of the encoder is the number of pulses output when the encoder rotate every revolution, and the count multiple × physical resolution is the maximum count value every revolution. When the Z phase clear function is enabled, the count value is cleared once every revolution of encoder.

* **Encoder\_1 Count Clear**

Edge control, when it is detected to be reset from 0 to 1, the corresponding encoder count value is cleared. If the encoder count initial value is set, the count value is also cleared.

* **Encoder\_1 Compare Output CH1/CH2 Enable**

0: disabled; 1: enabled.

When disabled, it can be used as a regular digital output channel.

* **Encoder\_1 Compare Output CH1/CH2 Direction**

Set Encoder\_1 Compare Output CH1/CH2 Direction to 0, implying decreasing comparison, that is, the direction in which the count value decreases from large to small; Set Encoder\_1 Compare Output CH1/CH2 Direction to 1, implying incremental comparison, that is, the direction of counting values from small to large.

* **Encoder\_1 Compare Output CH1/CH2 Mode**

0 (single trigger), 1 (repeated trigger).

For single trigger, after the compare output function is enabled, a pulse output will be triggered when the count value meets conditions, and no further comparison is made afterwards. To trigger the compare output again, the compare output function shall be re-enabled.

For repeated trigger, after the compare output function is enabled, a pulse output will be triggered when the count value meets conditions. After that, the next comparison will immediately begin, but the pulse output will not restart for a period of time during the compare output pulse time. After pulse output within the certain period of time of compare output trigger, the pulse output will be triggered again in case the comparison output conditions are met.

* **Encoder\_1 Output CH1/CH2 (Compare)**

When the compare output channel function is not enabled, it can be used as a regular digital output channel. For Digital channel output (NPN type output): When set to “0”, it outputs a high level of 24V, and when set to "1", it outputs a low level of 0V.

When the compare output is valid, the level of this pin will be flipped, so the invalid/valid level corresponding to the compare output can be set by first setting this bit and then enabling the compare output .

* **Encoder\_1 Output CH3/CH4**

When set to “0”, it outputs a high level of 24V, and when set to “1”, it outputs a low level of 0V.

* **Encoder\_1 Input Latch CH1/CH2 Enable**

0 :enable , 1 : disable

* **Encoder\_1 Compare Output CH1/CH2 SetValue**

The set value of encoder compare output channel is consistent with that of encoder count range, 0-2 ^ 32-1.

After the compare output function is enabled, the module will compare whether the current count value is consistent with the set value. When the compare direction is consistent with the compare set value, the corresponding compare output channel will output a pulse with adjustable time.

## 6.7 SRC5041 SSI Encoder Count Module

### 6.7.1 Upstream Data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Upstream Data 17 bytes** | | | | |
| **Name** | **Meaning** | **Value range** | **Data type** | **Length** |
| Encoder\_1 Probe Input CH1 | Encoder probe input signal channel 1 | 0: No signal input | bool | 1 bit |
| 1: Have signal input |
| Encoder\_1 Probe Input CH2 | Encoder probe input signal channel 2 | 0: No signal input | bool | 1 bit |
| 1: Have signal input |
| Encoder\_1 Input CH3 | Encoder ordinary input signal channel 3 | 0: No signal input | bool | 1 bit |
| 1: Have signal input |
| Encoder\_1 Probe Input CH1 Latched Finish | Encoder probe input channel 1 latch completion flag bit | 0:1->0 latch once, flip once | bool | 1 bit |
| 1: 0->1 latch once, flip once |
| Encoder\_1 Probe Input CH2 Latched Finish | Encoder probe input channel 2 latch completion flag bit | 0:1->0 latch once, flip once | bool | 1 bit |
| 1: 0->1 latch once, flip once |
| Encoder\_1 Count Value | Encoder count value | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Latch CH1 Value | Encoder probe input channel 1 latch value | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Latch CH2 Value | Encoder probe input channel 2 latch value | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Speed | Encoder speed | -2^31~2 ^31-1 | signed32 | 4 bytes |

**Upstream data description:**

* **Encoder\_1 Probe Input CH1/CH2**

The encoder is equipped with two probe input channels, indicating the presence or absence of input signals from the corresponding probe input channels.

When the probe input channel latch function is not enabled, it can be used as a regular digital input channel.

* **Encoder\_1 Input CH3**

The encoder is equipped with one ordinary digital input channel, indicating the presence or absence of the corresponding DI channel input signal.

* **Encoder\_1 Probe Input CH1/CH2 Latched Finish**

The encoder is equipped with two probe input channels. After the probe input channel is latched, the flag bit will flip from 0 to 1 or 1 to 0.

Example 1: Encoder 1 probe input channel 1 has a latch completion flag bit of 0. After completing one latch, the flag becomes 1, and after completing another latch, the flag becomes 0.

* **Encoder\_1 Count Value**

The encoder count value corresponds to the current count value of the encoder, with a range of 0-2 ^ 32-1.

* **Encoder\_1 Latch CH1/CH2 Value**

The encoder is equipped with 2 probe input channels. By inputting signals that meet the set conditions into the probe input channels, the current count value of the corresponding encoder can be quickly latched. Therefore, the range of the latched value is the same as the count value, with a range of 0-2 ^ 32-1.

* **Encoder Speed Encoder\_1 Speed**

The encoder speed is the pulse speed of the input channel of the encoder, with a numerical range of -2 ^ 31~2 ^ 31-1.

### 6.7.2 Downstream data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Downstream instruction 10 bytes** | | | | |
| **Name** | **Meaning** | **Value range** | **Data type** | **Length** |
| Encoder\_1 Compare Output CH1 Enable | Encoder compare output channel 1 enabled | 0: Disable | bool | 1 bit 0 |
| 1: Enable |
| Encoder\_1 Compare Output CH2 Enable | Encoder compare output channel 2 enabled | 0: Disable | bool | 1 bit 1 |
| 1: Enable |
| Encoder\_1 Compare Output CH1 Direction | Encoder compare output channel 1 compare direction | 0: Decreasing comparison | bool | 1 bit 2 |
| 1: Incremental comparison |
| Encoder\_1 Compare Output CH2 Direction | Encoder compare output channel 2 compare direction | 0: Decreasing comparison | bool | 1 bit 3 |
| 1: Incremental comparison |
| Encoder\_1 Compare Output CH1 Mode | Encoder compare output channel 1 trigger mode | 0: Single trigger | bool | 1 bit 4 |
| 1: Repeated triggering |
| Encoder\_1 Compare Output CH2 Mode | Encoder compare output channel 2 trigger mode | 0: Single trigger | bool | 1 bit 5 |
| 1: Repeated triggering |
| Encoder\_1 Output CH1(Compare) | Encoder output channel 1 (comparative output) | 0: Output high-level 24V | bool | 1 bit 6 |
| 1: Output low level 0V |
| Encoder\_1 Output CH2(Compare) | Encoder output channel 2 (comparative output) | 0: Output high-level 24V | bool | 1 bit 7 |
| 1: Output low level 0V |
| Encoder\_1 Output CH3 | Encoder output channel 3 (normal output) | 0: Output high-level 24V | bool | 1 bit 0 |
| 1: Output low level 0V |
| Encoder\_1 Output CH4 | Encoder output channel 4 (normal output) | 0: Output high-level 24V | bool | 1 bit 1 |
| 1: Output low level 0V |
| Encoder\_1 Input Latch CH1 Enable | Encoder probe input channel 1 latch enable | 0: Disable | bool | 1 bit 2 |
| 1: Enable |
| Encoder\_1 Input Latch CH2 Enable | Encoder probe input channel 2 latch enable | 0: Disable | bool | 1 bit 3 |
| 1: Enable |
| Encoder\_1 Compare Output CH1 SetValue | Encoder compare output channel 1 set value | 0~2 ^32-1 | unsigned32 | 4 bytes |
| Encoder\_1 Compare Output CH2 SetValue | Encoder compare output channel 2 set value | 0~2 ^32-1 | unsigned32 | 4 bytes |

**Downstream data description:**

* **Encoder\_1 Compare Output CH1/CH2 Enable**

0: disabled; 1: enabled.

When disabled, it can be used as a regular digital output channel.

* **Encoder\_1 Compare Output CH1/CH2 Direction**

Set Encoder\_1 Compare Output CH1/CH2 Direction to 0, implying decreasing comparison, that is, the direction in which the count value decreases from large to small; Set Encoder\_1 Compare Output CH1/CH2 Direction to 1, implying incremental comparison, that is, the direction of counting values from small to large.

* **Encoder\_1 Compare Output CH1/CH2 Mode**

0 (single trigger), 1 (repeated trigger).

For single trigger, after the compare output function is enabled, a pulse output will be triggered when the count value meets conditions, and no further comparison is made afterwards. To trigger the compare output again, the compare output function shall be re-enabled.

For repeated trigger, after the compare output function is enabled, a pulse output will be triggered when the count value meets conditions. After that, the next comparison will immediately begin, but the pulse output will not restart for a period of time during the compare output pulse time. After pulse output within the certain period of time of compare output trigger, the pulse output will be triggered again in case the comparison output conditions are met.

* **Encoder\_1 Output CH1/CH2 (Compare)**

When the compare output channel function is not enabled, it can be used as a regular digital output channel. For Digital channel output (NPN type output): When set to “0”, it outputs a high level of 24V, and when set to "1", it outputs a low level of 0V.

When the compare output is valid, the level of this pin will be flipped, so the valid/invalid level are corresponding to the compare output can be set by first setting this bit and then enabling the compare output .

**Note: 24V does not have load capacity.**

* **Encoder\_1 Output CH3/CH4**

When set to “0”, it outputs a high level of 24V, and when set to “1”, it outputs a low level of 0V.

**Note: 24V does not have load capacity.**

* **Encoder\_1 Input Latch CH1/CH2 Enable**

0 :enable , 1 : disable

* **Encoder\_1 Compare Output CH1/CH2 SetValue**

The set value of encoder compare output channel is consistent with that of encoder count range, 0-2 ^ 32-1.

After the compare output function is enabled, the module will compare whether the current count value is consistent with the set value. When the compare direction is consistent with the compare set value, the corresponding compare output channel will output a pulse with adjustable time.

### 6.7.3 Definition of Configuration Parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Configuration parameter 48bytes** | | | | | |
| **BITARR** | **Var Name** | **Var Content** | **Datatype** | **Access** | **Length** |
| 0 | 16 Data Format | Channel byte transmission order | UDINT | RW | 4B |
| 1 | 32 Data Format | Channel byte transmission order | UDINT | RW | 4B |
| 2 | Frame Bit Length | Encoder SSI frame length | UDINT | RW | 4B |
| 3 | CLK Frequency | Clock frequency when reading data | UDINT | RW | 4B |
| 4 | Interval Time | Interval time | UDINT | RW | 4B |
| 5 | Gray Conversion | Gray code conversion enable | UDINT | RW | 4B |
| 6 | LSB Position | LSB position number of position value | UDINT | RW | 4B |
| 7 | MSB Position | MSB position number of position value | UDINT | RW | 4B |
| 8 | Probe Mode | Probe mode | UDINT | RW | 4B |
| 9 | Probe Trig Edge | Probe triggers edge | UDINT | RW | 4B |
| 10 | Encoder Pulse Time CH1 | Compare the pulse time of output channel 1 | UDINT | RW | 4B |
| eleven | Encoder Pulse Time CH2 | Compare the pulse time of output channel 2 | UDINT | RW | 4B |

**Data Description:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Description** | **Default value** | **Value range** | **Meaning** |
| 16 Data Format | Channel byte transmission order | 0 | 0 | A-B |
| 1 | B-A |
| 32 Data Format | Channel byte transmission order | 0 | 0 | AB-CD |
| 1 | BA-DC |
| 2 | CD-AB |
| 3 | DC-BA |
| Frame Bit Length | Encoder SSI frame length | 13 | 10~40 | This parameter can set the resolution and total value of encoder count. |
| CLK Frequency | Clock frequency when reading data [1] | 0 | 0 | 125KHz |
| 1 | 250KHz |
| 2 | 500KHz |
| 3 | 1.0MHz |
| 4 | 2.0MHz |
| Interval Time | Interval time | 1 | 1~65535 | Unit 100us |
| Gray Conversion | Gray code conversion enable | 1 | 0 | Disable |
| 1 | Enable |
| LSB Position | LSB position number of position value | 0 | 0~39 | Least Significant Bit |
| MSB Position | MSB position number of position value | 12 | 1~40 | Most Significant Bit |
| Probe Mode | Probe mode | 0 | 0 | 0: CH1\_Single CH2\_Single  Channel 1 single, Channel 2 Single |
| 1 | 1:CH1\_Repeat CH2\_Single  Channel 1 Repeat, Channel 2 Single |
| 2 | 2: CH1\_Single CH2\_ Repeat  Channel 1 Single, Channel 2 Repeat |
| 3 | 3: CH1\_ Repeat CH2\_ Repeat  Channel 1 Repeat, Channel 2 Repeat |
| Probe Trig Edge | Probe triggers edge | 0 | 0 | 0: CH1\_Raising CH2\_Raising  Channel 1 raising edge, Channel 2 raising edge |
| 1 | 1: CH1\_Falling CH2\_Raising  Channel 1 falling edge, Channel 2 raising edge |
| 2 | 2: CH1\_Raising CH2\_Falling  Channel 1 raising edge, Channel 2 falling edge |
| 4 | 3: CH1\_Falling CH2\_Falling  Channel 1 falling edge, Channel 2 falling edge |
| Encoder Pulse Time CH1 | Pulse time of compare output channel 1 | 10 | 0~65535 | Unit: ms |
| Encoder Pulse Time CH2 | Pulse time of compare output channel 1 | 10 | 0~65535 | Unit: ms |

[1] The actual parameter values are slightly smaller due to the influence of the bottom bus.

<6.7.3.1> Byte Transfer Order Function of Channel Count Values

**16Bit Data Format:** Suitable for encoders below 16 bits, with a count range less than 65535. This parameter can be used to change the byte order of the count value. For example, setting the count value to hexadecimal, the default value of the 16Bit Data Format is 0, and the byte order of the count value is AB; When this parameter is set to 1, the byte transfer order of the count value becomes BA.

**32Bit Data Format:** Suitable for encoders below 32 bits, this parameter can be used to change the byte order of the count value.

<6.7.3.2> Encoder SSI Frame Length and Position Number Function

The frame length parameter, combined with the position number LSB and MSB parameters, can be used to set the resolution and total count value of the encoder count. Resolution refers to the value added by the encoder per revolution.

<6.7.3.3> Clock frequency function when reading data

The default value for clock frequency is 0, which is 125KHz, up to 2.0MHz.

<6.7.3.4> Interval Time Function

The default interval value is 1, which is 100us, and the range can be set from 1 to 65535 (100us).

<6.7.3.5> Gray code conversion enable function

By default, Gray code conversion is supported. Setting it to 0 will disable Gray code conversion.

<6.7.3.6> Probe Function

There are two types of functional probe parameters, **probe mode** and **probe trigger edge**. The encoder is equipped with 2 probe input channels, and by inputting corresponding signals to the probe input channels, the corresponding encoder count values can be latched.

**Probe mode:** The probe mode parameters can be configured to enable the encoder to operate in single/continuous mode for each probe function channel.

If the probe function channel is configured in single mode, after the probe function is enabled, when the channel inputs a signal that meets the set conditions, the count value can be latched once; When a signal that meets the set conditions is inputted again in the future, the count value will not be latched any longer unless the probe function channel is re-enabled.

If the probe function channel is configured in continuous mode, after the probe function is enabled, each time a signal that meets the set conditions is input to the channel, the count value can be latched once, indicating that the count value can be latched multiple times.

**Probe trigger edge**: to configure each probe function channel of the encoder to be triggered by raising /falling edges. The latch trigger signals of two probe function channels of each encoder can be configured separately, and the latch values can be displayed separately.

The probe input channel is compatible with PNP/NPN signals through COM terminal. When the COM terminal is connected to 0V, the input signal is PNP type, and the input high-level 24V signal is valid, while the input low-level 0V signal is invalid; When the COM terminal is connected to 24V, the input signal is NPN type, and the input low-level 0V signal is valid, while the input high-level 24V signal is invalid.

To trigger raising edge indicates that the probe input channel is triggered from an invalid signal to a valid signal, and to trigger falling edge indicates that it is triggered from a valid signal to an invalid signal.

<6.7.3.7> Compare Output Function

The pulse time of encoder compare output channel can be configured 0-65535ms

6.7.4 Definition of Configuration Parameters

The module configuration has a total of 12 parameters, as shown in the table below. **Note: The configuration parameters will take effect when the encoder is next enabled.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Function** | **Parameter Name** | **Value range** | **Default value** |
| Encoder 1 pulse mode | Encoder1 Pulse Mode | 0: ABZ (AB orthogonal) | 0 |
|  |  | 1: Pul+Dir (directional pulse) |  |
| 2: CW/CCW (dual pulse) |
| Encoder 1 filter | Encoder Filter | Level 0-15 | 7 |
| Encoder 1 counting multiples | Encoder 1 Count Multiples | 1, 2, 4 (only effective in AB orthogonal mode) | 1 |
| Encoder 1 count range | Encoder 1 Count Range | 0: 2 ^32 (0~2 ^32-1) | 0 |
| 1: Resolution×Multiples  (0~ring count resolution x count multiples -1, only effective in AB orthogonal mode) |
| Encoder 1 ring count resolution | Encoder 1 Count Resolution | 0~65535 | 0 |
| Encoder 1 count direction | Encoder Count Direction | 0: Forward | 0 |
| 1: Reverse |
| Encoder 1 count the initial value | Encoder 1 Count Initial Value | 0~2 ^32-1 | 0 |
| Encoder 1 probe mode | Encoder 1 Probe Trigger Mode | 0: CH1\_Single CH2\_Single  Channel Single, Channel 2 Single | 0 |
| 1: CH1\_Repeat CH1\_Single  Channel 1 Repeat, Channel 2 Single |
| 2: CH1\_Simple CH2\_Repeat  Channel 1 Single, Channel 2 Repeat |
| 3: CH1 Repeat CH2 Repeat  Channel 1 Repeat, Channel 2 Repeat |
| Encoder 1 probe trigger edge | Encoder 1 Probe Trigger Edge | 0: CH1\_Raising CH2\_Raising Channel 1 raising edge, channel 2 raising edge | 0 |
| 1: CH1\_Falling CH2\_Raising Channel 1 falling edge, channel 2 raising edge |
| 2: CH1\_Raising CH2\_Falling  Channel 1 raising edge, channel 2 falling edge |
| 3: CH1\_Falling CH2\_Falling  Channel 1 falling edge, channel 2 falling edge |
| Pulse time of Encoder 1 compare output channel 1 | Encoder 1 Compare Output CH1 Time | 0~65535 (unit: ms) | 10 |
| Pulse time of Encoder 1 compare output channel 2 | Encoder 1 Compare Output CH2 Time | 0~65535 (unit: ms) | 10 |
| Power down storage enable | Power Down Storage | 0: OFF | 1 |
| 1: ON |

<6.7.4.1> Encoder Counting Function

There are seven encoder count parameters, **encoder pulse mode, filter, count multiples, count range, ring count resolution, count direction, and count initial value.**

**Encoder pulse mode:** The encoder count supports input pulse modes, including AB orthogonal mode, directional pulse mode, and CW/CCW mode.

**Encoder filter:** Encoder filter is effective in all three pulse modes, with a total of 16 levels of filtering (0~15). Level 0 indicates no filter, and level 15 indicates the maximum filter degree. The default encoder filter parameter is level 7 and can be configured as needed.

**Encoder count multiple:** The encoder count multiple is only effective in AB orthogonal pulse mode.

**Encoder count range:** The count range of the encoder can be set to 0~2 ^ 32-1 or 0~ring count resolution x count multiple - 1. The former is suitable for the majority of situations, while the latter is suitable for situations where the encoder has no Z phase signal but still needs to be used for single circle count.

**Encoder ring count resolution:** The ring count resolution is used to set the count range of the encoder, which is set from 0 to 65535.

**Note: The ring count resolution here is different from the physical resolution of the encoder itself.**

**Encoder count direction:** The encoder count direction defaults to 0 for forward count; When set to 1 for re-enabling, the encoder will count in reverse.

**Encoder count initial value:** The encoder count initial value can be configured and will automatically take effect after the encoder is re-enabled. The initial count value range is 0-2 ^ 32-1. Note: When the Power Down Storage function is enabled, the initial count value is invalid, and the encoder count initial value is always 0.

**Example 1:** Encoder 1 pulse mode is set to AB orthogonal mode, and the count range of the encoder is 0~ring count resolution x count multiple -1. The ring count resolution is set to 50000, the count multiple is 4, the counting direction is forward, and the initial counting value is 0. Therefore, the count range is 0~200000. The module is connected to an encoder with a physical resolution of 1000. After starting count, the count value increases from 0. The encoder rotates once and the count value is 1000 × 4, namely 4000. After reaching 200000, the count value will return to zero and continue counting.

[6.7.4.2](6.5.3.2) Probe Function

There are two types of functional probe parameters, **probe mode** and **probe trigger edge**. The encoder is equipped with 2 probe input channels, and by inputting corresponding signals to the probe input channels, the corresponding encoder count values can be latched.

**Probe mode:** The probe mode parameters can be configured to enable the encoder to operate in single/continuous mode for each probe function channel.

If the probe function channel is configured in single mode, after the probe function is enabled, when the channel inputs a signal that meets the set conditions, the count value can be latched once; When a signal that meets the set conditions is inputted again in the future, the count value will not be latched any longer unless the probe function channel is re-enabled.

If the probe function channel is configured in continuous mode, after the probe function is enabled, each time a signal that meets the set conditions is input to the channel, the count value can be latched once, indicating that the count value can be latched multiple times.

**Probe trigger edge**: to configure each probe function channel of the encoder to be triggered by raising /falling edges. The latch trigger signals of two probe function channels of each encoder can be configured separately, and the latch values can be displayed separately.

The probe input channel is compatible with PNP/NPN signals through COM terminal. When the COM terminal is connected to 0V, the input signal is PNP type, and the input high-level 24V signal is valid, while the input low-level 0V signal is invalid; When the COM terminal is connected to 24V, the input signal is NPN type, and the input low-level 0V signal is valid, while the input high-level 24V signal is invalid.

To trigger raising edge indicates that the probe input channel is triggered from an invalid signal to a valid signal, and to trigger falling edge indicates that it is triggered from a valid signal to an invalid signal.

[6.7.4.](6.5.3.3)3 Compare Output Function

The **compare output function** is configured by the compare output channel enable, compare output set value, compare direction, single/repeated trigger mode, and compare output channel pulse time. When the encoder’s count value reaches the set value and meets the compare direction, the corresponding compare output channel will output a pulse with adjustable time, which is the compare output pulse time. The pulse output response speed of the compare output function can reach 50us.

The configuration parameters for the compare output function include **the pulse time of the encoder compare output channel** , with a configurable time range of 0-65535ms.

The encoder is equipped with two compare output channels, and the compare output channel enable, compare output set value, compare direction, and single/repeated trigger mode can all be set in the downstream data. When the compare output channel function is not enabled, the compare output channel can be used as a regular digital output.

**Example 1:** When the compare output channel 1 of encoder 1 is used as a regular digital output, the output value is set to 0 (the output value is set to 24V for NPN type output), and the channel indicator is turned off.

Set the value of encoder 1 compare output channel 1 at 1000, the compare direction to incremental comparison, and the compare output to single trigger mode, and configure the pulse time of 5 seconds for compare output channel 1. After the function of compare output channel 1 is enabled, when the count value of Encoder 1 increases from small to large (satisfying the compare direction) and reaches 1000, the compare output channel 1 will be output as the compare output channel. The status will flip from the original high-level output to low-level output, the pulse output time is 5 seconds, and the channel indicator will remain on for 5 seconds. After 5 seconds, the high-level output will be restored and the channel indicator will turn off. When the count value meets the set vale of compare output and compare direction again, due to the single trigger mode of the compare output trigger, the compare output channel has no response.

**Example 2:** When the compare output channel 1 of encoder 1 is used as a regular digital output, the output value is set to 1 (the output is 0V for NPN type output), and the channel indicator remains on.

Set the value of compare output channel 1 of encoder 1 at 1000, the compare direction to decremental comparison, and the compare output to repeated trigger, and configure the pulse time of 5 seconds for compare output channel 1. After the function of compare output channel 1 is enabled, when the count value of Encoder 1 increases from small to large (not satisfying the compare direction) and reaches 1000, the compare output channel 1 has no response. When the count value of Encoder 1 deceases from large to small (satisfying the compare direction) and reaches 1000, and the state will flip from the original low-level output to high-level output. The pulse output time is 5 seconds, and the channel indicator will turn off for 5 seconds. After 5 seconds, the low-level output will be restored and the channel indicator will remain on.

When the compare output trigger mode is repeated trigger and the count value meets the compare output set value and compare direction again within 5 seconds of pulse output time, the compare output channel will not change the pulse output status and will continue to complete the pulse output for 5 seconds. When the comparison condition is met again after 5 seconds, the state will flip again, from the original high-level output to low-level output. The pulse output time is 5 seconds, and the channel indicator will turn off for 5 seconds.

[6.7.4.](6.5.3.4)4 Power down storage function

When the power down storage enable parameter is enabled, the encoder count value can be stored in case of system power outage. The default setting is 1 to enable the power down storage function, and 0 to disable the power down storage function.

When the power down storage function is enabled, the initial value of the encoder count is invalid, and the initial values of the encoder count are all 0.

## 6.8 SRC6041 RS485/RS422/RS232 gateway module

### 6.8.1 Modbus RTU/ASCII Master Read Command

|  |  |  |  |
| --- | --- | --- | --- |
| **Request (downstream data)** | | | |
| **Register address** | **Function Description** | **Notes** | **Example** |
| Register 0 | Control word | 00H command release, 01H command enable | 0x01 |
| Register 1 | Station number | Interactive slave station numbers 1-247 | 0x02 |
| Register 2 | Function code | 01H, 02H, 03H, 04H | 0x03 |
| Register 3 | Register address HI | 0000H~FFFFH | 0x00 |
| Register 4 | Register address LO | 0xC8 |
| Register 5 | Number of registers HI | Discrepancy: 1-288  Register: 1~36 | 0x00 |
| Register 6 | Number of registers LO | 0x03 |
| Register 7-39 | Reserve | NULL | - |
| **Response (upstream data)** | | | |
| **Register address** | **Function Description** | **Notes** | **Example** |
| Register 0 | Status word | See fault code | 0x01 |
| Register 1 | Station number | Interactive slave station numbers 1-247 | 0x02 |
| Register 2 | Function code | 01H, 02H, 03H, 04H | 0x03 |
| Register 3 | Number of bytes in the data domain | Based on actual response | 0x06 |
| Register 4 | Data 1HI | 0x00~0xFF | 0xFF |
| Register 5 | Data 1LO | 0x00~0xFF | 0xFF |
| Register 6 | Data 2HI | 0x00~0xFF | 0xAA |
| Register 7 | Data 2LO | 0x00~0xFF | 0xAA |
| Register 8 | Data 3HI | 0x00~0xFF | 0x55 |
| Register 9 | Data 3LO | 0x00~0xFF | 0x55 |
| Register 10 | Data 4HI | NULL | - |
| Register 11 | Data 4LO | NULL | - |
| Register 12 | Data 5HI | NULL | - |
| Register 13 | Data 5LO | NULL | - |
| Register 14 | Data 6HI | NULL | - |
| Register 15 | Data 6LO | NULL | - |
| Register 16 | Data 7HI | NULL | - |
| Register 17 | Data 7LO | NULL | - |
| Register 18 | Data 8HI | NULL | - |
| Register 19 | Data 8LO | NULL | - |
| Register 20 | Data 9HI | NULL | - |
| Register 21 | Data 9LO | NULL | - |
| Register 22 | Data 10HI | NULL | - |
| Register 23 | Data 10LO | NULL | - |
| Register 24 | Data 11HI | NULL | - |
| Register 25 | Data 11LO | NULL | - |
| Register 26 | Data 12HI | NULL | - |
| Register 27 | Data 12LO | NULL | - |
| Register 28 | Data 13HI | NULL | - |
| Register 29 | Data 13LO | NULL | - |
| Register 30 | Data 14HI | NULL | - |
| Register 31 | Data 14LO | NULL | - |
| Register 32 | Data 15HI | NULL | - |
| Register 33 | Data 15LO | NULL | - |
| Register 34 | Data 16HI | NULL | - |
| Register 35 | Data 16LO | NULL | - |
| Register 36 | Data 17HI | NULL | - |
| Register 37 | Data 17LO | NULL | - |
| Register 38 | Data 18HI | NULL | - |
| Register 39 | Data 18LO | NULL | - |

### 6.8.2 Modbus RTU/ASCII Master Write Command

|  |  |  |  |
| --- | --- | --- | --- |
| **Request (downstream data)** | | | |
| **Register address** | **Function Description** | **Notes** | **Example** |
| Register 0 | Control word | 00H command release, 01H command enable | 0x01 |
| Register 1 | Station number | Interactive slave station numbers 1-247 | 0x02 |
| Register 2 | Function code | 0FH, 10H | 0x10 |
| Register 3 | Register Address HI | 0000H~FFFFH | 0x00 |
| Register 4 | Register Address LO | 0xC8 |
| Register 5 | Number of registers HI | Discrepancy: 1-256  Register: 1~32 | 0x00 |
| Register 6 | Number of registers LO | 0x03 |
| Register 7 | Byte count | Discrete: 1~32, register: 1~32 | 0x06 |
| Register 8 | Data 1HI | 0x00~0xFF | 0xFF |
| Register 9 | Data 1LO | 0x00~0xFF | 0xFF |
| Register 10 | Data 2HI | 0x00~0xFF | 0xAA |
| Register 11 | Data 2LO | 0x00~0xFF | 0xAA |
| Register 12 | Data 3HI | 0x00~0xFF | 0x55 |
| Register 13 | Data 3LO | 0x00~0xFF | 0x55 |
| Register 14~39 | Reserve | NULL | - |
| **Response (upstream data)** | | | |
| **Register address** | **Function Description** | **Notes** | **Example** |
| Register 0 | Status word | See fault code | 0x00 |
| Register 1 | Station number | Interactive slave station numbers 1-247 | 0x02 |
| Register 2 | Function code | 0FH, 10H | 0x10 |
| Register 3 | Register Address HI | 0000H~FFFFH | 0x00 |
| Register 4 | Register Address LO | 0xC8 |
| Register 5 | Number of registers HI | Discrepancy: 1~280  Register: 1~34 | 0x00 |
| Register 6 | Number of registers LO | 0x03 |
| Register 7-39 | Reserve | NULL | - |

### 6.8.3 Modbus fault codes

|  |  |
| --- | --- |
| **Fault code** | **Notes** |
| 0x00 | No errors |
| 0x01 | Illegal function code |
| 0x02 | Illegal data address |
| 0x03 | Invalid data |
| 0x04 | Substation equipment malfunction |
| 0x10 | Wrong station number |
| 0x11 | Error function code response |
| 0x12 | Wrong request length |
| 0x13 | Error response length |
| 0x14 | CRC check error |
| 0x15 | Wrong data frame |
| 0xFF | Unknown error |

### 6.8.4 Transparent Transmission Function Upstream Data (Hex)

|  |  |  |
| --- | --- | --- |
| **Byte number** | **Definition** | **Value range** |
| 01 | Status word | 0: Data packet transmission not completed |
| 1: The data packet is ready |
| 2: Packet count error |
| 3: Abnormal data length |
| F: Data transmission completed |
| 02 | Transmission mode | 0: Invalid set |
| 1: Pure input mode |
| 2: Pure output mode |
| 3: Request mode |
| 4: Response mode |
| 03 | Downstream data length | 0~FF |
| 04 | Upstream data length | 0~FF |
| 05 | Downstream packet count | 0-8 packet count, F packet completed |
| 06 | Upstream packet count | 0-8 packet count |
| 07 | Data 01 | 0~FF |
| 08 | Data 02 | 0~FF |
| … | … | … |
| 28 | Data 19 | 0~FF |

### 6.8.5 Transparent Transmission Function Downstream Data (Hex)

|  |  |  |
| --- | --- | --- |
| **Byte number** | **Definition** | **Value range** |
| 01 | Control word | 0: Disable |
| 1: Enable |
| 02 | Transmission mode | 0: Invalid setting |
| 1: Pure input mode |
| 2: Pure output mode |
| 3: Request mode |
| 4: Response mode |
| 03 | Downstream data length | 0~FF |
| 04 | Upstream data length | 0~FF |
| 05 | Downstream packet count | 0-8 packet count, F packet completed |
| 06 | Upstream packet count | 0-8 packet count |
| 07 | Data 01 | 0~FF |
| 08 | Data 02 | 0~FF |
| … | … | … |
| 28 | Data 19 | 0~FF |

### 6.8.6 Transmission Method Explanation for Transparent Transmission Function (Hex)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Pure Input Mode** | | | | | | | |
| **Command function** | **Byte No./Definition** | | | | | | |
| **01** | **02** | **03** | **04** | **05** | **06** | **07~28** |
| **Downstream: Control word**  **Upstream: Status word** | **Transmission mode** | **Downstream data length** | **Upstream data length** | **Downstream packet count** | **Upstream packet count** | **Data** |
| Write downstream data | 00 | 01 | Invalid | 28 Bytes | Invalid | Invalid | … |
| Downstream enable | 01 | 01 | Invalid | 28 Bytes | Invalid | Invalid | … |
| Wait for data reception and enable peripheral devices to send data at this time | | | | | | | |
| Upstream receive packet data 1 | 00 | 01 | Invalid | 28 Bytes | Invalid | 01 | Data01~ Data19 |
| Downstream packet data 2 receive command | 01 | 01 | Invalid | 28 Bytes | Invalid | 02 | … |
| Upstream receive packet data 2 | 00 | 01 | Invalid | 28 Bytes | Invalid | 02 | Data1A~ Data28 |
| Downstream disable | 00 | 00 | 00 | 00 | 00 | 00 | … |
| **Pure Output Mode** | | | | | | | |
| **Command function** | **Byte No./Definition** | | | | | | |
| **01** | **02** | **03** | **04** | **05** | **06** | **07~28** |
| **Downstream Control word**  **Upstream: Status word** | **Transmission mode** | **Downstream data length** | **Upstream data length** | **Downstream packet count** | **Upstream packet count** | **Data** |
| Downstream write packet data 1 | 00 | 02 | 28 Bytes | Invalid | 01 | Invalid | Data01~ Data19 |
| Downstream write packet data 2 and enable | 01 | 02 | 28 Bytes | Invalid | 02 | Invalid | Data1A~ Data28 |
| Write finish | 01 | 02 | 28 Bytes | Invalid | 0F | Invalid | … |
| Waiting for data transmission to complete | | | | | | | |
| Upstream transmission finish | 0F | 02 | Invalid | 28 Bytes | Invalid | 02 | … |
| Downstream disable | 00 | 00 | 00 | 00 | 00 | 00 | … |

Note: The data length is illustrated by 28 bytes, as shown in the table below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Request Mode** | | | | | | | |
| **Command function** | **Byte No./Definition** | | | | | | |
| **01** | **02** | **03** | **04** | **05** | **06** | **07~28** |
| **Downstream Control word**  **Upstream: Status word** | **Transmission mode** | **Downstream data length** | **Upstream data length** | **Downstream packet count** | **Upstream packet count** | **Data** |
| Downstream write packet data 1 | 00 | 03 | 28 Bytes | 28 Bytes | 01 | Invalid | Data01~ Data19 |
| Downstream write packet data 2 and enable | 01 | 03 | 28 Bytes | 28 Bytes | 02 | Invalid | Data1A~ Data28 |
| Write finish | 01 | 03 | 28 Bytes | Invalid | 0F | Invalid | … |
| Wait for data reception and enable peripheral devices to send data at this time | | | | | | | |
| Upstream receive packet data 1 | 00 | 03 | Invalid | 28 Bytes | Invalid | 01 | Data01~ Data19 |
| Downstream packet data 2 receive command | 01 | 03 | Invalid | 28 Bytes | Invalid | 02 | … |
| Upstream receive packet data 2 | 00 | 03 | Invalid | 28 Bytes | Invalid | 02 | Data1A~ Data28 |
| Downstream disable | 00 | 00 | 00 | 00 | 00 | 00 | … |
| **answer mode** | | | | | | | |
| **Command function** | **Byte number/definition** | | | | | | |
| **01** | **02** | **03** | **04** | **05** | **06** | **07~28** |
| **Downstream Control word**  **Upstream: Status word** | **Transmission mode** | **Downstream data length** | **Upstream data length** | **Downstream packet count** | **Upstream packet count** | **Data** |
| Write downstream data to packet 1 | 00 | 04 | 28 Bytes | 28 Bytes | 01 | Invalid | Data01~ Data19 |
| Write down to the next level  2 packs and enablement | 01 | 04 | 28 Bytes | 28 Bytes | 02 | Invalid | Data1A~ Data28 |
| Wait for data reception and enable peripheral devices to send data at this time | | | | | | | |
| Upstream receive packet data 1 | 00 | 04 | 28 Bytes | 28 Bytes | 02 | 01 | Data01~ Data19 |
| Downstream packet data 2 receive command | 01 | 04 | 28 Bytes | 28 Bytes | 02 | 02 | Data1A~ Data28 |
| Upstream receive packet data 2 | 00 | 04 | 28 Bytes | 28 Bytes | 02 | 02 | Data1A~ Data28 |
| Downstream enable response | 01 | 04 | 28 Bytes | 28 Bytes | 0F | 02 | Data1A~ Data28 |
| Downstream disable | 00 | 00 | 00 | 00 | 00 | 00 | … |